

NORTH-SOUTH CENTRE

Research for Development

Annual Report 2009



ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich



North-South Centre
Research for Development

Vision for the ETH Zurich

The ETH Zurich is a leading institution on North-South matters in its field. It has a long-term commitment to research and education in support of globally accessible knowledge for sustainable development.

Mission of the North-South Centre

The North-South Centre promotes research and education in the field of international development and cooperation. It facilitates collaboration with relevant institutions in developing countries, emerging economies and Switzerland in the technical, natural, human and social sciences. These activities are visible nationally and internationally.

Goals

- The North-South Centre promotes long-term research collaboration with partners in developing countries and emerging economies placing emphasis on both interdisciplinary research projects and the link to capacity development.
- The North-South Centre supports students from developing countries and emerging economies at the Master of Science, doctoral and post-doc levels as well as ETH students interested in topics relevant to development.
- The North-South Centre establishes and maintains contacts among its members, within the ETH Zurich and in national and international networks. In Switzerland and beyond, the North-South Centre aims to be recognised as the focal point of the ETH Zurich in all affairs that involve developing countries and emerging economies.

Editorial

The year 2009 marked a milestone for the North-South Centre. We elaborated the “Strategy 2010–2016”, which positions us within the ETH Zurich and vis-à-vis our Swiss peers. In our strategy, we specifically highlight the approach of research for development (R4D) as basis for contributing to sustainable development for human well-being. The “Focus” section of this year’s annual report is dedicated to this challenging approach. R4D is a long-term engagement. It not only demands flexibility, persistence and cultural empathy of the researchers involved, it also needs efforts in building up mutual trust in an interdisciplinary and inter-institutional environment. In addition, it calls for a review of the academic evaluation and reward system. Members of the North-South Centre and several scientists representing our peers contribute to the discussion and provide their specific perspective on R4D.

In the future, the North-South Centre will broaden its thematic portfolio by focusing on four main topics: “Food security”, “Natural resource management”, “Urban and rural transformation”, and “Technology and infrastructure”. While the North-South Centre has an impressive track record in the two former topics, new efforts are necessary for the latter two. Several activities related to the launch of “Urban and rural transformation” as new research topic of the North-South Centre are presented in this annual report.

My personal goal for my final year as President of the North-South Centre is to get the topic “Technology and infrastructure” off the ground. This subject fits a technical university as ours very well. However, ETH researchers in these areas are traditionally focused on the high-tech side of development, which is usually not taking place in poor countries. Our natural allies in directing more attention to the developing world are the ETH students. They show a considerable concern for the poor and are willing to contribute to the solution of technical problems in the less privileged parts of the globe. I believe that this source of energy could be

channelled into ETH Bachelor and Master projects. The North-South Centre is willing to support such student projects with partners in the developing countries by providing travel and seed money. In the autumn semester 2010, I plan to visit the engineering departments of the ETH Zurich in order to convince my colleagues that such projects would be fascinating and rewarding.

In conclusion, I hope the breadth of research topics that are presented in our annual report inspires you to continue or to newly embark on research for development.



Wolfgang Kinzelbach, President



Wolfgang Kinzelbach,
President of the North-South Centre



Zinc efficiency trials at the
IUT experimental station, Rudasht, Iran

The continuing destruction of the Earth's resources, growing urbanisation and the loss of drinking water, not to mention combating hunger and poverty, are the issues which ETH Zurich scientists must confront.

ETH Zurich "Shaping the Future. Strategy and Development Plan 2008–2011" (2008)

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A participatory trial planning meeting with farmers, Awae, Cameroon

Research is not the opposite of action – it is the opposite of ignorance.

Andrew Barnett, The Policy Practice Ltd. (2009)

Moving in a dynamic environment

Beyond the ongoing research collaboration and capacity development programmes, the main activity of the North-South Centre in 2009 was the development of our strategy. Throughout the year, we maintained high internal and external visibility by organising events, being present in fora, and communicating via our established tools. A new and promising experience for us is negotiating with non-traditional funding agencies.

One of the encouraging developments in 2009 was the steadily growing number and disciplinary breadth in membership. At the end of the year, we had more than 100 members from 10 out of 16 departments, including some 50 active and retired professors. This is equivalent to approximately 10% of all ETH professors. Thus, the North-South Centre is well represented among the ETH faculty. The research and teaching commitment of our members is the bulk of activities of the North-South Centre. While this chapter focuses on the strategic and management perspectives of our programme, these activities are portrayed in the respective chapters of this report.

Smooth governance and management

The governance structures proved fully functional. When the President of the North-South Centre was on a sabbatical abroad, the two vice-presidents continued to lead the Centre

smoothly. The Steering Committee met three times, thereof once specifically to approve the new strategy. The General Assembly took place in conjunction with the Annual Conference in September. It elected Stefanie Engel (D-UWIS) as new vice-president to replace Renate Schubert (D-GESS) who continues to serve on the Steering Committee.

The management team remained constant until December 2009 when Emma Lindberg joined to support us for the three-day conference “Tropentag”, which will be organised at the ETH Zurich in 2010. When Isabelle Gómez announced that she would start her new career in the diplomatic service of Switzerland, Emma Lindberg accepted to take over her portfolio from March 2010. In July, the management office moved to new premises in Hochstrasse 60a, higher up on the “Zürichberg”. One advantage of the new location is the immediate vicinity to NADEL. Another advantage is the quiet environment and the building informally called “North-South studio”, which further supports our good teamwork.

New strategy

In 2008, it became apparent that the business plan of 2006 needed to be complemented with a mid- to long-term strategy. Consequently, the Steering Committee started a strategy process by appointing a strategy taskforce. The process was supported by Jürg Kruppenacher (BHP – Brugger und Partner Ltd.) as external consultant and involved the members, the management team and external stakeholders. This process occupied us throughout the entire year, until the resulting strategy was approved in November 2009. The strategy positions us much more clearly than before in the ETH-internal environment and among our Swiss peers. In addition, our four new research areas “Food security”, “Natural resource management”, “Urban and rural transformation”, and “Technology and infrastructure” cover a broad range of disciplinary strengths, cutting across the majority of ETH departments. The strategy is presented in more detail in a separate chapter (see p. 8).



Barbara Becker, Managing Director of the North-South Centre

Dynamic funding environment

One of the most dominant experiences in the course of 2009 was the changing funding environment. In the past, the programme of the North-South Centre was built primarily on contracts with the Swiss Agency for Development and Cooperation (SDC). In the course of 2009, SDC went through a process of reorganisation, including an external review of the SDC research portfolio. Both processes led to a new positioning of research within SDC which will be concluded in 2010. For this reason, SDC did not enter any new contractual commitments. However, SDC extended our ongoing contracts until mid-2011. Throughout the year, we had several meetings with representatives of the sections "Analysis and policy" and "Global programme on food security". We were also fully involved in the stakeholder consultation of the external review of the SDC research portfolio, including one of the case studies in Peru. On a

smaller scale, SDC outsourced the backstopping mandate for bioenergy to the North-South Centre, to become effective in 2010.

Regarding funding, we experienced promising new contacts with private foundations. The contract signed with the Sawiris Foundation for Social Development in 2008 allowed us to award the first Sawiris fellowship in 2009 (see p. 84). Samih Sawiris did not only take an active interest in the selection process, but was also present as panelist at our North-South Forum on how to put research into use. Beyond this first signed partnership with a private foundation, our constructive relationship with the ETH Foundation has started to bear fruit. Through their intervention, we were successful in brokering a contract between a research group of our members and the UBS Optimus Foundation. They agreed to fund an innovation project on health hazards



Members of the North-South Centre discussing a first draft of the new strategy

caused by bacteria in East African milk, a research collaboration between Nairobi University in Kenya and the Laboratory for Food Biotechnology of the ETH Zurich. Furthermore, jointly with the ETH Foundation we have entered in promising negotiations with another private foundation who wants to expand its activities in Africa. In the course of these negotiations our emerging new strategy has proven a powerful instrument for making our case. Finally, two other funding mechanisms are currently being explored. The North-South Centre is steadily expanding its funding basis – a promising development for the future.

Challenging Master grants

Another brokering success was mobilising a fellowship and a partial grant for two participants in the Master of Advanced Studies (MAS) in Sustainable Water Resources (see p. 91). The two grants were obtained from the Oeuvre St Justin (www.justinus.ch), which supports students from developing countries in higher education. In addition, they provide housing for international students in the “Justinus-Haus” in Zurich. During many years, the Managing Director of the North-South Centre has been the person linking the ETH Zurich to this association. For the first time, this link materialised in a significant way. Beyond the grants of the Oeuvre St Justin, all six participants of the MAS course were provided affordable rooms in the “Justinus-Haus”. The Oeuvre St Justin indicated that they are interested in a longer-term commitment for Master students at the ETH Zurich and the University of Zurich.

Beyond this achievement, the North-South Centre management explored further options in promoting Master grants for candidates from developing countries. This objective proved more complex than expected. With regard to Master grants we continued our discussion with the ETH Foundation with the goal to complement the ETH Excellence Scholarships with a fund that suits excellent candidates from developing countries better. In the meantime, our analysis

of the “Livestock systems research programme” showed that this research partnership has yielded nearly thirty Master students as a “by-product” of eight research projects with a total of 14 doctoral students. Two-thirds of the trained Master students are from the South and obtained their degrees from their home universities in the partner countries. From this analysis, we have drawn the preliminary conclusion that Master grants are not a goal in itself. They should preferably be embedded in a wider research partnership with research institutions in the South, which in turn would reduce potential brain-drain.

Enhanced visibility

The North-South Centre kept the momentum of its first year with a series of events and other communication tools. Our conferences are presented in detail in the chapter on networking and communication. In addition, the Centre was actively involved at the SDC Annual Conference, the “Tropentag 2009”, “Treffpunkt Science City”, and the Alliance for Global Sustainability Annual Meeting. From the Managing Director’s perspective, a unique communication opportunity in 2009 was writing monthly columns in the ETH Life online magazine. These columns triggered interesting personal comments and made the North-South Centre more known throughout the entire ETH Zurich.

Barbara Becker

Strategy 2010–2016

In 2008, it became apparent that the business plan of 2006 needed to be complemented with a mid- to long-term planning including clearly defined, verifiable goals and priorities. In addition, it was considered necessary to better position the North-South Centre vis-à-vis the other Swiss players. Consequently, the Steering Committee started a strategy process that was supported by an external consultant and that involved the members and external stakeholders. The resulting Strategy 2010–2016 of the North-South Centre was approved by the Steering Committee in November 2009.

The strategy positions the North-South Centre within the ETH Zurich by relating it to the ETH strategy “Shaping the Future – Strategy and Development Plan 2008–2011”. Furthermore, it refers to the international strategy “ETH Zurich in the Global University Landscape – International Stra-

tegy” (see below) and the strategies of individual departments, notably those with a strong membership base in the North-South Centre.

The strategy confirms the organisational structure (see p. 13) and the three programme pillars of the business plan: “Research collaboration”, “Capacity development”, and “Networking and communication”. Yet, it is much more explicit on the intended future research portfolio. First of all, it lays out the conceptual approach of “Research for development”, which is being discussed in the “Focus” chapter of this annual report (see p. 18). The strategy defines “Sustainable development for human well-being” as the overall goal, and identifies four thematic research areas: “Food security”, “Natural resource management”, “Urban and rural transformation”, and “Technology and infrastructure”. In addition, it alerts to three transversal

ETH Zurich in the Global University Landscape – International Strategy

In November 2008, the ETH Zurich approved the international strategy “ETH Zurich in the Global University Landscape”, which is based on the strategy of the ETH Zurich. Its vision states: “As a university of the highest quality and stature, ETH Zurich plays a leading role in a globalised world. Thanks to its broad national support and its growing international reputation it is the number one choice both as a place of study for talented students from all over the world and as a research centre with global connections.”

The international strategy pursues nine strategic objectives:

1. Recruit talented students from Switzerland and around the world
2. Prepare graduates for the global job market
3. Integrate foreign students, lecturers, employees successfully
4. Make ETH staff fit for the global workplace
5. Support international research partnerships
6. Negotiate international alliances
7. Support research partnerships with international companies
8. Increase visibility and profile of the ETH Zurich abroad
9. Strengthen the brand “ETH Zurich”.

The mandate to implement the international strategy was given to International Institutional Affairs (IIA). While the majority of the international relationships of the ETH Zurich are still with partners in the North, the international strategy is a useful framework for strengthening and expanding the collaboration with developing countries and emerging economies.

topics, which cut across the four topics, namely “Gender”, “Good governance”, and “Impact generation”.

Food security results from the interactions of four components: (i) food availability, which includes sustainable production and processing, (ii) physical and monetary access to food, (iii) food use, including quality and safety, as well as the effect on human health and well-being, and (iv) environmental, economic and political stability. The food price crisis of 2008 brought food security back on the political agenda. Research on food security will have to contribute to solving global challenges such as reducing the number of currently more than one billion malnourished people in the world. Increased population growth, urbanisation, and higher incomes resulting in changing consumption patterns will accelerate the need to multiply global agricultural production in a sustainable manner.

Sustainable management of natural resources such as land, water, biodiversity and soil is one of the central challenges of developing countries. Ecosystems provide a broad range of services with high (economic) value to society. Among others, research is needed on the monetary valuation of such ecosystem services and their contribution to poverty alleviation, as well as to the design of policy and economic incentives for their provision. Rural transformation, economic development and climate change will continue to have strong impacts on ecosystems, requiring adequate adaptation and mitigation measures at the level of technologies as well as of policies.

Urban and rural transformation is one of the most dynamic processes in developing countries. By 2050 more than 6 billion people, two thirds of humanity, will be living in towns and cities. More than 90% of urban growth is expected to



Urban and rural transformation –
Interface of rural and urban livelihoods, Ethiopia



Technology and infrastructure –
Small-scale water retailers, Mauretania

occur in developing countries, with the fastest growing cities located in Africa. This poses immense challenges to rural and urban dwellers, the environment and social cohesion. The other side of the coin is equally rapid rural transformation. Providing adequate infrastructure and services to large, less densely populated rural areas is by far more challenging than in urban environments and requires innovative technological and institutional solutions. Both challenges, urban and rural transformation cannot be separated and have to be approached in an integrated manner.

Concerning *Technology and infrastructure*, the ETH Zurich has much to offer to achieve the goal of “Sustainable development for human well-being”. Engineering knowledge and expertise does not only contribute directly to helping poor people to meet their basic needs in a sustainable manner (for example, for safe drinking water, water for food production,

secure shelter, sanitation and waste management, etc.). It is essential for economic growth which, supported by appropriate national and local government policies, is required to achieve sustainable improvements for poor people. This holds true of information and communication technology for development, as well as of medical technologies for improved health, of transportation, energy systems, and infrastructure.

With regard to *Capacity development*, the strategy highlights the importance of individual capacity development as a task of the North-South Centre. In the future, tandem student research projects and summer schools will be added to the current portfolio of instruments. Concerning institutional capacity development, we believe that we are most effective by strategically targeting and bundling our instruments for individual capacity development to build up specific institutions.



Natural resource management –
Bush fires to control the vegetation, Ethiopia

In the area of *Networking and communication*, the strategy specifically highlights the importance of strengthening the networks with our partner institutions in developing countries. Within Switzerland, our priority lies on the collaboration with the National Centre of Competence in Research North-South (NCCR North-South) already focusing on the post-NCCR era when the institutional landscape will be changing within Switzerland. As a first step, joint North-South Fora with the NCCR North-South have been agreed to, starting in spring 2010. Communication will remain an important activity of the North-South Centre, which (as a competence centre) is sustained by its network capital. Therefore, its members need constant incentives and motivation to remain committed – for example, new platforms for the communication of their activities.

We are now in the initial phase of implementing the new strategy. While the two topics *Food security* and *Natural resource management* build on our past programmes and achievements, we are gradually developing new activities on *Urban and rural transformation* and on *Technology and infrastructure*. Institutionally, we have established new Technical Committees for each of the four research topics.



Food security –
Supermarket in Dar es Salaam, Tanzania

The North-South Centre at a glance

Programme and organisation

Many professors at the ETH Zurich deal with North-South issues. With its capacity in research, education and scientific advisory services the ETH Zurich contributes to solving problems related to developing countries and emerging economies. In order to better bundle these activities, the ETH Zurich has created a competence centre, the North-South Centre, in 2007.

The North-South Centre is the focal point of the ETH Zurich in all affairs that involve developing countries and emerging economies. It promotes research collaboration and capacity development in international development and cooperation covering the technical, natural, human and social sciences. The North-South Centre builds on the comparative

advantage of the ETH Zurich as one of the leading technical universities worldwide. It uses the competences of its members and their disciplinary strengths. Thus, the research activities of all members represent the core of the North-South Centre. Resulting partnerships with research institutions, governmental organisations, development agencies, and others in the North and in the South are another important pillar of the Centre.

The activities of the North-South Centre cover three main areas: “Research collaboration”, “Capacity development”, and “Networking and communication”. Thereby, the North-South Centre promotes the ETH Zurich as a leading institution on North-South matters in its field – research and education.

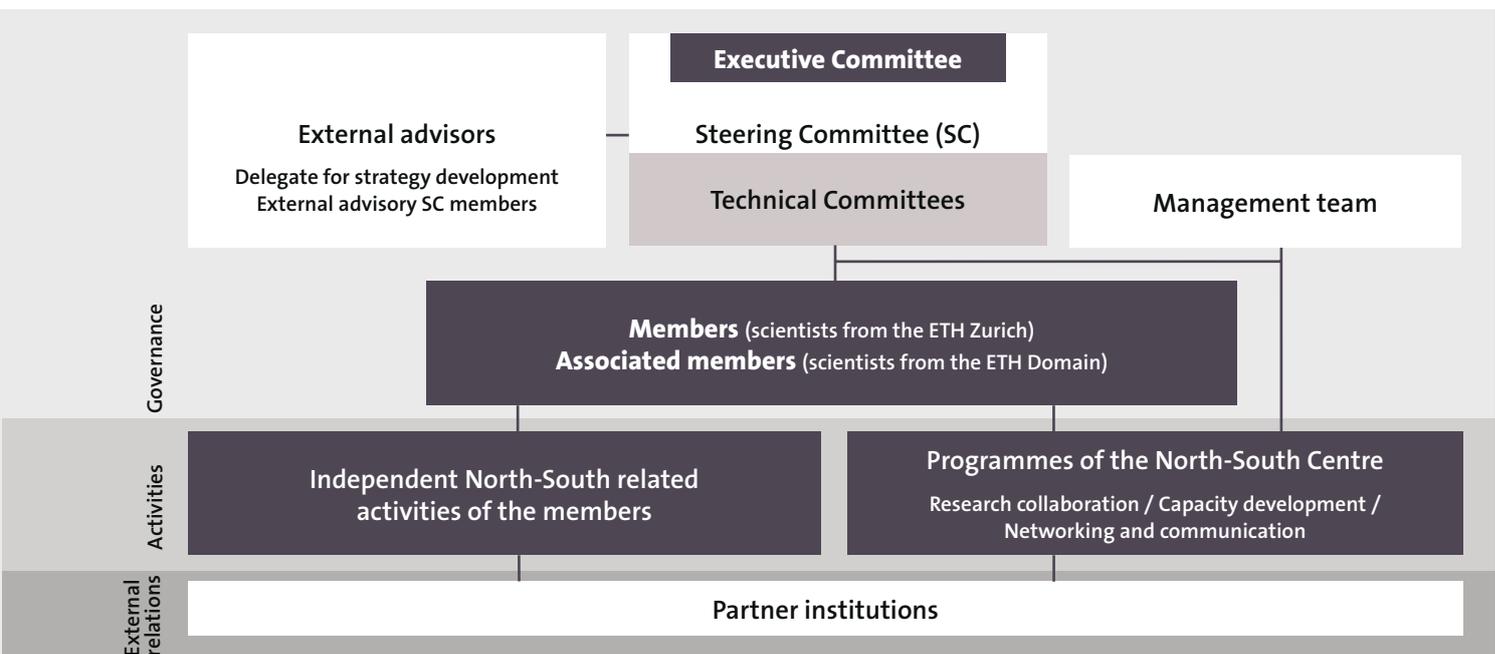


Programme structure of the North-South Centre

The core of the North-South Centre activities is based on the research partnerships of its members and associated members that currently belong to ten out of 16 departments of the ETH Zurich and to the Eawag, the PSI and a joint competence centre with the University of Zurich. The members either conduct research projects related to the different programmes of the North-South Centre or independent North-South related activities. All these activities are embedded in partnerships with institutions from the South and from the North.

As defined in the statutes of the North-South Centre, the governing bodies are the Executive Committee and the Steering Committee. In addition, Technical Committees oversee specific programme areas. External advisors are foreseen for the support of the centre in its strategic development.

The management team performs the day-to-day business. In 2009, it consisted of the Managing Director, and seven part-time staff members for programme management, programme assistance and communication.



Organisational structure of the North-South Centre

Executive Committee

Wolfgang Kinzelbach, D-BAUG (President)
Michael Kreuzer, D-AGRL (Vice-President)
Renate Schubert, D-GESS (Vice-President),
until 9 September 2009
Stefanie Engel, D-UWIS (Vice-President),
as of 10 September 2009

Steering Committee

Wolfgang Kinzelbach, D-BAUG
Michael Kreuzer, D-AGRL
Stefanie Engel, D-UWIS
Silvia Dorn, D-AGRL
Ines Egli, D-AGRL
Emmanuel Frossard, D-AGRL
Jaboury Ghazoul, D-UWIS
Gerald Haug, D-ERDW, as of 10 September 2009
Rolf Kappel, D-GESS
Renate Schubert, D-GESS
Rainer Schulin, D-UWIS
Hans Thierstein, D-ERDW, until January 2009
Barbara Becker, Managing Director (*ex officio*)

Technical Committees

Grants

Wolfgang Kinzelbach, D-BAUG (Chair)
Jaboury Ghazoul, D-UWIS
Rolf Kappel, D-GESS
Rainer Schulin, D-UWIS
Michael Siegrist, D-AGRL

International agricultural research

Michael Kreuzer, D-AGRL (Chair)
Silvia Dorn, D-AGRL
Ines Egli, D-AGRL
Emmanuel Frossard, D-AGRL
Bernard Lehmann, D-AGRL

UNEP Steering Committee

Renate Schubert, D-GESS (Chair)
Nina Buchmann, D-AGRL
Jaboury Ghazoul, D-UWIS
Wolfgang Kinzelbach, D-BAUG

RFPP Selection Committee

Barbara Becker, North-South Centre (Chair)
Swiss Agency for Development and Cooperation
(*Markus Bürlì/Carmen Thönissen*)
Urs Scheidegger, Swiss College of Agriculture,
Bern University of Applied Sciences
Jean-Pierre Sorg, D-UWIS
Chris Morger, Intercooperation

External advisor

Delegate for strategy development
Olaf Kübler, former President of the ETH Zurich

Management team

Barbara Becker, Managing Director
Mathias Egloff, Programme Officer
Isabelle Gómez, Programme Officer
Ursula Gugger Suter, Communication Manager
Manfred Kaufmann, Programme Officer
Emma Lindberg, Programme Officer (from December 2009)
Roger Merz, Programme Assistant
Dorota Niedzwiecka, Programme Assistant



The North-South Centre management team in 2009
(from left to right): Barbara Becker, Manfred Kaufmann,
Isabelle Gómez, Ursula Gugger Suter, Dorota Niedzwiecka,
Mathias Egloff, Roger Merz

The North-South Centre at a glance

Members

Department of Agricultural and Food Sciences (D-AGRL)

Souheila Abbeddou,
Institute of Animal Sciences

Shanker Raj Barsila,
Institute of Animal Sciences

Dr. Philipp Aerni,
Institute for Environmental Decisions

Prof. Dr. Nina Buchmann,
Institute of Plant Science

Dr. Else Katrin Bünemann,
Institute of Plant Science

Prof. Dr. Silvia Dorn,
Institute of Plant Science

Dr. Michel Dumondel,
Institute for Environmental Decisions

Dr. Ines Egli,
Institute of Food Science and Nutrition

Prof. Dr. Emmanuel Frossard,
Institute of Plant Science

Dr. Michael R. Goe,
Institute of Animal Sciences

Prof. Dr. Richard F. Hurrell,
Institute of Food Science and Nutrition

Dr. Jan Jansa,
Institute of Plant Science

Prof. Dr. Michael Kreuzer,
Institute of Animal Sciences

Prof. Dr. Christophe Lacroix,
Institute of Food Science and Nutrition

Prof. Dr. Bernard Lehmann,
Institute for Environmental Decisions

Svenja Marquardt,
Institute of Animal Sciences

Prof. Dr. Bruce McDonald,
Institute of Integrative Biology

Janina Meier,
Institute of Animal Sciences

Prof. Dr. Leo Meile,
Institute of Food Science and Nutrition

Dr. Astrid Oberson,
Institute of Plant Science

Prof. Dr. Michael Siegrist,
Institute for Environmental Decisions

Martijn Sonneveld,
Institute for Environmental Decisions

Prof. Dr. Peter Stamp,
Institute of Plant Science

Dr. Rita Wegmüller Coulin,
Institute of Food Science and Nutrition

Marc Zoss,
Institute for Environmental Decisions

Department of Architecture (D-ARCH)

Prof. Marc Angéllil,
Institute for Urban Design

Maud Châtelet,
Architecture and Construction

Dr. Margrit Hugentobler,
Centre for Research on Architecture, Society & the Built Environment

Department of Biology (D-BIOL)

Prof. Dr. Wilhelm Gruissem,
Institute of Plant Science

Charles Orek,
Institute of Plant Science

Judith Owiti,
Institute of Plant Science

Dr. Hervé Vanderschuren,
Institute of Plant Science

Dr. Peng Zhang,
Institute of Plant Science

Department of Civil, Environmental and Geomatic Engineering (D-BAUG)

Dr. Emmanuel Baltsavias,
Institute of Geodesy and Photogrammetry

Michael Curran
Institute of Environmental Engineering

Prof. Dr. Stefanie Hellweg,
Institute of Environmental Engineering

Prof. Dr. Hans Jürgen Herrmann,
Institute for Building Materials

Prof. Dr. Wolfgang Kinzelbach,
Institute of Environmental Engineering

Sabrina Krank,
Institute for Construction Engineering and Management

Dr. Darcy Molnar,
Institute of Environmental Engineering

Dr. Francesca Pellicciotti,
Institute of Environmental Engineering

Francesca Verones,
Institute of Environmental Engineering

Prof. Dr. Holger Wallbaum,
Institute for Construction Engineering and Management

Department of Computer Science (D-INFK)

Prof. Dr. Hans Hinterberger,
Institute of Computational Science

Minh Tran,
Department of Computer Science

Department of Earth Sciences (D-ERDW)

Dr. Werner Balderer,
Geological Institute

Prof. Dr. Jean-Pierre Burg,
Geological Institute

Prof. Dr. Domenico Giardini,
Institute of Geophysics

Prof. Dr. Gerald Haug,
Geological Institute

Dr. Andrew Kos,
Geological Institute

Prof. Dr. Simon Löw,
Geological Institute

Department of Environmental Sciences (D-UWIS)

Saraly Andrade de Sa,
Institute for Environmental Decisions

Virginie Elsa Boreux,
Institute of Terrestrial Ecosystems

Julia Born,
Institute of Terrestrial Ecosystems

Carina Cavalcanti,
Institute for Environmental Decisions

Clémence Dirac Ramohavelo,
Institute of Terrestrial Ecosystems

Prof. Dr. Peter Edwards,
Institute of Integrative Biology

Prof. Dr. Stefanie Engel,
Institute for Environmental Decisions

Prof. Dr. Andreas Fischlin,
Institute of Integrative Biology

Prof. Dr. Jaboury Ghazoul,
Institute of Terrestrial Ecosystems

Prof. Dr. Janet Hering (Director, Eawag),
Institute of Biogeochemistry and Pollutant Dynamics

Prof. Dr. Gertrude Hirsch Hadorn,
Institute for Environmental Decisions

Dr. Chris Kettle,
Institute of Terrestrial Ecosystems

Smitha Krishnan,
Institute of Terrestrial Ecosystems

Dr. Harry Olde Venterink,
Institute of Integrative Biology

Prof. Dr. Dani Or,
Institute of Terrestrial Ecosystems

Dr. Lucy Rist,
Institute of Terrestrial Ecosystems

Devesh Rustagi,
Institute for Environmental Decisions

Renate Saizaki,
Institute for Environmental Decisions

Prof. Dr. Roland W. Scholz,
Institute for Environmental Decisions

Prof. Dr. Rainer Schulin,
Institute of Terrestrial Ecosystems

Prof. Dr. Klaus Seeland,
Institute for Environmental Decisions

Dr. David Senn,
Institute of Biogeochemistry and Pollutant Dynamics

Dr. Jean-Pierre Sorg,
Institute of Terrestrial Ecosystems

Dr. Marcella Veronesi,
Institute for Environmental Decisions

Prof. Dr. Bernhard Wehrli (Eawag),
Institute of Biogeochemistry and Pollutant Dynamics

Prof. Dr. Alexander Widmer,
Institute of Integrative Biology

Prof. Dr. Alfred Wüest (Eawag),
Institute of Biogeochemistry and Pollutant Dynamics

Gabriela Wülser,
Institute for Environmental Decisions

Astrid Mirjam Zabel,
Institute for Environmental Decisions

Department of Humanities, Social
and Political Sciences (D-GESS)

Julia Blasch,
Institute for Environmental Decisions

Prof. Dr. Isabel Guenther,
NADEL

Prof. Dr. Rolf Kappel
NADEL

Prof. Dr. Renate Schubert,
Institute for Environmental Decisions

Department of Information Technology
and Electrical Engineering (D-ITET)

Prof. Dr. Gerhard Tröster,
Electronics Laboratory

Dr. Oliver Zenklusen,
Lecturer

Department of Management, Technology
and Economics (D-MTEC)

Mozhgan Alaeifar,
Centre for Energy Policy and Economics

Dr. Mehdi Farsi,
Centre for Energy Policy and Economics

Prof. Dr. Massimo Filippini,
Centre for Energy Policy and Economics

Reporting date: 31 December 2009

The North-South Centre at a glance

Associated members

Emeriti
<i>Prof. Dr. em. Rudolf Baumgartner</i> , NADEL (D-GESS)
<i>Prof. Dr. em. Huw Davies</i> , Institute for Atmospheric and Climate Science (D-UWIS)
<i>Prof. Dr. em. Felix Escher</i> , Institute of Food Science and Nutrition (D-AGRL)
<i>Prof. Dr. em. Armin Grün</i> , Institute of Geodesy and Photogrammetry (D-BAUG)
<i>Prof. Dr. em. Olaf Kübler</i> , Former President of the ETH Zurich
<i>Roland Schertenleib (em.)</i> , Department of Water and Sanitation in Developing Countries (Eawag)
<i>Prof. Dr. em. Franz Schmithüsen</i> , Institute for Environmental Decisions (D-UWIS)
<i>Prof. Dr. em. Daniel Theodor Spreng</i> , Centre for Energy Policy and Economics (D-MTEC)
<i>Prof. Dr. em. Hans R. Thierstein</i> , Geological Institute (D-ERDW)
<i>Prof. Dr. em. Caspar Wenk</i> , Institute of Animal Sciences (D-AGRL)

ETH Domain
<i>Dr. Nickolas Meyer (PSI)</i> , Laboratory for Energy Systems Analysis
<i>Dr. Hong Yang (Eawag)</i> , Department of System Analysis, Integrated Assessment and Modelling
<i>Dr. Chris Zurbrugg (Eawag)</i> , Department of Water and Sanitation in Developing Countries
Joint competence centres of the ETH Zurich and other universities
<i>Prof. Dr. Katharina Michaelowa (University of Zurich)</i> , Center for Comparative and International Studies (CIS)

Reporting date: 31 December 2009

Department	Professors	Senior scientists and post-docs	Doctoral students	Total
Department of Agricultural and Food Sciences (D-AGRL)	11	8	6	25
Department of Architecture (D-ARCH)	1	1	1	3
Department of Biology (D-BIOL)	1	2	2	5
Department of Civil, Environmental and Geomatic Engineering (D-BAUG)	4	3	3	10
Department of Computer Science (D-INFK)	1	1	0	2
Department of Earth Sciences (D-ERDW)	4	2	0	6
Department of Environmental Sciences (D-UWIS)	13	6	10	29
Department of Humanities, Social and Political Sciences (D-GESS)	3	0	1	4
Department of Information Technology and Electrical Engineering (D-ITET)	1	1	0	2
Department of Management, Technology and Economics (D-MTEC)	1	1	1	3
Associated members	10	4	0	14
Total	50	29	24	103

Membership (31 December 2009)



Preference ranking of different land types with a focus group of wealthy men, Soanierana-Ivongo District, Madagascar

A transdisciplinary approach requires that phenomena under investigation be regarded from a perspective that goes beyond specific disciplines and is based on systematic cooperation with those concerned.

Hans Hurni and Urs Wiesmann, NCCR North-South (2004)

FOCUS:

Research for development

What are the key characteristics of research for development (R4D)? When is research relevant for development in the North-South context? Is the R4D approach compatible with a scientific career? The concept of R4D is accepted in the development community. In the university environment, however, the evaluation system needs to be revised in order to attach academic value to R4D.

At first sight, the niche of the North-South Centre within the research portfolio of the ETH Zurich appears to be geographically determined, as the terms North and South suggest. However, these words are simply meant as a proxy for describing countries or regions with different economic conditions. Content-wise, the approach of the North-South Centre can best be defined as “Research for development” (R4D). The R4D concept has received broad acceptance in the development community over the last few years. For example, the British Department for International Development (DFID) maintains a research portal (www.research4development.info) with 25 000 project and document records, including more than 4000 peer-reviewed articles.

In this year’s “Focus” section, colleagues of the research community discuss the R4D concept and its characteristics from different perspectives. They position R4D in the context of academic research and the university environment. They emphasise the interface with development and the limited role of research agents. All contributions highlight the complementarity of researchers and other stakeholders, including their different knowledge systems. They are also explicit on the appropriate time horizon for R4D. While it takes time to establish mutually trustful cross-cultural research partnerships and to generate relevant research findings, at some point the researchers have to withdraw and let other stakeholders carry on with the implementation of the results. It is becoming increasingly apparent that the implementation of research results needs an enabling environment to make the “4D” happen, to engender development. This can only be achieved by functioning institutions and under conditions of good governance.

The North-South Centre strives for introducing the concept of R4D in the academic debate at the ETH Zurich and in the wider scientific community. For this purpose, we organised a North-South Forum on the topic of how to transfer research findings into policy and practice in May 2009.

Amongst others, Samih Sawiris (Egyptian entrepreneur), Anton Stadler (Swiss Agency for Development and Cooperation), and Urs Wiesmann (NCCR North-South) – representing the private sector, development cooperation and science – discussed the interface of research and development and the necessary conditions for implementing results. We hope that the following chapters will further contribute to a constructive debate on this issue.



Researchers visiting the project partners, Madagascar

Research for development – The North-South Centre approach

R4D is characterised as being demand-driven by the Southern partners, of direct relevance for development, and solution-oriented. The research design calls for envisioning the potential impact pathways, looking beyond the immediate research results or outputs such as publications. R4D integrates various players along the knowledge generation chain from basic to applied research, and to implementing agencies and institutions. It is thus trans-disciplinary in nature. The ETH Zurich contribution is usually close to the basic research end of this chain and involves strategic partners who connect this contribution to the implementation side.

Research for development – A challenging approach in the academic environment

Research for development (R4D) is the approach of the North-South Centre, of the NCCR North-South and of many southern partner institutions, such as the Centre Suisse de Recherches Scientifiques. However, this approach is still under debate. The following interview will shed light on common denominators and, to some extent, diverging opinions as to the effective meaning of R4D. It will also discuss challenges and benefits seen from different perspectives.

Participants:

Bassirou Bonfoh (CSRS),

Isabel Guenther (NADEL),

Urs Wiesmann (NCCR North-South),

Barbara Becker (North-South Centre)

Interviewer: Ursula Gugger Suter (North-South Centre)

When thinking about research for development (R4D), what crosses your mind first?

Isabel Guenther: The first thing that crosses my mind is research that understands or finds solutions to problems of developing countries. But, R4D does not have to be applied research directly related to development. Research can also indirectly have an effect on development.

Urs Wiesmann: The first thing that comes to my mind is that there are many misconceptions about this term. The misconception that R4D is only for the South; the misconception that it is mainly application of Northern knowledge in the South; the misconception that it is about the power of knowledge, which can override any other power; and the misconception that everyone knows what development is.

Bassirou Bonfoh: I agree with Urs. When we talk about R4D, people believe that it is development for the less-developed countries. But for me, R4D is related to the more developed and the less developed countries. It depends in which areas we want development to take place – development of knowledge, or as Isabel mentioned, the transformation of a situation by finding solutions. However, we know that many areas need to be tackled in the less developed countries. That is why there is – sometimes – a misconception on R4D.

Barbara Becker: I got in touch with this concept in the context of international agricultural research, where the scientists debated whether R4D was diluting the agenda of strategic research by shifting it towards applied science. I think it is a concept which is very valid along the entire research continuum.

The definition

Having gained a first impression of R4D, I would like to know what its key characteristics are.

Bassirou Bonfoh: For me, the key characteristic is the continuum. It starts with knowledge generation, with the understanding of phenomena, which enables us to embed them in the environment. The second key element is the solution: How we want to transform things for the well-being of humankind. Whereas knowledge generation could be seen as fundamental or basic research, transformation could be seen as applied research. These both go together.

Urs Wiesmann: Development is not happening nor needed at a certain point in space or time, but it is of global concern. Development in the sense of sustainable development is a common responsibility of the global community. As a consequence, R4D cannot be derived from research questions alone. It has to be embedded in a transdisciplinary discourse, while at the same time being disciplinary-rooted. R4D is a recursive process where you cannot start with a problem, then search for the solution and finally implement it. It is a circle, which has to go on aiming at more knowledge-based instead of power-based solutions. In that sense, R4D has an emancipatory dimension.

Barbara Becker: That is interesting. I also believe that the environment in which R4D is embedded is very important. I think there are three main characteristics of R4D. One is its impact-orientation: R4D is not “art for art’s sake”, it wants to achieve something in society. The second characteristic is what Urs called the transdisciplinary discourse. I think, it needs a network or chain of actors, each with different roles and responsibilities. Third, I believe it needs an enabling environment, an environment that supports such a research approach. For example, R4D cannot be performed at a university whose only focus is its publication record.

Isabel Guenther: I think it’s difficult to say what the key characteristics of good R4D are. As already mentioned, R4D can

be direct in the sense that you have a specific question you want to find a solution to. But R4D can also be indirect. Initially, you do basic research without focusing on solving a specific problem of society, but in the very end the outcome of your research is transferred to improve the lives of people.

We have spoken about different actors being involved in R4D, about a recursive process, or – as Isabel put it – impact happening by coincidence. Based on your experiences, who defines what the demand is?

Bassirou Bonfoh: In principle, you start your research based on your discipline. While conducting research you take the agenda of other people or communities into account. You integrate this in your research and by that time you are in a continuum where you cannot locate the starting point anymore.

Barbara Becker: Various actors can define demand. For example, it can come from within the research community, in the sense that while conducting research you discover questions which need to be addressed. Or, demand can also be derived from direct interaction with poor people in a small village who come up with a problem which needs a solution – the local population is thus expressing demand.

Urs Wiesmann: If we start again from the requirement of transdisciplinarity, the problem definition has to be found at the society-science interface – with many consequences. First, I think one cannot say from the beginning, if applied or basic research is needed. We call our approach “oriented research”, where you develop your research around the problem definition, which develops at that interface. This also means that you cannot pre-define which disciplines have to be involved – which is what I called recursive. On the demand side, we differentiate between three categories. Demand in the narrow sense, when research is seen as a knowledge pool, to which a political group, or population can refer. Second, demand can be more need-oriented, as explained by Barbara. The third category of demand – we call it “requirement-driven” – is guided by a negotiation about the visions of development. This third category can be conceptive, but it is never driven by research alone. I am strongly against leaving the so-called problem formulation to the outside world to be reflected in science – then we would be consultants and not researchers.

Barbara Becker: We only addressed the demand formulation so far. I think we also have to address the implementation of results. In that respect there are two critical groups



Barbara Becker

Barbara Becker is the Managing Director of the North-South Centre of the ETH Zurich. Her professional background is in tropical agro-ecology with research on vegetation ecology of Andean land use systems in Peru, Bolivia and Colombia and on edible wild plants in arid zones of Africa. Her experience in research management is based on former positions with the German government as a liaison officer for international agricultural research, and as a project coordinator for an information system on genetic resources. Barbara Becker serves on the Boards of Trustees of the International Institute of Tropical Agriculture (IITA) and of the Africa Rice Centre (WARDA).

of people outside the research community. The policy-makers and the private sector may take up technologies or research results for further distribution. These two groups are normally not the natural allies of researchers, but play a key role in the approach of R4D.

Isabel Guenther: The important point is that R4D is not a consultancy service for an externally formulated demand. What is the more important question is how one can transfer research results into action – this interface between research and society needs to be developed.

Bassirou Bonfoh: In West Africa, or in Africa in general, we sometimes listen to the decision-makers saying, “If you want to do research for research’s sake, this is not what we need. We need research that we can apply.” To apply research you need extra resources allowing you to validate what you have done. These funds are often lacking. In contrast, the “Partnership Action for Mitigating Syndromes” of the NCCR North-South¹ highlights the importance of research and application.

Urs Wiesmann: What is very interesting with these Partnership Actions is that in many cases you may not know in ad-

¹ Partnership Actions for Mitigating Syndromes (PAMS) are projects of limited financial scope and duration, implemented by local actors in partnership with scientific and non-scientific stakeholders. In close connection with research efforts, Partnership Actions implement and test approaches, methods and tools developed in research, in order to identify promising strategies and potentials for sustainable development.



Bassirou Bonfoh

Bassirou Bonfoh is the Managing Director of the Centre Suisse de Recherches Scientifiques en Côte d'Ivoire (CSRS), and regional coordinator of the NCCR North-South in West Africa. He is a veterinarian by training, specialised in epidemiology. Bassirou Bonfoh's field of work within the CSRS and the NCCR North-South is on safety of animal source food/zoonoses and livestock production systems, especially in extensive production systems in Africa and Central Asia.

The CSRS is located in Abidjan, Côte d'Ivoire. In 1951, the centre was established by the Swiss Academy of Sciences with the goal to encourage and support North-South research partnerships in Côte d'Ivoire and other West African countries. The purpose of the research (basic or applied research) is to generate results that are useful for development. The activities of the CSRS focus on research, training and services. These activities are run within the following three departments: "Environment and health", "Biodiversity and food security" and "Valorisation, resources and application".

vance who the actors are. These actions lead to identifying the actors who may be politicians, economic actors, or civil-society actors. In addition we also have to see how research becomes relevant. On the one hand, I believe that research can become relevant through linking with the above-mentioned actors and through not pre-defining problems out of our science logic, but rather out of that society-science interface. On the other hand, in R4D we are dealing with, you could call it, "real-world problems". Real-world problems are characterised by at least three main aspects: You always deal with many factual uncertainties, with value-loaded issues, and with many conflicting stakes. R4D gets relevant as soon as we are able to reduce uncertainty, make values more transparent, and make stakes negotiable. Normally, in R4D we are not looking for the big technology innovation. We are looking for contextualised

solutions, which might have been known as single solutions but are newly combined.

The challenges

Hearing your statements makes me think about funding mechanisms for R4D, which call for a precise definition of the goals, the research plan, the expected findings and – at times – the implementation concept. This sounds contradictory to what we heard about R4D so far. How do you go about this?

Isabel Guenther: For any research question, it is difficult to predict what kind of impact it might generate. I think the important point is that you can define partners with whom you see a potential for implementing your research findings in advance. You can show how you plan to generate impact, but there is no certainty that this will happen.

Barbara Becker: In my view, R4D is not different from other research in the sense that you define clear hypotheses and a clear work plan. I think that is a basic condition for all research. But, the complexity of how you go about it may be greater. The groups that you have to involve in your research may be more complex and go beyond the traditional experimental designs. I think the challenge is to capture this complexity, for example with interdisciplinary approaches. This may involve some transaction costs, which, coming back to your question, is often not covered by the normal funding mechanisms.

Urs Wiesmann: You said, as in any other research we have to have clear research questions and hypotheses. This is, of course, true for the start. However, R4D is always an iterative process with the concerned society – else it is conventional research. That means the research questions, the methodology, and the hypotheses will transform over time. The common funding mechanisms, especially scholarships, contradict with R4D, because they normally cover two to three years. You say what you want to do at the beginning and you answer at the end. That does not work in R4D unless – and that is what we are trying in the NCCR North-South – unless you, as a research institution in the North or the South, have a vision of a programme which you compose out of projects. I think the CSRS is a good example, having developed its vision over many decades, and acquiring different projects to come up with a programme as a whole, which is R4D.

Bassirou Bonfoh: I agree with you. Scholarships can contribute to the strategy or the programme of an institution. By embedding scholarships one can guarantee long-term success. The scholarship mechanisms can help to feed the programme developed by the institution.

Barbara Becker: I think there is another aspect to this long-term perspective. R4D is implicitly focused on the impact one wants to achieve, and research funding is normally focused on the outputs, for example a publication in a journal. But, in R4D you have the entire sequence from outputs to outcomes to impact. This takes much longer and ownership and authorship are more and more diluted. That is another contradiction between the classical research funding mechanisms and the expectations of R4D. For example, funding received for research allows for delivering a publication in a journal, which, per se, does not have a development impact as yet. In contrast, the actors on the development side expect immediate development effects, which research cannot offer.

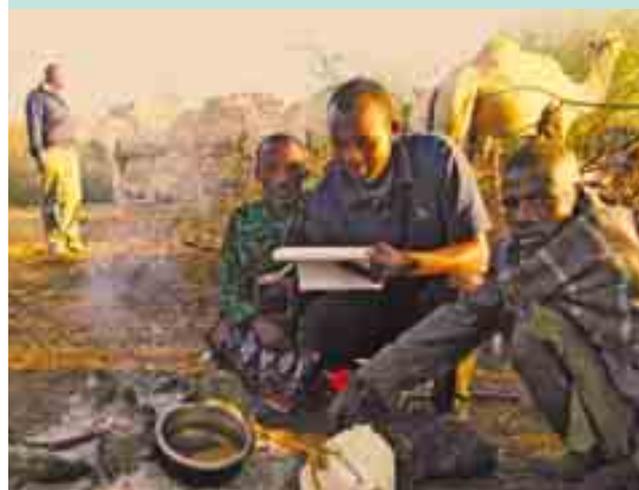
Isabel Guenther: I think Barbara's last point is especially relevant because nowadays development agencies or private actors are also funding R4D. They obviously want to see a direct development impact, which is not possible with research. At the end of a research project, usually you do not have a ready-made technology that you just need to implement in several development programmes. With regard to publications as an output measure, some research within R4D might indeed encounter a challenge if it is highly interdisciplinary. It is not easy to build up your profile with interdisciplinary research because most journals are very focused on a specific discipline, making publishing more difficult.

Urs Wiesmann: Yes, but I think the scientists in R4D also have to take a certain blame. This community was always very much oriented towards the impact – or trying to fulfil that unfulfillable goal of impact – and did not take care enough to build a scientific community, which then supports scientific growth. What is really needed, I think, is that global peers start developing scientifically acknowledged peers in the field of R4D, in the field of transdisciplinarity and interdisciplinary methodologies. For instance, the so-called sustainability science is now very strategically occupying certain high-ranking journals, thus building up their community. The same is needed in R4D. When you hand in papers to journals there have to be peers in the review panels. If a biologist reviews my paper on poverty and biodiversity, chances are high that it will be rejected, because the topic is exceeding the disciplinary borders. That is why it is difficult to publish in high-ranking journals.



Biofortification of zinc in rice, Philippines

MSc student Mulwa Dasel interviewing two herders about their dietary habits near Isiolo, Kenya





Experimental herd (F2 crossbreed from N'Dama and Boran) with visiting scientists, Kenya

Workshop with farmers at ICARDA, Aleppo, Syria



Bassirou Bonfoh: Within the NCCR North-South, we have developed transdisciplinary research. Knowing that different actors have used the results, our researchers wanted to publish and show how their research was relevant. Yet, it is difficult to find a journal that accepts such papers, because reviewers think that the disciplinary aspect is being diluted in transdisciplinary research. Therefore, we are now working to introduce transdisciplinarity at the university level in order to sensitise our colleagues to the relevance of interdisciplinary and transdisciplinary research.

How would you react if you were meeting with an Assistant Professor who was setting up his/her research group and establishing a network in the scientific community, and this professor claimed that R4D is not an option for him/her because that would harm his/her career?

Urs Wiesmann: That is valid for 99% of all scientists. We cannot claim that everyone has to go into R4D. You might also go into a very specialised field to gain in-depth methodological and topical knowledge, and then you can open up to interdisciplinary research, and perhaps go back again. I even think that iteration in the career is crucial, because there is one great danger with R4D: That it is not up-to-date, not focusing on the newest trends in theory and methodology. R4D might also have the tendency to become a bit amateurish because, for example, you have to simplify for policies. This is why one of our very basic credos in the NCCR North-South is: Without a very sound disciplinary foundation, you cannot make R4D and you cannot make transdisciplinary research.

Isabel Guenther: I think R4D should not only be seen as interdisciplinary research. R4D covers also very specialised and up-to-date technology research such as in the area of solar energy, for example. And, I agree with Urs that in R4D we should not pursue simplified research so that policy-makers could understand it more easily. This is why there needs to be a mechanism to translate research into policy. Research in R4D has the same quality standards as any other research discipline. To convince an Assistant Professor to engage in R4D, you could highlight that he/she could be working in scientific field that deals with – as Urs put it – “real-world problems”.

Barbara Becker: I think this is a tricky question, to give guidance on career planning. In some disciplines you run into trouble: if you want to pursue a career in R4D – you have to make sacrifices. First, my advice would be that one should pursue his or her own personal objectives. If this

means sacrificing certain career perspectives while still maintaining one's personal career, then I think it is justified. However, sometimes one could also first focus on disciplinary qualifications and later expand into other fields such as R4D – a sequential approach. In my view, there is a trade-off between pursuing a career in R4D and trying to get rapid achievements in one's own professional career.

Isabel Guenther: I am not so sure if there is always a trade-off. I agree that first one should pursue the questions that one finds interesting and relevant. But, I think there are always cases where a certain research topic is more fashionable, resulting in impressive publication lists, while other topics do not bring the fastest rewards. However, this is nothing specific for R4D, but it is true for any discipline. I do not agree that one necessarily has to make a trade-off between R4D and a career in science.

Bassirou Bonfoh: At the NCCR North-South, we are building the capacity of a new generation of scientists who are doing R4D. To get into R4D you have to prove that you have done basic research. Jumping directly into R4D is very difficult if you are not specialised before broadening your view by involving other disciplines or society in your research.

Urs Wiesmann: Nevertheless, it is very interesting that at your university you try to include courses in transdisciplinarity and interdisciplinary methodology. Parallel to the disciplinary education, you can build a foundation for R4D. An additional important tension exists between conventional research and R4D. In conventional research, you get more famous the more general and the more generally applicable your result is. In contrast, R4D is then relevant when it is contextualised. The links between poverty and global market, or biodiversity and climate change appear in each context differently. The subsequent problems are different – related to different value systems and different stakes.

Barbara Becker: In a way it comes back to what you said earlier about disciplinary research that has to be embedded in a larger programme in order to put it into perspective. For example, doctoral theses answer limited questions, leading to an academic degree. They usually consist of rather narrow disciplinary research not covering the entire continuum. In addition, doctoral theses in R4D are often highly demanding because they involve field research under very difficult conditions – compared to the lab situation at the university. This could be another trade-off. In addition, because our university environment or our research community does not award interdisciplinary research or impact generation – as has been said before – I wonder how one can influence this award system, the



Isabel Guenther

Isabel Guenther is Assistant Professor for Development Economics at the NADEL, ETH Zurich. She had previously been research associate at the Faculty of Development Economics of the University of Goettingen and at the Harvard School of Public Health. Her main research interest is in empirical microeconomics with a particular focus on measurement of poverty under uncertainty, health and population economics, economics of water and sanitation, and the effectiveness of development aid. Isabel Guenther has carried out most of her research in Mali, Benin, Burkina Faso, Ethiopia, and South Africa.

See more information on NADEL on p. 90

criteria by which you judge quality of research.

Isabel Guenther: With regard to interdisciplinarity: Interdisciplinarity is not that somebody engages in various disciplines. But, you learn how to look at a problem from several perspectives, how to work and discuss with people from other disciplines, how to understand other disciplines and trying to take them into account. Barbara also mentioned the challenge of doing research involving fieldwork in developing countries, which is much more time-consuming than doing other kinds of research. I think that this is a problem if research is only measured in how many papers one is producing in the short-term. In my eyes, the quality of research is not only defined by how many papers one is writing.

Bassirou Bonfoh: In our evaluation system, an African evaluation system of academics, we have different kind of indicators for evaluating the quality of research: The publications, the number of projects you can mobilise, and newly introduced “fiches techniques”, as we call them in French. If you want to transfer your research findings to the community or a single user, you can develop a leaflet that could be used for sensitisation or information of the research users. Such



Urs Wiesmann

Urs Wiesmann is a human geographer by profession. He is the Director of the Centre for Development and Environment of the University of Bern, and together with Hans Hurni, he heads the Swiss National Centre of Competence in Research North-South (NCCR North-South). His main areas of professional focus are sustainable regional development, natural resources management and global change particularly in developing and transition countries, as well as interdisciplinary and trans-disciplinary methodology and its application in the context of development and environment. Urs Wiesmann has conducted research in the Swiss Alps, in Africa (Kenya, Tanzania, Madagascar, Ethiopia, and Morocco), and in Asia (Kyrgyzstan, India, Laos, and Vietnam).

The NCCR North-South is an innovative research programme in the fields of global change and sustainable development. Encompassing a network of over 400 researchers active in more than 40 countries worldwide, it is dedicated to finding sustainable, practicable solutions to specific challenges of global change.

leaflets are now one of the indicators for evaluating researchers.

Barbara Becker: It would be worthwhile to consider such an evaluation system for Swiss universities as well.

Urs Wiesmann: I think, another aspect should not be forgotten: Interdisciplinarity is related to methodological innovation. However, these innovations are not published enough because – again – the peers are missing. Not only the relevance of R4D but also its scientific impact in developing thoughts, methodologies, and knowledge is important. In order to strengthen that outcome we have to develop a community. For example in Switzerland, the few institutions involved in R4D have to support each other very strongly and build capacity together.

The benefits

After having discussed the various challenges of R4D, let us now focus on its benefits. What are the desired outputs of R4D?

Barbara Becker: I would like to come back to my earlier comments on outputs, outcomes and impacts. When we talk about R4D, I immediately associate impacts such as poverty alleviation, or income generation. On the output side, I think of scientific results which are being taken up by a community outside the immediate research environment. This could be with a leaflet, as Bassirou said, and also accidentally, when somebody comes across a publication and thinks this could be useful for application. Finally, another desired output is that the research results are relevant in some way or other, that they describe a technology, methodology, or product, which has the potential for application and implementation.

Urs Wiesmann: Outputs – I think that the important point is that in R4D you have to have a very broad variety of different forms of output. As said before, you cannot rely on journals only. Talking of the outcomes, for me the main outcomes are capacities in dealing with the research-society interface, or knowledge-society interface. We need to couple capacity development directly with the research. Second, that we see development as a global concern, and build alliances through that. These alliances among researchers from all over the world are crucial. We have to build our own programmes and projects and cannot wait for the donors to provide us with such programmes. Finally, the vital goal is to have a more knowledge-based and development-relevant decision-making – so that knowledge and not just power is the guiding principle of decision-making. This has something to do with justice in the sense that the interests of the most part of society and of the future generations influence decision-making.

Isabel Guenther: I think the benefit of R4D is that you are not only tackling scientifically interesting research questions, but also research questions that are relevant for society. Many researchers do not see that their research could be applied to a development context. To put R4D on the screen of many more researchers might be another output one could aim for. Lastly, and as Urs said, another important point is that development policies should more often be based on knowledge, and therefore research.

Bassirou Bonfoh: For me, the benefit of engaging ourselves in R4D is that we gain legitimacy vis-à-vis the decision-

makers. R4D allows for explaining that we are doing research for external users and not only for our own researchers' environment.

What would you like the readers of this interview to keep in mind?

Bassirou Bonfoh: If we want to emphasise the impact of R4D, we need other funding mechanisms to support this specific research – different from most of the funding mechanisms that exist today.

Barbara Becker: There are two key messages. The first builds on what Isabel said earlier, that those colleagues at the ETH Zurich or among our readers who have not had anything to do with R4D or problems of developing countries might get the idea that their research, on ICT for example, is also relevant when put into the development context. The second key message is that we have to develop new approaches to the award system for judging the quality of science – approaches that are more appropriate for assessing and capturing the quality of R4D.

Urs Wiesmann: I fully subscribe to that. I would be happy if we were able to show with this interview that R4D is not applied research in a purely demand- or consultancy-driven way, but that it is facing very large scientific challenges. These challenges call for innovation in terms of methodology, in terms of approaches, and in terms of generating outputs and outcomes. The second message is that in science we should stop thinking that globalised knowledge is automatically better than contextualised knowledge. The two have to go together and supplement each other. Only in this way can science make a meaningful contribution to society at large, to the economy, and to the environment.

Isabel Guenther: In addition to everything said before, I would like to highlight that working in research in a development context is very rewarding. I do not think it is a trade-off, nor a low-tech area nor a consultancy service for development agencies and governments – it is a field with very interesting and relevant scientific questions.



Fresh camel milk samples are waiting for pH measurements, Isiolo, Kenya

Interview with the village head, Guruwahi, India



Research for development and academic career trajectories: Opportunities and challenges

Research for development (R4D) poses both opportunities and challenges to the academic research¹ community. On one hand, R4D provides an opportunity for academic researchers to make meaningful and lasting contributions to the improvement of human welfare. On the other hand, academic researchers must balance their commitment to R4D activities with their other academic responsibilities and must also accommodate the differing values and expectations associated with these endeavours.

Academic freedom and research for development

Academic researchers enjoy the remarkable privilege of pursuing research topics on the basis of the intellectual challenges that they pose as well as their potential to provide a direct benefit to society. This *academic freedom* is a core value of the academic community (Karran, 2007). Within its scope, academic researchers have pursued a wide range of research interests including R4D.

Academic freedom is, however, not entirely without constraints. In practical terms, the key constraint is the value placed on R4D within the system of evaluation for tenure and professional advancement. Before the tenure decision, academic researchers are subject to review on a relatively short timeframe. Thus pre-tenure academic researchers must demonstrate productivity in the short-term and often on the basis of conventional academic criteria (i.e. publications, particularly in high-impact journals).

After a (successful) tenure decision, academic researchers can choose to set their own standards for evaluating their work, but this strategy is not entirely without consequences. Further professional advancement and access to resources may also depend on performance according to conventional indicators, which are gaining ever-increasing prominence in the evaluation of academic institutions. Criticisms of this approach have also been increasing, particularly because of biases (for example, against transdisciplinary and long-term research) that indicators tend to create and perpetuate (Zilahy *et al.*, 2009).

Dissonances between engagement in R4D and furthering academic careers

It is worth considering some points where engagement in R4D may impede the professional advancement of academic researchers. The first issue is that successful engagement in R4D requires a substantial investment of time to develop personal relationships among partners in the

North and South and to build capacity in the South (KFPE, 1998). This investment does not necessarily pay off in the short-term but is essential for long-term success. The time that needs to be invested represents a trade-off with other activities, including both responsibilities to the researchers' home institutions (for example, teaching responsibilities) and other professional activities. An additional point is that some activities in R4D (particularly those that are more oriented toward implementation) are often not appropriate for publication in highly-ranked, peer-reviewed academic publications. Finally, it is difficult to identify indicators appropriate to R4D that could be used in parallel with more traditional academic indicators. Ideally, R4D-specific indicators would be derived from the impact of R4D projects, but such outcomes are often not easily linked to a single research project. Even recognised influences can be difficult to document and even harder to quantify.

Overcoming dissonances – Ways forward

Academic researchers with tenure have the academic freedom to pursue research interests that they consider to be important, including R4D. However, they must also accept the responsibilities that accompany this freedom. Specifically, researchers must be willing and able to justify the importance of R4D activities, to define their successes, and to demonstrate their impact. Researchers in R4D should not ignore the academic aspects of their work. Experience with specific cases should be leveraged to develop general concepts; this could also include concepts for the improvement of effectiveness in technology transfer and capacity development. Such generalised and conceptual analyses should be brought into the broader academic community through journals and conferences, which would serve to integrate R4D with more traditional academic values. Collaborations among researchers engaged in R4D activities could also allow the integration of implementation-oriented and conceptual perspectives and expertise. It is also important that R4D researchers recognise that academic institutions cannot act as development agencies. Rather, partnerships among R4D researchers and development agencies can provide a conceptual basis for development strategies and improve the transferability of results and experiences from specific cases to a more general context. Researchers in R4D should also focus strongly on capacity building for partners in the South, which would both improve implementation at the local level and help to ensure long-term sustainability. Academic research institutions can also play a role in promoting R4D both by integrating such activities into the broader

¹ Here, the term academic research is used to refer to investigator-initiated research as practiced in universities and in academic research institutions in contrast to directed research practiced in industrial research laboratories.

academic community and by explicitly valuing R4D activities. In this context, research institutions (in contrast to universities) have the advantage that permanent research staff can conduct R4D activities that require long-term engagement. All academic research institutions, however, must be willing to trust in their researchers over appropriate time horizons and to avoid overly simplistic indicators.

Outlook

Research for development presents one specific case of the general question of how academic institutions should contribute to society. Academic institutions must determine appropriate balances between applied and fundamental research, between the generation and transfer of knowledge, and balance between the transfer of knowledge within and outside the academic community.

It is not reasonable to expect a single simple answer or perfect solution for all academic institutions or even for any single institution. The contributions of academic institutions to societies must account for different opportunities in different fields and also for the different interests and talents of individuals. It would, perhaps, be best to take a pragmatic and adaptive approach that evolves over time in response to changing opportunities and constraints.

In considering how to meet the future challenges in R4D, it is both important and inspiring to recall the many significant contributions that academic researchers have already made, and continue to make, in this field. All of us who are interested in conducting and promoting R4D can learn from their experiences to imitate approaches and strategies that have been successful and avoid those that have not. As just one example, we can be encouraged that a compendium of sanitation technologies developed within the academic research community (Tilley, 2008)² has been translated by development agencies and NGOs (at their own expense) into Vietnamese, French, Spanish, Nepali, and Urdu. In addition, it is being used by the Bill and Melinda Gates Foundation to guide internal discussion for its programme in Water, Sanitation, and Hygiene.

Despite past and present contributions and engagement, much remains to be accomplished in R4D as documented in reports on progress toward the Millennium Development Goals (United Nations, 2009). Collaboration and mutual support among R4D researchers are crucial to increasing the effectiveness and efficiency of these activities.

² This article was inspired by the contributions made to R4D by Roland Schertenleib over his 30-year career at Eawag as Head of the Department of Water and Sanitation for Developing Countries (Sandec) and member of the Eawag Directorate, as an Adjunct Professor at the ETH Zurich, and as a member of the Board of Directors of the NCCR North-South.



Close interaction between researchers and local practitioners on an applied research project in Burkina Faso

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The IITA research for development approach

The IITA research for development (R4D) approach was born out of the need to look for a solution to the perennial question asked by governments, development agencies, and scientists, on “how could more of the investment in agricultural research reach the poor?”. IITA began by analysing research undertakings in the developing world over the last three decades. This analysis included a close look at Dr. Norman Borlaug’s approach in Asia (Dr. Norman Borlaug was presented the Nobel Peace Prize in 1970 for his accomplishments in India and Pakistan and for his role as “Father of the Green Revolution”). IITA drew two conclusions from this analysis: One was that technologies alone would not suffice. In other words, the traditional approach of conducting research and waiting and hoping for someone to use its results, is *not* adequate. The needs of the poor are too pressing for such a “wait and hope” approach. The second conclusion, derived from the first, was that a “beyond research” approach was one way to go about it.

Our analysis also answered the question debated by the international research organisation Consultative Group on International Agricultural Research (CGIAR), as to whether one should focus only on research or on R4D. Development is a complex, society-driven process. Research, though vital, is merely a tool that helps deliver development. Thus, it rarely is a question of research versus development. Even basic research aims at “development” – somewhere in the distant future. Organisations that address more immediate needs such as hunger have an immediate future in mind.

The steps of the IITA R4D approach

The elements of the approach and their sequence increase the relevance and effectiveness of research in addressing developmental needs while contributing to scientific knowledge. It starts with defining development needs with national partners, thus ensuring relevance, and then designing the research to address these needs. The identified needs are documented with baseline studies, which are later used to measure impact via ex-post studies. A key point to note is that the development needs, and the expected solutions, are both a *guide* and a *goal*. Up to this stage, the approach resembles other R4D and research-and-development (R&D) models. Beyond this stage, some critical elements contribute to success. These elements include the envisioning of the development outcome, the research outcome, advocacy, and exit.

Envisioning and describing the social or developmental outcome is important. The IITA R4D approach calls for an explicit description of the potential developmental outcome or impact. Doing this has the effect of encouraging and motivating scientists. In addition, the description as such is an effective tool to facilitate the decision-making process in research financing and it allows for more effective advocacy.

Research outcome is one of the critical elements for an R4D approach. Not only must the research deliver its outcome(s), but it must also be *significant* enough to excite, encourage, and entice national investments into the programme. Once this happens, IITA exits.

The importance and necessity of exiting

Conceptually, a successful outcome should lead to IITA’s exit from the undertaking, leaving its partners in the national system – private sector, farmers, agribusinesses, or consumers – to deliver the large development impact. Enticing national entities to take over contributes to higher probabilities for sustainability. However, exiting can be delicate. Doing it too early may jeopardise the exercise. Exiting too late gets complicated as stakeholder interests differ and the exit value diminishes, as do the chances for attaining sustainability. To mitigate these complications, a predetermined exit strategy is helpful. By having established the conditions for exiting, it clarifies and thus minimises the effect of the stakeholder interests. It is also a useful planning tool as it helps to visualise the path ahead and acts as an important reminder to any development organisation that self-perpetuation in the undertaking is not an objective.

The role of advocacy

Advocacy is needed to boost the receptivity, adoption, and ultimately the impact. This requires the engagement of the highest levels of government and agribusinesses. Advocacy helps the national entities to learn about the research outcomes and their potential. This knowledge encourages them to take ownership, invest, and pursue the programme.

The IITA R4D approach explicitly recognises that the larger developmental impact is *always* delivered by the national entities and not by the development or research organisation. The United States did not deliver the larger development impact of the European Marshall Plan, even though its support was vital. The larger social impact was delivered by the citizens of the respective countries.

The success story

In some quarters, there were doubts about IITA taking this R4D path. Today, after having tested the approach at scale in Nigeria, a country with over 140 million people, those doubts have evaporated. In four years, the R4D approach reached about 90 million consumers and eight million farmers, boosting the production of cassava by ten million tons. It did this without causing a price drop. In addition, it reduced the need for 800 000 hectares formerly used for cassava. Other governments in Africa have heard these results and IITA has been requested to replicate the approach in their countries. (For more information see “It is possible” on www.iita.org)

Hartmann

Definitions:

Research output = technologies and publications
 Research outcome = effects of research *output*, such as adoption and use
 Development outcome = impact of research *outcomes* on development needs

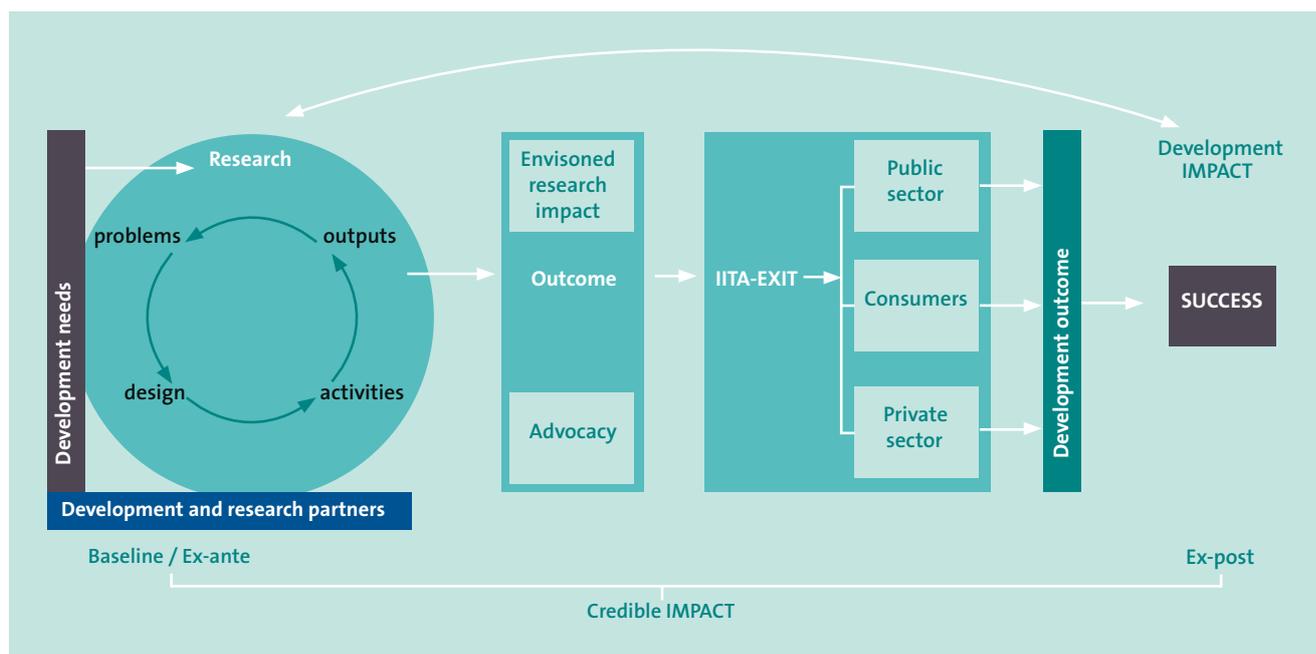
IITA

IITA was created in 1967 by the Ford and Rockefeller Foundations and the Government of Nigeria. Its purpose is to address hunger and poverty in Africa. By working with partners in Africa and beyond IITA reduces producer and consumer risks, enhances crop quality and productivity, and generates wealth from agriculture. IITA serves sub-Saharan Africa via its three hubs IITA-East (Tanzania), IITA-South (Zambia), and IITA-West (Nigeria). IITA has about 120 international staff from 30 countries and 750 support staff members. It is governed by an international board.

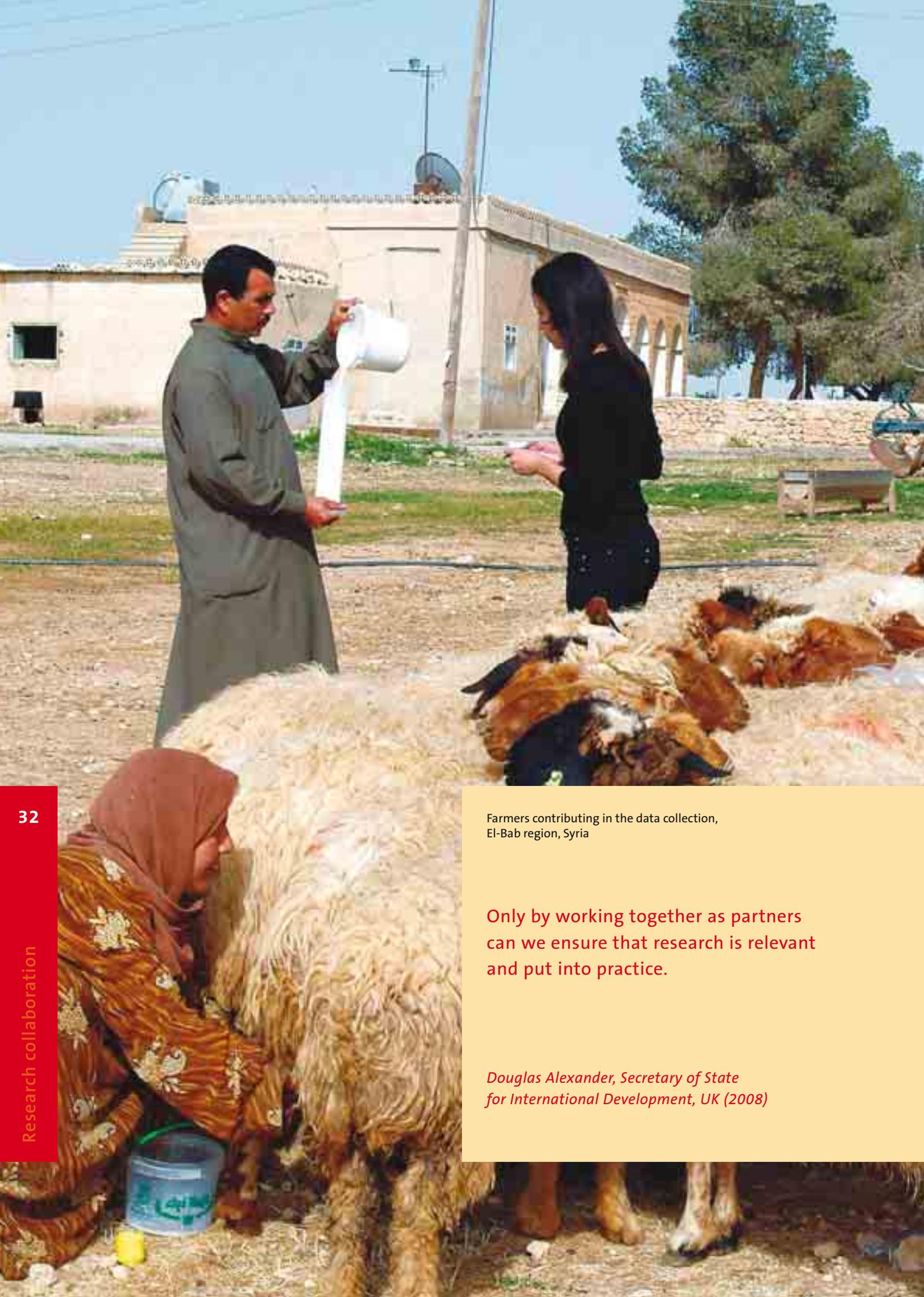
IITA works on key food crops of sub-Saharan Africa and on cropping systems and African ecologies such as the savannas, coastal low lands, and humid tropics. Its strength has been in improving food crops and in helping African nations to tackle biological threats from food pests and diseases. Its research findings are also used in the Central Asian Caucasus (black-eyed peas), and Central America and the Caribbean (roots and tubers).

IITA is supported by the OECD countries, Brazil, Nigeria, South Africa, and the CGIAR.

www.iita.org



The IITA research for development model



Farmers contributing in the data collection, El-Bab region, Syria

Only by working together as partners can we ensure that research is relevant and put into practice.

Douglas Alexander, Secretary of State for International Development, UK (2008)

Research collaboration

The North-South Centre has set solid foundations for a successful implementation of its strategy, which is very explicit about the intended future research portfolio. The conceptual approach “research for development” and the overall goal “sustainable development for human well-being” outlined in the strategy have permeated the minds of our members and are reflected in all our activities.

In the future, the North-South Centre will pursue four thematic areas: “Food security”, “Natural resource management”, “Urban and rural transformation”, and “Technology and infrastructure” (see p. 8). Already today, many research activities of our members feed the new portfolio.

The topics of “Food security” and “Natural resource management” can build on long-standing expertise of the North-South Centre, both at the level of its individual members and at the level of programme management. The project reports of the research programme “Livestock research in support of poor people” described on the next pages highlight the interdisciplinary collaboration among ETH scientists, in particular between the groups of food and nutrition, agriculture, and environmental sciences. The fellowship programme RFPP (see p. 64) with its numerous doctoral and post-doc projects covers both “Food security” and “Natural resource management”.

In the case of “Urban and rural transformation”, we see great potential in developing this thematic area together with the relevant ETH scientists who have expressed their interest in the topic. The North-South Centre can help to channel the wealth of expertise at the ETH Zurich into research partnerships with developing countries and emerging economies. In this year’s annual report, we will already shed light on activities conducted in 2009 (see p. 48).

“Technology and infrastructure” will be gradually explored as another new field within the profile of the North-South Centre. The topic fits well to the comparative advantage of a technical university, and is highly relevant for development. In 2009, we started to approach new ETH departments by organising the Annual Conference together with the Energy Science Center. Furthermore, in a workshop with the Volkswagen Foundation we discussed potential research activities in engineering for development (see p. 106).



Geographic distribution of research projects conducted by members of the North-South Centre

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Livestock systems research in support of poor people

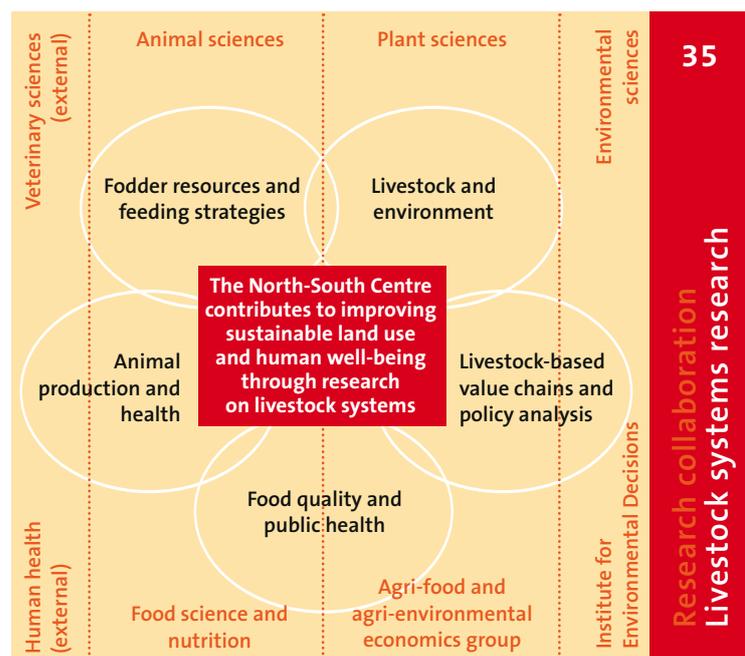
In developing countries, the demand for meat and milk will more than double over the next two decades. Soon, the global livestock sub-sector will contribute half of the total agricultural products in value terms. The livestock sector employs 1.3 billion people (20% of the world population) and creates livelihoods for one billion people (25% of the world's poor). The main drivers of the increased livestock production are urbanisation, population growth and higher incomes in developing countries. However, the livestock sector has a large impact on the environment, causing or aggravating problems of land degradation, climate change and water pollution, as well as extensive water demand. Increasingly, competition with wildlife for habitat and resources leads to a loss of biodiversity.

The central research challenge related to livestock is to enable resource-poor farmers to benefit from livestock-keeping while reducing its negative impacts. The SDC co-funded programme “Livestock systems research in support of poor people” was set up to contribute to finding solutions for these challenges. It focused on poverty alleviation and on the sustainable management of natural resources. The programme will come to an end in 2010.

The programme is structured along the thematic clusters depicted at right. Although the current projects do not cover all areas, this structure has allowed us to conduct relevant research that is justified by (i) the demand as

derived from the challenges identified in each discipline, and (ii) the impact that can be achieved. On the following pages, each of the projects is presented with its own report. The list at the bottom of each page shows to which cluster the project belongs.

The annual internal review of the programme, the “Progress Forum 2009”, aimed at demonstrating how access to results could be established, and how relevance and ownership could be ensured. Members of the project teams presented an overview on the status of their research, focusing especially on the added-value of the project for the programme as a whole. Considering that the projects were all in their final stage, it was also important to reflect on a possible extension or follow-up of the programme.



Programme structure with thematic clusters

An ecosystem service approach to agricultural security in a sacred landscape mosaic

The value of pollination services for agricultural production has been much debated, particularly in the context of alternative management interventions. Our research seeks to determine the value of pollination services in the context of a variety of management interventions in a coffee producing region in Southern India. Specifically, we seek to evaluate the relative benefits that forest fragments afford to coffee pollination and coffee production under a variety of management scenarios.

Wild bees are known to provide pollinator services to agricultural crops such as coffee. By supporting a range of bee species, forest fragments are presumed to be source habitats for such pollination services. Hence, it is widely expected that higher coffee yields will be obtained within plantations that are located close to forest fragments. To validate this hypothesis, we quantified bee visitation to coffee flowers at varying distances from forest fragments, and under a variety of management interventions for more than 100 coffee plantations in Kodagu district. Using these data, we attributed the importance of pollination, of proximity to forest fragments, and of management interventions to coffee production.

Bees contribute up to 40% of the total coffee produced in this region. Yet, the distance to forest fragments did not affect pollinator diversity or abundance on coffee flowers. A high density of forest fragments in the landscape combined with comparatively large foraging ranges of the principle bee pollinators likely account for this. However, pollinator abundance at coffee flowers was higher at plantations that are located near to large forest patches. In addition, several management interventions contributed substantially to coffee production. Irrigation by farmers stimulated early coffee flowering, in turn increasing pollinator abundance and, as a consequence, coffee production. Addition of lime and other soil management practices also increased coffee production. In contrast, retention of native shade trees did not provide a clear benefit for coffee production.

In conclusion, the benefits of pollination services must be assessed in the context of plantation management. Technical interventions greatly increase coffee production. Pollinator services are secured regardless of local proximity to forest fragments. At this stage and despite the recognised value of pollination services, there is little direct incentive for farmers to retain native shade trees or forest fragments.

Project leader
Jaboury Ghazoul

Contact persons
Virginie Boreux
Smitha Krishnan

Collaborators
Jean-Pierre Sorg, ETH Zurich, Switzerland;
Uma Shaanker and CG Kushalappa,
UAS Bangalore, India;

Duration
October 2006 – September 2009

Thematic cluster
Livestock and environment



Deity of a sacred forest – Sacred forests are forest fragments protected by the local community according to their cultural beliefs.

New policy mechanisms to mitigate wildlife-livestock conflicts

Performance payments are a novel approach to provide incentives for conservation. In this project, we investigate performance payments as a policy tool to alleviate wildlife-livestock conflicts. Often, such conflicts are especially severe in tropical countries, which host many of the world's remaining endangered carnivores but, at the same time, face high levels of rural poverty. In many cases, poor subsistence farmers are hostile toward carnivore conservation as these animals kill their livestock and, therefore, are a threat to their livelihood. The performance payment approach seeks to generate pro-conservation incentives by offering in-kind or monetary payments to farmers based on indicators of conservation outcomes. At a large scale, this approach so far has only been implemented in Sweden, where livestock herders receive payments based on the number of carnivore offspring on their land.

In our project, we developed a framework of issues that should be considered when planning a performance payment scheme. Furthermore, we developed an outline for a scheme that could be implemented at Bandhavgarh National Park (BNP), a tiger reserve in India. The proposed pilot scheme is based on a policy workshop co-organised with Anil Gupta, an interview with the director of BNP, and structured interviews with 305 households in 20 villages in the buffer zone of BNP.

Furthermore, we investigated whether poorer village members are more vulnerable to carnivore attacks than others. Our data reveals that there are economies of scale in livestock protection. Households with larger herds may spend more effort in guarding their livestock and, thus, incur fewer losses. Currently, the park authorities offer a compensation for predation incidents. The data indicates a self-selection process in which only households with higher per capita income apply for compensation. Furthermore, households that apply and receive compensation have higher per capita incomes than those who apply but do not receive compensation.

Based on these findings we suggest that the scheme bears room for improvement in its outreach to economically weaker households. Initiatives to increase awareness of the scheme and efforts to assure its transparency may be especially useful for poorer households.



Male tiger in the Bandhavgarh National Park

Project leader
Stefanie Engel

Contact person
Astrid Zabel

Collaborators
Göran Bostedt, SLU, Sweden;
Anil Gupta, IIM, India;
Michael Kreuzer, ETH Zurich, Switzerland;
Robin Reid and Mohammed Said, ILRI, Kenya;
Pooja Sawhney,
Asian Development Bank, India;
Jeff Sayer, WWF International, Switzerland;
Thomas Sterner, HGU, Sweden

Duration
April 2007 – March 2010

Thematic cluster
Livestock and environment

Agroforestry for carbon sequestration to improve small farmers' livelihoods

Sustainable agroforestry can increase resilience against environmental change, enhance carbon sequestration and generate income. Improved plant health is an indispensable prerequisite to render the concept of agroforestry attractive to small farmers and promising to policy-makers.

Subproject 1 aimed to assess the response of plant productivity to future climate change in different land use systems in Panama. In addition, it aimed to quantify the carbon sequestration potentials in these systems, providing baseline information for adaptive management decisions and the very first data sets to policy-makers.

During the dry seasons, assimilation and thus crop yields were lower in the traditional pasture than in the improved afforestation system. The opposite was true during the rainy seasons. Probably due to overgrazing, total ecosystem respiration was always higher for pasture than for afforestation. Overall, the pasture lost about 350g C/m² from June 2007 to June 2009, while the eight-year-old afforestation gained about 320g C/m² during the same period. Thus, the carbon budgets determined for our afforestation site confirm the general carbon sink pattern for forests. In contrast, our pasture site clearly acted as a carbon source. In the future, avoidance of overgrazing will help to convert the pasture source into a carbon sink.

Subproject 2 aimed to take novel natural-based approaches to increase plant health and reduce insect pests in afforestation and silvopastoral livestock systems. This subproject shall support timber tree establishment on current pastures as a future source of income to the rural poor.

Different afforestation planting regimes influenced tree growth rather than tree survival. The best growth was found for trees protected by insecticides. *Tabebuia rosea* trees excelled other native species tested, as it performed well under different conditions. Herbivore insects, however, seem to reduce growth substantially. The key herbivore species identified were a pyralid caterpillar and a chrysomelid beetle. *T. rosea* trees surrounded by a companion fodder tree species hosted significantly lower numbers of the pyralid herbivore. This indicates timber tree protection by the respective planting regime. There were no indications for any interspecific competition among timber and companion trees. Therefore, applying the combination timber and companion tree within the silvopastoral system may offer additional sources of income for small-scale livestock farmers.

Project leaders

Nina Buchmann
Silvia Dorn

Contact persons

Werner Eugster
Sebastian Wolf
Karsten Mody
Mirco Plath

Collaborators

Catherine Potvin, STRI, Panama and McGill University, Canada;
Hector Barrios, Universidad de Panama and STRI, Panama

Duration

July 2006 – March 2010

Thematic cluster

Livestock and environment



Local expert evaluating herbivory on *Tabebuia rosea*, the most promising native timber species identified

Reversing soil degradation by tropical legume trees using GIS analysis

In our project, we are evaluating and analysing the effects of the incorporation of *Gliricidia sepium* on soil productivity and the livelihoods in the Meegahakivula region, Sri Lanka. Our integrative approach includes agronomic, socio-economic and geographical aspects.

The extensive on-farm field trials of the agronomic component showed that an increase in the site inclination as well as increased continuous cropping decrease soil fertility, especially organic matter and soil nitrogen contents. In addition, productivity in crop fields and home gardens is most restricted by increasing inclination and drought. Frequent incorporation of green or composted manure from *Gliricidia* trees may enhance soil organic matter content and crop yields – more pronounced at smaller slopes and in home gardens. Home gardens are usually characterised by greater soil fertility than crop fields. Increasing their use may contribute to improved food security and a higher income through direct marketing of vegetables.

The economic component analysed different driving forces in the economic environment of these smallholder hill country farming systems. Changes in prices of products and production factors, salary-levels, or off-farm employment opportunities influence labour allocation decisions and the

labour-capital relationship. Data showed that flows of cash and goods are fluctuating around a steady state. A sustainable increase of income through market integration of these farming systems needs external investments and policies to create beneficial conditions. A simulation model is used to analyse the sensitivity of these systems to changes in the economic environment based on their portfolio. The portfolio can be either more self-sufficiency- or market-oriented.

The photogrammetric project component generated the Meegahakivula Geographic Information System in form of a common database incorporating the agronomic, socio-economic, geographic and topographic data about the farming systems. It allows for analysing spatially-related datasets. The Meegahakivula GIS is a web-based platform, which provides a database of variables from various thematic backgrounds. It also has the potential to inform extensionists, as such contributing to the knowledge transfer into agricultural practice.

Our project demonstrates the potential of introducing a tree species to improve productivity and sustainability of crop production in smallholder hill country farming systems, taking the diversity of livelihood strategies into account.



Farmers transporting *Gliricidia* and other wood species to a market to sell as firewood, Badulla, Sri Lanka

Project leaders

Peter Stamp
Armin Grün
Bernard Lehmann

Contact persons

Chaminda Egodawatte
Henri Eisenbeiss
Martijn Sonneveld

Collaborators

Ravi Sangakkara and Cyril Bogawahatte, Peradeniya University, Sri Lanka;
K.R.M.U. Bandara and Lal Samarakoon, AIT, Thailand

Duration

October 2006 – October 2010

Thematic clusters

Fodder resources and feeding strategies, Livestock and environment, Livestock-based value chains and policy analysis

Benefits of cover crop legumes in smallholder systems in Central America

In smallholder farming systems of the Nicaraguan hillsides, intensification of land use has led to soil nutrient depletion and a decrease in crop and livestock productivity. In order to sustain the agricultural production, the drought-tolerant cover legume *Canavalia brasiliensis* (canavalia) is being introduced as green manure and forage into the maize-bean-livestock system.

Nitrogen (N) is the nutrient most limiting crop production in the area. Canavalia represents a significant source of N. However, when tested as green manure on farmers' fields, canavalia showed no effect on subsequent maize yields after one year of rotation. This does not mean that residues did not decompose and release N. Yet, their benefit to maize remains unknown. An N dynamics study was set up in the hillsides of Nicaragua in order to determine the N fertiliser value of canavalia residues for maize. The direct ^{15}N -labelling technique was used, where ^{15}N -labelled amendments are added to an unlabelled soil in order to trace the fate of amendment N in the soil-plant system. Microplots were installed in three maize-canavalia rotation plots of a five-year-old field trial. In June 2008, ^{15}N -labelled canavalia residues and ^{15}N -labelled mineral fertiliser were applied on the

microplots. The microplots were then planted with maize and harvested five months later. In average, maize took up 1.0 g N m^{-2} from canavalia residues and 2.6 g N m^{-2} from mineral fertiliser, respectively, corresponding to N recovery of 12% and 33% from amendment. Most of the amendment N remained in the soil. At harvest, combined total ^{15}N recovery in both maize and soil was highest for canavalia residues with 98%, followed by mineral fertiliser with 83%. These results show that canavalia residues represent a valuable source of N for the subsequent maize crop. A part of N in the residues is probably retained in specific soil organic matter fractions, and will slowly become available for crops with time.

Farmers' perception of canavalia was studied using the Structured Mental Model Approach. After one year of cultivation, farmers testing canavalia realised that the cover legume increases milk and maize yields, and generates income. The study also showed that there is room for improvement in the communication between legume specialists and farmers. By increasing the knowledge of the farmers on their own production system, sustainable adoption of canavalia could be supported.

Project leaders

Emmanuel Frossard
Astrid Oberson

Contact person

Sabine Douxchamps

Collaborators

Michael Kreuzer, ETH Zurich, Switzerland;
Idupulapati Rao, CIAT, Colombia;
Axel Schmidt and Rein van der Hoek, CIAT, Nicaragua;
Martin Mena and Alexander Benavidez, INTA, Nicaragua;
Claudia Binder, University of Graz, Austria

Duration

January 2007 – December 2009

Thematic cluster

Fodder resources and feeding strategies



Farmers and partners attending a canavalia workshop, Nicaragua

Improving small ruminant productivity in dry areas

In many developing countries, food security is compromised by recurrent and severe droughts coupled with the still ongoing food crisis. Consequently, there is a need to replace cereals with alternative feeds – including wastes and by-products from agro-industry – in order to avoid competition with human nutrition. This is especially true in a country such as Syria where livestock is the main resource for many small-scale farmers and an important element in the country's economy. While many studies have been carried out proposing individual feeds as options for small ruminants, comparisons in respect of their feeding value and their effects on milk production and product quality are still lacking.

Therefore, our project included several comparative experiments, testing various options for forage and concentrate substitutes. The aim was to determine the most promising options in terms of availability on the feed markets, intake and nutritional value. In the final period of the project, we completed all laboratory and statistical analyses related to two digestibility experiments and an *in situ* experiment. In an on-station experiment with lactating ewes, five feed alternatives were tested. Some analyses (for example, milk fatty acid profiles) of the collected samples still need to be completed.

Based on the results of these experiments, an on-farm experiment involving six farmers was conducted. During this experiment, the farmers observed that a balanced ration including by-products from the food industry could ensure the same milk production, or even result in better milk production than the traditional feeds. After completing the on-farm experiment, a closing participatory workshop was organised. We presented weight development of the ewes, milk yield and composition in relation to the feeding alternatives and discussed the data with the farmers.

The analyses of both soil and plant experiments that complement the experiments with sheep are in their final stage. These experiments aim at assessing the effect of alternative feeds on the fertiliser value and on nitrogen fluxes in the soil-plant system. Incubation of soil with fresh or composted manures from the experimental animals resulted in clear differences in nitrogen mineralisation. Similarly, the pot experiment with barley showed that fresh olive cake and fresh manure from sheep fed with olive cake was detrimental for biomass production, whereas composted manure reduced this adverse effect.



Response of barley plants to the different fertilisers

Project leader
Michael Kreuzer

Contact person
Souheila Abbeddou

Collaborators
Barbara Rischkowsky, Luis Iñíguez and Muhi El-Dine Hilali, ICARDA, Syria;
Astrid Oberson, Christophe Lacroix and Bernard Lehmann, ETH Zurich, Switzerland;
Hans Dieter Hess, ALP, Switzerland

Duration
October 2006 – March 2010

Thematic clusters
Fodder resources and feeding strategies,
Food quality and public health

Camel milk products of high hygienic quality and safety

Camel milk is consumed in East Africa as untreated fresh milk or fermented milk product known as “suusac”. Pathogenic microorganisms (MO) in suusac represent health risks for consumers. We assume that these MO develop in uncontrolled, spontaneous fermentations due to unhygienic processes and raw material of low quality. The objective of this project is to improve existing camel milk products. Through investigation of the microbiota of camel milk, we aim at (i) developing starter cultures for the production of improved fermented milk, and (ii) reducing risk-MO, which might have a negative impact on human health.

We collected more than 1500 bacterial and fungal isolates of over 130 milk product samples from Kenya and Somalia. At first, we focused our search on lactic acid bacteria (LAB), which might be responsible for acidification, proteolysis and aroma forming during spontaneous milk fermentation. A promising selection of potential starter culture candidates were identified and comprised species such as *Streptococcus thermophilus*, *Lactococcus lactis* subsp. *lactis* and *Lactobacillus* spp. In addition, predominant pathogenic species such as *Streptococcus agalaticae* (raw milk) and *Streptococcus infantarius* (suusac) indicating the potential

health risk were also isolated. First fermentation trials were successfully performed. In these trials we used potential starter cultures in order to investigate acidification rate, symbiotic interactions, metabolite production, and antimicrobial activity. We also included the first lab-scale production of suusac. For safety reasons, we assessed antibiotic resistances in pathogenic MO such as *Enterobacteriaceae* and *Staphylococci*. Worrying resistances to a number of antibiotics were detected. These findings coupled with our extended diversity analysis of pathogens imply that improved hygiene practice at all levels in the production and marketing chain are needed.

Therefore, a first set of potential starter culture strains are about to be tested in small-scale pilot plant experiments at the University of Nairobi. Simultaneously, further experiments with the goal to optimise starter culture composition, to analyse fermentation kinetics and to produce the starter culture will continue at the ETH Zurich. Coordinating lab-scale, pilot-plant and field experiments in Kenya and Switzerland should allow for a fast and high quality development of an adapted and safe suusac starter culture.

Project leaders

Christophe Lacroix
Leo Meile
Zakaria Farah

Contact persons

Christoph Jans, ETH Zurich
Patrick Njage, University of Nairobi, Kenya

Collaborators

Jakob Zinsstag, Swiss Tropical Institute, Basel, Switzerland;
John Wangoh, University of Nairobi, Kenya;
Mario Younan, KARI, Nairobi, Kenya

Duration

June 2007 – June 2010

Thematic cluster

Food quality and public health



Patrick Njage, Christoph Jans and Mulwa Dasel working on bacteria isolated from camel milk products at Analabs, Nairobi, Kenya

Zinc fluxes from the soil into the food chain in arid agro-ecosystems – A case study in Iran

Zinc (Zn) deficiency is considered a major global problem in human nutrition, particularly in arid regions where the population depends on cereals as staple foods. In this project in central Iran, we are performing a case study on Zn fluxes from the soils into the crop plants and from agricultural food products into human nutrition. The goals are (i) to analyse the effects of agricultural practices on grain Zn and phytate concentrations in cereals, (ii) to assess the impacts of these cereals on human nutrition, and (iii) to evaluate agricultural options which reduce dietary Zn deficiency.

We performed a field survey assessing soil Zn concentrations, various soil and climate factors known or suspected to directly or indirectly influence the bioavailability of soil Zn, and the grain Zn concentrations of cereals grown on the sampling sites. The analysed soil and climate variables explained only a small part of the total variance in grain Zn. The analysis of Zn fluxes into agricultural soils revealed that, in general, Zn inputs by fertilisation exceed outputs through harvest by 1–2 kg Zn per ha and year. On average, manure and inorganic fertilisers contribute equally to the inputs. As expected, these data demonstrate that problems of insufficient Zn supply to crops are not due to ab-

solute Zn deficiency in the soils, but to insufficient Zn bioavailability. In summary, the results suggest that there is substantial scope for increasing grain Zn concentrations in cereals. Appropriate agricultural management practices could enhance soil Zn bioavailability without excessive Zn fertilisation – also on soils where conditions appear to be rather unfavourable for Zn uptake by crop plants.

In addition, we performed two surveys on human Zn intake using the method of three-day weighted food records – one in a suburban community and the other in a village. In both populations, the major staple foods were bread and rice. The consumption of meat and dairy products differed considerably between households, depending primarily on economic conditions. This was more evident in the suburban population where variations in the economic conditions of the participating families were larger than in the village population. Comparing the calculated total Zn intake rates with RDA (Recommended Daily Allowance) reference values suggests that Zn deficiency is in fact a mineral malnutrition problem in parts of the sampled populations. Serum samples taken from the participants are currently being analysed in order to obtain information on their physiological Zn status.



On-campus bakery, Isfahan University of Technology (IUT), Iran

Project leaders

Rainer Schulin
Richard Hurrell
Emmanuel Frossard

Contact persons

Manouchehr Amini, ETH Zurich
Mahin Karami, IUT Isfahan, Iran
Nazanin Roohani Sharaki, ETH Zurich

Collaborators

Majid Afyuni and Amir Khoshgoftarmansh,
IUT Isfahan, Iran;
Rita Wegmüller, ETH Zurich, Switzerland;
Claudia Binder, University of Graz, Austria;
Armin Keller, ART, Switzerland

Duration

July 2007 – June 2010

Thematic cluster

Food quality and public health

The Memorandum of Understanding (MoU) between the United Nations Environment Programme (UNEP) and the ETH Zurich serves as a framework for collaboration that culminated in the interdisciplinary research project “myEcosystem”.

The overall goal of this project is to develop methods to quantify impacts to ecosystems in the South caused by consumption of products in the North. Decision-support tools will indicate potential measures to reduce this impact – be it via changes in the production or offsetting damages by consumers.

The partnership between UNEP and the ETH Zurich

In November 2005, the United Nations Environment Programme (UNEP) and the ETH Zurich signed a Memorandum of Understanding (MoU) to formally establish cooperation between the two institutions. On the side of the ETH Zurich, the North-South Centre was given the operative mandate for the implementation of the MoU.

In 2008, an interdisciplinary research group coordinated by Stefanie Hellweg developed several interlinked projects on assessing and compensating the ecosystem impacts of biophysical products in a North-South context. The projects were accepted for funding by the ETH Zurich research commission and started in 2009. An outline of the projects is presented on the following pages. In the light of this interdisciplinary research programme, the MoU was renewed in 2009 with a sharper focus on the ongoing activities. The collaboration between the ETH Zurich and UNEP is now focused on, but not limited to:

- investigating sustainable management of ecosystems through compensating ecosystem damage by global offsetting schemes, including payments for ecosystem services and their monetary valuation;
- classifying critical ecosystem services with particular emphasis on regulating functions;
- assessing environmental changes and trends, as well as interlinkages between the natural environment and socio-economic processes at different spatial scales;
- analysing sustainable production and consumption, notably through life cycle assessment;
- setting-up a library of case studies in which the developed methodologies are applied and the offsetting scheme is elaborated.

Stefanie Hellweg, Michael Curran, Francesca Verones (all from the Institute of Environmental Engineering) with Barbara Becker and Manfred Kaufmann (both from the management team of the North-South Centre) formed a de-

legation of the ETH Zurich who attended a kick-off workshop at the UNEP headquarter in Nairobi in June 2009. The workshop allowed the delegation to present and discuss the projects conducted at the ETH Zurich and to receive feedback from UNEP representatives of different divisions, namely the Division on Early Warning and Assessment and the Division of Technology, Industry and Economics. As an immediate result of the workshop, three thematic feedback groups were established: on land, on water and on offsetting. These groups will form an advisory board for the three doctoral theses and provide feedback to intermediary results. UNEP suggested various case studies for the ETH research projects. It was also agreed that UNEP representatives will try to formally include the ETH projects in the UNEP Programme of Work. In addition, the workshop allowed the establishing or intensification of contacts with several high-ranking UNEP officials, among them Angela Cropper, UNEP Deputy Executive Director, who agreed to come as keynote speaker to the “Tropentag 2010” in Zurich.

For UNEP, the partnership with the ETH Zurich is an important element in the ongoing initiative of strengthening the science-policy interface by bringing scientists and policy-makers together. The ETH Zurich will benefit from the network of UNEP in disseminating research results worldwide and enhancing the application of the developed methods.

“myEcosystem”: Assessing and compensating ecosystem impacts of agricultural products

Many products consumed in the industrialised world originate from developing countries and emerging economies. Agricultural products such as fodder crops, food and bio-fuels create multi-faceted environmental impacts in the countries of origin. Biodiversity loss is amongst the most severe impacts, driven primarily by land and water use for agriculture. In this project, we aim at developing new methods in life cycle assessment (LCA) to quantify these impacts to biodiversity in the South caused by consumption of globally traded commodities in the North. In addition, we will provide decision-support tools that indicate potential measures for reducing this impact. Three complementary doctoral theses and one post-doc study investigate case studies in Africa and South America.

Impacts of land use on biodiversity: Development of a spatially differentiated global assessment methodology for life cycle assessment (Laura de Baan)

During the various stages of a product's life cycle, potentially damaging land use activities occur in different world regions. For example, phosphorus mining in Morocco provides inputs to soya bean production in Brazil, which is

fed to Swiss cows for milk production. Accounting for such disparate processes requires a truly global approach. This project aims at developing a spatially explicit global assessment method. Two approaches will be used: (i) A top-down approach, using global datasets to derive meaningful estimates of impact to biodiversity in all regions of the world, and (ii) a bottom-up approach, modelling biodiversity on a landscape level, taking the effects of landscape configuration and local biodiversity data into account.

Development of a global and spatially differentiated methodology for the assessment of agricultural (ground-) water use impacts on terrestrial biodiversity (Francesca Verones)

Groundwater-related impacts on biodiversity from lowering water tables arise from both direct and indirect use of water: Groundwater use for irrigation and damming of upstream rivers or altered recharge patterns. Such impacts affect fragile, groundwater-dependent terrestrial ecosystems, typically located in arid and semi-arid areas harbouring a unique flora and fauna. The aim of this research is to develop a globally applicable, spatially explicit assessment method for groundwater related impacts, focusing on direct groundwater use in water-limited areas. We will apply (i) a

Project leader
Stefanie Hellweg

Additional supervisors
Michael Kreuzer
Roland Scholz
Annette Köhler
Thomas Köllner

Doctoral students
Francesca Verones
Michael Curran
Laura de Baan

Postdoctoral student
Karin Bartl

Collaborators
Marion Cheatle, UNEP
Guido Sonnemann, UNEP

Duration
July 2009 – June 2012



The Santa Rosa wetland is located near Chancay along the Peruvian Coast. Water enters the wetland from the Rio Chancay, via exfiltration of the groundwater. Eutrophication and associated impacts to biodiversity due to upstream agriculture is a long-standing problem.

top-down approach using globally available datasets, remote sensing and groundwater modelling, and (ii) a bottom-up approach consisting of several case studies for deriving impact factors in detail. One case study will be located in Peru, investigating the impact of agricultural water use on wetlands in the coastal area.

A global framework for compensating the biodiversity impacts of agricultural products in the North-South context (Michael Curran)

The developed world is straining ecosystems in the developing world with increasing demands for agricultural commodities and raw materials. This doctoral study aims at investigating the potential of a North-South compensation scheme to mitigate or offset such impacts, for example, an added premium to be invested into local land stewardship and conservation. First, we will establish global guidelines to target payments and to estimate the likelihood of success given prevailing regional conditions – both biological and socio-political conditions. This will involve mapping global conservation priorities, thus establishing the potential for habitat restoration to contribute to biodiversity recovery. Second, we will illustrate how the balance between

loss and gain might be quantified in selected case studies, aiming for a robust framework that adapts to the region. The loss models will be based on the results of the above-mentioned doctoral studies. However, the challenge will be to match these estimates with the achievements of conservation interventions in the region where the impact occurs.

Local decision-making in agriculture: An example of dairy products and beef production in Peru (Karin Bartl)

Milk and beef production are important activities for smallholder farmers in Peru, providing a regular and secure income. Earlier results of an LCA of typical milk production systems in Peru showed a comparably high environmental burden of milk produced in a smallholder system in the highlands in comparison to both smallholder and semi-industrial systems in the coastal region. However, only climate change and pollution impacts were considered. As is typical in LCA, biodiversity damages have yet to be included. Water is a scarce resource in all three production systems. Furthermore, it is used to irrigate fodder crops in the coastal region. The “downstream” effects on biodiversity due to water and land use may reveal an intriguing new dynamic to the system.



A snowy egret (*Egretta thula*) is reliant on wetlands and other freshwater bodies such as lakes and bogs for breeding and reproduction.



Landscape and village of Canchayllo in the central Andes of Peru

Urban and rural transformation is one of the greatest challenges for developing countries. By 2050, two thirds of humanity will be living in cities with more than 90% of the urban growth occurring in developing countries. This migration to urban areas leads to equally rapid rural transformation.

This section portrays three activities related to these challenges: Pro-poor urban futures in developing countries, sustainable urban development in Asian megacities, and urban and rural transformation in Ethiopia.

Urban Laboratory – Addis Ababa

Actor networks in sustainable urban and rural transformation

The *Urban Laboratory – Addis Ababa* is as multifaceted as the assemblage of people that has contributed to its genesis. As many endeavors, it all began with a dinner. Franz Oswald, our colleague and guest, had just returned from Ethiopia and recalled with excitement what he had seen and experienced. He talked of places and people, not unlike Marco Polo's narration in Italo Calvino's *Invisible Cities*, that set to coalesce into a montage of fragmentary images: the roof of Africa, the "new flower" of Addis, the Queen of Sheba, Emperor Menelik II, and so forth. But he also addressed the conditions that frame current developments in Ethiopia: widespread poverty, the AIDS epidemic, insufficient sanitation, contested elections, migration from rural to urban regions, and the increased role of China in Africa. Little did we know that this would be just the beginning of myriad expeditions, not only into foreign terrains but also into the very culture that we call our own.

Oswald, arguing for understanding the city as a collection of intertwined networks, became the first actor in a complex net of participants who temporarily joined forces to form *ad hoc* groups linked by a common project. With this, the *Urban Laboratory – Addis Ababa* was founded to address questions pertaining to Ethiopia's current urban and rural transformation – a laboratory to combine expertise from a range of fields, via research and integrated design processes, in order to promote strategies for achieving sustainable settlements. What began as a partnership linking faculty and students from Addis Ababa University and the ETH Zurich soon evolved into a network of collaborators that included city officials, professionals, and local stakeholders, for any potential change could only be initiated from within. Here, urban design as a discipline became the central platform in processes of mediation. The design propositions that emerged from the research – whether pertaining to infrastructure planning, to slum up-grading, or the formation of new towns in rural territories – offered a base for dialogue, a type of round-table for debates where ideas could be bartered and conflicts possibly resolved. A recent exhibition of the work in Addis Ababa combined with a series of workshops took on the role of a participatory forum, with urban design as an agent tracing connections between controversies, unraveling disagreements, and setting potential courses of action for Ethiopia's urban and rural transformation – urban design as a form of communicative action.

Marc Angéil and Dirk Hebel

Marc Angéil is Professor of Architecture and Design in the Network City and Landscape (NSL) of the Department of Architecture of the ETH Zurich. Dirk Hebel is Director of the Ethiopian Institute of Architecture, Building Construction and City Development at Addis Ababa University.

Their book *Cities of Change Addis Ababa: Transformation Strategies for Urban Territories in the 21st Century* has been published by Birkhäuser Verlag in 2009.



Alternative project for affordable mass housing and urban agriculture in Addis Ababa, combining pre-fabrication and self-built construction (Sarah Graham 2009/2010)

Pro-poor urban futures in developing countries

“Urban futures: The challenge of sustainability”, was the title of the 2009 Annual Meeting of the Alliance for Global Sustainability (AGS), held at the ETH Zurich from January 26–29. AGS is a partnership of four leading technological universities (Massachusetts Institute of Technology, the University of Tokyo, Chalmers University of Technology, and the ETH Zurich). The North-South Centre participated in the AGS Annual Meeting by organising and moderating a panel on pro-poor urban futures in developing countries.

Currently, the global population is growing by approximately 70 million people per year, with most of this growth being concentrated in urban areas in developing countries. The rapid and unplanned expansion of low-income settlements on the outskirts of large cities often occurs without an accordant expansion of public services, facilities and job opportunities. In many developing countries, the proportion of urban poor is increasing faster than the overall rate of urban population growth. As a consequence, achieving the Millennium Development Goals will depend to a large extent on how well developing countries manage their cities.

The panel “Pro-poor urban futures in developing countries” allowed the presentation and discussion of several approaches to address urban poverty, such as social inclusion, participatory planning, offering alternative livelihood strategies, and improving access to services and resources.

- Isa Maria Ferreira da Rosa Guará and Anna Schmid presented their research about the role of residential institutions in improving the lives of Brazilian street children. More than 20 000 children in Brazil are raised in residential institutions, which become their main place of socialisation. The researchers found that the goals and design of residential institutions are crucial factors to reach the goal of social inclusion of street children.
- Andrea Catenazzi and Adriana Rabinovich studied complex decision-making processes in urban planning by analysing the rehabilitation of inner-city areas with heritage values in Buenos Aires, Havana and Bangkok. All projects had the objectives of preserving heritage values, improving economic opportunities and promoting access to housing for the lower-income population. The researchers found considerable opportunities for innovation in urban planning by participatory decision-making processes, accommodating and reconciling the values of many stakeholders.
- Ouola Traore described the potential of urban and peri-urban agriculture in the two largest cities of Burkina Faso. Agricultural production remains the main activity of many low-income households and contributes significantly to reduce malnutrition and urban poverty. Training of farmers, allocation of land for urban agriculture, implementation of land tenure programmes, improved access to credit, and closure of urban waste cycles are ways to support urban agriculture and to make it more sustainable.
- Doulaye Koné discussed the economic potential of wastewater and excreta as reusable resources. Many developing countries have plans for recycling wastewater and excreta for agricultural use. However, technologies that reduce pathogen contamination without losing value nutrients still need to be developed.

Andrea Catenazzi is Associate Professor at the Instituto del Conurbano of the National University of General Sarmiento, Buenos Aires, Argentina.

Isa Maria Ferreira da Rosa Guará is Professor and lecturer at Bandeirantes University, Sao Paulo, Brazil.

Doulaye Koné is group leader at the Department of Water and Sanitation in Developing Countries (Sandec) at the Eawag, Switzerland.

Adriana Rabinovich teaches and researches at the Urban Sociology Laboratory at the EPFL, Switzerland.

Anna Katharina Schmid is lecturer and researcher at the School of Social Work of the Zurich University of Applied Sciences, Switzerland.

Ouola Traore is manager and researcher at the National Research Institute of Burkina Faso.

Assessing sustainable urban development in Asian megacities of developing countries

Due to their size, complexity, growth rates and socio-cultural diversity, megacities in developing countries pose a particular challenge to the concept of Sustainable Urban Development (SUD). Over the last years, a number of indicator systems for the assessment of SUD have been developed. The systems combine indicators, such as per-capita income, literacy rate or particulate matter emission. These systems intend to cover the elementary needs for SUD in a designated city or city type and are thus helpful tools for understanding and communicating the context-specific issues of SUD. They further point out the need for improvement in areas with poor results, and contribute to the formulation of standards and development goals. Typically, indicator systems are embedded in comprehensive assessment programmes. However, most of these programmes remained at the study level or were in use for only a short period. In-depth analyses of existing practices in developing countries have rarely been conducted.

Our project aims at understanding and developing assessment concepts for SUD in developing countries in Asia with a focus on megacities. We are exploring how pivotal actors perceive the contribution of sustainability indicators as their perception influences the implementation success. Specific implementation constraints, as well as success and failure factors of indicator systems are being identified, and models for the development of assessment programmes are being derived.

The study draws on interviews with pivotal local actors in Jakarta (Indonesia), Bangkok (Thailand), Shanghai (China), Hyderabad and Ahmedabad (both India) conducted in 2008. Experts included (i) scholars, (ii) government officials at the national, provincial and municipal levels, (iii) representatives of regional planning authorities and urban planning associations, and (iv) representatives of social, environmental and international organisations. So far, the lessons learned – based on 16 indicator programmes – show that using indicators has positive effects, but may also harbour dangers. In developing countries, the experts focus more on the lack of effect and on negative contributions of sustainability indicators than previous literature has. In cities with numerous indicator systems in place, actors' awareness of negative effects is higher. Constraints for the indicator implementation could be identified in six different areas, with a number of similarities between the five cities, but diverging key areas.



Slum improvement project in Klong Bang Bua, Bangkok, Thailand: Canal bank with old structures (left), and redevelopment (right)

Research fellow

Sabrina Krank, ETH Zurich, Switzerland

Supervisors

Holger Wallbaum, ETH Zurich, Switzerland;
Adrienne Grêt-Regamey, ETH Zurich, Switzerland;
Rashmi Mahon,
Pragna Research and Consultancy Service, India

Collaborators

The research is conducted in cooperation with 29 institutions in Jakarta, Bangkok, Shanghai, Hyderabad and Ahmedabad.

Duration

June 2007 – May 2010

In addition to the research programme on livestock systems and the activities related to the MoU with UNEP, the North-South Centre provides small seed money grants. These grants serve to prepare new projects or to develop new institutional partnerships.

Furthermore, they strengthen impact generation by enabling the initiation of the implementation of given research results. The seed money projects are always carried out in a partnership between scientists from the ETH Zurich and scientists from developing countries.

Nutrient dynamics in conservation agriculture in the Malagasy Highlands

Seed money for the preparation of a new project (Emmanuel Frossard)

Conservation agriculture has been proposed to sustainably improve agricultural production in the tropics. This approach combines direct-seeding, permanent mulch cover and diverse crop rotation and is being adopted by smallholders in the Midwest of Madagascar. Whereas the effects of soil preparation and of residue management have been studied, little work has been done on nitrogen (N) and phosphorus (P) dynamics, and their interaction in conservation agriculture – as practiced by smallholders in the tropics. Nutrient limitations in these systems might be one of the barriers hindering the adoption of conservation agriculture by smallholders.

The Group of Plant Nutrition of the ETH Zurich in collaboration with the Laboratory of Radio-Isotopes at the University of Antananarivo and the Sustainable Farming and Rice Cropping Systems Unit (SCRID) in Antananarivo, Madagascar prepared a project that was submitted to the Swiss National Science Foundation and SDC. It aims at understanding how conservation agriculture affects the fluxes and dynamics of N and P in the presence of legumes. Furthermore, together with farmers, it aims at identifying possible strategies that will allow using these resources in the most sustainable way. This information will contribute to the development of tools for evaluating the relevance of conservation agriculture for smallholders in the tropics.

Hydromechanical effects of compaction on ferrasols of the Havana Province

Seed money for the preparation of a new project (Dani Or)

Although almost 50% of the total area of Cuba is covered by agricultural soils and the climate is favourable, Cuba imports most of the food consumed by its inhabitants. Economic and anthropic factors have severely affected the efficiency of the agricultural activity. They have provoked a negative impact on the ecosystem, mainly expressed in terms of soil erosion and compaction. In 2001, it was estimated that 24% of the cultivated land could be affected by soil compaction.

Havana Province is the region with the most intensive and most technical agriculture in Cuba. In this region, the predominant soil type is ferrasol. The region has a mostly flat topography, which is very favourable for the use of machinery. This has contributed to compaction not only at the top soil layers but also deeper in the subsoil.

The Group of Soil and Terrestrial Environmental Physics at the ETH Zurich in collaboration with the Agrophysics Research Unit of the Universidad Agraria de la Habana prepared a project that was submitted to the Swiss National Science Foundation and SDC. The project aims at investigating the effects of compaction in ferrasol fields in terms of soil hydromechanical behaviour and water balance. Furthermore, it aims at identifying how compaction in subsurface soil layer affects potato crop development and yields and how these effects could be mitigated.



A view from the Malagasy Highlands, Madagascar



On-site observations during the preliminary visit of Dani Or and Hannes Flüher in the Havana Province, Cuba

The members of the North-South Centre are involved in numerous activities with partners in developing countries, of which the Centre formally manages only a fraction. Notably, several projects of the Competence Center Environment and Sustainability (CCES) of the ETH Domain cover topics related to developing countries with about one third of our members being involved in these projects.

The list on the following pages provides a flavour of the breadth of North-South related activities conducted by the members of the North-South Centre.

Research projects related to developing countries

Project leader(s)	Project title	Project partner(s)	Countries	Funding source(s)	Duration
Agricultural and Food Sciences (D-AGRL)					
Agri-food & Agri-environmental Economics					
Bernard Lehmann, Michel Dumondel, Hermann Comoé	Analysis of socio-economic determinants of the sale of bovines in northern Côte d'Ivoire	D. Daouda, Centre Suisse de Recherches Scientifiques (CSRS), Côte d'Ivoire	Côte d'Ivoire	Scholarship ETH Zurich	09/08 – 06/09
Bernard Lehmann, Martijn Sonneveld, Bojan Scheurer	Analysis of the SADP (Sustainable Agricultural Development Program) and its influence on the sustainable development in the region of Meegahakivula regarding value added chains	Peradeniya University, Sri Lanka	Sri Lanka	Internal funding	09/07 – 02/09
Agromony and Plant Breeding					
Peter Stamp	The dynamics of female flowering and grain set in sweet corn	S. Jampatong, Kasetsart University, Thailand	Thailand	Internal funding	10/06 – 12/09
Peter Stamp	Protein quality improvement of waxy maize by incorporation of QPM in South East Asia	S. Jampatong, Kasetsart University, Thailand; Ham Le Huy, Institute for Agricultural Biotechnology, Vietnam	Thailand, Vietnam	Internal funding	10/07 – 12/10
Animal Nutrition					
Svenja Marquardt, Michael Kreuzer	Activity and plant selection patterns of free-ranging cattle in Southern Bolivian mountain forests, and the impact of cattle stocking density on the woody vegetation	H. Alzérreca, S. Beck, Herbario Nacional de Bolivia	Bolivia	VELUX Foundation	10/04 – 03/09
Michael Kreuzer	Development of a fertility-enhancing supplement for breeding bulls and cows based on the Andean plant species Maca (<i>Lepidium meyenii</i> Walp.)	C. Clément, ETH Zurich; I. Manrique, T. Bernet, International Potato Center (CIP), Lima, Peru; D.D. Ponce Aguirre, National University Daniel Alcides Carrion, Cerro de Pasco, Peru; I.A. Khan, B. Avula, University of Mississippi, USA; U. Witschi, Swissgenetics, Mülligen, Switzerland	Peru	Public institutions	12/07 – 11/10
Florian Leiber	Impact of increasing the complexity of forage composition in ruminant feed on ruminal biohydrogenation and methanogenesis	A. Jayanegara, S. Marquardt, C.S. Soliva, ETH Zurich; E. Wina, Indonesian Research Institute for Animal Production, Bogor, Indonesia	Switzerland, Indonesia	DIKTI scholarships for Indonesian Lecturers of the Indonesian Government	12/08 – 11/11
Frigga Dohme, Michael Kreuzer	Renaissance of a neglected forage plant: Nutritional and anthelmintic potential of sainfoin	B. Azuhnwi, H.D. Hess, ALP, Switzerland; Beat Boller, ART, Switzerland; M. Martens, Eric Schweizer AG, Switzerland; I. Mueller-Harvey, University of Reading, UK	Switzerland	Public institutions	06/08 – 05/11

Project leader(s)	Project title	Project partner(s)	Countries	Funding source(s)	Duration
Animal Nutrition, continued					
Florian Leiber	Assessment of natural pasture resources (essential nutrients) in endemic mountain regions with respect to nutritional balance and quality of sheep milk and dairy products (white brine cheese, yellow cheese, yogurt)	L. Angelov, T. Nedelcheva, V. Kafedjiev, Institute of Cryobiology and Food Technology, National Centre for Agricultural Science, Sofia, Bulgaria	Bulgaria	SNF-SCOPES	01/06 – 03/09
Carla S. Soliva	Development and application of molecular techniques to enhance the utilisation of tanniferous forages by ruminants	T. Seresinhe, B. Piya-digama, R.A.U.J. Marapana, Department of Animal Science, University of Ruhuna, Sri Lanka	Sri Lanka	University of Ruhuna, Sri Lanka; ETH Zurich	02/08 – 12/09
Svenja Marquardt, Michael Kreuzer	Testing the concept of diversity in feeding in the tropics and subtropics: Effect of experience, adaptation and choice on feed selection, intake and foraging behaviour in sheep	J. Meier, ETH Zurich; B. Rischkowsky, M. Louhaichi, International Centre for Agricultural Research in the Dry Areas (ICARDA), Syria; A. Abdalla, Centro de Energia Nuclear na Agricultura, Brazil	Syria, Brazil, Switzerland	Public institutions	09/09 – 08/12
Food Biotechnology					
Leo Meile	Pathogenic streptococci in East African milk products: Prevalence, diversity and health hazards for children	J. Wangoh, University of Nairobi; D. Mulwa, M. Younan, Kenyan Agriculture Research Institute (KARI), Kenya	Kenya	Private foundation	09/09 – 07/10
Leo Meile, Christophe Lacroix	Diversity of microorganisms in sourmilk products of Mali and development of standardized starter cultures	Stephan Wullschleger, ETH Zurich; Institut du Sahel, Bamako, Mali; B. Bonfoh, LCV Bamako, Mali; J. Zinsstag, Swiss Tropical Institute, Basel, Switzerland	Mali	ETH Zurich	10/05 – 03/09
Grassland Science					
Michael Scherer-Lorenzen	Biodiversity and ecosystem functioning (BEF CHINA)	Several German and Swiss partners; Chinese Academy of Sciences; various Chinese universities	China	DFG; CAS	2008 – 2010
Michael Scherer-Lorenzen, Jan Jansa	FUN_DIV: Functional significance of tree diversity for nutrient dynamics in a tropical plantation	B. Turner, STRI, Panama; C. Potvin, Mc Gill University, Canada	Panama	SNF	03/06 – 03/09
Olga Mayol, Werner Eugster	Impact of African dust on clouds and precipitation in a Caribbean tropical montane cloud forest	Partners in Puerto Rico and the USA	Puerto Rico	NSF ATM (USA)	2009 – 2012
Human Nutrition					
Richard Hurrell, Ines Egli	Malaria and the safety of iron interventions	G. Brittenham, Columbia University, USA	Switzerland, Thailand	National Institute of Health (NIH), USA	2009 – 2013

Project leader(s)	Project title	Project partner(s)	Countries	Funding source(s)	Duration
Plant Nutrition					
Else Katrin Bünemann, Emmanuel Frossard	Composition and dynamics of bacterial phosphorus in phosphorus deficient soils	L. Bakken, University of Norway; A. Bationo, African Network for Tropical Soil Biology and Fertility (AfNet), Kenya	Norway, Kenya	SNF	10/07 – 04/10
Biology (D-BIOL)					
Plant Biotechnology					
Wilhelm Gruissem	Biocassavaplus	Shanghai Center for Cassava Biotechnology; University of Bath, UK; Donald Danforth Plant Sciences Center, St. Louis, USA; IITA, Nigeria; CIAT, Colombia	Nigeria, Uganda, Kenya, Tanzania	Bill & Melinda Gates Foundation	07/05 – 07/10
Civil, Environmental and Geomatic Engineering (D-BAUG)					
Ecological Systems Design					
Stefanie Hellweg	Life cycle human exposure and risk assessment of pesticide application on agricultural products in Colombia	C. Binder, Graz University, Austria; Universidad Nacional de Colombia, Bogota; University of Boyaca, Colombia	Colombia	SNF	05/09 – 08/12
Groundwater and Hydromechanics					
Wolfgang Kinzelbach, Thomas Bernauer	Combined modelling of water availability and water demands in large scale international river basins	ZESCO; University of Zambia	Zambia, Zimbabwe, Mozambique	SNF	2008 – 2011
Wolfgang Kinzelbach	Sustainable water and land management of the Okavango Delta, Botswana	Department of Water Affairs, Botswana; Harry Oppenheimer Research Centre of the Okavango Delta, Botswana; Technical University of Denmark, Lyngby	Botswana	SNF	10/04 – 03/09
Wolfgang Kinzelbach, Rolf Kappel	Management of soil salinisation in Sinkiang, China	Institute of Geo-Environmental Monitoring, Beijing, China; Agricultural University of Xinjiang, Urumqi, China; Flinders University, Adelaide, Australia	China	ETH Zurich (D-BAUG, FILEP)	01/03 – 12/09

Project leader(s)	Project title	Project partner(s)	Countries	Funding source(s)	Duration
Earth Sciences (D-ERDW)					
Structural Geology and Tectonics					
Jean-Pierre Burg	Structural development of the Makran Accretionary Wedge	Geological Survey of Iran	Iran	SNF	10/05 – 12/09
Jean-Pierre Burg	Double subduction: Numerical modelling of the tectonic interplay and magmatic productivity with application to the paired Karakoram and Kohistan Arcs	University of Lahore, Pakistan; Pakistan Museum of Natural History	Pakistan	ETH Zurich	10/07 – 09/10
Jean-Pierre Burg	Morphological stability of accretionary wedges: Record from the river system and morpho-tectonics of the Iranian Makran	Geological Survey of Iran; Teheran University, Iran	Iran	ETH Zurich	9/08 – 8/11
Jean-Pierre Burg	Thermal evolution and energy potential of the Makran Accretionary Wedge	DARIUS (Oil Company Consortium)	International	Industry	06/06 – 05/09
Jean-Pierre Burg	Rehabilitation and conservation strategy for historical buildings and structures in Lahore	College of Earth and Environmental Sciences, University of the Punjab, Pakistan	Pakistan	Higher Education Commission, Pakistan; Culture Ministry of Pakistan	since 04/08
Environmental Sciences (D-UWIS)					
Aquatic Chemistry, Eawag					
Bernhard Wehrli	African Dams Project ADAPT	T. Bernauer, P. Edwards, R. Kappel, W. Kinzelbach, D. Senn, ETH Zurich; A. Schleiss, EPFL, Switzerland; A. Wüest, Eawag, Switzerland; I. Nyambe, University of Zambia	Zambia, Mozambique, Zimbabwe	CCES, SNF, ETH Zurich, Eawag	01/09 – 12/11
Aquatic Physics, Eawag					
Alfred Wüest, Martin Schmid	Lake Kivu: Learning from the past for managing its future	Institut Supérieur Pédagogique de Bukavu, D.R. Congo; Kigali Institute of Technology (KIST), Rwanda	Rwanda, D.R. Congo	SNF, SDC	06/09 – 06/12

Project leader(s)	Project title	Project partner(s)	Countries	Funding source(s)	Duration
Ecosystem Management					
Jean-Pierre Sorg, Bronislav Ivanovitch Venglovsky	ORECH-LES: Biodiversity and sustainable management of Kyrgyzstan's walnut-fruit forests. Development of new silvicultural approaches	Groupe de foresterie pour le développement, ETH Zurich; D. M. Mamadjanov, D. Sakbaev, Forest Research Institute Bishkek, Kyrgyzstan; KIRFOR, Intercooperation Bishkek, Kyrgyzstan	Kyrgyzstan	Various sources	08/99 – 12/10
Jean-Pierre Sorg, Gabrielle Rajoelison	Aménagement et gestion de grands espaces forestiers en zone sèche à Madagascar	Groupe de foresterie pour le développement, ETH Zurich; Ecole Supérieure des Sciences Agronomiques Antananarivo, Madagascar; Centre de Formation Professionnelle Forestière, Morondava, Madagascar	Madagascar	Various sources	2005 – 04/09
Jaboury Ghazoul, Chris Kettle	Impact of forest fragmentation and invasive species on gene flow among tropical trees	University of Agricultural Sciences, Bangalore, India	India	ETHIIRA, ETH Zurich	10/08 – 10/11
Jaboury Ghazoul, Chris Kettle	Ecological and genetic restoration of inselberg plant populations	Seychelles Ministry of Environment	Seychelles	ETHIIRA, ETH Zurich	04/08 – 04/11
Lian Pin Koh, Jaboury Ghazoul	Oil palm expansion and implications for biodiversity and livelihoods	Musim Mas, Indonesia; CIFOR, Indonesia	Indonesia	SNF	07/09 – 07/12
Christopher Kaiser-Bunbury, Jaboury Ghazoul	Impact of invasive species on plant-pollinator networks	Seychelles Ministry of Environment	Seychelles	SNF	04/07 – 05/10
Jaboury Ghazoul	Species coexistence in tropical forests: The paradox of generalist species	Forest Research Centre, Sepilok, Malaysia; University of Aberdeen, Scotland, UK	Malaysia	ETHIIRA, ETH Zurich	04/06 – 03/10
Jaboury Ghazoul	Pollinator services and land use impact on coffee production at landscape scales	University of Agricultural Sciences, Bangalore, India; ATREE, Bangalore, India	India	Internal funding	04/06 – 03/10
Jaboury Ghazoul	Modelling oil palm expansion and its impacts on biodiversity and carbon storage	K. Obidzinski, CIFOR, Indonesia; L.T. Gan, PT Musim Mas, Indonesia	Southeast Asia	ETH Research Fellowship	07/08 – 07/11
Environmental Philosophy					
Gertrude Hirsch Hadorn	Structuring the science-policy nexus in sustainability research	U. Wiesmann, CDE, University of Bern, and NCCR North-South, Switzerland; H. Wiggering, ZALF, Germany; B. Hubert, INRA, France; G. Bammer, Australian National University, Australia; A. Wiek, Arizona State University, USA	Various	SNF, CCES	04/08 – 03/12

Project leader(s)	Project title	Project partner(s)	Countries	Funding source(s)	Duration
Environmental Policy and Economics					
Charles Palmer; Stefanie Engel	The effectiveness of community conservation agreements in the periphery of Lore Lindu National Park in Sulawesi, Indonesia	S. Schwarze, University of Goettingen, Germany; A.Pfaff, Duke University, USA	Indonesia	Internal funding	ongoing
Stefanie Engel	ClimPol, Subproject: Designing payments for environmental services under uncertainties	C. Palmer, L. Taschini, London School of Economics, UK; M. Kosfeld, University of Frankfurt, Germany	Brazil, Mexico	CCES, ETH Zurich	01/08 – 12/11
Marcella Veronesi	Climate change adaptation and food security in Ethiopia	S. di Falco, London School of Economics, UK	Ethiopia	Internal funding	06/09 – 12/10
Michele Baggio	Welfare effect of a potential biological invasion: The case of Lake Maracaibo, Venezuela	E. Lichtenberg, University of Maryland, USA; F. Troncone, Institute for the Conservation of Lake Maracaibo (ICLAM), Venezuela; Agricultural Development Economics Division at the FAO (ESA-FAO), Italy	Venezuela	Internal funding	ongoing
Plant Ecology					
Peter Edwards	Encroachment of <i>Mimosa pigra</i> and other shrubs in the Kafue flats floodplain, Zambia	Griffin Shanungu, Zambia Wildlife Authority; H. Olde Venterink, W. Blaser, ETH Zurich; Harry Chabueta, University of Zambia	Zambia	CCES-ADAPT	07/09 – 06/11
Soil Protection					
Rainer Schulin, Emmanuel Frossard, Richard Hurrell, Rita Wegmüller	Agronomic biofortification to fight human Zn deficiency in arid regions	M. Afyuni, A. Khoshgoftarmansh, Isfahan University of Technology (IUT), Iran; B. Nowack, Empa, Switzerland	Iran	SNF	03/09 – 02/12

Project leader(s)	Project title	Project partner(s)	Countries	Funding source(s)	Duration
Humanities, Social and Political Sciences (D-GESS)					
NADEL					
Isabel Guenther	Impact of water interventions in rural Benin	University of Amsterdam, Netherlands; Amsterdam Institute for International Development (AIID), Netherlands	Benin	KfW, IOB Netherlands	since 08/08
Isabel Guenther	Economics of sanitation in developing countries	Harvard School of Public Health, Boston, USA; Eawag, Switzerland	Uganda, global	World Bank, NCCR North-South	since 10/09
Isabel Guenther	Differential mortality in sub-Saharan Africa	University of Goettingen, Germany	sub-Saharan Africa	Internal funding	since 08/08
Isabel Guenther	Social interactions, mortality and fertility	Harvard School of Public Health, Boston, USA	Various	Internal funding	01/08 – 12/09
Isabel Guenther	Development aid of NGOs		Various	Internal funding	since 11/09
Economic Research					
Renate Schubert	Institutional economics of the Clean Development Mechanism	Markus Ohndorf, Moritz Rohling, ETH Zurich	Switzerland	Internal funding	06/06 – 05/10
Renate Schubert	Global climate change – Technological and institutional innovations	J. Blasch, ETH Zurich; WBGU, Germany	Switzerland	ETH Zurich, WBGU	2008 – 2011
Renate Schubert	Financial crisis and climate policy	J. Blasch, ETH Zurich; WBGU, Germany	Switzerland	ETH Zurich, WBGU	2009 – 2011
Centre for International Studies (ETH Zurich/University of Zurich)					
Katharina Michaelowa, Alain Patrick Nkengne Nkengne, Anke Weber, Sebastian Fehrler	Education policy in sub-Sahara Africa	J. Bourdon, IREDU, University of Burgundy, France; M. Frölich, University of Mannheim, Germany	International	University of Zurich, SNF, UNESCO, other public institutions	09/06 – 12/10
Katharina Michaelowa, Anke Weber	Aid effectiveness / Political economy of aid	A. Dreher, University of Goettingen, Germany; J. Faust, German Development Institute (GDI), Germany; A. Borrmann, Hamburg Institute of International Economics (HWWI), Germany; R. Stockmann, University of Saarbrücken, Germany	International	Public institutions	09/06 – 12/10
Katharina Michaelowa, Sophia Hänny	Aid and democratization	A. Bächtiger, University of Bern, Switzerland	International	University of Zurich	09/06 – 12/10
Katharina Michaelowa, Axel Michaelowa, Stefanie Bailer	Negotiating climate change	L. Andonova, Graduate Institute for International Studies, Geneva, Switzerland; C. Bals, Germanwatch, Germany; B. Ryf, University of Zurich, Switzerland	International	Public institutions	09/09 – 12/11



Extraction of DNA for genes at the ETH Zurich Plant Biotechnology Lab

Universities and higher education are key to socio-economic development, to self-esteem and success of any society, whether poor or rich.

Anton Stadler, Swiss Agency for Development and Cooperation (2009)

Capacity development

Individual capacity development supported by the North-South Centre has lasting effects at the institutional level – in particular if the collaboration is continuous, combining various instruments. Strengthening the institutional capacities in the South and opening up opportunities for scientists to remain in their home institutions contributes to reducing the “brain-drain” from South to North.

Capacity development activities at the North-South Centre take place mainly at the individual level, supporting scientists from developing countries and emerging economies as well as researchers from the ETH Zurich dealing with development-related topics. A variety of instruments such as grants for visiting scientists or teaching stays, scholarships and our annual colloquium respond to the interests of doctoral students, post-docs and senior scientists.

By strategically targeting the available instruments for individual capacity development, we can have a leverage effect at the institutional level. For example, training a doctoral candidate from a partner institution and later on supporting his post-doc career as staff of the home institution will strengthen the academic profile of this partner institution. This has been practiced, for example, with the Centre Suisse de Recherches Scientifiques (CSRS) in Côte d'Ivoire, as the case of Lucien Diby illustrates: In 2001, the young scientist from Côte d'Ivoire obtained a scholarship from the Research Fellowship Partnership Programme (RFPP), which allowed him to realise a doctoral research project on the growth of yam in collaboration between the CSRS and the ETH Zurich. While he carried out the fieldwork in Côte d'Ivoire, he stayed several times at the Institute of Plant

Science at the ETH Zurich in order to conduct specialised laboratory analyses and to acquire additional experimental skills. He successfully obtained his doctoral degree from the University of Cocody in 2005 and was assigned as programme manager at the CSRS and as lecturer at the École Supérieure d'Agronomie (ESA) in Yamoussoukro. In 2008, Lucien Diby returned to the ETH Zurich to continue his research and to organise (together with Emmanuel Frossard) a conference on yam physiology for international experts in Zurich. This visit was made possible by a North-South Centre grant for visiting scientists from developing countries. Today, the long-term institutional collaboration with the CSRS is continuing with a follow-up project involving another RFPP fellow from Côte d'Ivoire, Valéry Kouamé Hgaza.

Thus, various individual capacity development instruments applied in settings of continuous collaboration with research institutions in developing countries will strengthen these institutions. The career of Lucien Diby is typical for a former RFPP fellow, as the statistics show: Since 1996, 30 doctoral candidates and post-docs concluded their research projects funded through RFPP fellowships. Of the 13 fellows from the South, 70% currently work for a research institution in a developing country or for an international research centre.

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Research Fellow Partnership Programme for Agriculture, Forestry and Natural Resources

The Research Fellow Partnership Programme for Agriculture, Forestry and Natural Resources (RFPP) is funded by SDC and managed by the North-South Centre. In 2009, 18 projects were ongoing whereof six were initiated during this year. Four of these new projects are dealing with issues of special importance to Africa: Hermann Comoé is exploring farmers' decision-making processes and risk management strategies related to climate change in Côte d'Ivoire. In the neighbour country Burkina Faso, Innocent Delwendé Kiba is conducting research on the effect of organic amendments on the phosphate nutrition of crops and on phosphate transformations in lixisols. Two other fellows are both working in Kenya: Charles Orek is conducting research at IITA on ways to increase stress tolerance of cassava by developing markers for drought tolerance. Post-doc scientist Sonal Patel is based at ILRI where she is developing a new vaccination method against East Coast Fever in cattle. The remaining new projects are located in Brazil and the Philip-

ines. Saraly Andrade de Sa started her research on direct and indirect effects of biofuel production on land use, forest conversion and social welfare in Brazil. Post-doc scientist Somayanda Impa Muthappa is investigating biofortification of zinc in rice to improve the nutritional status of children and adults across South Asia.

Three fellows successfully accomplished their research projects in 2009: Marco D'Alessandro finished his post-doc on biological control of pest insects in Mexico. Currently, he works as a scientific collaborator at the Federal Office for the Environment, Switzerland. Sajad Bukobero concluded his doctoral research on sustainable rainforest management in Madagascar and intends to continue doing research within this area. Atti Tchabi successfully defended his thesis on the effect of indigenous arbuscular mycorrhizal fungi on yam growth and yam nematodes infestation. He is currently working as a lecturer at the University of Lomé, Togo.



RFPP research fellows (top row from left to right): Lanto Herilala Andriambelo, Clémence Dirac Ramohavelo, Valéry Kouamé Hgaza Kouassi, Apollin Fotso Kuate, Peter Njoroge Njau, Christine Flury, Martin Jemo. (Middle row from left to right): Cassandra Leah Olds, Carina Cavalcanti, Sandra Contzen, Marc Zoss, Devesh Rustagi, Zora Lea Urech, Mihajamanana Fetra Rabenilalana. (Bottom row from left to right): Saraly Andrade de Sa, Delwendé Innocent Kiba, Charles Orek, Sonal Patel, Somayanda Impa Muthappa, Hermann Daisy N'nhon Comoé

Enhancing the livelihood of the local population in a biodiversity hotspot

In the dry region of Central Menabe, along the west coast of Madagascar, clearing has drastically reduced the once large forests. The main goal of this project was to set up scientific recommendations for a multifunctional and participatory management of this forest landscape.

Rice is the most marketed product, and its supply is considered to be insufficient. Although maize, cassava and groundnuts contribute strongly to the rural households' budgets, the commercial interest remains weak. While zebu breeding is slightly lucrative, small livestock products are sold more often. The "tenrec" hedgehog (*Tenrec ecaudatus*) is the most promising non-wood product.

The cultivation of maize, cassava and groundnuts causes clearings more frequently than rice cultivation does. Whereas the use of fire to renew pasture land accentuates deforestation, overgrazing creates additional local ecological instabilities. Extending rainfed rice cultivation areas and using agricultural natural fertilisers are thus suitable means to improve rural livelihoods and to conserve biodiversity. Under certain conditions, improving the sanitary state of chicken and introducing payments for environmental services would be suitable as well. However, such programmes need appropriation by locals.

Of the 192 inventoried wood species, about 30 are traditionally collected and used by the local population. The population prefers six of these because of their technical characteristics. Although these species are decreasing, the population can satisfy its needs by adapting to other species. Villager associations manage the forests in five of the seven studied villages. However, the members of these associations are urged to take part by NGOs and the state. Therefore, they do not feel responsible for the forest.

Based on our findings, we recommend:

- promoting the appropriation of projects by the local population;
- developing socio-economic prospects by optimising cultivation techniques and improving livestock farming (especially for chicken);
- reducing ecological degradation by improving the management of pasture lands;
- managing the forest landscape in order to satisfy the needs of the local population as regards forest products for local use;
- including commercial activities which do not exploit wood (such as ecotourism, or apiculture) into the forest management;
- conveying a sense of responsibility to the local population by including them in the forest management.

Research fellows

Lanto Herilala Andriambelo, ESSA, Madagascar;
Clémence Dirac Ramohavelo, ETH Zurich, Switzerland

Supervisors

Alexandre Buttler, EPFL, Switzerland;
Gabrielle Rajoelison, ESSA, Madagascar;
Jean-Pierre Sorg, ETH Zurich, Switzerland

Collaborators

R. Solomampionona, CFPF, Morondava, Madagascar;
B. Campbell, CIFOR, Indonesia;
S. Razanaka, CNRE, Antananarivo, Madagascar;
R. Steppacher, IHEID, Geneva, Switzerland;
L. Rakotomalala, SAHA Menabe, Morondava, Madagascar;
E. Hertz, University of Neuchâtel, Switzerland;
M. Reinhard, ECOS, Lausanne, Switzerland

Duration

November 2005 – April 2009



Traditional apiculture in Central Menabe, Madagascar

Understanding yam (*Dioscorea* spp.) response to fertiliser application

Yams (*Dioscorea* spp) are a staple tuber crop for many of the poorest in Nigeria, Ghana, Togo, Benin, Côte d'Ivoire and Cameroon. This crop demands a very high soil fertility level and therefore is usually grown as the first one after long-term fallowing. Due to the increasing population pressure, the available areas under long-term fallowing are, however, rapidly diminishing in these countries. Nevertheless, the demand for these tubers keeps increasing – also because of the growing population. Therefore, approaches have to be developed to fix yams in crop rotations and to increase their productivity.

Adequate mineral or organic fertiliser inputs could be considered to palliate the low soil fertility of cultivated soils. However, until now, field trials have shown variable response of yams to mineral fertiliser applications – which can be positive, null or even negative. We hypothesised that these variable responses are related to an inefficient uptake of nutrient derived from the fertiliser itself, which in turn is related to a limited root density. This study was undertaken to characterise the root system growth and its spatial distribution in *Dioscorea alata* cv. TDa 95/00010 grown in mounds with and without fertiliser application. Over the growing seasons in 2006 and 2007, the soil core technique and the wall profile method were used to determine root growth parameters and root spatial dis-

tribution pattern respectively. Seminal, adventitious and tubercular roots were identified. *D. alata* was shown to be a shallow-rooting species with coarse and low density roots. The roots grew in the mound during the vegetative phase, and mostly horizontally outside of the mound after tuber initiation. The maximum root extension, with a clump distribution, was observed at tuber bulking phase. The root system started to show necrosis during tuber maturation. Our results suggest that the relatively low root density and the superficial root system of this cultivar does not limit tuber yields when water and nutrients are available.



Root system of yam (*Dioscorea* spp.) consisting of adventitious roots originating from the primary nodal complex and of tuber roots arising from the tuber

Research fellow

Valéry Kouamé Hgaza Kouassi, CSRS, Côte d'Ivoire

Supervisor

Emmanuel Frossard, ETH Zurich, Switzerland

Collaborators

Aké Sévérin, Université de Cocody, Côte d'Ivoire;
Tié Bi Tra, Ecole Supérieure d'Agronomie, Côte d'Ivoire;
Andres Tschannen and Lucien Diby, CSRS, Côte d'Ivoire

Duration

December 2005 – December 2009

Control options for the African root and tuber scale on cassava

The African root and tuber scale *Stictococcus vayssierei* is a major pest in the forest zone of Central Africa where it infests at least ten cultivated crops with greatest occurrence on cassava. In southern Cameroon, our research has focused on understanding factors responsible for the recent increase in pest status of *S. vayssierei*. The scale is closely associated with the ant *Anoplolepis tenella*, which is considered essential for scale survival and dispersal. One of the key questions that we have addressed in the process of developing scale control options is the question about the nature of its interactions with the ant *A. tenella*, and the conditions that promote the abundance and proliferation of the ant. In initial studies, we monitored ant diversity in the predominant vegetation types in the forest zone of southern Cameroon. Furthermore, we collected various associated data to determine the factors affecting the observed distribution. We then conducted laboratory and greenhouse experiments to understand how *A. tenella* interacts with other dominant co-occurring ant species, and we completed experiments that demonstrated the role of *A. tenella* in scale dispersal. Subsequently, we devoted much of our efforts to the development of baits for *A. tenella*. We found that the boric acid-sucrose liquid bait was the most promising bait for *A. tenella* control. We are presently testing this bait in participatory field experiments on eight farms.

From the data collected to date, average *A. tenella* abundance was significantly lower in fields with boric acid ant bait compared with control fields. Similar trends were observed for *S. vayssierei* abundance, certainly due to lower ant abundance in ant-baited fields compared with control fields. These trends are a first large-scale experimental confirmation that *A. tenella* control can reduce *S. vayssierei* abundance.

We are looking forward to obtaining the remaining ant and scale sampling from the ant control trial. Currently, our main activities are monitoring the ongoing experiment and preparing manuscripts on the completed experiments. In addition, we initiated a protocol on ant competition that we will be complementing within the next few months.

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Research fellow

Apollin Fotso Kuate, IITA, Cameroon

Supervisors

Peter Nagel, University of Basel, Switzerland;
Rachid Hanna, IITA, Cameroon

Collaborators

Maurice Tindo, University of Douala, Cameroon;
Georg Goergen, IITA, Benin

Duration

November 2006 – December 2010



Groundnut and cassava planting in Awae, Cameroon

Analysis and initial exploitation of resistance to wheat stem rust race Ug99

This project aims at (i) identifying improved wheat germplasm resistant to Ug99 race of stem rust, and (ii) characterising “Avocet/Pavon 76” mapping population for stem rust. Seven of the good lines selected from the Advanced Yield Trials (AYT) were forwarded to the National Performance Trial Committee (NPTC) for final testing before release as varieties in Kenya. These seven lines were planted in ten sites across the wheat growing areas in Kenya. We obtained data on yield, test weight and quality aspects. In terms of yield, lines KSRR6 and KSRR7 were the best at 1.7 tons/ha and 1.6 tons/ha respectively. They did better than the best check by over 50% and will likely be released after another season of testing. Line KSRR2 was evaluated for the second season. It performed better than the best check by 19% and was released as a variety (Kenya Robin). We are now multiplying the seeds for this variety so that they will be available to farmers by October 2010. Two more lines will be released early this year. In terms of quality, all the seven lines have flour extraction of above 70%, loaf volume of above 500cc, protein content of above 10%. This is very acceptable for bread-making.

180 recombinant inbred lines (RILs) of the original Avocet/Pavon 76 mapping population were planted in the main season of 2008, off-season of 2008–2009 and main season of 2009. During these three seasons, the disease severity has been too low to obtain good phenotypic data. In 2008 main season, the problem occurred due to an accidental application of fungicide. The 2008–2009 off-season and 2009 main-season were marked by extreme drought in Kenya. This caused poor plant and rust development. The experiment was replanted again in 2009–2010 off-season in order to obtain a second year of reliable data. Of the 180 RILs, 92 were sent for diversity array technology (DART) analysis with 458 markers distributed across all the chromosomes. A tentative map for the population has been developed using mapmaker. The process of identifying quantitative trait locus (QTL) for stem rust resistance is in progress. However, we still need more phenotypic and simple sequence repeats (SSR) marker data. In the case of microsatellite markers, 96 SSR were used to screen the parental lines using LI-COR 4200 DNA analyser. Five SSRs were found to be polymorphic for both parents. These were ran on the 180 lines and used for mapping together with the DART markers.



Blocks of the new wheat lines at a trial site in Timau, Kenya

Research fellow

Peter Njoroge Njau,
University of Zurich, Switzerland

Supervisors

Beat Keller, University of Zurich, Switzerland;
Ravi P. Singh, CIMMYT, Mexico

Collaborator

Macharia Gethi, KARI, Kenya

Duration

January 2007 – March 2010

Estimating effective population size for the conservation of African cattle breeds

Demographic information is often lacking for livestock breeds of the developing world. Therefore, effective population size – a major criterion to assess the degree of breed endangerment – cannot be calculated. However, basic population information is crucial for priority-setting and decision-making in livestock conservation, and consequently, for a sustainable management of local breeds. In this project, a molecular method for the efficient estimation of effective population size is proposed. We are investigating the use of genome-wide Single Nucleotide Polymorphisms (SNPs) to estimate the effective population size of two indigenous African cattle populations and one reference population.

The new method was elaborated in a research partnership between the Swiss College for Agriculture (SHL), Zollikofen, Switzerland, the International Livestock Research Institute (ILRI), Nairobi, Kenya, and the Institute of Animal Breeding and Genetics of the University of Goettingen, Germany. The partnership is expected to contribute profound knowledge regarding animal breeding in developing countries, molecular genetics and conservation of animal genetic resources.

In early 2009, further analysis of the full genotyping results was conducted. The genotyping results were merged with the bovine genome assembly 4. In total 53 903 SNPs (on the 29 autosomes) became useable for final analyses. The genotyping results served for the estimation of local recombination rates for each chromosome and each breed. As expected, the estimation of recombination rates for each breed was time-consuming. In total, the jobs were running over four months. In April 2009, Miika Tapio spent two weeks in our group at SHL. This visit allowed for interesting discussions on the results, on additional analyses and the planning of further steps.

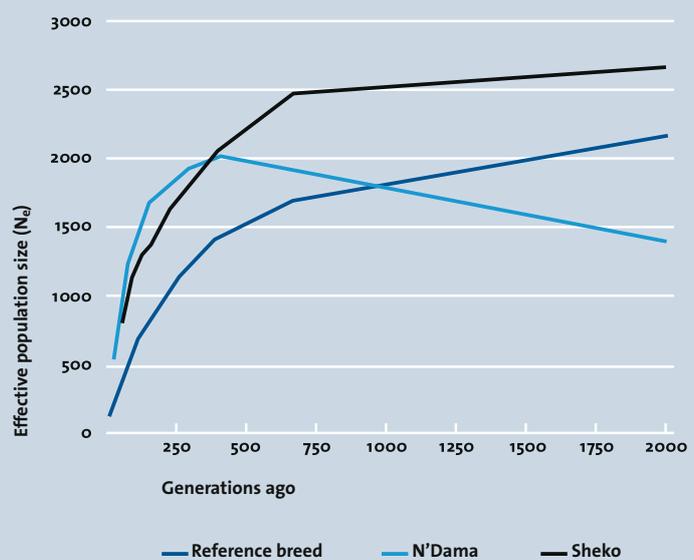
In a first publication, the feasibility of the method was proven for the reference population (a local Swiss breed). With a second publication on the use of genome-wide SNP-data for the conservation of two African cattle breeds, this project will reach a successful end.

Research fellow
Christine Flury, SHL, Switzerland

Supervisors
Stefan Rieder, SHL, Switzerland;
Olivier Hanotte, University of Nottingham, UK;
Henner Simianer,
University of Goettingen, Germany

Collaborator
Miika Tapio, ILRI, Kenya

Duration
February 2007 – March 2010



Effective population size for the three breeds using the estimated genetic map distance for all 29 autosomes

Mycorrhizas and maize yields in different land-use systems in Southern Cameroon

Mycorrhizal symbiosis is commonly established by many crop plant species and has the potential to improve plant nutrition and resistance against diseases and parasites. The mycorrhizal benefits can deteriorate due to changes in the composition and/or activity of indigenous mycorrhizal communities. Therefore, this project addressed whether this deterioration could explain the rapid yield decline occurring during cropping following forest clearance in the humid tropics.

The project consisted of three modules. First, we carried out a three-season field experiment with continuous maize cropping on three sites close to the Metet village in Southern Cameroon. These sites differed in their previous land use: Cleared forest, chromolaena fallow, and continuously cropped land. The set of trials addressed the effect of phosphorus (P) fertilisation and the removal of mycorrhizal fungi by application of fungicide (benomyl) on maize P acquisition, biomass production and seed yield. Second, we carried out a pot experiment with soils from the three different land use systems sampled in Metet village. The soils were sterilised and then inoculated with non-sterile soils – either from the same land use or from different land uses. Some soils were left non-inoculated. Maize was grown in pots and its biomass production and P uptake was measured in order to quantify the symbiotic benefits of the different indigenous mycorrhizal communities grown on the different soils.

Third, we carried out a pot experiment with compartmented cuvette containers and P radioisotope labelling, addressing the extent of functional diversity among different mycorrhizal fungal species co-occurring in the forest soils of Southern Cameroon.

Both P and fungicide applications resulted in higher growth and yields of maize in the field trials, with lower yields more often found in continuously cropped than in fallowed or cleared forest soils. The pot experiment with sterilised soil showed significantly lower symbiotic benefits (support of maize growth and P uptake) of the mycorrhizas from cleared forest soil as compared to the mycorrhizas from the chromolaena fallow or cropped land soils. Therefore, we conclude that yield decline during the cropping sequence following forest clearance cannot be attributed to declining mycorrhizal benefits or mycorrhizal activity in continuously cropped soils. This is valid in spite of the differences in functioning of different mycorrhizal species as demonstrated in the last experimental module.



Flowering of maize in a P-fertilised plot in the third cropping cycle on a previously forested area, Cameroon

Research fellow

Martin Jemo, IITA, Cameroon

Supervisors

Emmanuel Frossard and Jan Jansa, ETH Zurich, Switzerland

Collaborators

Fritz Oehl, University of Basel, Switzerland;
Robert Abaidoo, IITA, Nigeria;
Dieudonné Nwaga and Adamou Souleymanou, University of Yaoundé, Cameroon;
Jean Kuate, Institute of Agricultural Research for Development, Cameroon

Duration

June 2007 – December 2009

Exploring the effects of anti-tick vaccines on the transmission of *Theileria parva*

Tick-borne diseases (TBD) affect approximately 80% of the world's cattle population. Anti-tick vaccines (ATV) serve as a method for TBD control in cattle livestock systems by decreasing the number of ticks in successive generations thereby reducing the likelihood of infection with TBD. This project aims at evaluating the merits of using ATV as a control method for *Rhipicephalus appendiculatus*-transmitted *Theileria parva*, the causative agent of East Coast Fever in cattle.

The potential of recombinant Ra86, the *R. appendiculatus* homologue of the commercially available ATV used to control *Boophilus microplus* in cattle, was investigated as a *T. parva* transmission-blocking agent. Parameters investigated were the effect of vaccination on the biology of nymph and adult ticks, as well as the ability of nymphs to acquire *T. parva* parasites after feeding on infected cattle. Eight Friesian cattle were vaccinated with Ra86 while additional eight were used as controls. After vaccination, we experimentally infected all cattle with *T. parva* and applied ticks for feeding.

Ra86 vaccination had no significant effect on the mortality rate of ticks or the duration of tick feeding. Engorgement weights in nymphs did not differ significantly. However, the

adult females showed a slightly lower engorgement weight in the vaccinated group. For both groups, the egg laying capacity of adult females was seen to decrease with an increase in feeding duration, but the overall difference in egg weight was not significant. In contrast, we observed a significant difference between the hatching potential of eggs for the last adult detach day. 48.5% of the vaccine groups eggs failed to hatch compared to 18.7% in the control group. The most significant effect of Ra86 vaccination was seen in the moulting of *T. parva* infected nymphs to adults. A significantly higher percentage of nymphs (14%) fed on Ra86 vaccinated animals failed to moult compared to 3.5% of nymphs fed on control animals. This parameter is an important factor in disease control as ticks infected in the nymph instar are responsible for *T. parva* transmission during subsequent adult feeding.

Experiments are ongoing in order to assess the *T. parva* infection rates in tick salivary glands, thus determining the effect of vaccination with Ra86 on the *T. parva* development within the vector. In conclusion, we provide first time evidence that recombinant Ra86 used to immunise cattle resulted in a statistically significant reductive effect on nymph moulting, a parameter that has clear implications for *T. parva* transmission in the field.

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Research fellow

Cassandra Leah Olds, ILRI, Kenya

Supervisors

Claudia Daubenberger, STI, Switzerland;
Richard Bishop, ILRI, Kenya

Collaborators

David Odongo, ILRI, Kenya;
Barend Mans, Onderstepoort Veterinary Institute,
South Africa

Duration

May 2008 – April 2011



Storage of ticks in temperature and humidity controlled incubators at the ILRI tick unit facility, Kenya

The role of cooperativeness in adopting sustainable common resource management

This research takes place in the context of an environmental programme (EP) targeting fishermen living in a natural reserve in Brazil. In this natural reserve, one of the most important income sources, fishing, is threatened by over-fishing. In addition to catching fish, many fishermen have started to catch shrimp. This has led to the decline of the shrimp population because fishermen use traps which capture large amounts of not yet fertile shrimp. The main objective of this project is (i) to better understand the roles of cooperative and less cooperative fishermen in introducing a new policy for the management of shrimp resources, and (ii) to help policy-makers to design suitable institutions in this regard.

In 2008, fieldwork was conducted with 143 fishermen. It included replacing some of the current traps, and manufacturing less exploitative shrimp traps. Additionally, the fishermen were asked to (i) participate in laboratory experiments, (ii) vote on participation/non-participation in the programme, and (iii) take part in a survey in which we asked questions on their social networks, perceptions and beliefs. This unique sequence of measures with the same individuals will help us to understand the role of experimentally-observed cooperative behaviour in the adoption of a sustainable policy.

One of our findings shows that fishermen who are well-integrated in the social network of their community, and fishermen who participated in the development of the EP cooperate more during the programme than others. In addition, we find that the perception of the necessity of this EP plays an important role for cooperation during the programme. Furthermore, we find no evidence that individuals are more likely to be friends with individuals who share similar economic preferences than with others. On the contrary, our findings suggest that opposites attract when it comes to risk and time preferences. In addition, our results also show that risk and competition preferences are related to the centrality in the network: Individuals who are more central in the network are more likely to take risks and compete more than individuals at the periphery. Social preferences are not significantly related to network structure and network centrality.

These results provide empirical evidence for the role of social integration, participation, and perceptions for community resource management. Our findings may also be useful for the interpretation of relationships between social network characteristics and economic behaviours.



A Brazilian fisherman with his new, less exploitative shrimp trap

Research fellow

Carina Cavalcanti, ETH Zurich, Switzerland

Supervisor

Stefanie Engel, ETH Zurich, Switzerland

Collaborators

Ernst Fehr, University of Zurich, Switzerland;
Randall E. Brummert, World Fish Center, Cameroon;
Elinor Ostrom, Indiana University, USA;
Jose Augusto Tosato, Secretaria do Meio Ambiente e Recursos Hidricos, Brazil;
Luciano Vaz,
Universidade Estadual de Feira de Santana, Brazil;
Marcelo Raseira, ProVárzea – IBAMA, Manaus, Brazil

Duration

May 2008 – April 2010

Understanding the views of poor households in rural municipalities

In Honduras, about half of the population live and work in rural areas dominated by steep hills and mountains. In these areas smallholder farming predominates, mostly on subsistence levels. Access to services and economic opportunities other than agriculture is low, and the poverty rate is very high at 77%. In 2001, Honduras introduced an ambitious poverty reduction strategy (PRS) in order to fight poverty and to receive debt relief. The strategy includes measures such as a general increase in social expenditure, the set-up of a decentralised poverty reduction fund for local projects, or programmes such as access to agricultural land or reactivation of the rural economy. However, neither in rural nor in urban areas did the poverty rates decrease significantly between 2001 and 2008.

This project aims at analysing the PRS, its implementation and its benefits for poor and marginalised households in view of future development strategies. I am comparing the livelihood situation of rural poor with the PRS process in two municipalities. In late 2008 and beginning of 2009, I selected two municipalities in Western Honduras. First, a landscape and history mapping of each municipality was carried out and complemented with a brief, random sample household survey in each location. Based on these findings, I will select the sample for the life history interviews.

In June and July 2009, qualitative interviews with local politicians and members of community development councils were conducted. These interviews focused on the development processes and especially the implementation of PRS-related policies at the local level. The preliminary results indicate differences between the two study locations with regard to the political space that is open to poor and marginalised households for influencing PRS project formulation and implementation. While in one municipality PRS projects are prioritised in a participatory process, in the other study location the local political elite decides on how these funds are spent. However, at this stage no conclusion can be drawn on whether poor households can effectively integrate their needs into the PRS process in either one of the municipalities. I cannot yet say whether they feel represented by the elite and finally, whether the PRS projects satisfy their needs. These questions will be tackled during the next field stay. I will then explore the livelihood situation and strategies of the local poor, as well as their views on the PRS process and results at the local level using qualitative life history interviews.

Research fellow

Sandra Contzen,
University of Zurich and SHL, Switzerland

Supervisors

Ulrike Müller-Böker and Urs Geiser,
University of Zurich, Switzerland;
Urs Scheidegger, SHL, Switzerland

Collaborators

Maria Eugenia Baltodano, CIAT, Nicaragua;
Arie Sanders, University Zamorano, Honduras;
Andrea Flück and Rudi von Planta, SDC, Honduras

Duration

June 2008 – May 2011



Group discussion with members of a community development council, Coalaca, Honduras

Governance, collective action and development interventions in vegetable value chains

High-value agriculture is the fastest growing agricultural sector in developing countries. Vegetables are a typical example of high-value products, because they have relatively high unit values and a high income elasticity of demand. The demand for high-value vegetables is expected to rise for the following reasons: First, rapid urbanisation is coupled with the emergence of a middle class consumer group of relative wealth. Second, altered consumer preferences occur both at the regional and at the global level.

An increased demand for vegetables may have potential beneficial outcomes such as a positive impact on the health of vegetable consumers, and increased employment for a predominantly female work force. Because of these opportunities, vegetable production, marketing and consumption has recently gained increasing interest of development cooperation agencies. Our project aims at identifying the potential and the modalities of smallholder integration into the possibly profitable vegetable sector. Thereby a value chain approach is being applied. The project comprises the components (i) value chain governance, (ii) smallholder participation, (iii) collective action and entrepreneurship, as well as (iv) intervention by external facilitators.

Northern Tanzania, our study region, is a major vegetable growing area. We follow a comparative case study metho-

dology, investigating both domestic and export-oriented value chains. In 2009, the project focused on the identification of key actors, institutions, and organisations. Explorative, informal interviews with resource persons and participating observance were used to obtain qualitative data on the value chains. Subsequently this information was complemented by semi-structured interviews with key stakeholders. Based on this information, we mapped the value chains and developed a typology of generic vegetable value chains. The typology includes the following value chains:

- local green markets;
- urban green markets;
- vegetable seed production;
- processed vegetable value chains;
- institutional buyers and tourism industry;
- fresh vegetable export to developed countries.

At first, we investigated the local and urban green markets in more detail. Preliminary data suggest that these domestic green market value chains are governed by a high degree of spot-market arrangements. In addition, individual actors often hold powerful positions within the chains. Further research on the other value chain types will continue in 2010.



High quality produce ready for delivery to hotels and restaurants, Tanzania

Research fellow

Marc Zoss, ETH Zurich, Switzerland

Supervisor

Bernard Lehmann, ETH Zurich, Switzerland

Collaborators

Sophie Révion, ETH Zurich, Switzerland;
Abdou Tenkouano,
World Vegetable Center AVRDC, Tanzania;
Katinka Weinberger,
World Vegetable Center AVRDC, Taiwan;
Andrew Temu,
Sokoine University of Agriculture, Tanzania

Duration

August 2008 – July 2011

Behavioural heterogeneity and human cooperation

Maintaining large-scale cooperation requires incentives to overcome cooperation dilemmas in which freeriders enjoy public goods created by others without bearing the costs. Literature suggests (i) that conditional cooperation and costly punishment can stabilise cooperation, and (ii) that group selection based on culture provides larger scope for the evolution of these traits. However, most evidence on the former remains a major empirical challenge when applied in the real world. Evaluation of the latter could be improved by measuring culture through behavioural experiments and by estimating cultural differentiation among neighbouring groups of small-scale societies. In this study, we employed a variety of behavioural experiments, household questionnaires, and community surveys to measure these behaviours as well as other factors, and then study their effect on the outcomes of forest commons management. The study area covered 49 groups of the Bale Oromo people in Ethiopia.

Our results show that high shares of conditional cooperators in a group have a significantly positive effect on the outcomes, even after controlling for conventional factors. Costly monitoring is a key mechanism by which conditional cooperators sustain cooperation. Our preliminary investigations further show that freely conferred deference on the group leader partially accounts for group level differences in

conditional cooperation. The investigations also show that cultural group selection, as estimated through cultural differentiation among 77 pairs of neighbouring small-scale societies, provides scope for the evolution of costly cooperative traits. A detailed examination of the punishment behaviour of a group leader in response to deviations from co-operation norms reveals substantial variations. Norm-driven leaders who explicitly punish deviations from the conditional cooperation norm have a positive but insignificant effect on the outcomes. In contrast, spiteful leaders who punish cooperators have a significantly negative effect.

Furthermore, we investigated how behavioural heterogeneity and beliefs interact in voluntary cooperation. We find that most Bale Oromo conditional cooperators exhibit “altruistic” bias, contributing slightly more than the partner player does. This challenges the hypothesis that imperfect conditional cooperation causes decline in cooperation over time. Our results reveal that behavioural heterogeneity is a highly significant predictor of voluntary cooperation and that beliefs have a positive effect on cooperation only when a player is a conditional cooperator.

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Research fellow

Devesh Rustagi, ETH Zurich, Switzerland

Supervisors

Stefanie Engel, ETH Zurich, Switzerland;
Michael Kosfeld, University of Frankfurt, Germany

Collaborators

Bruce Cambell, CIFOR, Indonesia;
Franz Gatzweiler and Günther Manske,
ZEF, University of Bonn, Germany;
Martin Neumann, GTZ Sustainable Utilization of Natural
Resources for Food Security (SUN), Oromia, Ethiopia;
Gurara Gebissa, Regional State of Oromia Forest
Enterprises Supervising Agency, Ethiopia

Duration

September 2008 – December 2009



Economic experiments used to analyse the prevalence of social preferences in Ethiopian communities

The importance of forest fragments in local livelihood systems

On the east coast of Madagascar, forests are increasingly being pushed back as a result of the shifting cultivation pursued by the majority of the local land users. Intact forests are reduced by these burning systems and what remains are forest fragments in a mosaic landscape. Our research project focuses on ways to improve the management of forest fragments with regards to biodiversity and local livelihood strategies. At the centre stands the relationship between human beings and forest fragments, and the management of the forest fragments in this patchwork landscape. The main outputs should be:

- to gain a holistic knowledge about the importance of forest fragments in livelihood systems;
- to describe distribution, texture and diversity of forest fragments;
- to identify reasons for forest degradation and future driving forces;
- to find incentives and new approaches for the management of forest fragments in order to enhance biodiversity and reduce poverty.

The information should allow us to analyse the extent to which a sustainable use of forest fragments is compatible

with the local livelihood systems. The research study will integrate ecological and socio-economic aspects.

Based on a spatial analysis, we distinguished two principal classes of fragmentation: “Low fragmented forest” and “fragmented forest”. Subsequently, floristic inventories were carried out in each class with the goal of determining the potential of the forests. The results showed the impact that the local needs and extraction have on the existing tree diameter distribution, plant diversity and regeneration.

The first results of the socio-economic study show that the perception of forest fragments and their importance for the local population changes with increasing proximity to the forest resources. Not only became forest fragments more important to satisfy the daily needs of the people, but they also had an increasing potential to cause conflicts between villagers.

Most of the achievements of our studies have been communicated to the local community forestry project. Passing on this knowledge contributes to the improvement of the forest management, as it considers the relationship between local livelihood systems and the ecosystem of forest fragments.



A woman cutting leaves from *Pandanus* spp. for weaving, Madagascar

Research fellows

Zora Lea Urech, ETH Zurich, Switzerland;
Mihajamanana Fetra Rabenilalana, ESSA, Madagascar

Supervisors

Jaboury Ghazoul, Jean-Pierre Sorg and Hans-Rudolf Felber,
ETH Zurich, Switzerland;
Gabrielle Rajoelison, ESSA, Madagascar

Collaborators

Jean-Laurent Pfund, CIFOR, Indonesia;
Etienne Andriamapandry, AIM, Madagascar

Duration

September 2008 – July 2011

Ethanol production impacts on land use and deforestation

Less-developed countries such as Brazil and Indonesia with established biofuel production capacities and high land surpluses stand to benefit from increasing biofuel demand in both developed and developing economies. However, there is currently a debate on potential negative impacts of biofuels. More precisely, the links – either direct or indirect – between bio-ethanol production, land use and forest conversion are still not well-understood, neither at the conceptual nor at the empirical level. Therefore, the objective of this project is to fill the gap in the literature, by investigating these direct and indirect links and by measuring them empirically. In addition, the research findings from this project are expected to be useful for optimal policy design both in current biofuel producer and consumer countries. Potential future producers, such as South Africa, Colombia and Angola, may also benefit from policy implications derived from the research output.

The first phase of the project consisted in conceptualising the impacts of ethanol production resulting in a theoretical paper identifying three potential effects of ethanol production on land use and deforestation. First, the standard and well-documented effect of direct land competition between rival uses increases deforestation and decreases food production. Second, an indirect displacement of food production across regions, provoked by a shift in the price of food, increases deforestation and reduces the total

output of the food sector. Finally, labour mobility between sectors and regions tends to decrease food production but also deforestation. The overall impact of ethanol production on forest conversion is ambiguous, providing a number of interesting pointers to further, empirical research.

The second phase of the project is currently being prepared. It consists on testing the theoretical results, using empirical data from Brazil – the second world largest bio-ethanol producer, and an important consumer country. Although some data is available on-line, a stay in Brazil is necessary to collect more secondary data via key informants such as local researchers and governmental institutions (both at federal and state levels). We also consider this stay to be an opportunity to disseminate and discuss our theoretical results with our local partners and with representatives of government institutions.

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Research fellow

Saraly Andrade de Sa, ETH Zurich, Switzerland

Supervisors

Stefanie Engel, ETH Zurich, Switzerland;
Charles Palmer, London School of Economics, UK

Collaborators

Charlotte Opal, EPFL, Switzerland;
Sven Wunder, CIFOR, Brazil;
Paulo Moutinho, Amazon Environmental
Research Institute IPAM, Brazil

Duration

February 2009 – February 2011



Sugarcane field in São Paulo State, the main ethanol production area of Brazil

Phosphate nutrition of crops in lixisols from semi-arid West Africa

A very large proportion of the population living in the semi-arid areas of sub-Saharan Africa lives from subsistence agriculture and is suffering from extreme poverty and food insecurity. Research conducted in West Africa has shown that organic matter and phosphorus (P) inputs are essential to restore the fertility of the fragile soils (lixisols) and to improve crop production in the region. However, there is a lack of information on how organic amendments affect P availability to crops in these lixisols. This project conducted in the centre of Burkina Faso aims at evaluating the effects of organic amendments on soil P dynamics, on crop nitrogen (N) and P nutrition, and on crop productivity. The model crops used are sorghum (*Sorghum bicolor*), which is widely cultivated in the area, and promiscuous cowpea (*Vigna unguiculata*), which is an important cash crop.

From July to December 2009, we conducted a field study in Burkina Faso. Different treatments were applied to cowpea plants in the long-term field experiment in the Saria research station: no nutrient input; low rate of nutrient inputs as mineral and organic fertilisers; low rate of nutrient inputs as mineral fertilisers; high rate of nutrient inputs as mineral and organic fertilisers; and high rate of nutrient input as mineral fertilisers.

First, we studied the impact of these treatments on cowpea yields, soil available P, and soil microbial P. Weeds and sorghum plants in the vicinity of cowpea plants were sampled in order to assess the impact of these treatments on nitrogen fixation by cowpea using the natural abundance method.

At the beginning of the growing season, we identified with farmers' organisations 167 farms producing sorghum and/or cowpea on lixisols in a 30 km radius around the Saria research station. On each farm, a field was chosen in which two microplots were installed to assess cowpea and/or sorghum yields as well as selected soil properties. In addition, the 167 households were surveyed in order to analyse their socio-economic status and their agricultural practices. The objective of this part of the project is to understand the practices of farmers, and to compare these practices with the fertilisation strategies used in the long-term trial. Based on this, we aim at identifying fertilisation strategies, which can be recommended to farmers.



A meeting with farmers' organisations, Burkina Faso

Research fellow

Delwendé Innocent Kiba, INERA, Burkina Faso

Supervisors

Emmanuel Frossard, ETH Zurich, Switzerland;
Michel P. Sedogo, Université polytechnique de Bobo,
Burkina Faso;
François Lompo, INERA, Burkina Faso

Collaborator

Saïdou Koala, CIAT, Kenya

Duration

May 2009 – May 2012

Characterisation of drought tolerance in Cassava (*Manihot esculenta* Crantz)

The majority of Kenya's population depends on agriculture for their economic livelihood. More than one third of these people live in arid and semi-arid areas that are prone to frequent droughts. These lands have agricultural potential if adequate irrigation systems and drought-tolerant crops are available. Cassava is the fifth important staple crop after maize, rice, wheat and potato, providing food for over 800 million people in the tropics and sub-tropics. Cassava yields more than most staple crops – not only under optimal conditions but also under prolonged drought conditions.

This research aims at characterising drought tolerance in cassava at the phenotypic, physiological and molecular level. In addition, it aims at developing molecular markers for drought tolerance trait introgression in cultivars preferred by farmers. We will evaluate cassava phenotypic and physiological response to drought under field and greenhouse conditions. Molecular analysis of drought tolerance involves (i) the identification of differentially expressed genes (literature) and sequences blasted onto the cassava genome in order to confirm orthologs, and (ii) the use of OMICS tools¹ to characterise the cassava transcriptome and proteome modulation.

While a multi-site and multi-seasonal drought trial experiment has been set up in Kenya, a similar experiment under greenhouse conditions has been set up at the ETH Zurich. A number of contrasting cassava cultivars are being screened for drought tolerance. We will determine leaf retention, photosynthetic rates, stomatal conductance, water use efficiency, total biomass and storage root yield. Furthermore, molecular characterisation is to be carried out on selected drought-tolerant cassava genotypes. Currently, we are compiling a list of potential drought-tolerant candidate genes from the model plant *Arabidopsis thaliana*, and from other crops. In addition, we are developing primers in order to characterise transcript modulation upon drought via qRT-PCR (quantitative Reverse Transcription Polymerase Chain Reaction).

In 2009, the project has been initiated with field establishment in Kenya and greenhouse experiments in Switzerland. Data collection is still in its initial phase.

¹“OMICS tools” refers to genomics, proteomics and metabolomics

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Research fellow

Charles Orek, ETH Zurich, Switzerland

Supervisors

Wilhelm Gruissem and Herve Vanderschuren,
ETH Zurich, Switzerland;
Morag Ferguson, IITA, Nairobi, Kenya

Collaborator

Joseph Kamau, KARI, Nairobi, Kenya

Duration

October 2009 – October 2012



Establishment of contrasting cassava genotypes for drought tolerance screening under controlled greenhouse conditions, Switzerland

Whole genome profiling of *Theileria parva* isolates

East Coast Fever (ECF) is a fatal bovine lympho-proliferative disease endemic in sub-Saharan Africa. Twenty-eight million cattle are at risk of contracting the disease. It results in the death of at least one million cattle, causing economic losses of about 200 million dollars annually. In sub-Saharan Africa, the disease is primarily controlled by the use of chemical acaricides. However, this is becoming unsustainable due to high costs, increasing risks of emergence of acaricide-resistant tick strains, and the retention of toxic residues of the chemicals in meat, milk and the environment.

The infection and treatment method (ITM) of immunisation is a medium-term sustainable method increasingly being adopted by farmers in East, Central and Southern Africa. It involves inoculation of cattle with a near-lethal dose of live sporozoites of *Theileria parva* – the causative agent of ECF – along with a high dose of oxytetracycline to control the infection. One mixture of *T. parva* stocks that is increasingly used by local farmers is the Muguga cocktail. It comprises three stocks of *T. parva*: Muguga, Kiambu 5 and Serengeti-transformed. In this project, we will sequence the whole genomes of eight strains of *T. parva*, including the components of the Muguga cocktail and two buffalo-derived strains, using the high throughput 454 sequencing technology.

So far, the focus of the project has been on sequencing material preparation. Genomic DNA of *T. parva* Uganda, Marikébuni and Uganda/Muguga recombinant have been derived successfully and are being sequenced. Samples for the *T. parva* Kiambu-5 isolate are being prepared at ILRI. The genome of the Serengeti-transformed isolate has recently been sequenced by the 454 method using a combination of paired-end and shotgun libraries. It has been assembled into 32 contigs using the published *T. parva* Muguga genome as a template. Annotation against *T. parva* Muguga genome using sequence comparison methods such as BLAST algorithms¹ is underway.

After sequencing Kiambu-5, we will compare the three vaccine components in order to gain insight into the genes that might contribute towards the efficiency of the ITM. From the sequences we will identify (i) highly conserved and rapidly evolving genes, (ii) genes under positive selection that would relate to host-parasite interactions, and (iii) SNPs for micro-epidemiological studies. The genome sequences of the other parasite isolates will enable us to study evolutionary forces driving parasite diversity also on the level of sexual recombination.

¹ Basic Local Alignment Search Tool algorithms



The infection and treatment method vaccine being administered to a pastoralist's calf

Research fellow

Sonal Patel, ILRI, Kenya

Supervisors

Claudia Daubenberger, STI, Switzerland;
Richard Bishop, ILRI, Kenya

Collaborators

Weihong Qi, University of Zurich, Switzerland;
Etienne de Villiers, ILRI, Kenya

Duration

August 2009 – July 2012

Healthy rice for healthy people: Biofortification of zinc in rice

Zinc (Zn) deficiency is one of the most widespread nutritional disorders affecting resource poor women and children in South and Southeast Asia. Biofortification of rice, a major staple cereal for more than 2.5 billion people, is a cost-effective strategy to overcome human Zn deficiency. Although several rice lines with high grain-Zn have been developed through conventional breeding, the grain-Zn content is highly influenced by soil physico-chemical properties. In order to develop a line for multiple environments or for a specific target area, it is crucial that we understand the physiological mechanisms underlying Zn uptake and allocation under different soil environments. This project aims at characterising the Zn uptake mechanisms by roots, and Zn transport and remobilisation mechanisms from roots or leaves to grain in existing high and low grain-Zn rice genotypes. Furthermore, it aims at understanding how key soil and crop management practices (Zn fertilisation x water) affect Zn uptake and transport mechanisms within various soil environments and rice ecologies.

The range of Zn concentration causing deficiency/toxicity in rice is very narrow and identifying an optimum is essential. A preliminary experiment was set up to (i) identify the optimum concentration of Zn required for the normal growth of rice and (ii) to establish ideal conditions for the growth of rice in agar nutrient solution (ANS) until maturity. IR74, a Zn

deficiency-susceptible rice variety was grown in ANS in pots, placed in a greenhouse. The ANS consisted of 0.1 % agar +Yoshida's nutrient solution except Zn. Different Zn concentrations ranged from 0.0 to 6.5 μM of ZnSO_4 . The Zn treatments were imposed for two weeks starting three weeks after sowing.

The leaf symptoms with 0.15 and 1.5 μM ZnSO_4 were significantly lower than 0.0 and 0.005 μM ZnSO_4 . The symptom scores increased with higher Zn treatments, which might be due to Zn toxicity. There were no treatment effects on traits such as plant height, root length and root weight. However, higher Zn treatments showed an increased shoot dry weight, with 1.5 μM ZnSO_4 showing the highest shoot weight. Based on the initial results, 1.5 μM ZnSO_4 seems to be the optimum Zn level for normal growth of plants in ANS solution. Currently, we are quantifying the actual Zn concentration in plant tissues and Zn uptake by roots at different Zn treatments. This will further clarify the optimum Zn for normal growth in ANS solution.

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Research fellow

Somayanda Impa Muthappa, IRRI, Philippines

Supervisors

Sarah Beebout, IRRI, Philippines;
Rainer Schulin, ETH Zurich, Switzerland

Collaborator

Abdelbagi Ismail, IRRI, Philippines

Duration

October 2009 – August 2011



Rice (*Oryza sativa* L. var IR74) growing in a greenhouse at IRRI, Philippines

Farmers' responses to climate change in northern and central areas of Côte d'Ivoire

As most developing countries in Africa, Côte d'Ivoire experiences an increase in climatic variability with a reduction of up to 28% in rainfall and an increase in temperature since the late 1960s. Consequently, the dry season is getting longer both in the northern and central part of the country. This aggravates the already existing water shortage problems, which in turn severely affect both food crops and livestock. Therefore, this project aims at analysing the farmers' decision-making processes related to climate change, and their risk management strategies when faced with negative impacts of climate change. Furthermore, we will investigate farmers' perception of climate change and their adaptation behaviour taking into account: (i) the institutional context in Côte d'Ivoire, (ii) the socio-economic and market conditions, as well as (iii) individual factors such as values and climate risks perceptions.

We are identifying, analysing, and assessing:

- the personal decision field of farmers regarding farm management;
- the farmers' behaviour related to uncertainties of climate change;
- the relevant determinants of the decision behaviour of farmers leading to the adoption of certain adaptation strategies – with a special emphasis on water shortages;

- the institutional context regarding climate change and food security including the interplay between the relevant institutions and farmers;
- the adaptation strategies and the necessary conditions, which would lead to an active response to climate change by farmers;
- the feasibility of these adaptation strategies;
- the factors which prevent farmers from participating in adaptation strategies.

We will collect the data through qualitative interviews, focus groups and surveys. The data analysis will be carried out by using both common statistical tools and structural equation modelling. Based on the results we will then elaborate adaptation strategies to climate change that are feasible and acceptable. We will formulate recommendations for a successful implementation of these adaptation measures strategies. Finally, we will make suggestions on how to transfer this knowledge to the stakeholders.



Interview with livestock sellers, Côte d'Ivoire

Research fellow

Hermann Daisy N'nhon Comoé, ETH Zurich, Switzerland

Supervisors

Bernard Lehmann, Aysel Tikir and Michel Dumondel, ETH Zurich, Switzerland;

Dao Daouda, CSRS, Côte d'Ivoire

Collaborators

Bassirou Bonfoh, CSRS, Côte d'Ivoire;

Marcel Tanner, STI, Switzerland

Duration

October 2009 – January 2013

In 2008, the Sawiris Foundation for Social Development donated doctoral scholarships to the ETH Zurich for the programme “Sawiris Scholarships – Science & Technology for the South”. The goal of the programme is to promote the development of products or methods, which are directly relevant for improving the livelihoods of poor people in developing countries. The topics have to reflect high scientific standards and at the same time aim at direct implementation of the results. The first scholarship has been awarded to Shanker Raj Barsila from Nepal.

Improving grazing systems with yak-cattle crossbreds in Nepal

Sawiris Scholarships – Science & Technology for the South

In Nepal, livestock husbandry is an important source of livelihood, in particular in the mountain regions. About one million hectare of the total pasture land available in the country (12% of total land area) is situated in mountainous regions. Traditionally, common natural resources with a high potential for livestock production are used for this activity. However, rangeland productivity is constantly declining due to high grazing pressure of mixed herds of domestic animals such as mountain goats, sheep and large ruminants (cattle, yaks and their crossbreds, which are called “Chauries” in Nepali). Consequently, the sustainability of the livestock production system in the Nepalese highlands is severely threatened, and conflicts between different groups of herders about the use of pasture land affect the social relations.

Among the three currently applied livestock production systems – transhumance, sedentary and stall-feeding – the transhumance mode is the oldest one. Its specific feature is the herd movement between different grazing sites from temperate to high alpine altitude. The objective of this project is to promote a sustainable use and management of the natural pasture resources of the Eastern Himalayan Mountains by improving the existing transhumance systems. Simultaneously, the productivity and quality of milk from yak-cattle crossbreds should be increased.

The study area is the Kangchenjunga Conservation Area in the Taplejung district. In a first step, we will conduct a survey to characterise the local transhumant pastoral system of this area. Following the survey, a controlled grazing experiment will be performed at five different study sites, which are located at three altitudinal levels following the seasonal ascending and descending transhumant herd movement along the pastures and sub-pastures. In this experiment, we will assess forage intake, animal behaviour, milk yield and quality of the milk and milk products such as butter and ghee. Additionally, we will record changes in the vegetation such as herbage biomass yield in relation to the stocking densities before and after grazing. In parallel to the controlled grazing experiment, the Chauri herd movement patterns under free-ranging conditions will be recorded in detail.



A crossbred yak carrying goods in the Eastern Himalayan Mountains, Nepal

Research fellow

Shanker Raj Barsila, ETH Zurich, Switzerland

Supervisor

Michael Kreuzer, ETH Zurich, Switzerland

Collaborators

Svenja Marquardt, ETH Zurich, Switzerland;
Naba Raj Devkota, Tribhuvan University, Nepal

Duration

September 2009 – August 2012

As part of its capacity development activities, the North-South Centre supports visiting scientists and teaching stays. Under the umbrella of visiting scientists, two types of activities are funded: research stays of scientists from partner institutions in the South, as well as support for the attendance of scientists from the South at conferences organised by the ETH Zurich.

In addition, the North-South Centre promotes teaching activities of ETH scientists or ETH emeriti at partner institutions in the South.

Preparing a joint project at the Institute of Terrestrial Ecosystems

Visiting scientists Elena Ruiz and Hanoi Medina

In October 2009, Maria Elena Ruiz (Head of the Agrophysics Research Unit, GIAF, at the Agrarian University of Havana in Cuba) and Hanoi Medina (member of GIAF) visited the Group of Soil and Terrestrial Environmental Physics at the ETH Zurich. The main objective of the visit was to finalise the definition of the theoretical and practical aspects for a proposal to be submitted to the Swiss National Science Foundation and SDC (see p. 53).

During their visit, Maria Elena Ruiz and Hanoi Medina were introduced to various measurement methods and received training in several devices to measure soil water content. All the measurements were done in ferrasols brought from Cuba. In addition, Maria Elena Ruiz and Hanoi Medina obtained some devices and equipments necessary to make preliminary measurements in Cuban ferrasols on-site. This enhances the capacity of GIAF for conducting studies in the soil channel about the temporal changes of soil hydraulic properties.

The most important benefit arising from the visit is the expanded knowledge about the modern approach in Soil Physics science. A continued collaboration with the ETH Zurich will increase the theoretical level in soil physics at the GIAF and contribute to resolve agricultural problems in Cuba – such as the compaction of ferrasols in Havana Province that is adversely impacting various crops.

Winter school, TERI University, New Delhi, India

Teaching stay of Massimo Filippini, January 9 – 13, 2009

In India, the rapid economic growth impacts the availability and use of infrastructure and energy resources. Consequently, the challenge for policy-makers is to balance the need for sustained economic growth while addressing sustainability and equity issues both regional and intergenerational. Thus, policy initiatives have to rely on relevant research in order to improve the effectiveness of policy-making.

Several members of the Centre for Energy Policy and Economics (CEPE) at the ETH Zurich are conducting research on topics relevant to the sustainable development of India's energy sector – For instance, research on energy poverty, on disparities in access to energy resources, and on developmental and health impacts. However, the research findings have not yet been disseminated extensively in India.

Recognising the need for bridging the gap between research and policy, TERI University in partnership with CEPE organised a week-long winter school “Selected topics in energy economics and sustainable development”. Daniel Spreng (Prof. em. ETH Zurich) and Massimo Filippini (CEPE) gave several lectures. Approximately 50 participants attended, including research economists and economic practitioners from TERI University and other academic institutions in India. Apart from disseminating research results, the winter school provided an opportunity for networking and for developing new research partnerships.



Elena Ruiz (fourth from left) and Hanoi Medina (second from right) during the preliminary visit of Dani Or and Hannes Flühler in Havana, Cuba



Scholars attending the winter school at TERI University, India

Sound disciplinary knowledge is a prerequisite to conducting research for development successfully. Therefore, a specific North-South related curriculum at the MSc level is not advisable. However, continuing education and doctoral studies in development and cooperation may enhance the quality of research by specifically focusing on developing countries.

Currently, the following ETH programmes and courses are explicitly related to North-South topics: the NADEL programmes, the MAS in Sustainable Water Resources, and the North-South Centre colloquium.

Colloquium “Selected aspects of sustainable development”

The annual colloquium “Selected aspects of sustainable development” of the North-South Centre brings together scientists with different backgrounds working on development-related topics. It is the aim of the colloquium to allow doctoral students to discuss their projects with an interdisciplinary audience in order to hear new viewpoints and to get – at times – surprising, unexpected feedbacks on their research. In 2009, 14 young scientists exposed their projects to a critical and interested public. As usual, the majority of participants were doctoral students of the ETH Zurich. In addition, this year participants from the University of London and from the International Livestock Research Institute in Kenya added another international touch to the event – going beyond the exotic locations of the research projects. The topics ranged from linking smallholders to vegetable value chains in Tanzania to the impacts of biofuel production in Brazil, and human zinc nutrition in Iran, giving thereby evidence of the manifold aspects of development.

Despite the variety of topics, the participants could benefit from the discussions – as one student put it: “Exchanging views with different people coming from various backgrounds is very interesting and productive.” One of the common aspects was the challenge with which all projects are ultimately confronted: How to render the obtained results relevant for people in developing countries? This topic is a constant companion for us at the North-South Centre. With the internet platform “Howtopedia”, Maud Châtelet presented a possible solution to this challenge. The platform operates like Wikipedia, but for technologies and research results. By publishing this information, the online library aims at fostering technology and knowledge transfer. The accessibility and easily understandable presentation of this internet platform should facilitate the implementation of research results into practical use in everyday life.

Thanks to the contributions of all participants, the colloquium fulfilled its objective of being a forum for lively exchange and discussion. It was so lively and constructive that we decided to continue the debate at a monthly lunch meeting. Every first Tuesday of the month, young scientists interested in development issues meet for lunch in order to discuss their research topics. All interested researchers are very welcome to join.



At one of the monthly lunch meetings (from left to right): Sarah Sabry (University of London), Alessandro Palmoso (IHEID), Saraly Andrade de Sa, Renata Saizaki, Nazanin Roohani, Marc Zoss, Maud Châtelet (Howtopedia), Sascha Ismail, Isabelle Gómez, Gabriela Landolt (University of Zurich)

NADEL – Postgraduate Studies for Developing Countries

NADEL, a unit at the D-GESS, provides *training, research* and *consultancy* in the field of cooperation with developing countries. The present team consists of seven academic professionals and two administrative staff members. Furthermore, doctoral candidates are being supervised at all times.

Training

The Master of Advanced Studies (MAS) prepares students with a university degree (or equivalent qualification) for working with developing countries. It starts every second year and consists of three parts. A full-time study semester provides insight into the major social, economic, political, demographic and ecological development processes. This semester is followed by a project assignment in a developing country. During the concluding advanced semester, the participants have the opportunity to deepen and broaden their knowledge. The MAS language is German. Upon suc-

cessful completion of the MAS, the diploma “MAS ETH in Development and Cooperation” is awarded by the ETH Zurich.

The Certificate of Advanced Studies (CAS) is an advanced academic training for promoting the professional competences in key areas of development cooperation. The graduates are introduced to the main instruments used in development cooperation, and know the central topics in the current debate on international development policies. Upon successful completion of the training, the “Certificate in Advanced Studies ETH in Development and Cooperation” is awarded by the ETH Zurich. The advanced training courses are conceived as units focusing on specific topics and are geared to the needs in development cooperation.

Research

Research at NADEL focuses on providing empirical results and operational solutions. As part of an overarching objective to alleviate poverty in developing countries, the main areas of research are economic and institutional reform, strategies to reduce poverty and the means of verifying their effectiveness, as well as issues of sustainable resource use. Projects are generally tied into joint international research programmes that also include partners from developing countries.

Consultancy

The members of NADEL regularly carry out consultancy assignments for both governmental and non-governmental development agencies. Such mandates are important, as it is essential for the lecturers to resort to up-to-date experience while teaching. Key areas of consultancy are strategic and operational planning, as well as implementation of development cooperation projects and programmes. Furthermore, NADEL provides expert advice on rural development and natural resource management issues, on economic and political reforms, and on measuring poverty.

www.nadel.ethz.ch



MAS student presenting the results of a teamwork session

Master of Advanced Studies in Sustainable Water Resources

The Master of Advanced Studies in Sustainable Water Resources (MAS ETH SWR) is offered by the Institute of Environmental Engineering (D-BAUG) at the ETH Zurich. It advocates an integrated vision of sustainable water resources management, with a focus on technical training and high-level research. The programme is designed to advance the education of scientists and policy-makers on the importance of water availability and water scarcity in a changing world. At the same time, it is preparing the participants to face the challenges of the future such as climate and land use change, increased water use and population growth. The programme is interdisciplinary and focuses on case studies from around the world.

Participants in the MAS acquire skills which will enable them to become leaders in implementing sustainable and environmentally conscious water policies in their home

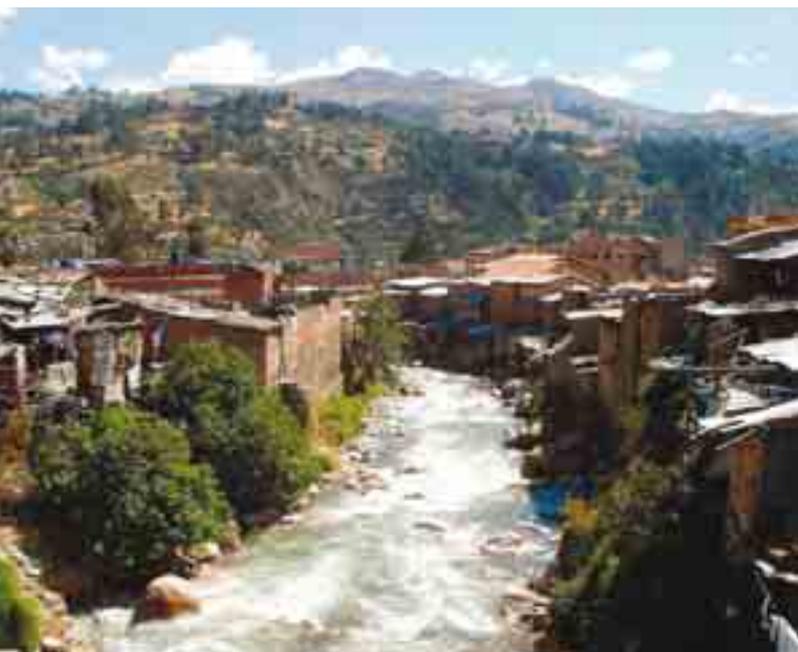
countries. The students propose their own research topic, around which a tailor-made study programme is established. The study programme includes Master level courses offered by the Institute of Environmental Engineering and other institutes at the ETH Zurich, as well as a Master thesis. The thesis topics include water quality, water quantity, water for agriculture, water for the environment, adaptation to climate change, and integrated water resource management.

The MAS in Sustainable Water Resources is designed to generate international collaboration in water-related research. It is anticipated that through the MAS future joint projects will be established between the ETH Zurich and universities from around the world.

The MAS in Sustainable Water Resources is a full-time 12-month study programme. All courses, seminars, and communication with academic advisors are held in English. The MAS thesis has to be written and defended in English.

Successful graduates in this programme acquire the academic degree Master of Advanced Studies ETH in Sustainable Water Resources (MAS ETH SWR). Currently, the seven MAS students come from Colombia, Ecuador, France, Italy and Peru. One student is self-supported. The remaining ones are supported by the SDC, SENACYT, a Sardinian scholarship programme, and the Oeuvre St Justin in Switzerland.

www.ifu.ethz.ch/MAS_SWR



Cordillera Blanca, Peru: Three MAS students are from Peru and have chosen a water-related research topic relevant to their home country.

Several departments of the ETH Zurich offer lectures and other courses related to developing countries on a regular basis. While some of these are focused exclusively on development challenges, others include certain aspects of countries in the South. In addition, NADEL provides training specifically pertaining to development and cooperation.

The list on the following pages provides an overview of teaching activities related to developing countries conducted by members of the North-South Centre.

Teaching activities related to developing countries

Title of course unit	Lecturer(s)	Type of course unit	% related to DC
Agricultural and Food Sciences (D-AGRL)			
Agri-food & Agri-environmental Economics			
Entwicklungsökonomie II	A. Crole-Rees	Lecture	50
International competition and local outcome	B. Lehmann	Lecture	30
Nahrungsressourcen	B. Lehmann	Lecture	100
Agronomy and Plant Breeding			
Kulturpflanzen	P. Stamp	Lecture	10
Crops and cropping systems	U.R. Sangakkara	Lecture with exercise	10
Animal Nutrition			
Ruminant science; tropical ruminant systems	M. Kreuzer, M.R. Goe, J.M. Müller, P. Voegeli, M. Schneeberger, C. Härdi-Landerer	Lecture with exercise	15
Tropical animal nutrition	K. Samarasinghe, S. Marquardt	Block course	100
Applied Entomology			
Angewandte Entomologie	S. Dorn	Seminar	20
Plant protection in the tropics: Entomology	S. Dorn, K. Mody	Lecture (biennial)	100
Recent advances in applied entomology	S. Dorn	Seminar	20
System-oriented management of herbivore insects II	S. Dorn	Lecture with exercise	10
Breeding Biology			
Tropical animal genetics and breeding	M. R. Goe	Lecture	100
Food Biotechnology			
Expt. Lebensmittelmikrobiologie und -biotechnologie	L. Meile, C. Jans, M. Schuppler	Practical/lab. course	35
Food fermentaton and biotechnology	C. Lacroix, C. Jans	Lecture with exercise/ Block course	10
Grassland Science			
Biogeochemistry and sustainable management	N. Buchmann	Lecture with exercise	50
Carbon mitigation	N. Buchmann, N. Gruber	Lecture/Seminar	50
Global change biology	N. Buchmann, H. Bugmann, A. Knohl, A. Wolf	Lecture/Seminar	50
Graslandssysteme	N. Buchmann	Lecture with exercise	70
Öko- und Ertragsphysiologie	N. Buchmann, J. Leipner	Lecture with exercise	5
Human Nutrition			
Human nutrition I	R. Hurrell, C. Wenk	Lecture	10
Human nutrition II	I. Egli, M. Zimmermann	Lecture	15

Title of course unit	Lecturer(s)	Type of course unit	% related to DC
Human Nutrition, continued			
International nutrition, food fortification	I. Egli	Lecture	80
Nutrition of different population groups	R. Hurrell	Lecture	30
Nutrition and chronic disease I	R. Hurrell	Lecture	10
Nutrition Biology			
The food chain: Links between plant, animal and human nutrition	C. Wenk	Lecture	30
Plant Nutrition			
Plant Nutrition II: Integrated nutrient management	E. Frossard, A. Oberson Dräyer	Lecture	20
Rhizosphere ecology	J. Jansa, K. Ehlers	Lecture with exercise	40
Biology (D-BIOL)			
Plant Biotechnology			
Applied plant biotechnology: Session on cassava research	H. Vanderschuren	Block course	50
Civil, Environmental and Geomatic Engineering (D-BAUG)			
Hydrology and Water Resources Management			
Water Resources Seminars	P. Molnar, invited speakers	Lecture/Seminar	80
Sustainability and Water Resources	P. Molnar, P. Perona, invited speakers	Block course	80
Sustainable Construction			
Internationale Sommerakademie Nachhaltiges Bauen	H. Wallbaum	Block course	5
Nachhaltiges Bauen	H. Wallbaum	Lecture	5
Sustainable product design	A. Köhler, J. Baumann, H. Wallbaum	Lecture	5
Earth Sciences (D-ERDW)			
Structural Geology and Tectonics			
Geomorphological evolution during formation of the Makran wedge (Teheran University, Iran)	J.-P. Burg	Lecture	80
Numerical modelling of deformation structures (Teheran University, Iran)	J.-P. Burg, S. Schmalholz	Block course	80
Seismic risk in the Makran subduction system (Geological Survey, Iran)	J.-P. Burg	Lecture/Seminar	80
Environmental Sciences (D-UWIS)			
Aquatic Chemistry			
The Science and Politics of International Water Management	T. Bernauer, B. Wehrli, D. Senn	Seminar	>50
Ecosystem Management			
Foundations of ecosystem management	J. Ghazoul, F. Knaus	Lecture with exercise/ Seminar	50

Title of course unit	Lecturer(s)	Type of course unit	% related to DC
Ecosystem Management, continued			
Disturbance ecology	J. Ghazoul, A. Pluess	Lecture with exercise/ Practical/lab. course	20
Managing for resistance and resilience	C. Kettle, J. Ghazoul	Lecture with exercise	30
Agroforstwirtschaft	J.-P. Sorg	Lecture	90
Erd- und Produktionssysteme (forest part)	J.-P. Sorg	Lecture	50
Weltwaldwirtschaft	J.-P. Sorg	Lecture	50
Environmental Biochemistry			
Sustainability in water supply, water use and management of aquatic ecosystems	J. Hering	Lecture with exercise	80
Environmental Policy and Economics			
Policy and economics of ecosystem services	S. Engel	Lecture	100
Environmental governance	S. Engel, W. Zimmermann	Lecture	50
Introduction to the theory of human-environment systems	S. Engel, R. Scholz, M. Siegrist, K. Seeland	Lecture	50
Seminar für Bachelorstudierende: Anthroposphäre	K. Seeland, S. Engel, T. Köllner, M. Siegrist	Seminar	50
Concepts and perspectives of sustainable development	C. Pohl, W. Zimmermann, S. Engel, V. Hoffmann	Lecture	50
Lunch seminar on resource, environmental and energy economics	L. Bretschger, S. Engel, M. Fillippini, T. Rutherford, H. Gersbach	Lecture	50
Humanities, Social and Political Sciences (D-GESS)			
Economic Research			
Entwicklungsländer in der Weltwirtschaft I	R. Kappel, I. Guenther, R. Schubert	Lecture	100
Entwicklungsländer in der Weltwirtschaft II	R. Kappel, I. Guenther	Lecture	100
Entwicklungsökonomie I (BSc Agrarwissenschaft)	R. Kappel	Lecture	100
Seminar for Ph. D. Students: Selected Aspects of Sustainable Development	R. Kappel, B. Becker, E. Frossard, J. Ghazoul	Colloquium	100
Business and politics of climate change	V. Hoffmann, R. Schubert	Lecture	30
Umweltökonomie	R. Schubert, M. Ohndorf	Lecture with exercise	30
Information Technology and Electrical Engineering (D-ITET)			
Technik, Energie und Umwelt	O. Zenklusen, T. Flüeler, C. Küffer, M. Kurath	Lecture	20

At the ETH Zurich, a large number of doctoral students do research related to developing countries. The topics cover various disciplines and the candidates come from a wide variety of countries. Many of these doctoral dissertations are funded via the North-South Centre. This underlines the role of the centre in individual capacity development.

The list on the following pages provides an overview of doctoral dissertations related to developing countries supervised by members of the North-South Centre.

Supervision of doctoral dissertations related to developing countries

Supervisor(s)	Candidate	Title of dissertation	North-South Centre programme
Agricultural and Food Sciences (D-AGRL)			
Agri-food & Agri-environmental Economics			
B. Lehmann, S. Réviron	Marguerite Paus	Collective agro-food supply chain and sustainable rural development: Articulation between internal governance and rural governance	
B. Lehmann	Martijn Sonneveld	Integrating agronomic and socioeconomic aspects of reversing soil degradation by tropical legume trees by GIS analysis	■
B. Lehmann, S. Réviron	Enkh-Amgalan Tseelei	Building up value chains in the countryside of Mongolia for pro poor economic development	
B. Lehmann, S. Réviron	Marc Zoss	Linking smallholders to high-value supply chains: Collective organizations and development interventions in domestic and export-oriented vegetable value chains in Tanzania	■
B. Lehmann, M. Dumondel, A. Takir	Hermann Comoé	Contribution to food security by improving farmers' responses to climate change in northern and central areas of Côte d'Ivoire	■
Agronomy and Plant Breeding			
P. Stamp, Ham Le Huy (Ministry of Agriculture and Rural Development, Vietnam)	Chi Dang Ngoc	Protein quality improvement of waxy maize by incorporation of QPM in South East Asia	
P. Stamp, R. Sangakkara (University of Peradeniya, Sri Lanka)	Chaminda Egodawatte	Integrating agronomic and socioeconomic aspects of reversing soil degradation by tropical legume trees by GIS analysis	■
P. Stamp, S. Jampatong (Kasetsart University, Thailand)	Quanjai Rupitak	The dynamics of female flowering and grain set in sweet corn	
Animal Nutrition			
M. Kreuzer, A. Oberson, H.D. Hess (ALP, Switzerland)	Souheila Abbeddou	Improving small ruminant productivity in dry areas through cost-efficient animal nutrition and improved quality of milk and dairy products	■
M. Kreuzer F. Dohme (ALP, Switzerland)	Blasius Azuhwi	Renaissance of a neglected forage plant: Nutritional and anthelmintic potential of sainfoin	
M. Kreuzer E. Frossard	Céline Clément	Development of a fertility enhancing supplement for breeding bulls and cows based on the Andean plant species Maca (<i>Lepidium meyenii</i> Walp.)	
M. Kreuzer, N. Buchmann	Svenja Marquardt	Activity and plant selection patterns of free-ranging cattle in Southern Bolivian mountain forests, and the impact of cattle stocking density on the woody vegetation	
M. Kreuzer, S. Marquardt	Shanker Barsila	Improving grazing systems with Nepalese yak crossbreeds to foster livelihood of mountain farmers in the Taplejung district of Nepal	■
M. Kreuzer, F. Leiber, C.S. Soliva, S. Marquardt	Anuraga Jayanegara	Impact of increasing the complexity of forage composition in ruminant feed on ruminal biohydrogenation and methanogenesis	
M. Kreuzer, S. Marquardt, B. Rischkowsky	Janina Meier	Testing the concept of diversity in feeding in the tropics and subtropics: Effect of experience, adaptation and choice on feed selection, intake and foraging behaviour in sheep	

Supervisor(s)	Candidate	Title of dissertation	North-South Centre programme
Applied Entomology			
S. Dorn, K. Mody	Mirco Plath	Increased plant health in silvopastoral and pasture-afforestation systems	■
Food Biotechnology			
C. Lacroix, L. Meile	Stephan Wullschleger	Biodiversity and microbial safety of artisanal Malian sour milk fèné and development of adapted starter cultures for controlled production	
L. Meile, C. Lacroix	Christoph Jans	Microbiological analysis of spontaneously fermented camel milk and its impact on the development of biotechnological processes for new safe products	■
L. Meile, J. Wangoh (University of Nairobi, Kenya)	Patrick Njage	Safety analysis of the microflora in spontaneously fermented camel milk products and interventions in the production chain	■
Grassland Science			
N. Buchmann, W. Eugster	Sebastian Wolf	Carbon sequestration potentials of different land use types in the tropics (Panama)	■
N. Buchmann, M. Scherer-Lorenzen, J. Jansa	Fabienne Zeugin	Functional significance of tree diversity for nutrient dynamics in a tropical plantation	
N. Buchmann, M. Scherer-Lorenzen	Stefan Trogisch	The functional significance of tree diversity: Nitrogen cycling in subtropical forests of China	
Human Nutrition			
R. Hurrell	Maria Andersson	Efficacy trial of dual fortified salt in southern India	
R. Hurrell, I. Egli, R. Wegmüller	Colin Cercamondi, Marica Brnic	Novel staple food-based strategies to improve micronutrient status for better health and development in sub-Saharan Africa	
R. Hurrell, I. Egli	Stéphanie Good	Animal source foods and nutrition during early life: An evaluation of possible links between livestock-keeping, food intake and nutritional status of young children	■
R. Hurrell, I. Egli	Nico Petry	Identification of iron rich varieties of common beans (<i>Phaseolus vulgaris</i>) for iron biofortification	
R. Hurrell	Barbara Troesch	Optimizing iron absorption from the DSM/WFP complementary food powder mix	
R. Hurrell, R. Wegmüller	Siwaporn Pinkaew	Triple fortification of rice with iron, zinc and vitamin A	
R. Hurrell, R. Wegmüller	Dominik Glinz	Aetiology, prevention and control of anaemia in sub-Saharan Africa	
R. Hurrell, I. Egli	Maren Fischer	Improving iron and zinc nutrition in Ethiopian children consuming injera based diets	
Plant Nutrition			
E. Frossard, A. Oberson, I. Rao (CIAT, Colombia)	Sabine Douxchamps	Introduction of <i>Canavalia brasiliensis</i> in the crop-livestock system of the nicaraguan hillsides: Environmental adaptation and nitrogen dynamics	■
E. Frossard, E. Bünemann, A. Oberson	Knut Ehlers	Composition and dynamics of bacterial phosphorus in phosphorus deficient soils	
E. Frossard, A. Gaume (ACW, Switzerland), I. Rao (CIAT, Colombia)	Anna-Elizabeth Louw-Gaume	Adaptation of Brachiaria grasses to low-P soils of the hillsides of Central America	■

Supervisor(s)	Candidate	Title of dissertation	North-South Centre programme
Plant Nutrition, continued			
E. Frossard, J. Jansa, F. Oehl (University of Basel), R. Abaidoo (IITA, Nigeria)	Martin Jemo	Mychorrhizas and maize yields in different land-use systems in Southern Cameroon	■
E. Frossard, A. Assa and S. Ake (University of Cocody, Côte d'Ivoire), T. Bi Tra (Ivorian Institute of Technology, Côte d'Ivoire), A. Tschannen (CSRS, Côte d'Ivoire)	Hgaza Kouassi Valery Kouamé	Understanding yam (<i>Dioscorea</i> spp.) response to fertilizer application	■
E. Frossard, M.P. Sedogo (Université polytechnique de Bobo, Burkina Faso), F. Lompo (INERA, Burkina Faso), S. Koala (CIAT, Kenya)	Delwendé Innocent Kiba	Impact of organic amendments on the phosphate nutrition of crops and on phosphate transformations in lixisols from semi-arid West Africa	■
Biology (D-BIOL)			
Plant Biotechnology			
W. Gruissem, H. Vanderschuren, T. Fitzpatrick (University of Geneva)	Li Kuan-Te	Biofortification of cassava and rice	
W. Gruissem, H. Vanderschuren	Isabel Moreno	Engineering cassava brown streak virus resistance in cassava	
W. Gruissem, H. Vanderschuren, M. Ferguson (IITA, Kenya)	Charles Orek	Characterization of drought tolerance in cassava (<i>Manihot esculenta</i> Crantz)	■
Civil, Environmental and Geomatic Engineering (D-BAUG)			
Computational Physics of Engineering Materials			
H. J. Herrmann	Petrucio Barrozo da Silva	Organizing particles and pedestrians counter flow by ratchet design	
H. J. Herrmann	Neto Apiano, Ferreira de Morais	Non-newtonian flow through three-dimensional porous media	
H. J. Herrmann	Hansjörg Seybold	Modeling river delta formation	
H. J. Herrmann	Martins Carneiro, Vinicius Marcus	The behavior of assemblies of electric charged particles	
H. J. Herrmann J. Soares de Andrade Jr.	Saulo Davi Soares e Reis	Study of complex networks	
H. J. Herrmann L.R. da Silva	Gabriel Alves Mendes	Redes Complexas e aplicações	
Ecological Systems Design			
S. Hellweg, T. Köllner, A. Köhler	Michael Curran	A global framework for compensating the biodiversity impacts of agricultural products in the North-South context	■
S. Hellweg, A. Köhler, T. Köllner, S. Pfister	Francesca Verones	Development of a global and spatially differentiated methodology for the assessment of agricultural (ground-) water use impacts on terrestrial biodiversity	■
Groundwater and Hydromechanics			
W. Kinzelbach R. Kappel	Li Haitao	Sustainable water resources management in the Yanqi Basin, Sinkiang, China	
W. Kinzelbach, A. Bardossy	Philipp Meier	Sustainable water management in the Kafue Basin, Zambia	

Supervisor(s)	Candidate	Title of dissertation	North-South Centre programme
Sustainable Construction			
H. Wallbaum, A. Grêt-Regamey, R. Mahon (Pragna Research and Consultancy Service, India)	Sabrina Krank	Assessment of sustainable urban development in Asian megacities of developing countries: Review of existing practices and method development based on lessons learned	
Earth Sciences (D-ERDW)			
Engineering Geology			
W. Balderer	Hadi Jafari	Irrigation Return Flow in Areas of Southern Iran	
Structural Geology and Tectonics			
J. P. Burg	Asghar Dolati	Stratigraphy and structural evolution of the Makran accretionary wedge in southern Iran	
J. P. Burg, N.M. Chaudhry (Punjab University, Pakistan)	Saima Gulzar	Characterization of materials, environmental impacts and conservation strategy for historic structures of the Shahdara Complex-Lahore (Pakistan)	
Environmental Sciences (D-UWIS)			
Aquatic Chemistry, Eawag			
S. Hug B. Wehrli, A. Vögelin, R. Kretzschmar	Linda C. Roberts	Arsenic dynamics in groundwater-irrigated and seasonally flooded paddy soils in Bangladesh	
H. Wang, B. Wehrli, A. J. B. Zehnder	Jafet Anderson	Rainwater harvesting for irrigation in South Africa	
D. Senn, B. Wehrli, M. Lehmann	Roland Zurbrügg	Biogeochemistry of the Kafue River in Zambia	
Aquatic Physics, Eawag			
A. Wüest, M. Schmid, B. Wehrli, J.-P. Descy	Natacha Pasche	Nutrient cycling and methane production in Lake Kivu	
A. Wüest, D. Senn, B. Wehrli, A. Schleiss	Manuel Kunz	Downstream effects of the hydropower-reservoirs in the Zambezi River Basin	
Ecosystem Management			
J. Ghazoul	Smitha Krishnan	An ecosystem service approach to agricultural security in a sacred landscape mosaic, India	■
J. Ghazoul	Virginie Boreux	A comparative assessment of pollination services and crop management in Indian coffee growing landscapes	■
J. Ghazoul	Julia Born	Species coexistence among tropical rainforest trees: The paradox of generalist species	
J. Ghazoul, C. Kettle	Sascha Ismail	Effects of fragmentation and of invasion by alien plants on the breeding ecology of threatened tree species of the Western Ghats, India	
J. Ghazoul, C. Kettle	Aline Finger	Gene flow and genetic diversity among inselberg tree species in the Seychelles	
L. P. Koh, J. Ghazoul	Janice Lee	Modeling land use for decision support in the context of biofuel expansion	

Supervisor(s)	Candidate	Title of dissertation	North-South Centre programme
Ecosystem Management, continued			
J. Ghazoul, J.-P. Sorg , R. Felber (NADEL)	Zora Urech	Remaining forest fragments in a mosaic landscape in Madagascar: Ways to improve their management with regards to biodiversity and local livelihood strategies	■
J. Ghazoul, G. Rajoelison (ESSA, Madagascar)	Lanto Andriambelo	Critères d'aménagement de l'espaces forestier villageois dans le Menabe central	■
J.-P. Sorg, M. Hufty (University of Geneva, Switzerland)	Sajad Bukobero	Social practices and conservation policies. Enhancing livelihoods through sustainable forest management in Madagascar	■
J.-P. Sorg , A. Buttler (EPFL, Switzerland)	Clémence Dirac	Contribution à l'aménagement multifonctionnel et participatif des espaces forestiers du Menabe central, Madagascar	■
J.-P. Sorg, B. Lehmann (IED) , R. Steppacher (University of Geneva)	Isabelle Gambetta	L'importance des produits forestiers non ligneux pour les communautés villageoises des environs de la cordillera Huacamayos, province de Tena, Amazonie équatorienne	
J.-P. Sorg, G. Rajoelison (ESSA, Madagascar)	Mihajamanana Rabenilalana	Intégration de la conservation de la biodiversité et des moyens d'existence des communautés rurales dans les paysages forestiers fragmentés de Manompana (Madagascar)	■
J.-P. Sorg, J.-M. Gobat (University of Neuchâtel), A. Buttler and M. Reinhard (EPFL, Switzerland)	Olga Raharimalala	Optimisation des stades de formations forestières secondaires dans la pratique de la culture sur brûlis. Cas d'Andranolava dans le Menabe central (Madagascar)	
J.-P. Sorg , G. Rajoelison (ESSA, Madagascar)	Eliane L. Raminoarisoa	Analyse de l'interface homme-forêt. Elaboration de modèles de gestion participative des forêts secondaires très dégradées dans le nord-ouest de Madagascar	
J.-P. Sorg, G. Rajoelison (ESSA, Madagascar)	Voahiraniaina Razafintsalama	Rôle et importance des formations secondaires dans l'aménagement des espaces forestiers. Cas du Menabe central (Madagascar)	
J.-P. Sorg, G. Rajoelison (ESSA, Madagascar)	Naritiana Rakotoniaina Ranaivoson	Etude de la forêt sclérophylle de moyenne altitude à <i>Uapaca bojeri</i> et du <i>Borocera cajani</i> en vue d'une amélioration de la gestion. Cas d'Arivonimamo, province d'Antananarivo, Madagascar	
Environmental Biogeochemistry			
J. Hering	Joanne Favre-Bulle	Diagenetic evolution and mineral composition of Fe/Mn layers in Lake Baikal, Russian Federation	
J. Hering	Vanessa Sternitzke	Optimisation of co-precipitation processes in apatite-based filter materials for the removal of fluoride from drinking water	
Environmental Philosophy			
G. Hirsch Hadorn , C. Pohl, U. Wiesmann (University of Bern, Switzerland)	Gabriela Wülser	Structuring the science-policy nexus in sustainability research	
Environmental Policy and Economics			
S. Engel , G. Bostedt (SLU, Sweden), L. Bretschger (D-MTEC)	Astrid Zabel	New policy mechanisms to mitigate wildlife-livestock conflicts	■
S. Engel , K. Holm-Müller, (University of Bonn, Germany)	Tobias Wünscher	Spatial targeting of payments for environmental services in Costa Rica	

Supervisor(s)	Candidate	Title of dissertation	North-South Centre programme
Environmental Policy and Economics, continued			
S. Engel, M. Maréchal, (University of Zurich, Switzerland), A. Diekmann (D-GESS)	Carina Cavalcanti	The role of cooperativeness in the adoption of sustainable common resource management: A shrimp trap exchange programme in a natural reserve in Brazil	■
S. Engel, M. Kosfeld (University of Frankfurt, Germany)	Devesh Rustagi	Economic incentives for the conservation of coffee forests in Ethiopia: Incorporating social preferences through experimental approaches	■
S. Engel, C. Palmer	Saraly Andrade de Sa	Direct and indirect impacts of biofuel production in Brazil: Land use, forest conversion and social welfare	■
S. Engel, C. Palmer	Renata Saizaki	Climate change, land use and external changes	
Natural and Social Science Interface			
R. W. Scholz, T. Koellner, S. Hellweg	Laura de Baan	Impacts of land use on biodiversity: Development of a spatially differentiated global assessment methodology for life cycle assessment	■
Plant Ecology			
H. Olde Venterink, P. Edwards, M. Bustamente (University of Brasilia)	Luciola Lannes	Are exotic invasions and species loss related to N:P stoichiometry? A test for the Brazilian Cerrado vegetation	
H. Olde Venterink, P. Edwards, W. Suter (WSL, Switzerland)	Judith Sitters	Vegetation-herbivory interactions in Tanzania: Importance of N and P fluxes and stoichiometry	
W. Suter (WSL), P. Edwards, H. Olde Venterink	Annette Stähli	Herbivore-vegetation interactions in tall grass savannas: Exploring the limits for grazers to drive landscape dynamics	
H. Olde Venterink, P. Edwards	Wilma Blaser	Interactions among hydrology, vegetation and herbivores in the Kafue flats floodplain, Zambia	
Society, Environment and Culture			
K. Seeland, P. Edwards	Franz Huber	What defines sustainability? An ecological and societal analysis of wild medicinal plant and mushroom collection in the Hengduan Mountains, Southwest China	
Soil Protection			
R. Schulin, R. Hurrell, A. Khoshgoftarmansh (Isfahan University of Technology, Iran), R. Kelishadi (Isfahan University of Medical Sciences, Iran)	Nazanin Roohani Sharaki	Zinc nutrition in Central Iran – A case study	■
R. Schulin, E. Frossard, A. Khoshgoftarmansh (Isfahan University of Technology, Iran)	Anja Gramlich	The role of Zn fluxes through the food chain for human nutrition in Zn deficient agro-ecosystems of Iran	
Humanities, Social and Political Sciences (D-GESS)			
Economic Research			
R. Schubert, S. Engel	Markus Ohndorf	Regulatory and contractual issues within the Clean Development mechanism of the Kyoto Protocol	

Supervisor(s)	Candidate	Title of dissertation	North-South Centre programme
NADEL			
I. Guenther, S. Klasen	Elena Gross	Impact of water interventions in sub-Saharan Africa	
I. Guenther	Jonathan Gheysens	Global warming and risks and poverty in sub-Saharan Africa	
I. Guenther	Alexandra Horst	Economics of sanitation in developing countries	
R. Kappel, T. Bernauer	Claudia Casarotto	Towards an optimal water use in the Kafue region of the Zambezi Basin	
R. Kappel	Ivan Pavletic	The political economy of pro-poor growth	
Management, Technology, and Economics (D-MTEC)			
Centre for Energy Policy and Economics (CEPE)			
M. Filippini	Mozhgan Alaeifar	Market behavior of OPEC countries and the effect on oil prices	
Sustainability and Technology			
V. Hoffmann, R. Schubert, E. Jochem	Malte Schneider	Corporate responses to the emerging global carbon market	
Centre for International Studies (ETH Zurich/University of Zurich)			
K. Michaelowa, J. Bourdon	Alain Patrick Nkengne Nkengne	Contract teacher policy and the education for all objective: A political economic analysis	
K. Michaelowa, P. Finke	Aliya Khawari	The political economy of microfinance	
K. Michaelowa, H. Kriesi, S. Trakulhun	Linda Maduz	Analyzing the determinants of welfare state development in Asia	
K. Michaelowa	Paula Castro	The CDM and climate change mitigation strategies for rapidly industrializing countries after 2012: The low-hanging fruits issue revisited	
K. Michaelowa	Sebastian Fehrler	Preferences, signalling and sorting in the labour market. Consequences for the public sector and in particular for schools	
K. Michaelowa	Florens Flues	The political economy of the Clean Development Mechanism: An empirical analysis of the economic and political influences on the Clean Development Mechanism's (CDM) Executive Board and determinants of CDM project supply and demand	
K. Michaelowa	Sophia Hännny	The impact of process conditionality on democratisation in developing countries	
K. Michaelowa	Martin Stadelmann	Negotiating levels of ambition for climate change mitigation actions in developing countries	
K. Michaelowa	Anke Weber	Sanctioning, clientelism and ethnic parties: The impact of ethnicity on primary and secondary education in Africa	



البيان المالي المتكامل

2014	2013	2012	
214	326	109	
63	107	214	
		210	
332	222	302	
	318		
220		358	
63			
102	102		
14	20		
2,78	2,78	2,77	
20,2	19,3	27,4	
440,0	440,0	440,0	

Final workshop with farmers, El-Bab, Syria

If we resolve to harmonise our approach to implementing agricultural research, to manage for results, and to partner with all users of our research, the possibilities for change and impact are endless.

Katherine Sierra, CGIAR (2009)

Networking and communication

Doing research for development, the North-South Centre finds itself in a specific niche of the scientific landscape. Joining forces with partner institutions is thus very important in order to enhance the validity of our approach and, consequently, to generate impact. As part of the strategy process, a stakeholder survey shed light on the perception of the North-South Centre by our peers in Switzerland.

In the course of the strategy development process, an external consultant conducted a survey in order to learn about the stakeholder perception of the North-South Centre, as well as their expectations for the future orientation of the centre. The interviewed colleagues represent the following Swiss institutions: Swiss Agency for Development and Co-operation (SDC), Commission for Research Partnerships with Developing Countries (KFPE), Swiss National Centre of Competence in Research North-South (NCCR North-South), State Secretariat for Economic Affairs (SECO), and Post-graduate Studies for Developing Countries (NADEL).

In summary, the findings of the survey show that the research for development (R4D) environment within Switzerland is fragmented and a closer cooperation and coordination would strengthen the impact of the different activities. In general, the creation of the North-South Centre has been judged to be positive. The centre is well-managed, professionally presented, and organises interesting conferences with highly qualified speakers. It is also very well-linked on an international scale. The stakeholders see the North-South Centre as “entry-point” to the scientists of the ETH Zurich dealing with R4D.

However, the North-South Centre does not do full justice to its name, still focusing too much on agriculture. The stakeholders miss a clear programmatic direction of the centre (see p. 8 and p. 33 for our new thematic research areas). The ETH Zurich should make better use of its potential and should strengthen its engagement in research and education on issues of global change. In addition, the interviewees expressed their reservation about the capacity development activities of the North-South Centre. They would like to see capacity building to be more institutional than individual (see p. 63 for our assessment of this perception).

The findings of the stakeholder survey reveal a considerable communication need. First, the institutional set-up

is not very well understood in its specificity as competence centre of the ETH Zurich – a network of scientists each having his/her specific research needs. Second, the activities of the North-South Centre and its members are not known well enough. Consequently, the North-South Centre needs to explore mechanisms to increase the visibility of the institution and the multiple research partnerships with institutions and individuals in the South. It should also increase the visibility of the broad range of activities and topics covered by its members. In order to do so, we have to communicate in a more targeted manner and more frequently to the broad audience of stakeholders. Furthermore, as a competence centre which lives off its network capital, its members need constant incentives and motivation to remain committed. One means to do so is by providing platforms for them to communicate their activities. By developing an additional communication tool in the form of a public newsletter and restructuring the public website in the year 2010, we will work toward the achievement of these goals.

Some of the most visible communication activities of the North-South Centre are its conferences, fora, lectures and workshops organised throughout the year. These events provide opportunities for the North-South Centre to position itself, and for our members to communicate their research activities. At the same time, they are important networking platforms, which complement the manifold networking activities of the North-South Centre and its members.

Conferences, lectures and workshops

At the different North-South Centre events organised in 2009, speakers and participants discussed a broad range of topics, which are highlighted below. The Annual Conference and a workshop with the Volkswagen Foundation can be seen as starting points for our increased focus on “Technology and infrastructure” (see also p. 8). In the North-South Forum, we debated on how to implement research findings into policy and practice (see also p. 18). Furthermore, the North-South Centre contributed to a workshop on this topic organised by the Alliance for Global Sustainability. Finally, a public lecture dealt with environmentally forced migration.

Energy for development

Energy poses multiple challenges for developing countries as the harnessed supply is not keeping up with growing demand. The production and use of fuels as well as the generation of electricity may expose the environment and populations to high risks. At the same time, industrialised nations contribute the most to global CO₂ emissions, whereas developing countries are expected to suffer the most from the impacts of climate change.

The joint conference of the North-South Centre and the Energy Science Center highlighted and explored pathways to sustainable energy systems in developing countries – in particular, harnessing renewable energy sources and improving energy efficiency.

www.esc.ethz.ch



Ralph Eichler, President of the ETH Zurich, welcoming the participants of the conference on energy for development

Engineering for development

Engineering knowledge can contribute directly to helping poor people meet their basic needs. In a workshop with the Volkswagen Foundation, participants from several departments discussed which engineering topics are important for the future development of countries in the South, and how engineering sciences could be fostered in Africa.

The participants agreed that a simple transfer of technologies from the North to the South would not do justice to the complex conditions in developing countries. As teaching in engineering sciences is not widespread in African universities, educating young academics is seen as the most important step to take. Local capacities are needed to develop ecologically, economically and socially adapted technologies.

www.volkswagenstiftung.de

From research to implementation

Research for development strives to contribute to sustainable development and to improve the living conditions in developing countries. However, moving from lab or field experiments into full-scale implementation of research results remains a major challenge for most research projects.

The second North-South Forum demonstrated that multiple relations between the different stakeholder groups shape the linking of research, policy and practice. Social, cultural, political, organisational, institutional and legal factors determine the behaviour of the actors involved.



Kirk Smith (centre) and Shonali Pachauri (right) discussing with an interested participant of the conference on energy for development.

Environmentally forced migration and drought in Mexico

Professor Úrsula Oswald Spring of the National University of Mexico lectured on environmental and social problems in Mexico that have added to the complexity of reasons for international migration and, consequently, to the number of illegal immigrants in the USA.

The erosion of social cohesion and networks related to migration, the loss of livelihood, the illegal crossing with the help of transnational criminal gangs, and the US policy of deportation have created a situation of low intensity war. Úrsula Oswald Spring concluded that cooperation instead of repression, and development activities that improve livelihood in remote rural areas, could avoid the rise of criminal behaviour.

www.ied.ethz.ch



Professor Úrsula Oswald Spring, National University of Mexico, key speaker at a public lecture organised jointly with the IED

From outreach to partnership: Defining the role of universities in achieving sustainability A workshop organised by the Alliance for Global Sustainability and hosted by the Competence Center Environment and Sustainability of the ETH Domain.

Problems of sustainability are complex, multi-disciplinary and value-laden. Academic institutions are in a unique position to assemble whatever expertise may be needed for understanding such problems. Sustainability research should be directed primarily towards finding solutions and bringing about change, which requires conceptual advances in our understanding of how environmental, technological and societal systems interact. Adapting solutions to particular circumstances call for collaboration between researchers and local actors.

At the workshop, participants from academia and non-academic organisations discussed how universities and researchers could improve their partnerships with non-academic stakeholders. The participants found that for new knowledge to be used effectively, it must be relevant to the problem in question, and accessible and credible to the user. Ensuring this requires a continuing dialogue between researchers and actors in society.

www.ags.ethz.ch/partnership

Networking consists of formal memberships in national and international governance bodies or fora and selective interaction with strategic partners. In 2009, the networking of the North-South Centre focused on the consolidation of our position within the ETH Zurich and on our role in the national R4D environment.

Ultimately, the increasing recognition of the North-South Centre as important actor in the field of research for development enabled us to present impressive speakers at our conferences.

Networking

The North-South Centre is actively involved in networking at both the operational and the strategic level, nationally and internationally. This involvement ranges from membership in various institutions to governance and oversight responsibilities. On our website, we have listed some fifty international and development-relevant commitments of our members to various scientific associations, advisory boards or similar institutions (www.northsouth.ethz.ch/networking).

Individual members of the North-South Centre are involved in various strategic bodies of the ETH Zurich, such as the Strategy Taskforce of the School Board (N. Buchmann), the Research Commission (J. Ghazoul, H. Herrmann), the Ethics Commission (I. Egli), the International Advisory Board (W. Kinzelbach), or steering committees of other competence centres.

Networking within the ETH Zurich and the ETH domain

Within the ETH Zurich, the North-South Centre is well recognised by the School Board as well as by the professors and scientists. The large number of members is an indicator of its broad acceptance. Internally, the North-South Centre positions itself among other ETH units with an international mandate, such as the Postgraduate Studies for Developing Countries (NADEL) or International Institutional Affairs (IIA). We participate in the bi-monthly meetings of the International Forum established by IAA. Members of the management teams of IIA and the North-South Centre interact regularly in operational activities depending on the respective mandates. With regard to NADEL, the physical vicinity after the move of the North-South Centre office in July 2009 boosted the day-to-day interaction and the personal relationships between both teams.



Lawrence Agbemabieses,
United Nations Environment Programme



Samih Sawiris,
Sawiris Foundation for Social Development

Additionally, ETH Sustainability and the Alliance for Global Sustainability at the ETH Zurich (AGS) are important partners for the North-South Centre. Since the reorganisation of ETH Sustainability in 2008, we could establish a regular exchange of experiences, which in 2009 led to the planning of a joint summer school on urban development to be implemented in 2010. Our involvement in activities of the AGS is portrayed on p. 50 and p. 109. In September 2009, we held our Annual Conference as a joint event with the Energy Science Center of the ETH Zurich, by which we reached out to a new target group within the ETH Zurich and beyond. Our contribution to the MAS in Sustainable Water Resources and our collaboration with the ETH Foundation is discussed on pp. 6–7. With regard to the ETH Domain, the Competence Center Environment and Sustainability (CCES), Eawag and especially its Department of Water and Sanitation in Developing Countries (Sandec), as well as EPFL with

cooperation@epfl are our main counterparts. The link to our sister centre cooperation@epfl was strengthened by a visit of members of our management team to Lausanne, in response to their visit to Zurich in 2008.

Networking within Switzerland

At the national level, the Managing Director of the North-South Centre is an *ad personam* member of the Commission for Research Partnerships with Developing Countries (KFPE). We contributed to the production and editing of the KFPE brochure “Cooperating for Success. Benefits of Research Partnerships with Developing Countries”, which presents twelve successful projects, including an example of our research programme, showing the advantages of scientific partnerships with institutions in the South. The publication is targeted mainly at policy-makers. We were also present at the KFPE annual conference in Lugano that focused on this topic.



Anton Stadler, Swiss Agency for Development and Cooperation



Dorah Lebelo, Women for Climate Justice, South Africa



Urs Wiesmann, NCCR North-South

As peers we interact mainly with the Swiss members of the National Centre of Competence in Research North-South (NCCR North-South). Among others, we had Urs Wiesmann from the University of Bern as speaker at our North-South Forum in May. Subsequently, we agreed to organise these fora in the future as joint events. We continued our friendly ties with the office for international relations of the University of Zurich, mainly in an informal manner.

Reflecting our long tradition in agricultural research, the North-South Centre remained an active partner in the Swiss Forum for International Agricultural Research (SFIAR). The SFIAR Award 2009 was given to our Steering Committee member Silvia Dorn and her team of the Applied Entomology Group for a project in a former North-South programme. Furthermore, we continued to manage the secretariat of the association LivestockNet (see below).



Padruot Fried, SFIAR President, and Silvia Dorn, SFIAR Award winner 2009

The North-South Centre liaises with the Swiss Agency for Development and Cooperation (SDC) and with other federal offices. Contract-wise, SDC is still our main counterpart. We interacted with the State Secretariat for Economic Affairs (SECO) concerning framework conditions for research in India, with the State Secretariat for Education and Research (SER) on a national research agreement with Ethiopia, and we explored closer collaboration with the Federal Office on Agriculture (FOAG) in the context of the Swiss commitment to FAO.

With respect to the private sector we maintained contacts with the Syngenta Foundation for Sustainable Agriculture and with Nestlé.

Throughout the year, we presented our research collaboration activities at various national and international events,

LivestockNet

LivestockNet is a Swiss network of university, private sector, NGO and government stakeholders working in livestock and development. Since 2007, the North-South Centre has managed the secretariat of this association. In 2009, two meetings were held. The first meeting at the premises of the member organisation Intercooperation, was dedicated to administrative tasks and exchange among the members. The discussion on the future of LivestockNet, its mission, and its structure was continued. In 2009, LivestockNet could celebrate its tenth year of existence. The book launch of "Livestock in a changing landscape", to which several members of LivestockNet contributed was identified as a potential opportunity to make a public appearance. It finally took place in March 2010.

The second meeting was held at the field station of Swissgenetics in Mülligen. It was dedicated to the topics of artificial insemination and to the fertility enhancing plant Maca (*Lepidium peruvianum* Chacon), a vegetable from the Andes. A study conducted by a joint ETH Zurich/Swissgenetics group in Peru and at the field station of Swissgenetics explores the potential of Maca as a fodder supplement.

among others at the Annual Conference of SDC in Zurich, which focused on climate change and development.

Networking with international partners

Internationally, our main partners have remained the centres of the Consultative Group on International Agricultural Research (CGIAR), and the Centre Suisse de Recherches Scientifiques (CSRS) in Côte d'Ivoire. The annual Progress Forum in September was another opportunity for face-to-face exchange with our partners in the livestock systems research programme from these centres. The Managing Director continued her commitment on the Boards of Trustees of the International Institute for Tropical Agriculture (IITA) and the Africa Rice Center (WARDA).

In March, we had a visit from Jim Butler, the Deputy Director General of the United Nations Food and Agriculture Organi-

sation (FAO) with whom we explored options for closer collaboration between FAO and the ETH Zurich. This resulted in the invitation of a D-AGRL representative and member of the North-South Centre at the FAO high-level meeting on food security in November 2009.

At the European level, the North-South Centre stayed involved in two ERA-NETs at the interface of research and policy (see box on p. 115). The Managing Director continued to represent the D-AGRL in the General Assembly of the "Network of European institutions for higher education in agriculture for the tropics and subtropics" (NATURA) which obtained the legal status as a European Economic Interest Group in the course of 2009 and is now called AgriNatura.

A twelve member delegation of the North-South Centre participated again in the "Tropentag 2009" in Hamburg,



Thomas Rutherford,
Energy Science Center of the ETH Zurich



Eduard Bruckner,
former agricultural advisor for Nestlé



Kirk Smith,
University of California, Berkeley, USA

Germany. We did not only contribute five oral presentations and four posters, but we formally invited the participants to the next “Tropentag 2010” in Zurich to be hosted by the North-South Centre. We also used the opportunity to exchange experiences with the German organisers in view of our role as next host.

Last but not least we had a fruitful visit from Detlef Hanne from the Volkswagen Foundation with whom we organised a small workshop on engineering for development. We expect that this exchange of experiences will continue when we become more engaged in our new research topic “Technology and infrastructure”.

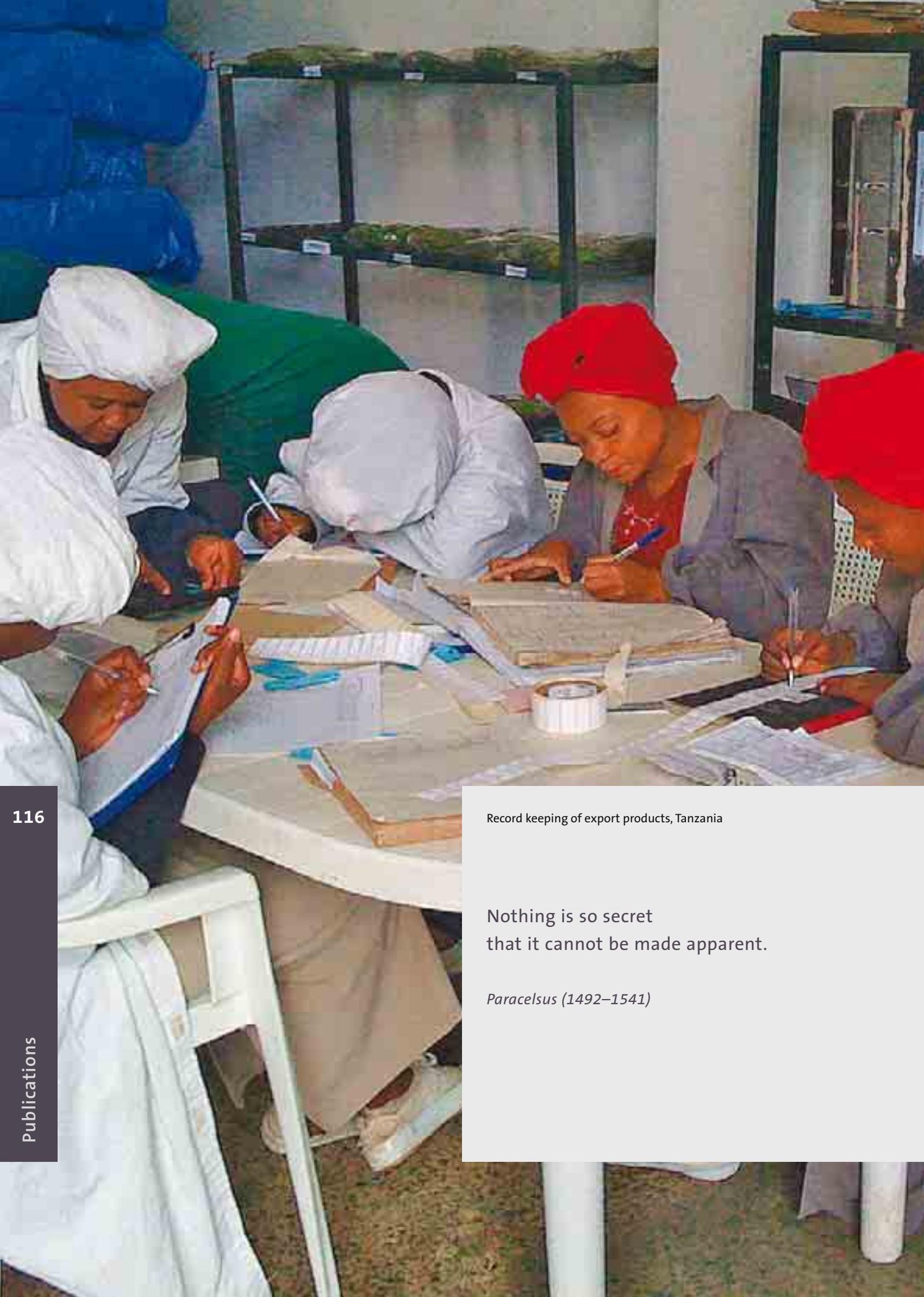


Rosmarie Bär,
Alliance Sud

ERA-ARD and SPLASH

ERA-ARD and SPLASH are two European Research Area Networks (ERA-NETs) which both aim to coordinate and harmonise research for development in Europe and – together with Southern partners – to contribute to poverty reduction. The European Research Area in Agricultural Research for Development (ERA-ARD) seeks to improve synergies between national ARD programmes in Europe through joint planning, funding and implementation of agricultural research activities. In 2009, it has started to fund five research projects, which study the opportunities and risks of bioenergy production in developing countries and in Eastern Europe.

SPLASH – the ERA-NET of the European Water Initiative – aims at improving water research for development by coordinating existing programmes, designing collaborative research calls and facilitating transfer of knowledge into policy and practice. In 2009, one of the main activities of SPLASH was the preparation of a joint research call on sustainable sanitation service chains. The call will be launched in 2010. The Swiss contributions to both ERA-NETs are managed by SDC by a part-time staff member of the North-South Centre.



Record keeping of export products, Tanzania

Nothing is so secret
that it cannot be made apparent.

Paracelsus (1492–1541)

Publications

Refereed publications

Projects funded via the North-South Centre

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- Hgaza, V.K., Diby, L.N., Aké, S., Frossard, E., 2009: Leaf growth and photosynthetic capacity as affected by leaf position, plant nutritional status and growth stage in *Dioscorea alata* L. *Journal of Animal and Plant Sciences*, 5(2): 483–493.
- Karami, M., Afyuni, M., Khoshgoftarmansh, A. H., Papritz, A., Schulin, R., 2009: Grain zinc, iron, and copper concentrations of wheat grown in central Iran and their relationships with soil and climate variables. *Journal of Agricultural and Food Chemistry*, 57: 10876–10882.
- Mejía Kerguelen, S., Rao, I.M., Ramirez, H., Louw-Gaume, A., Gaume, A., Frossard, E., 2009: Morphologic and physiological attributes of *Brachiaria* genotypes in soil with low available phosphorus and high aluminium saturation. *Acta Agronomica*, 58(1): 1–8.
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- Tiemann, T.T., Franco, L.H., Peters, M., Frossard, E., Kreuzer, M., Lascano, C.E., Hess, H.D., 2009: Effect of season, soil type and fertilizer on the biomass production and chemical composition of five tropical shrub legumes with forage potential. *Grass and forage Science*, 64(3): 255–265.
- Tiemann, T.T., Hincapie, B., Frossard, E., Kreuzer, M., Hess, H.D., 2009: Effect of supplementing tropical tannin-free and tanniferous legumes to grass-fed sheep on the utility of their manure as nitrogen fertilizer. *Livestock Research for Rural Development*, 21(3): article 41.
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Poster presentations

Projects funded via the North-South Centre

Andrade de Sa, S., 2009: Sustainability of ethanol production. Urban Futures: The Challenge of Sustainability, Alliance for Global Sustainability Annual Meeting, ETH Zurich, Switzerland, January 27–29.

Andrade de Sa, S., Palmer, C., Engel, S., 2009: Direct and indirect effects of bio-ethanol production in Brazil: Land use, forest conversion and social welfare. Urban Futures: The Challenge of Sustainability, Alliance for Global Sustainability Annual Meeting, ETH Zurich, Switzerland, January 27–29.

Egodawatta, C., Wijesinghe, D., Dissanayake, U., Sangakkara, U.R., Stamp, P., 2009: Root development of maize as affected by weeds in tropical major and minor seasons. Root Research and Applications (RootRAP), 7th ISRR Symposium, Vienna, Austria, September 2–4.

Egodawatta, C., Wijesinghe, D., Dissanayake, U., Sangakkara, U.R., Stamp, P., 2009: Application method of green manures affect root development of field grown maize and mungbean in tropical minor seasons. Root Research and Applications (RootRAP), 7th ISRR Symposium, Vienna, Austria, September 2–4.

Fotso Kuate A., Hanna R., Nagel, P., Tindo, M., Georgen G., 2009: Ant diversity in the humid forest zone of Cameroon. CIFOR Forestry Day, Yaoundé, Cameroon, November 10.

Meile, L., Tanner, S., Weller, M., Niklaus, C., Jans, C., Wullschlegler, S., Perreten, V., Farah, Z., Lacroix, C., 2009: Antibiotic resistance analysis of *enterococci*, *staphylococci* and *streptococci* in East African raw and fermented camel milk. International Society of Camelid Research and Development (ISOCARD) Conference, Djerba, Tunisia, March 12–14.

Müller, J.L., Babu, M.M., Saklani, P.L., Kreuzer, M., 2009: Beweidung geschützter Flächen mit Rindern und Ziegen am Beispiel der Randzonen des Bandhavgarh Nationalparks in Indien: Bedeutung botanischer und managementbedingter Faktoren. Von der Billigmarke zur Spezialität: Beitrag der Tierernährung in der Labelproduktion. Tagung ETH Zurich, Switzerland, May 5.

Niklaus C., Wullschlegler S., Jans C., Perreten V., Lacroix C., Meile L., 2009: Molecular typing and antibiotic resistance profiling of *Streptococcus infantarius* and *Streptococcus gallolyticus* from spontaneously fermented African sour milks. 3rd Congress of European Microbiologists (FEMS2009), Gothenburg, Sweden, June 28–July 2.

Plath, M., Mody, K., Potvin, C., Dorn, S., 2009: How to improve small-scale farmers' livelihood in the tropics: implications of planting regimes for growth performance of native timber trees in pasture reforestation. Joint Annual Meeting of the Association for Tropical Biology and Conservation (ATBC) and the Society for Tropical Ecology (GTÖ), Marburg, Germany, July 27–30.

Wolf, S., Eugster, W., Buchmann, N., 2009: Land-use change and its effects on carbon cycling in the tropics. 8th NCCR Climate Summer School, Grindelwald, Switzerland, August 30–September 4.

Zoss, M., 2009: Mapping of vegetable value chains in Northern Tanzania. Value Chains of Vegetables for Local Market, Export and Processing. Conference of the Horticultural Association of Kenya (HAK), December 2–5.

Projects not funded via the North-South Centre

Jaturasitha, S., Petra, C., Sanghuayprai, N., Wicke, M., Kreuzer, M., 2009: Effect of roughage: concentrate ratio on fatty acid composition of the *Longissimus dorsi* of mature buffaloes. Von der Billigmarke zur Spezialität: Beitrag der Tierernährung in der Labelproduktion. Tagung ETH Zurich, Switzerland, May 5.

Jayanegara, A., Makkar, H.P.S., Becker, K., 2009: Methane reduction properties of tannin-containing plants, simple phenols and purified

tannins in *in vitro* rumen fermentation system. FAO/IAEA International Symposium on Sustainable Improvement of Animal Production and Health, Vienna, Austria, June 8–11.

Jayanegara, A., Soliva, C.R., Marquardt, S., Wina, E., Kreuzer, M., Leiber, F., 2009: Relationship between phenolic contents in tropical plants and *in vitro* ruminal methane concentration. Von der Billigmarke zur Spezialität: Beitrag der Tierernährung in der Labelproduktion. Tagung ETH Zurich, Switzerland, May 5.

Krank, S., Wallbaum, H., 2009: Needs for sustainable cities? Study of Thailand Sustainable City Indicators. Urban Futures: The Challenge of Sustainability, Alliance for Global Sustainability Annual Meeting, ETH Zurich, Switzerland, January 27–29.

Marquardt, S., Beck, S.G., Encinas, F.D., Mayer, A.C., Kreuzer, M., Alzérreca, H., 2009: Pflanzenselektion durch freilebende Rinder in süd-bolivianischen Bergwäldern. 10. Wissenschaftstagung Ökologischer Landbau, ETH Zurich, Switzerland, February 11–13.

Marquardt, S., Bouillot, H., Kreuzer, M., Beck, S., Marquez, A., Mayer, A.C., Alzérreca, H., 2009: Verbissintensität an jungen Bäumen und Sträuchern bei unterschiedlicher Rinderbesatzdichte in einem süd-bolivianischen Bergwaldgebiet. Von der Billigmarke zur Spezialität: Beitrag der Tierernährung in der Labelproduktion. Tagung ETH Zurich, Switzerland, May 5.

Pinkaew, S., Späh, A., Aeberli, I., Winichagoon, P., Wegmüller, R., Zimmermann, M., Hurrell, R., 2009: Double burden of overweight and malnutrition in a Muslim population in Thailand. 19th International Congress of Nutrition, BITEC, Bangkok, Thailand, October 4–9.

Pinkaew, S., Wegmüller, R., Hurrell, R., 2009: Vitamin A stability and sensory evaluation of extruded rice grains fortified with iron, zinc and vitamin A. 19th International Congress of Nutrition, BITEC, Bangkok, Thailand, October 4–9.

Piyadigama, B., Seresinhe, R.T., Soliva, C.R., Kreuzer, M., Marapana, R.A.U.J., 2009: An overview of goat farming in the Hambantota district of Sri Lanka, with special reference to health aspects. FAO/IAEA International Symposium on Sustainable Improvement of Animal Production and Health, Vienna, Austria, June 8–11.

Sadrarhami, A., Khoshgoftarmanesh, A. H., Schulin, R., 2009: Screening wheat genotypes for zinc and iron efficiency using stress tolerance index (STI) under field condition. 10th International Conference on the Biogeochemistry of Trace Elements (ICOBTE), Chihuahua, Mexico, July 13–18.

Schwer, C., Frossard, E., Jansa, J., 2009: Phosphate transporter of *Glomus intraradices*: regulation by soil and plant P status. Plant-Microbe Interactions. Symposium of the Zurich-Basel Plant Science Center, Basel, November 13.

Wagg, C., Jansa, J., van der Heijden, M.G.A., 2009: Linking below-ground interactions among arbuscular mycorrhizal fungi with above-ground productivity in a grass clover community. Plant-Microbe Interactions. Symposium of the Zurich-Basel Plant Science Center, Basel, November 13.

Zeugin, F., Jansa, J., Potvin, C., Scherer-Lorenzen, M., 2009: Is tree diversity an important driver for nitrogen and phosphorus pools in a young tropical plantation? Joint Annual Meeting of the Association for Tropical Biology and Conservation (ATBC) and the Society for Tropical Ecology (GTÖ), Marburg, Germany, July 27–30.

Invited oral presentations

Projects funded via the North-South Centre

Becker, B., 2009: Livestock systems research in support of poor people. European Wildlife Disease Association, Vétérinaires sans Frontières Suisse and Vetsuisse Faculty of the University of Bern, Bern, March 26.

Buchmann, N., 2009: Functional soil processes, greenhouse gas emissions and sequestration – Current knowledge. Forum Sustainable Land Management (Forum SLM), Centre for Development and Environment (CDE), University of Bern, Bern, Switzerland, August 27.

Cavalcanti, C., Engel, S., Leibbrandt, A., 2009: Social networks and community resources management. Workshop in Political Theory and Policy Analysis, Indiana University, Bloomington, USA, October 14.

Dorn, S., Schmale, I., Velten, G., Rott, A.S., Cardona, C., 2009: Preventing post-harvest losses. Symposium World Food Day, organised by SDC and the Swiss Federal Office for Agriculture, Bern, Switzerland, October 10.

Dorn, S., Schmale, I., Velten, G., Rott, A.S., Conde Petit, B., Cardona, C., 2009: Effectively counteracting post-harvest losses in beans: A collaborative research effort between breeders, entomologists and food technologists. Symposium on Stored Product Insect Pest Management, Entomological Society of America (ESA) Annual Meeting, Indianapolis, USA, December 13–16.

Farah, Z., Mollet, M., Younan, M., Dahir, R., 2009: Camel dairy in Somalia: Limiting factors and development potential. International Society of Camelid Research and Development (ISOCARD) Conference, Djerba, Tunisia, March 12–14.

Filippini, M., 2009: Efficiency measurement in the electricity and gas distribution sectors. School of International Studies, Jawaharlal Nehru University, New Delhi, India, January 12.

Filippini, M., 2009: Productivity and efficiency measurement. Teri University, New Delhi, India, January 9.

Kreuzer, M., Kamra, D.N., Soliva, C.R., 2009: Utilizing the natural resources of the tropics: Plants and plant extracts mitigating methane in ruminants. Animal Nutrition: Preparedness to Combat Challenges. Animal Nutrition Association (ANA) World Conference, New Delhi, India, February 14–17.

Kreuzer, M., Kamra, D.N., Soliva, C.R., 2009: Employing plants and plant extracts mitigating methane in ruminants: A way of utilizing the natural resources of the tropics. Development and use of rumen molecular techniques for predicting and enhancing productivity. Final Workshop of the Coordinated Research Project, International Atomic Energy Agency, Vienna, Austria, June 10–13.

Rustagi, D., Engel, S., Kosfeld, M., 2009: Strong reciprocity and participatory forest management in Ethiopia (presented by S. Engel). Annual Meeting of the Committee on Environmental and Resource Economics of the Verein für Socialpolitik, Vienna, Austria, April 24–25.

Rustagi, D., 2009: Behavioral heterogeneity among the pastoral communities in Ethiopia. Canada Research Chair in Culture, Cognition, and Evolution, University of British Columbia, Vancouver, Canada, May 12.

Rustagi, D., Kosfeld, M., 2009: Leader's punishment behavior and common property forest management in Ethiopia. Canada Research Chair in Culture, Cognition, and Evolution, University of British Columbia, Vancouver, Canada, May 19.

Rustagi, D., Engel, S., Kosfeld, M., 2009: Conditional cooperation, costly monitoring, and common property forest management in Ethiopia. Canada Research Chair in Culture, Cognition, and Evolution, University of British Columbia, Vancouver, Canada, May 26.

Rustagi, D., Engel, S., Kosfeld, M., 2009: Conditional cooperation, altruistic punishment, and common property forest management in Ethiopia. Department of Economics at the University of British Columbia, Vancouver, Canada, June 1.

Rustagi, D., Engel, S., Kosfeld, M., 2009: Conditional cooperation norm, altruistic punishment, and participatory forest management in Ethiopia. Behavior, Evolution, and Culture (BEC), Department of Anthropology, University of California Los Angeles (UCLA), USA, June 3.

Schulin, R., 2009: Zn fluxes from soil into the food chain in arid agroecosystems – A case study in Iran. International Rice Research Institute (IRRI), Los Baños, Philippines, November 26.

Urech, Z., Rabenilalana, M., 2009: Fragments de forêts dans un paysage de mosaïque: approches pour améliorer la gestion en considérant les systèmes locaux. Kolo Ala Manompana and Inter-cooperation Madagascar, Antananarivo, December 14.

Urech, Z., 2009: Remaining forest fragments: Ways to improve their management with regards to local livelihood strategies. From Data to Knowledge Creation and Sharing in Landscape Mosaics, CIFOR/ICRAF, Nairobi, Kenya, October 5.

Zabel, A., Bostedt, G., Engel, S., 2009: Outcomes and determinants of success of performance payment scheme for carnivore conservation. Department of Forest Economics, SLU Umeå, Sweden, October 7.

Projects not funded via the North-South Centre

Buchmann, N., 2009: Ausrichtung von Forschung und Lehre: Sicherstellung der Ernährung (Food Security) in Verbindung mit den globalen Herausforderungen. Die ETH Zürich in Bundesbern. Casino Bern, Switzerland, March 11.

Buchmann, N., 2009: Klimawandel: Ein zukünftiges Sicherheitsrisiko mit neuer Qualität? Ostschweizerische Gesellschaft für Geographie (OGG), St. Gallen, Switzerland, November 23.

Buchmann, N., 2009: Klimawandel und Landnutzungskonkurrenzen: Optionen für die Zukunft? Geographische Gesellschaft Zürich (GEGZ) within the series "Facetten der Entwicklung", Zurich, Switzerland, November 11.

Buchmann, N., 2009: Lachgas-Emissionen: Handlungsoptionen gegen teure N-Verluste mit klimarelevanter Wirkung? Nutztierernährung morgen: Gesunde Tiere – Effiziente und nachhaltige Erzeugung – Wertvolle Produkte, Ittingen, Switzerland, September 3.

Bull, S., Owiti, J., Niklaus, M., Beeching, J., Gruissem, W., Vanderschuren, H., 2009: Development of an improved cassava transformation protocol. BioCassavaPlus Annual Meeting, University of Mayaguez, Mayaguez, Puerto Rico, May 27–29.

- Clément, C., 2009: The Maca project. A collaborative project between ETH and Swissgenetics. Meeting of LivestockNet, Mülligen, Switzerland, December 11.
- Curran, M., 2009: Impacts to biodiversity from agriculture in the North-South context – “MyEcosystem”. CBD Third Business and the 2010 Biodiversity Challenge Conference, Jakarta, Indonesia, December 1.
- Ehlers, K., 2009: Relevance of soil drying-rewetting as a driving force for P mineralization in a Kenyan ferralsol. Colloquium at the Institute of Plant Sciences, ETH, Zurich, Switzerland, November 23.
- Engel, S., 2009: Payments for environmental services. International Doctoral Program, Center for Development Research, Bonn, Germany, October 8.
- Engel, S., 2009: The policy and economics of reducing emissions from deforestation and degradation. Course Business and Economics of Climate Change, ETH Zurich, Switzerland, November 1.
- Ghazoul, J., 2009: Conservation: Personal reflections. Keynote address. Joint Annual Meeting of the Association for Tropical Biology and Conservation (ATBC) and the Society for Tropical Ecology (GTÖ), Marburg, Germany, July 27–30.
- Guenther, I., 2009: Fertility and social interactions in developing countries. Verein für Socialpolitik Annual Meeting, Magdeburg, Germany, September 8–11.
- Guenther, I., 2009: Impact of water and sanitation interventions in rural Benin. BMZ, Bonn, Germany, December 1.
- Guenther, I., 2009: Mortality, fertility and social interactions in developing countries. Seminar on Development Economics – Frankfurt University, Frankfurt, Germany, February 10.
- Guenther, I., 2009: Mortality, fertility and social interactions in developing countries. Verein für Socialpolitik – Research Committee Development Economics, Frankfurt, Germany, June 26–27.
- Guenther, I., 2009: Quantitative methods to analyze the effectiveness of development projects and programs. SDC, Bern, Switzerland, May 10–11.
- Guenther, I., 2009: The economics of sanitation. Seminar of the Swiss Federal Institute of Aquatic Science and Technology (Eawag), Zurich, Switzerland, November 20.
- Guenther, I., 2009: The silent crises? The impact of sanitation on child mortality. An Analysis of DHS Data, Centre for Studies of African Economies (CSAE), Oxford, UK, March 22–24.
- Hering, J., 2009: Everybody talks about the weather, but nobody does anything about it. Goldschmidt Conference, Davos, Switzerland, June 21–26.
- Hering, J., 2009: Stumm and Schindler: Mineral-water interface chemistry, a retrospective. Invited keynote speaker, Goldschmidt Conference, Davos, Switzerland, June 21–26.
- Jansa, J., Thonar, C., Frossard, E., 2009: Enhancement of symbiotic benefits through manipulation of the mycorrhizal community composition. Positive Plant Microbial Interactions in Relation to Plant Performance and Ecosystem Function, Grantham, UK, December 15–16.
- Kappel, R., 2009: Corruption perception and aid flows: What has changed since the mid-1990s? What do we know about the results of fighting corruption in developing countries and development co-operation? NADEL Discussion Forum, ETH Zurich, April 24.
- Kappel, R., 2009: What became of the food price crisis of 2008? Hydromechanics and Groundwater, and More. Symposium for Wolfgang Kinzelbach, ETH Zurich, September 4.
- Kreuzer, M., 2009: Die Kuh und das Klima: Wege der Tierernährung zur Limitierung der Methanfreisetzung. Seminar zu aktuellen Themen der Nutztierwissenschaften, Christian-Albrechts University, Kiel, Germany, November 18.
- Kreuzer, M., 2009: Methansenkung: eine neue Aufgabe für die Tierernährung. Nutztierernährung morgen: Gesunde Tiere – Effiziente Erzeugung – Wertvolle Produkte. 3 mal 40 Jahre Tierernährung: Rückblick/Ausblick von G. Flachowsky, O. Simon und C. Wenk. Kartause Ittingen, Schweiz, September 2–4.
- Kreuzer, M., 2009: New approaches in ruminant nutrition to improve the health value of the lipids in milk and meat. Sino-German Tibetan Rangeland Ecosystem Research Symposium, Center for Research Promotion of the Natural Sciences Foundation of China (NSFC), Lanzhou University, Lanzhou, China, July 20–26.
- Marquardt, S., 2009: Livestock and biodiversity. Symposium on Livestock Revolution and Global Biodiversity: Specific Contexts and Local Applications. European Wildlife Disease Association, Vétérinaires sans Frontières Suisse and Vetsuisse Faculty of the University of Bern, Bern, March 26.
- Meile, L., 2009: Microbes in spontaneous food fermentations: Creative cultures or potential risk factors? Department of Agriculture, University of Norway, Oslo, Norway, March 5.
- Michaelowa, K., 2009: Bildung als Weg zur Entwicklung: Chancen und Fallstricke. Presentation at the NGO “Aiducation”, Zurich, Switzerland, November 25.
- Michaelowa, K., 2009: Die Auswirkung der globalen Krise auf Bildung und Gesundheit in Entwicklungsländern (Millenniumentwicklungsziele 2–6). Panel zur globalen Finanz- und Wirtschaftskrise, Jahrestagung des Entwicklungsländerausschusses des Vereins für Socialpolitik, Frankfurt, Germany, June 26.
- Michaelowa, K., 2009: Evaluation: Einige wesentlichen Herausforderungen. Presentation at the Technische Zusammenarbeit der Physikalisch-Technischen Bundesanstalt (PTB), Braunschweig, Germany, February 16.
- Michaelowa, K., 2009: Evaluation methods and their results in different institutional settings. NADEL Workshop, ETH Zurich, Switzerland, October 8.
- Michaelowa, K., 2009: Global governance – The example of development aid. Panel on Global Governance, SVPW, St. Gallen, Switzerland, January 8.
- Michaelowa, K., 2009: How to solve the climate-or-development-dilemma? Presentation in the series “Traverse” of SDC, Bern, Switzerland, September 25.
- Michaelowa, K., 2009: Poverty reduction strategies (PRS), democratization and the role of the World Bank. PEIO II, Geneva, Switzerland, January 30.

Michaelowa, K., 2009: Teacher shortages, teacher contracts, and their impact on education in Africa. Seminar on Macroeconomics, Finance and Labor, Institute of Empirical Economics, University of Zurich, Switzerland, February 18.

Michaelowa, K., 2009: Teacher shortages, teacher contracts, and their impact on education in Africa. Workshop of the Working Group on "Development & Environment" of the Swiss Political Science Association, Zurich, Switzerland, June 8.

Michaelowa, K., 2009: Teacher shortages, teacher contracts, and their impact on education in Africa. Africa Workshop, Department of Economics, Brunel University, Brunel, UK, September 8.

Palmer, C., MacGregor, J., 2009: Forest carbon payments: Opportunities and risks for environment and development. Department for Agricultural Economics and Rural Development (DARE) Seminar, Goettingen, Germany, January 6.

Pfeiffer, R., 2009: Erstellung eines nationalen Aktionsplanes zur Desertifikationsbekämpfung in Kamerun. SPRING Kolloquium, Fakultät Raumplanung, Fachgebiet für Raumplanung in Entwicklungsländern, University of Dortmund, Germany, October 29.

Rehnus, M., 2009: Habitatsnutzung und Höhlenaktivität des Weissflügelspechts (*Dendrocopos leucopterus*) in den Walnuss-Fruchtwäldern Kirgistans. 142. Jahresversammlung der Deutschen Ornithologischen Gesellschaft, Pörschach, Austria, April 1–5.

Sorg, J.-P., 2009: La gestion des forêts de noyers au Kirgystan. Musée jurassien des sciences naturelles, Porrentruy, April 3.

Vanderschuren, H., 2009: Cassava biotechnology research. Center for Genetic Engineering and Biotechnology (CIGB), Havana, Cuba, May 19.

Vanderschuren, H., 2009: Engineering virus resistance: From keep it encapsidated to keep it silent. University of Kwazulu-Natal, Pietermaritzburg, South Africa, December 5.

Vanderschuren, H., 2009: The contribution of biotechnology to the improvement of cassava. National Institute for Root and Tubers Research (INIVIT), Vila Clara, Cuba, May 21.

Vanderschuren, H., 2009: The contribution of biotechnology to the improvement of cassava. University of Witwatersrand, Johannesburg, South Africa, December 2.

Vanderschuren, H., Adler, A., Zhang, P., Gruissem, W., 2009: Transgenic cassava resistant to ACMV. BioCassavaPlus Annual Meeting, University of Mayaguez, Mayaguez, Puerto Rico, May 27–29.

Wehrli, B., 2009: Is small beautiful? Impacts of multi-purpose dams. Competing Claims on Energy – Access and Benefit Sharing. Joint Annual Conference of the Energy Science Center and the North-South Centre of the ETH Zurich, Switzerland, September 10–11.

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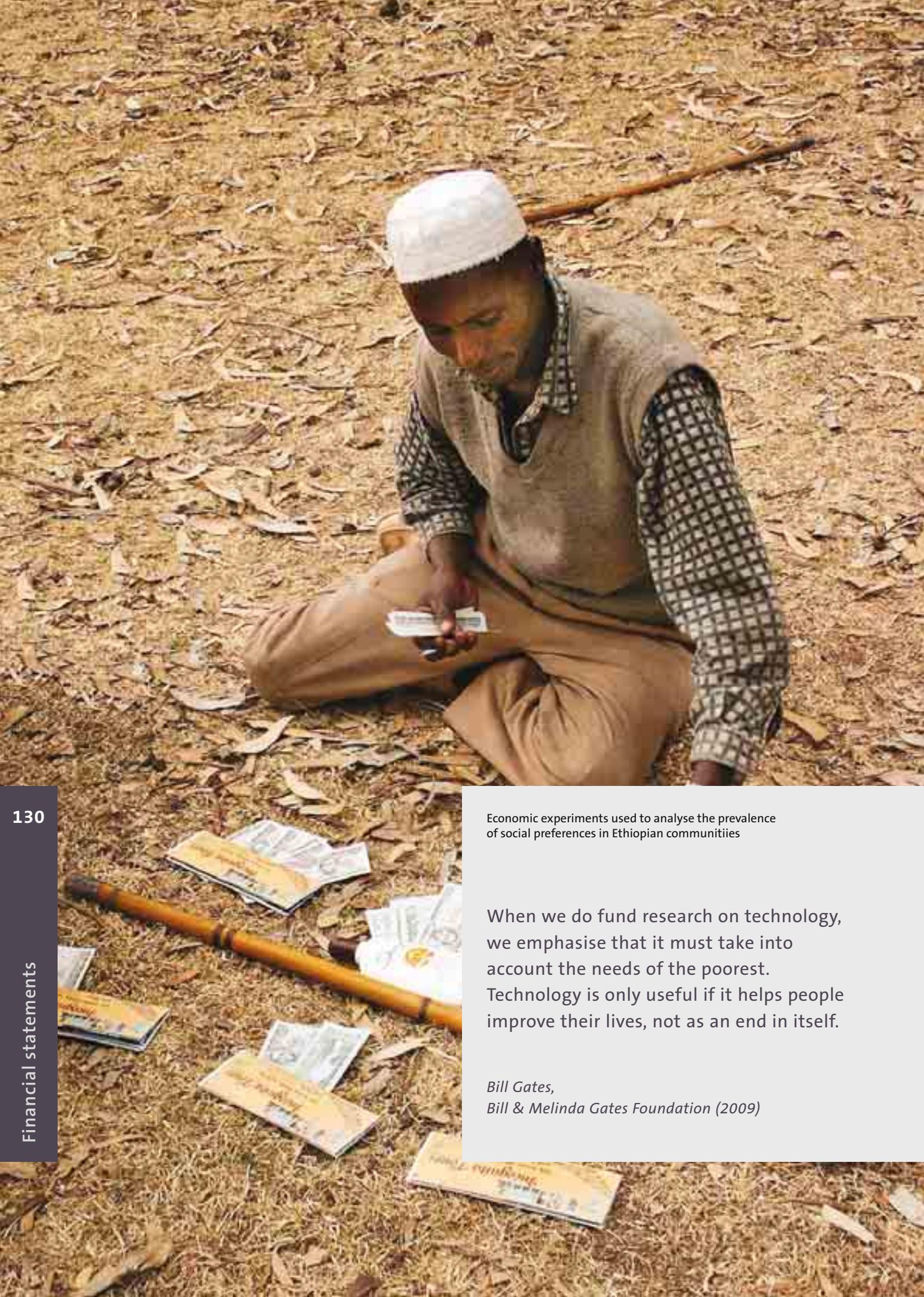
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Economic experiments used to analyse the prevalence of social preferences in Ethiopian communities

When we do fund research on technology, we emphasise that it must take into account the needs of the poorest. Technology is only useful if it helps people improve their lives, not as an end in itself.

*Bill Gates,
Bill & Melinda Gates Foundation (2009)*

Financial statements

Administratively, the North-South Centre is a unit of the ETH Zurich funded partially by ETH credits and by third-party contracts, primarily from the public sector. All funds are allocated to predefined activities according to the objectives of the Centre and its specific contracts.

All accounts were audited externally and internally and were unconditionally approved.

Balance sheet North-South Centre

Assets	
Management	
Cash	300
Operating funds (ETH accounts)	738 362
Receivables, third parties	16 617
Subtotal assets, management	755 279
Programmes	
Operating funds (ETH accounts)	1 386 249
Subtotal assets, programmes	1 278 209
Total assets	2 141 528
Liabilities	
Management	
Equity	672 255
Accruals (S-ENETH contribution 2009–11)	100 000
Over-expenditure	-16 976
Subtotal liabilities, management	755 279
Programmes	
Equity	1 225 944
Under-expenditure	160 305
Subtotal liabilities, programmes	1 386 249
Total liabilities	2 141 528

Income statement North-South Centre

Expenditure	
Management	
Personnel *	351 092
Operations	23 461
Public relations	52 323
Subtotal expenditure, management	426 876
Programmes	
Seed money and grants (ETH contribution)	21 146
Livestock systems programme (SDC contribution)	575 224
RFPP fellowships (SDC contribution)	793 262
Sawiris Scholarships	50 000
ERA-ARD	14 819
Subtotal expenditure, programmes	1 454 451
Total expenditure	1 881 327

* Personnel expenses for the Managing Director are covered by the ETH Zurich through the D-UWIS directly.

Income	
Management	
Member contributions	40 600
Contribution S-ENETH 2008	50 000
SDC management contributions (livestock systems programme & RFPP)	269 205
Other income, third parties	50 096
Subtotal income, management	409 901
Programmes	
ETH contribution (seed money and grants)	50 000
SDC contribution (livestock systems programme, research projects)	738 795
SDC contribution (RFPP fellowships)	525 500
Sawiris Scholarships	300 461
Subtotal income, programmes	1 614 756
Total income	2 024 657
Under-expenditure	143 330

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Communication Manager, North-South Centre
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Managing Director, North-South Centre

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List of acronyms

All units of the ETH Zurich are in italics.

ACW Agroscope Changins-Wädenswil
ADAPT African dams project, CCES
AGS Alliance for Global Sustainability
AIM Association Interooperation Madagascar
AIT Asian Institute of Technology, Bangkok, Thailand
ALP Agroscope Liebefeld-Posieux
ARD Agricultural Research for Development
ART Agroscope Reckenholz-Tänikon
AVRDC World Vegetable Center
C Carbon
CAS Certificate of Advanced Studies
CAS Chinese Academy of Sciences
CCES Competence Center Environment and Sustainability of the ETH Domain
CDE Centre for Development and Environment, University of Bern
CDM Clean Development Mechanism
CEPE Centre for Energy Policy and Economics
CFPF Centre de Formation Professionnelle Forestière, Madagascar
CGIAR Consultative Group on International Agricultural Research
CIAT International Center for Tropical Agriculture
CIFOR Centre for International Forestry Research
CIMMYT International Maize and Wheat Improvement Centre
CIP International Potato Centre
ClimPol Climate Policy Making for Enhanced Technological and Institutional Innovations, CCES
CNRE Centre National de Recherches sur l'Environnement, Madagascar
CO₂ Carbon dioxide
CSRS Centre Suisse de Recherches Scientifiques, Côte d'Ivoire
D-AGRL Department of Agricultural and Food Sciences
D-ARCH Department of Architecture
D-BAUG Department of Civil, Environmental and Geomatic Engineering
D-BIOL Department of Biology
D-ERDW Department of Earth Sciences
D-GESS Department of Humanities, Social and Political Sciences
D-INFK Department of Computer Science
D-ITET Department of Information Technology and Electrical Engineering
D-MTEC Department of Management, Technology and Economics
D-UWIS Department of Environmental Sciences
DC Developing countries
DFG Deutsche Forschungsgemeinschaft
DFID Department for International Development, UK
DNA Deoxyribonucleic acid
DSM DSM Nutritional Products AG
Eawag Swiss Federal Institute for Environmental Science and Technology
ECOS Laboratory of ecological systems, Lausanne
EPFL Federal Institute of Technology Lausanne
ERA-ARD European Research Area on Agricultural Research for Development
ERA-NET European Research Area Network
ESA Ecole Supérieure d'Agronomie, Côte d'Ivoire
ESSA Ecole supérieure des sciences agronomiques, Université d'Antananarivo, Madagascar
ETHIIRA ETH Independent Investigators' Research Awards
EU European Union
FAO Food and Agricultural Organisation of the United Nations
Fe Iron
FIBL Forschungsinstitut für biologischen Landbau
FOAG Federal Office for Agriculture
GEF Global Environmental Facility
GFAR Global Forum on Agricultural Research
GIS Geographic Information System
GTZ Deutsche Gesellschaft für Technische Zusammenarbeit
ha Hectare
HGU School of Business, Economics and Law, University of Gothenburg, Sweden
IAEA International Atomic Energy Agency
IBAMA Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis
ICARDA International Centre for Agricultural Research in the Dry Areas
ICT Information and Communication Technology
IED Institute for Environmental Decisions
IHEID Graduate Institute of International and Development Studies, Geneva
IIA International Institutional Affairs
IIM Indian Institute of Management
IITA International Institute of Tropical Agriculture
ILRI International Livestock Research Institute
INERA Institut de l'Environnement et Recherches Agricoles, Burkina Faso
INRA French National Institute for Agricultural Research
INTA Nicaraguan Institute of Technology
IOB Netherlands Policy and Operations Evaluation Department of the Ministry of Foreign Affairs, Netherlands
IREDU Institut de Recherche sur l'Éducation, Université de Bourgogne, France
IRRI International Rice Research Institute
IUCN International Union for the Conservation of Nature
IUT Isfahan University of Technology, Iran
KARI Kenya Agricultural Research Institute
KFPE Commission for Research Partnerships with Developing Countries
KfW KfW Entwicklungsbank
Kg Kilogramme
KIRFOR Kyrgyz-Swiss Forestry Support Programme
LAB Lactic acid bacteria
LCA Life cycle assessment
LCV Laboratoire Central Vétérinaire du Mali
MAS Master of Advanced Studies
Mn Manganese
MO Microorganism
MoU Memorandum of Understanding
MSc Master of Science
N Nitrogen
NADEL Postgraduate Studies for Developing Countries
NATURA Network of European institutions for higher education in agriculture for the tropics and subtropics (new: AgriNatura)
NCCR North-South National Centre of Competence in Research North-South
NGO Non-governmental organisation
NSF ATM National Science Foundation, Atmosphere Program, USA
NSL Network City and Landscape
OECD Organisation for Economic Co-operation and Development
OPEC Organisation of the Petroleum Exporting Countries
P Phosphorus
PRS Poverty reduction strategy
PSI Paul Scherrer Institute
R4D Research for development
RDA Recommended daily allowance
RFPP Research Fellow Partnership Programme
S-ENETH former School Domain of Earth, Environment and Natural Resources, ETH Zurich
SAHA Programme de Développement Rural, Interoopération – Délégation Madagascar
Sandec Department of Water and Sanitation in Developing Countries, Eawag
scnat Swiss Academy of Sciences
SCRID Sustainable Farming and Rice Cropping Systems Unit, Madagascar
SDC Swiss Agency for Development and Cooperation
SECO State Secretariat for Economic Affairs, Switzerland
SENACYT Ecuadorian Secretary of Science and Technology
SER State Secretariat for Education and Research, Switzerland
SFIAR Swiss Forum for International Agricultural Research
SHL Swiss College of Agriculture, Zollikofen
SLU Swedish University of Agricultural Sciences
SNF Schweizerischer Nationalfonds
SPLASH European Research Area Network of the European Water Initiative
spp. Species
STI Swiss Tropical and Public Health Institute, Basel (new: Swiss TPH)
STRI Smithsonian Tropical Research Institute, Panama
TWAS Academy of Sciences for the Developing World
UAS University of Agricultural Sciences, Bangalore, India
UNEP United Nations Environment Programme
UNESCO United Nations Educational, Scientific and Cultural Organization
WARDA Africa Rice Center
WBGU German Advisory Council on Global Change
WFP World Food Programme
WHO World Health Organisation
WSL Swiss Federal Institute for Forest, Snow and Landscape Research
WWF World Wide Fund for Nature
ZALF Leibniz Centre for Agricultural Landscape Research, Germany
ZEF Center for Development Research, University of Bonn, Germany
ZESCO Zambia Electricity Supply Corporation
Zn Zinc
ZnSO₄ Zinc sulphate

ETH Zurich
North-South Centre
HCW, Hochstrasse 60a
8092 Zurich, Switzerland

Tel +41 44 632 79 35
Fax +41 44 632 15 89

northsouth@ethz.ch
www.northsouth.ethz.ch



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