

## Proceedings of the 1<sup>st</sup> Workshop

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29.07. - 07.08.2011, Tharandt, Germany



# DAAD

Deutscher Akademischer Austausch Dienst  
Servicio Alemán de Intercambio Académico



***INCA-WORKSHOP PARTICIPANTS***



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# **1. SCIENTIFIC CONTENT**

## ***1.1 KEYNOTES:***

**Dr. Mario Tapia**

**Universidad Nacional Agraria La Molina – Lima, Peru**

*Andean Region, tropical high mountains – Environment, Agriculture and Climate Change*

Introduction

- Central zone is one of the most intensive agriculture used in the world especially for crop production.
- 18 Agro-ecological zoning in the central part of Cordillera de los Andes (Peru), characterized by 8 parameters such as: Humidity, soil conditions, frost-free days, agricultural conditions, species composition: crops and forestry, etc.

Experiences inter-Andean valleys

- Book published in 2010: “Guia de campo de los cultivos andinos”.
- Research in Agro-Biodiversity:
  - 1) Potatoes are described according to how fast to cook (local knowledge), 8 different species and 180 wild relatives.
  - 2) Important point of discussion: How the different varieties adapt to different zones?
  - 3) Plan breeding program: “Conservative program” with 8 different varieties of Quinoa (*Chenopodium quinoa*)
  - 4) Kaniwa (*Chenopodium pallidicaule*) is the most resistant crop to the extreme climate conditions.
  - 5) Several seed fairs organized all over the Andean region
- Research in Traditional technology:
  - 1) Terraces: 500.000 ha with terraces and 8% in use because of migration, not support by government and importation of wheat.
  - 2) Sukakollos (irrigation trenches): 30.000 ha in the Altiplano of Peru
- dynamic conservation indigenous entrepreneurship

Discussion:

- Use of traditional knowledge for pest management
- How does the “Land use planning” work in the Andean region?  
Murray’s theory: verticality of land use and interchange of products between populations of different zones
- Implementation of “Seed keepers”, peasants that have the ability and desire to conserve the seeds. Non-pay workers

**Dr. Stephan Beck**

**Universidad Mayor de San Andres – La Paz, Bolivia**

*Impacts of Climate Change on Natural Ecosystems in the Andes*

Key points

- What is happening with the pollination and dispersal mechanisms of different species in the Andes in terms of Climate Change?
- Types of changes: vegetation type, increasing seasonality in the south Andes, shift in the orographic cloud banks (*ceja de monte*) → elevation profiles will change
- Wetlands (*bofedales, turberas*) are one of the most endangered ecosystems which naturally act as reservoirs (damps)
- Lakes are drying out
- Impacts on species: shifts in geographic range, changes in phenotypes or abundance of species, missing or changing habitats
- Mountains can function as refuges

GLORIA project (Global Observation Research Initiative in Alpine Environments)

- Working with communities on adaptation
- Developing awareness and understanding of local knowledge and local perceptions
- Reaching a common understanding

Main Discussion point

- How to incorporate other disciplines (e.g. ecology) into the INCA research?
- Lack of data vs. observable ongoing processes



taken from presentation of Dr. Stephan Beck

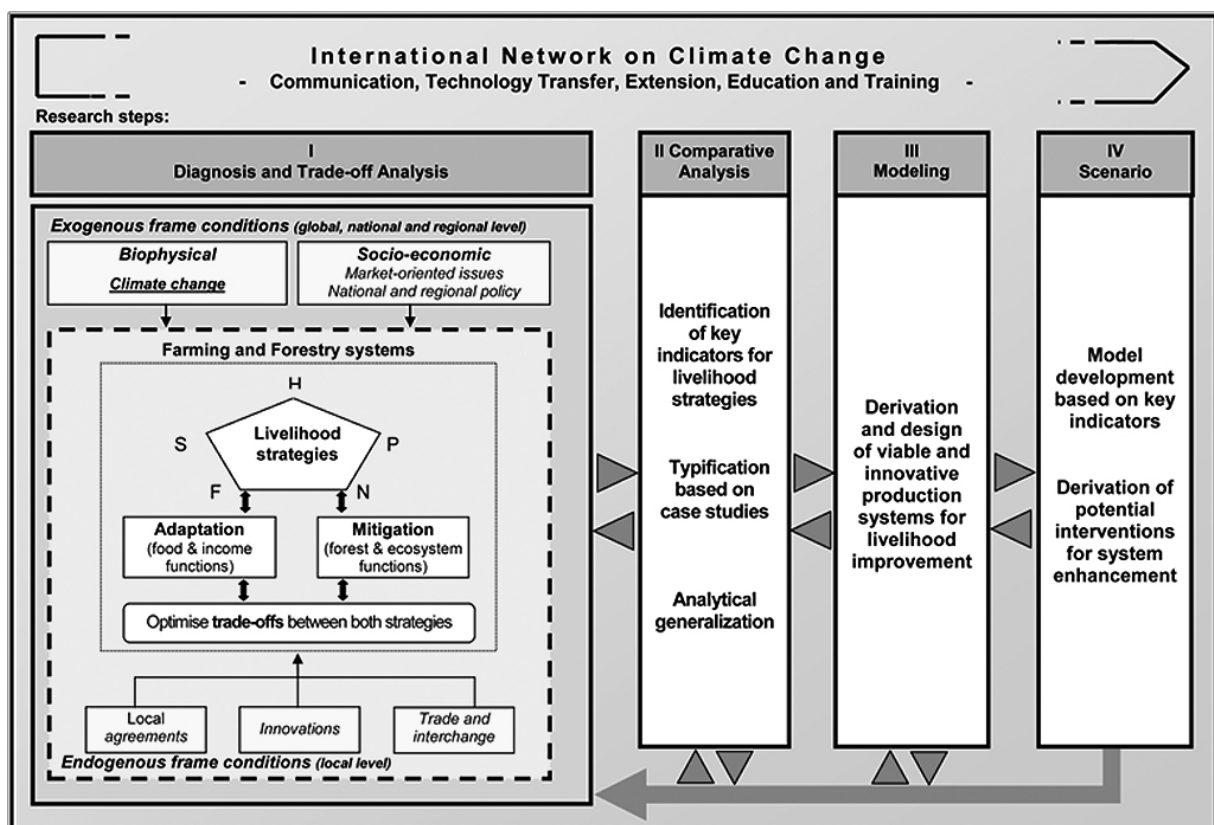
## 1.2 INCA PROJECT:

André Lindner

Dresden University of Technology – Germany

### Introduction and Integration of INCA

- Existence of other related networks has to be taken into consideration
- Review on studies/projects/material/methods to prevent unnecessary replication
- Seek synergies to DAAD Biodiversity-Network
- Embed research in existing frameworks
- Beside the scientific level – enhance exchange among local users, state authorities and NGOs
- Choice of research sites regarding their suitability, comparability and infrastructure/logistics



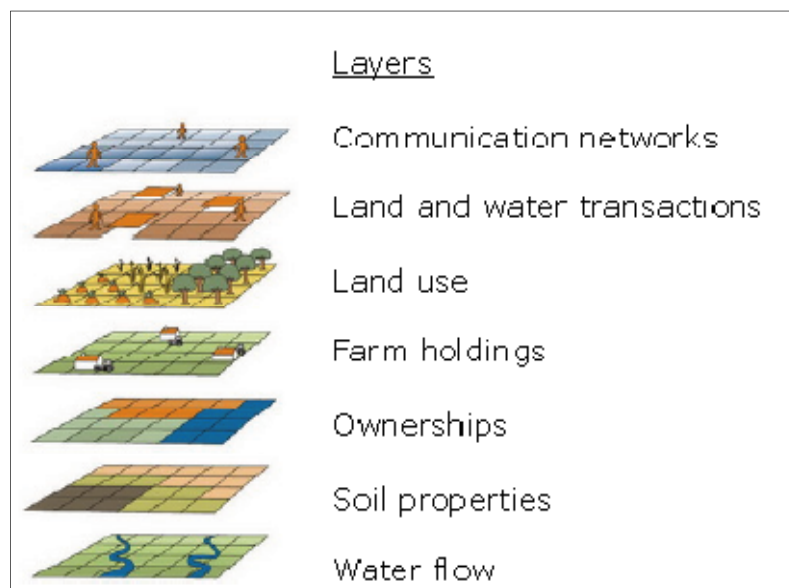
Framework developed by Prof. Dr. Jürgen Pretzsch

**Prof. Dr. Uta Berger**

**Dresden University of Technology – Germany**

*Introduction to Agent-Based Modelling*

- The Agent-Based-Modelling (ABM) seems to be suitable for the INCA project objectives.
- The model has some basic principles:
  - 1) set of agents
  - 2) set of agents' relationships
  - 3) agents' environment
- The agents have certain attributes: static (gender, name) or dynamic (age, resources endowment)
- They are related and influenced by the environment interacting with other agents
- ABM results have to be validated with stakeholders
- The models are tools for decision making, they are not a dogma



*taken from presentation of Prof. Dr. Uta Berger*

**Cristina Ruiz**

**Universidad Mayor de San Andres – La Paz, Bolivia**

*Climate Change in Bolivia: A scientific background referring to adaptation and mitigation processes*

- General lack of local data on temperature, rainfall, humidity etc.
- Point of view on Climate Change developed in a philosophical ways instead in a scientific one
- Social tools as methods to improve knowledge on Climate Change: round table, network mapping, agroclimatic calendar, surveys, participant observations, transects etc.
- Corpuma valley proposed as main work zone for INCA in Bolivia
- What kind of productive systems in the area?
- Endangered species with economical importance
- Importance of exotic species (e.g. *Eucalyptus*) and related economic and ecological issues



*taken from presentation of Cristina Ruiz*



**Prof. Dr. Carlos Llerena**  
**Universidad Nacional Agraria La Molina – Lima, Peru**

*INCA – Project Overview Peru*

- Importance of social –economic and biological aspects of forestry and land use
- Biogeographical zonation of Peru
- Importance of the participation of additional actors: AgroRural and other local supporters
- Biodiversity-Program Workshops: lessons learnt, personal experiences
- Upcoming Biodiversity-Program Workshop will be realized in Lima (UNALM 2012- Instituto Regional de Desarrollo de Selva “Genova”, San Ramon, Junin (Field work- reforestation project) and (Oxapampa Reserva de biosfera Oxapampa-Yanesha Prov. Oxapampa, Pasco (Native communities, field work, experiences with thesis and research works) – underlines the synergies between INCA and DAAD Biodiversity-Program
- Latin American Forestry Congress in Universidad Nacional Agraria La Molina: October 18 – 21, 2011

**Alejandra Martinez**  
**Instituto Geofisico del Peru – Lima, Peru**

*Extreme meteorological events and risk management in the Central Peruvian Andes*

MAREMEX project overview

- MAREMEX project of more than 10 years, it is focused on Climate Change with Integration of a local assessment
- Demand of people caused to investigate extremes meteorological events
- Project strengthens the capacity of risk management to extreme meteorological events by the population and the institutions
- Main features of the project:
  - 1) “Research action project” must be used in application for people.
  - 2) Urban and rural scopes
  - 3) Implementation of “Huayao” observatory
  - 4) Assessment of extreme events, analysis, sectors, cross cutting themes

Project planning and issues

- Inclusion of forest sector. Lack of information that will fill with project INCA

- Climatology and climate change trends 1922-2009
- Socioeconomic vulnerability, health, livestock, agriculture , fishing farming data to be completed using INCA
- Importance of the perception of people and traditional knowledge
- Systematize perceptions and traditional knowledge: "Climate forecast of good year": astronomical indicators, biological indicators and hydro-meteorological indicators – more research needed
- Implementation of the Mini-meteorological network - Objectives:
  - 1) Have this network of high density (very low cost) and easy installation
  - 2) Involve population in the use and maintenance of this network
- New projects:
  - 1) Impacts of variability and climate change in the Tumbes mangrove ecosystem
  - 2) ANDES PLUS (September 2011 - June 2012): closure of 10 years of research including forests in the Mantaro valley

## Discussion

- The mini meteorological network: How the people use the information for agricultural activities?
- Cutting themes can include more aspects: institutions, market, however too many could be impossible to manage.
- Future researches: Policy changes.... Regional authorities
- Results validation and dissemination. More important : results of the project as a way to "Give back to people"



*taken from presentation of Alejandra Martinez*



**Alvaro Valverde**

**Universidad Mayor de San Andres – La Paz, Bolivia**

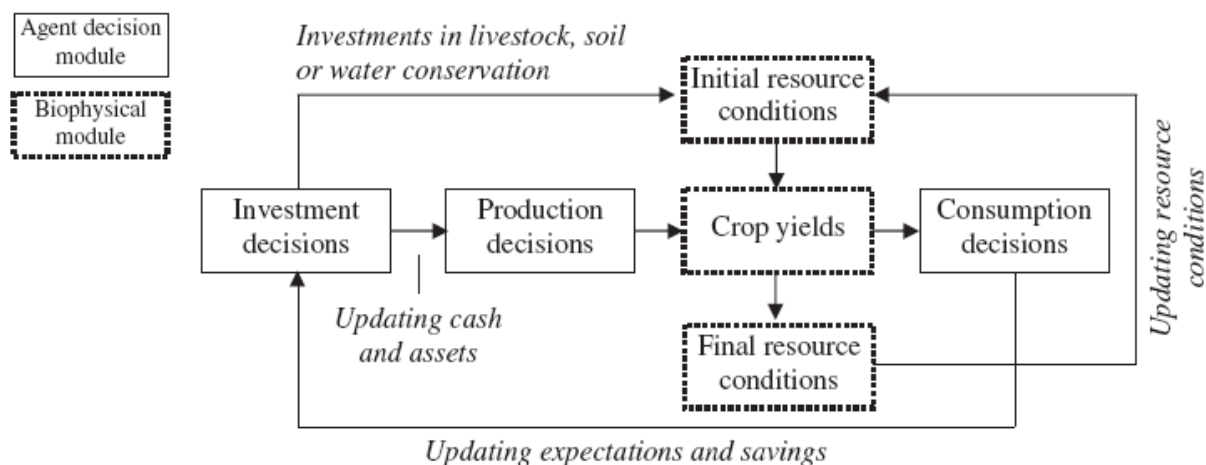
*INCA – Incorporation of Climate Change component at the National Environmental Planning in Bolivia*

- Introduction to water management in Bolivia
- Watershed (cuenca) as basic unit for analysis
- PRAA (Proyecto de Adaptation al Impacto del Retroceso Acelerado de Glaciares en los Andes Tropical):
  - 1) Scenarios generation (with support of Brazilian researchers)
  - 2) Development and implementation of adaptation projects
  - 3) Glacier monitoring
- Balance between water needs and demands

**Mariana Vidal**

**Dresden University of Technology – Germany**

*Understanding the effects of climate change on the livelihood strategies of small farmers of the Andean Region: A modeling approach*



*taken from presentation of Mariana Vidal*

- Main research objective: analyze farmers' agronomic adaptation strategies to climate change and the effects of these strategies on the farmers' socioeconomic status - the focus is on traditional farmers of the Andean Region of Peru
- Research questions:
  - 1) Are there already signs of climate change in the study area? Of which kind?

- 2) Do farmers of the Andean Region have already been experiencing issues concerning climatic change? What is the nature of these issues?
  - 3) Which productive strategies are being used by farmers of the Andean Region to cope with Climate Change?
  - 4) Which farmers' adaptation strategies can be expected under the different future climate change scenarios? How will they develop in time?
  - 5) How do the strategies adopted (in the different CC scenarios) will impact the socioeconomic status of the farmers at a household level?
  - 6) What are the expected trade-offs between the different adaptation strategies?
- Research site: Achamayo sub watershed in the Mantaro valley
  - Main tool: Mathematical Programming-based Multi-Agent Systems (MP-MAS)
  - Indicators: climate (data from IGP), population, households (own data collection), technologies, markets, land use
  - Data collection in the field:
    - 1) Participatory workshops
    - 2) Semi-structured interviews
    - 3) Interview with key informants
    - 4) Frost research
    - 5) Networking

#### Discussion:

- application of the model so far in Chile, Germany and Africa – until now not applied in high mountain areas like the Andes
- incorporation of different climate data: scientific measurements & participatory maps
- observation of ecological changes (shift in distribution of species)
- agroforestry: with native species and mainly *Eucalyptus*
- collected data and outcome usable for further studies
- definition of “traditional farming”
- sample size – possibility to cover the great variability
- more economic data needed

#### **Francois Jost**

#### **Dresden University of Technology – Germany**

#### *Forest and trees and their influence in adaptation and mitigation of Climate Change in rural areas of the Andes*

- Main objective: Analyze the use of trees as a measure of adaptation to agricultural droughts and as a contribution to the mitigation of Climate Change
- Specific objectives:
  - 1) Analyze the implications of agricultural droughts in the farm household systems
  - 2) Identify the local strategies used to cope with the agricultural droughts

- 3) Assess the influence of trees on water availability and yield variation inside the farm staple crops
  - 4) Identify its implications between the different production systems and the food security (vulnerability and risk reduction)
  - 5) Assess the local attitudes toward agroforestry systems and their role in relation to the mitigation of the effects of agricultural droughts
  - 6) Carry out a qualitative comparative analysis between the case studies in order to typify key indicators
  - 7) Analyze the trade-off between the different production alternatives evaluated
- Research site: Achamayo sub watershed in the Mantaro valley
  - Methods:
    - 1) General description of the study area
    - 2) Specific description of the farming system in the area
    - 3) Description of the selected farm household systems
    - 4) Assessment on the land-use decision making in the area
    - 5) Description of agricultural droughts in the area, their distribution and historical evolution
    - 6) Analyze the influence of trees on soil moisture and yield
    - 7) Assess local attitude towards agroforestry systems and their influence on the farm household systems (in contrast to crops)
    - 8) Description of expectations from farmers of agricultural drought events in the future
    - 9) Identification of vulnerable areas and the feasible adaptation options on the household level
    - 10) Identification of local attitudes toward land use change with focus on forests and agroforestry systems in relation to Climate Change and its effects on agricultural droughts
    - 11) Comparison and classification of study areas
    - 12) Analysis of trade-off between different goals or production alternatives
  - Research issues:
    - 1) Results from the yield sampling test did not differ significantly with distance to trees (most probably lack of repetitions)
    - 2) Local inhabitants did not identify agricultural drought as such - just one consequence coming from it (mainly in potatoes): "Early blight" ("Rancho amarilla").
    - 3) Soil humidity preliminary results without clear outcomes yet
    - 4) Choice of comparable research area in Bolivia

#### Discussion:

- recommendation: application of research approach for a low number of case studies – overview of topic in very specific cases
- study of yield problematic: too many aspects to consider
- consider different altitudinal levels for selection of case studies
- re-check existing literature



taken from presentation of Francois Jost

**Claudia Zuleta**

**Dresden University of Technology – Germany**

*Comparative analysis of farm forestry systems developed by traditional inhabitants in the Andean Amazon, Peru*

Research questions:

- Differences regarding the reliance on forest resources?
- Internal and external factors influencing the use?

On methodology:

- Community selection criteria -> purposive
- Information collected considering the 5 capitals of sustainable livelihood approach
- Study sites: Achamayo sub-basin and Palcazu sub-basin
- Selection criteria of study zones:
  - 1) Presence of farm forestry systems
  - 2) Low input (not mechanized)
  - 3) Locals maintain traditional practices

Preliminary results:

- Forests are not a common property resource
- Maintenance of rules: not to harvest the top of the mountains
- Traditional forest management practices
- People living there represent more or less the "Forest management"

Discussion:

- Work is considered a first explorative study
- Suggestion: compare traditional methods and legislation of Peru and Bolivia



taken from presentation of Claudia Zuleta

**Fernando Medina**

**Dresden University of Technology – Germany**

*Monitoring and analyzing land use/land cover and their changes using Remote Sensing and GIS in the Achamayo and Shullcas region, Peruvian Andes*

- Situation: trends and drivers and possible future conversion
- Lack of knowledge on forest cover
- Objective: produce land use and land cover maps & matrix and Identify patterns of land use (change) including a verification

## Methods:

- Use of ground verification and semi-structured interviews with key informants
- Produce two maps: from 1985 and 2010 and compare both to obtain changes
- determine ecological zones (*nevados tropicales, tundra pluvial alpino tropical, paramo húmedo subalpino tropical, bosque húmedo montano tropical and bosque seco montano tropical*) and Agroecological zones (*alta, media and baja*)

## Considerations:

- Lack of information on land use at landscape level
- Urban expansion, loss of high quality agricultural areas
- Increase in forest cover (1985 - 2010) (*bosquetes* vs. large plantations, land tenure)
- Marginal areas for forest: superficial & rocky soils, slopes, which negatively affects tree development
- Altitude: limits tree plantations
- Irrigation: effects land use

## Conclusion:

- Need of higher ground resolution imagery (not LandSat)
- Selection of intermediate date for image analysis
- Dynamism of changes: consider socio-economic scenarios
- Monitoring plantations development
- Investigate more adapted clones and species
- Mapping of irrigation

## Discussion:

- Old plantations mostly communal: ask permission, use money for community benefits
- New plantations mostly belong to individual farmers
- Change in detected highest altitude for agriculture: in 1981 4250 m, today 4300 m, the latitude could be an issue
- Comparison of scientific ecological zones to those identified by inhabitants
- Rotation is lacking, dynamic of rotation
- Process of historical land use
- Include the use of historical data





taken from presentation of Fernando Medina

## ***1.3 GUEST LECTURES***

**Dr. Heidi Wittmer**

**Helmholtz Centre for Environmental Research – Germany**

*The Economics of Ecosystems and Biodiversity TEEB: Overview of the initiative and the approach*

- TEEB is not:
  - 1) It is not a research project
  - 2) No new methods developed
- TEEB is:
  - 1) A rapidly evolving multi-donor initiative, 2007-2010, hosted by UNEP, to explore economic perspectives on nature
  - 2) An “Open Architecture” project... over 500 contributors
  - 3) Maker of “Global Public Goods”: the TEEB Report suite
  - 4) Catalyst of Change within Society: relationship to Nature, Economics
- TEEB is aiming for:
  - 1) Synthesis of existing knowledge and experience on economics of ecosystems & biodiversity
  - 2) Prepared for different users in public politics and business
  - 3) Active and worldwide dissemination to these users
  - 4) Awareness raising and mainstreaming

- The lessons:
  - 1) There is room to manoeuvre – recognising ecosystem services is the first step to make your natural capital work for local development and human well-being
  - 2) Adapt appraisal design to your needs – in order to get useful results you need to understand and decide what is being measured or valued and how
  - 3) Find the right place for your results in decision making – if economics is weaponry, then paying attention to rights, knowledge and participation help you take care against backfiring
  - 4) Build on the full range of values – cashing in on single services provides incentives for degrading the entire system we depend on.
  - 5) It is better to err on the side of caution – ecology is complex and our understanding limited – but future damage costs are too high to risk doubting

**Regine Brandt**

**Martin-Luther-University Halle/Wittenberg – Germany**

*Ethnobotany and Social Learning related to Climate Change in the Andes*

- Agroforestry as an adaptation strategy to Climate Change
- Objective: identify the most promising local woody species for agroforestry from the point of view of local perceptions and from a sustainable point of view (economical, social and environmental)
- What are the main factors determining the preferences of local people for tree usefulness?
- Questions: What is (and who defines) what is sustainable?
- Techniques: communicative learning / collective / social learning – horizontal learning



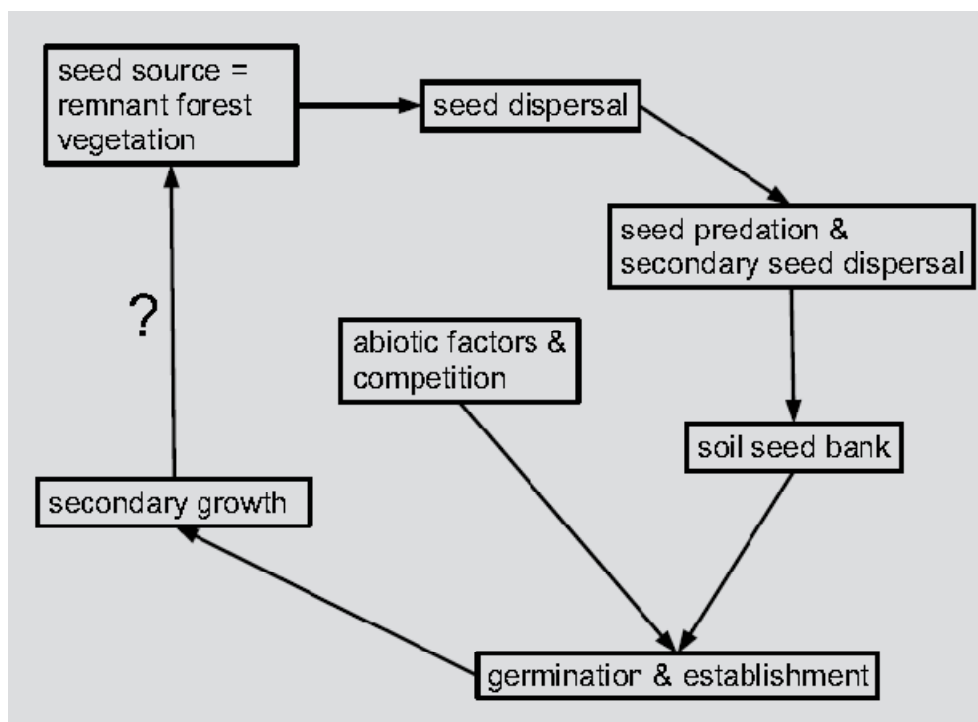
*taken from presentation of Regine Brandt*

**Denis Lippok**

**Martin-Luther-University Halle/Wittenberg – Germany**

*Regeneration of tropical montane forests in burned sites in The Bolivian Andes*

- Study site: Chulumani, Provincia Sud Yungas, Departamento La Paz
- Research on secondary succession after fire events:
  - 1) Seed dispersal
  - 2) Seed predation
  - 3) Soil seed bank
  - 4) Natural recruitment
- Problems:
  - 1) Loss of research sites due to fire
  - 2) Removal of measuring equipment
  - 3) Determination of site age and land use history



*taken from presentation of Denis Lippok*

## 1.4 LEIPZIG EXCURSION

- Tour through the botanical garden of the University of Leipzig by Dipl.-Biol. Katharina Stein with information on the ecology, history and use of plants from different ecozones of the world – also information on importance of botanical gardens for teaching, research and maintain biodiversity
- Presentation about biodiversity, climate change and land-use history in the floodplain forest of Leipzig by the chief of the forest department: Andreas Sickert – short excursion to present ecology and different systems of control in the forest



photo by André Lindner

## **2. LITERATURE**

Following is a list of the literature database so far – articles, books etc. are categorized into:

- 1) Biodiversity
- 2) Climate Change
- 3) Native Ecological Knowledge & Methods
- 4) Small Farms & Agroforestry
- 5) FAO
- 6) Agroforestry

Literature which belongs to more than one category is listed multiply in the according categories. Many of the listed literature is available via the project coordinator (pdf-file and/or hardcopy) or accessible via the internet. After the data base list there are also some book recommendations.

### **BIODIVERSITY**

Birol, Ekin; Smale, Melinda; Gyovai, Ágnes (2006): Using a Choice Experiment to Estimate Farmers' Valuation of Agrobiodiversity on Hungarian Small Farms. In *Environ Resource Econ* 34 (4), pp. 439–469.

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Gruberg, H.; Augstburger, H.; López, R.; Meruvia, R. (2009): El tiempo se está cansando. Proyecto Conversando Saberes que Germinan. Gestión Local de la Biodiversidad. Gaia Pacha. Cochabamba.

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Higgins, Paul A. T. (2007): Biodiversity loss under existing land use and climate change: an illustration using northern South America. In *GLOBAL ECOL BIOGEOGR* 16, pp. 197–204.

Jokisch, B. (1999): Changing fortunes: Biodiversity and peasant livelihood in the Peruvian Andes. In *ECON GEOGR* 75 (2), pp. 201–203.

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UMSA	Universidad Mayor de San Andres – Bolivia
UNA	Universidad Nacional de Asuncion – Paraguay
UNALM	Universidad Nacional Agraria La Molina – Peru

# WORKSHOP IMPRESSIONS



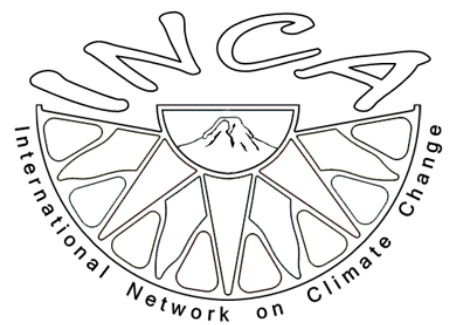






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