



Zentrum für Entwicklungsforschung  
Center for Development Research  
University of Bonn



Years of Development Research by ZEF

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# Prefaces

The Center for Development Research (ZEF) began its research activities ten years ago. In the meantime, it has established itself as an academic think-tank for international and interdisciplinary questions of development and has gained a worldwide reputation in the fields of research and practice. Research at ZEF focuses on three core areas: economic development and technological change; ecology and the management of natural resources; and political and cultural change. Close cooperation with local partners in the fields of science, politics and civil society is an essential element of ZEF's work.

ZEF has significantly enhanced interdisciplinary research within the framework of its projects, the majority of which have been components of programs funded by the Federal Ministry of Education and Research (BMBF). These include the SHIFT Program on land utilization and alternatives to forest clearance in Brazil, which has now been completed; the GLOWA Program on climate change and water use in West Africa; and the BIOTeam Program on the maintenance of biodiversity. Furthermore, the BMBF is funding a large-scale ZEF project in Uzbekistan on the use of land and water in the Aral Sea region.

ZEF's long years of interdisciplinary research into land use, water management and biodiversity in developing and transformation countries have made a decisive contribution to improving application-oriented development research and advising policy makers in Germany. The Center has also contributed to the development of the City of Bonn to become a center for international cooperation.

I am delighted that ZEF's interdisciplinary and transdisciplinary approach to development research has prevailed and has proved so successful. I would like to wish ZEF and its staff continued success with their innovative research work.

*Annette Schavan*

ZEF's contribution  
to innovation

*by Annette Schavan,  
Federal Minister  
of Education and  
Research*



## ZEF: Research for development

*by Heidemarie Wieczorek-Zeul,  
Federal Minister  
for Economic  
Cooperation and  
Development*



This year, the Center for Development Research (ZEF) can look back on ten years of research, teaching and policy advice.

ZEF was set up at Bonn University in 1995 within the framework of the Bonn-Berlin Law by the German Bundestag, the Federal Government and the Land of North Rhine-Westphalia. It began its actual research work in 1997. In the meantime, ZEF enjoys a worldwide reputation in the fields of research and practice as an academic think-tank on international and interdisciplinary questions of development.

The links between ZEF and the Federal Ministry for Economic Cooperation and Development (BMZ) have been close from the very start. The BMZ regarded the establishment of ZEF as an important step towards improving application-oriented development research in Germany and advising policy makers, and as a significant contribution towards Bonn's expansion to become a center for international cooperation. The Ministry for Economic Cooperation and Development considers research to be an essential component of a successful development policy. This year has seen a considerable increase in our research budget. The BMZ has had a senior representative on ZEF's International Board since 1999 and professors from ZEF advise the Ministry as members of the BMZ's Academic Advisory Board. There have been many different consultations and cooperation projects at specialist level. This does not just apply to the BMZ itself, but also to subordinate organizations working in the field of development cooperation within the Ministry's remit.

For several years now, the BMZ has also been supporting the Bonn International Graduate School for Development Research, which is part of ZEF. The Graduate School has become one of the world's largest interdisciplinary graduate training institutions in the field of development research and plays an important role in enhancing the academic capacity of young researchers from developing countries. The BMZ supports the Graduate School by providing substantial funds for scholarships for talented young researchers from these countries.

I am delighted to be able to congratulate ZEF on its tenth anniversary and look forward to further successful cooperation in the future.

*Heidemarie Wieczorek-Zeul*

It is a great pleasure for me to congratulate – personally and on behalf of the Rheinische Friedrich-Wilhelms-University of Bonn – the Center for Development Research (ZEF) to its 10th anniversary. For one decade, ZEF has been a success story in many respects.

Since its foundation in 1997, ZEF has significantly contributed to the research profile of this university. Back then, development research was successfully introduced as a new interdisciplinary research field. The co-operation with several other university institutes, especially with those of our Faculties of Agriculture, of Mathematics and Natural Sciences as well as of Arts and Humanities, has an exemplary function. The joint project on conservation of wild coffee in Ethiopia (CoCE), for instance, shows how fruitful such an interdisciplinary co-operation can be.

From the beginning, ZEF has had a very strong international orientation. Its three departments work closely not only with many research institutes in Germany, but also with a large number of other academic institutions in different parts of the world. A good example for this international co-operation is the so-called GLOWA Volta Project that has started into research phase III in 2006.

The strong international and interdisciplinary profile of ZEF is also visible in its renowned doctoral program. From the beginning in 1999 to May 2007, 335 PhD candidates from 67 countries have been enrolled in this program, receiving doctoral degrees either in social or political science, economics, agricultural economics, agriculture or in natural sciences.

Furthermore, ZEF is of particular importance for Bonn University because of the special relations it fosters to the Institute for Environment and Human Security of the United Nations University (UNU-EHS) which is also situated in Bonn. Thanks to these contacts, Bonn University has recently become an associated institution of the United Nations University and can now further strengthen the co-operation with the various UN secretariats that just officially opened their doors on the UN campus of Bonn.

Even under changed and more difficult conditions – since the beginning of 2005, the funding of ZEF by the Bonn-Berlin compensation agreement has come to an end – ZEF has managed so far to carry out the same high-level research as before. This is above all due to ZEF's ongoing success when it comes to attract third-party fundings. Considering all that, I see a great future for ZEF, and I wish it all the best for the upcoming years!

## Ten years ZEF: A success story *by Matthias Winiger, Rector of the University of Bonn*



*Matthias Winiger*

# Editorial

## Looking back, looking forward – 10 years of ZEF

*by Solvay Gerke,  
Executive Director of  
ZEF*



After a decade has passed, it is quite common to admit that “the world has changed dramatically”, and of course nobody would deny that significant changes have occurred since ZEF started its activities 10 years ago. When first research plans were put into operation in 1997, the world population amounted to 5.8 billion, whereas today 6.6 billion people are living on earth. Energy consumption measured in barrels of oil has risen accordingly from 73 million to 83 million barrels daily. The spread of communication, especially internet use, shows a most remarkable increase from 117 million to 1,139 million users over the last decade.

These are remarkable changes, but they were not unforeseen. When ZEF was founded 10 years ago, basic trends in population increase, climate change, consumption of natural resources, etc had already been forecasted by scientists throughout the world. Looking back, the changes themselves may not be that striking; remarkable however is the change in awareness of these trends among politicians and the general public. Man-made climate change, for example, was still denied or at least controversially disputed 10 years ago, whereas today it is accepted as a fact and has become a matter of worldwide popular concern. Other mega trends like population growth, CO<sup>2</sup> emissions and shifts in the global economic and political power structure are slowly moving to the forefront of wider public interest.

The rapid spread of concern is, of course, intimately related to increased communication and the dissemination of information and knowledge. The general principle behind these processes could be labelled “connectivity”, which refers to the increased networking of NGOs, stakeholders, development agents and the formation of communities of practice. Through ICT-based mass communication and support for stakeholders, biodiversity loss, land degradation, and water problems that occur in many places worldwide are now regularly discussed in the media. These trends in ecosystem changes have found an international platform for recognition and concern and are connected to the global problem of climate change. It is a result of increasing “connectivity” that local catastrophes such as droughts, floods and abnormal weather conditions are now seen in direct connection with global climate changes and have become an increasingly pressing theme for policymakers across the world. It is also acknowledged that the continuing growth of population is leading to scarcity of both water and arable land, with negative effects on the economies of many countries in the world.

The rise in “connectivity”, i.e. the possibility to connect events, information and people, has led to a fundamental change in the way individuals look at their own existence in their social,

cultural and natural context. We have left the stage of involution, of more of the same, and have entered a phase of genuine cultural change, a new era of human development. Of course, people have always had local concerns and reflected on their changing living conditions, but these concerns now include global political, economic and ecological changes to a much greater degree. Sociologists refer to this phenomenon as "reflexivity", a process of awareness and reflection. Philosophers, religious specialists and scientists no longer hold a monopoly on the interpretation of our world. Knowledge is used to create more knowledge, experts and consultants influence political decisions and research results are spreading through the mass media to civil society and its activists. Opportunities as well as risks connected with development are debated not only by experts, but also by the people concerned themselves. To cite just one prominent example that happens to also be one of the focal points of ZEF's research efforts: Global warming. This issue was well documented in research publications by the time ZEF was founded, but popular awareness only came to the fore 10 years later and is now dominating press headlines as well as popular anxieties.

"Connectivity" and "reflexivity" have become institutionalized. Networking is no longer characterized by informal meetings, little favours and exchanges of views, but is organized in international professional associations, network fora, chat rooms and internet communities. "Reflexivity" is produced in talk shows, public hearings, international conferences and research and development institutes. ZEF is now a firmly established nodal point in a network of scientific exchange, practicing "connectivity" in trans-disciplinary research and joint international research programmes. Together with scientists from other European universities, ZEF researchers are engaged in capacity building, passing on their knowledge in development research to doctoral students in our International Graduate School, who in turn take their knowledge and degrees to Asia, Africa and Latin America. More than ever before, the rich data sets from our major research projects will be disseminated to those concerned in government administration and civil society in an effort to fuel "reflexivity" in those countries where ZEF researchers have done their work. Development strategies and programmes will be grounded on solid data, and providing assistance in building decision-support systems will be high on ZEF's research agenda.

The new ZEF Strategic Plan is an instrument of "reflexivity". It takes a critical look at ZEF's mission in a globalized world of development research and tries to balance available financial resources and the need to maintain a global perspective on development. It is hoped that reflecting on and assessing global problems will help us to find local solutions to global problems.

*Volray Geste*

# Chronology



Setting up a Center...  
ZEF building in 1989



Having a Center...  
ZEF building in 2007

In 1991, the rector of Bonn University and the chair of the Committee on Economic Cooperation in the German Bundestag (Parliament) began an exchange of ideas about the future of Bonn as an international "City of Science". At the same time, a coordination panel consisting of representatives of the federal state level, the state of North Rhine-Westphalia and the City of Bonn was negotiating a package of substitution measures in the context of the German Federal Government's move from Bonn to Berlin. The package included a concept for and the establishment of international research institutes in Bonn.

## February 1993:

The Senate of Bonn University adopts a concept on an "International Science Forum Bonn" (IWB), implying two research institutes.

## December 1993:

International Conference on „Science in Intercultural Dialogue: Development Research as a Challenge to Universities" in Bonn. International high-ranking experts from science and universities, politics, and NGOs contribute to the conceptual framework of a center on development research.

## March 1994:

Launch of a "CAESAR-plus"-concept by the universities of Bonn and Cologne and the Technical College of Aachen. Intended is the set up of three research centers in the Region: A Center for Applied Sciences (Caesar), a Center for Development Research (ZEF), and a Center for Studies on European Integration (ZEI).

## June 1994:

Adoption of the Bonn-Berlin Law by the German Bundestag, including the decision to set up the two international research centers ZEF and ZEI in Bonn.

## May 1995:

The Senate of the University of Bonn decides to found ZEF and ZEI as "central scientific institutions" of the University's Senate.

## October 1996:

In the Rector's Annual Report, ZEF and ZEI are called "CICERO" (Centre for International Cooperation in Advanced Education and Research). However, the final name of the administrative and coordinating umbrella facility for both centers will be "International Science Forum Bonn" (IWB).



September 1997:

Joachim von Braun starts as ZEF's first director of the Department of Economic and Technological Change. In 1998, Paul Vlek and Andreas Wimmer follow as directors of, respectively, ZEF's Department of Ecology and Natural Resource Management and the Department of Cultural and Political Change.

2005:

Payments from the Bonn-Berlin compensation fund are only provided until the end of 2004. From 2005 onwards, ZEF and ZEI receive core funding from the State of NRW via the University of Bonn. Both centers have to raise additional funds by themselves for the continuation and extension of their research projects. ZEF and ZEI go independent ways and the IWB's umbrella function therefore becomes superfluous. ZEFConsult, a unit focusing on policy advice and policy dialogue, is set up.

2007:

ZEF celebrates its 10th anniversary as a development research institute.



First batch of directors in 2001

# Projects

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## Fighting to conserve forests, fields and soils.

### *The Tipitamba project in the Brazilian Amazon*

#### *Project duration:*

1991 – 2004. Continuation by local partners.

#### *Main donor:*

German Federal Ministry of Education and Research (BMBF)

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## Introduction

If you clear-cut the forests, you get fields. This is what farmers in the developing world used to do to increase their space for cultivating crops in order to feed their families. But often the quality of the soil of the fields deteriorates in the long run, so the fields get unusable for agricultural purposes, not to speak of the necessary recovery process of forests. Thus, in Brazil, “capoeira” (a “forest that used to be” in the local Tupi Indian language) becomes “tipitamba” (a “field that used to be” in the Tiryó Indian language). In the end, there is not much left.

“Tipitamba” is also the name of a project which ZEF carried out in the Bragantina region in the Eastern Amazon of Brazil from 1998 until 2003. The project was conducted in cooperation with Embrapa<sup>1</sup> Amazônia Oriental in Belém within the framework of the research program ‘Studies on Human Impact on Forests and Floodplains in the Tropics’ (SHIFT). It was funded by the German Federal Ministry of Education and Research (BMBF) and the Brazilian Council for Scientific and Technological Development (CNPq). In December 2002, the Tipitamba project was awarded the Chico Mendes Environment Prize by the Brazilian government in recognition of its promising solutions for agricultural and environmental issues in the Eastern Amazon. The prize is named after the Amazonian environmentalist Chico Mendes, who was murdered in 1988.

The project's scientists did research on the ecological and socio-economic sustainability of the small farmers' land-use system in the Bragantina region, located close to the city of Belém in the Eastern Amazon. The main goal of the project was to develop alternatives to the traditional slash-and-burn practice applied in this region. The slash-and-burn practice involves a shift of the cropped fields on the farm area from one place to another, also known as shifting cultivation. Due to the use of fire for land preparation, the slash-and-burn practice causes land degradation, human-health hazards through smoke, economic losses due to accidental fires, as well as a tremendous ecological deterioration due to soil fertility decrease. Since slash-and-burn agriculture has been implemented very intensively in the Bragantina region for more than a century, the Amazonian rainforest here has been completely replaced with fallow vegetation (*capoeira*).

In the Brazilian Amazon, the livelihood of more than half a million small farmer families depends on slash-and-burn. With a low population density and with long fallow periods, shifting cultivation is an ecologically sustainable way of using land. In the Eastern Amazon, particularly in the Bragantina region, these conditions are no longer given. The region has a population density that is 50 times higher than the rest of the Amazon. Therefore,

farmers must intensify their land use to meet rising market demands. Under these conditions, slash-burning coupled with short fallow periods, leads to the degradation of the natural resource base. Consequently, farmers increase the use of agricultural inputs, such as costly mineral fertilizers, to compensate for the declining yields.

## The Tipitamba project

The scientists in the ZEF-led Tipitamba project developed a mechanized, fire-free method of land preparation by cutting and chopping the fallow vegetation with tractor-driven machines. This "chop-and-mulch" method leaves behind a mulch layer on the ground, which helps to conserve soil fertility. Besides, the technology does not only avoid fire as a tool of land preparation but eliminates the need for back-breaking work. In traditional land preparation, the shrubby fallow vegetation has to be slashed manually in order to allow it to dry in the sun before burning it. Thus, mechanical chopping also improves labor quality significantly, since the chopping machines are able to cut and chop the bush fallow and spread the chips as mulch over the field in one go.

Fertilizer recommendations for the mulched fields also had to be developed and low-input crop varieties to be found. In addition, the technology allows: a) the extension of the cropping period, b) switching the crop sequence, and c) changing the cropping calendar, since land preparation is now being detached from the dry season. These modifications enable the farmers to manage their land more flexibly with regard to agronomic optimization, labor distribution, and market prices.

## Local participation

The project's scientists organized regular field days following ZEF's participatory approach that promotes the role of local partners. These brought about an overwhelming cross-regional interest among cooperatives, extension workers, politicians, credit providers, and NGOs. The project maintained close contact to many farmers in the Bragantina region who tested the mulch technology on-farm. Socorro Kato from the local partner institution Embrapa says: "To assess farmers' reactions to mechanized mulching, we have been working together with 30 farmers. Initially, we provided the chop-and-mulch field preparation and fertilizers, while the farmers provided land and labor. What is most exciting for them is the fact that the workload of the farmers is lower. Formerly, it took one man 15 days to slash one hectare before it was burned. Now, the tractor does the work within five hours without burning. This leaves time for more valuable work. Also, hoe-weeding is reduced, because the mulch layer does not permit the emergence of





weeds. In future, the farmers will successively take over all the costs and risks, which will improve our judgment on their willingness to accept our approach as a long-term alternative."

## Farmers' participation

Economists in the project conducted a survey among the farmers who participated in the project. Among their positive reactions to the project were statements such as: no back-breaking land clearing, less weeding necessary, no damage to neighboring plantations by escaping fires, no threat to wildlife, no pollution of streams, control of erosion, conservation of soil moisture, better quality products. But there were also statements with negative implications: loss of fuel wood as all wooden parts are chopped and nothing remains on the field as was the case after the burn, planting takes more time because of the dense mulch layer, walking on mulched field in the commonly used sandals is difficult, there are not enough choppers available in the region, technology is not well-known yet, choppers need to be improved, costs and benefits are not clear yet.

## What policy can do?

We expect that policy measures to reduce production risks in the study region would increase the demand for fertilizers, and hence, mechanical mulching. Such policies could involve, for example, the provision of technology-specific crop-yield insurance or environmentally friendly credit programs (e.g. the Brazilian PROAMBIENTE<sup>2</sup> program) for farmers who adopt chop-and-mulch instead of using slash-and-burn or conventional mechanization practices. Increased demand for mechanized mulching could provide sufficient incentives for potential investors to make the technology available as an alternative to slash-and-burn and conventional mechanization services.

Both, slash-burning and conventional mechanization that are presently the only readily available land preparation technologies for the production of annual crops in the Amazon, have shown themselves to be environmentally unsustainable if applied over longer periods of time and at current levels of intensity. However, as long as the global environmental services of forest fallows, such as carbon sequestration, are not represented in user costs, any attempt to modernize slash-and-burn agriculture through technological progress is easily prone to fail in the long-run. Policies that charge the causers of the environmental costs of burning or eliminating forest fallows, e.g. environmental taxes or payments for environmental services, can redress this situation. Yet, they depend on the existence of environmentally friendly technological alternatives in order to bring

about the desired changes in human behavior. Policy makers should therefore recognize that mechanical mulching represents a potentially sustainable addition to the classical portfolio of technologies for land preparation available to smallholders in the Amazon. It can therefore be a necessary, albeit not exclusive step towards integrating resource use and conservation in the region.

## Actual situation

Currently, Embrapa Amazônia Oriental, the local partner that successfully took over the project after it ended in 2003 and integrated it into Embrapa's nation-wide agro-ecological research in Brazil, is conducting adaptation and implementation projects in cooperation with the Brazilian PROAMBIENTE and ATER<sup>3</sup> programs as well as with a number of initiatives by private industrial companies, such as the aluminum producer ALBRAS<sup>4</sup>. The demand for the technology now exceeds the capacities of the research organization Embrapa and an extension of its implementation would require additional support from agricultural development initiatives.



## Endnotes

- 1 Embrapa: Empresa Brasileira de Pesquisa Agropecuária (Brazilian Agricultural and Livestock Research Organization)
- 2 PROAMBIENTE: Programa de Desenvolvimento Socioambiental da Produção Familiar Rural (Brazilian national credit program to support environmentally friendly technologies in family agriculture)
- 3 ATER: Assistência Técnica e Extensão Rural (Brazilian national program to support agricultural extension services)
- 4 ALBRAS: Alumínio Brasileiro S.A. (Brazilian Aluminum company)

# Who uses water for what? How to manage competing water demands in West Africa.

## *The GLOWA Volta project*

*Project duration:*

2001 – 2010

*Main donors:*

German Federal Ministry of Education and Research (BMBF)

*Contact:*

Charles Rodgers, ZEF  
(crodders@uni-bonn.de)

*Project homepage:*

[www.glowa-volta.de](http://www.glowa-volta.de)

## Introduction

Ensuring that everyone in need of water receives an adequate amount of it is not an easy task in West Africa. Here, the regional impacts of global environmental change present extraordinary challenges for the users and managers of water resources. This is particularly true in the Volta River Basin in West Africa, where ZEF is conducting research on the impacts of climate change on the regional hydrological cycle.

The Volta Basin occupies an area roughly the size of Germany, located largely within the West African savanna. The region is characterized by low incomes and a rapidly expanding population. The Volta Basin is overwhelmingly rural, and small-scale rain-fed agriculture is the dominant economic activity. Agriculture employs roughly two out of three basin residents. However, agricultural productivity is low, which reflects the erratic and unreliable precipitation and a lack of irrigation infrastructure. Due to strongly seasonal rainfall patterns, periodic drought and a steep south-to-north precipitation gradient, water availability is neither predictable nor distributed equitably among users geographically.

Therefore, the region's inhabitants suffer periodic water shortage due to heavy reliance on rain-fed agriculture, inadequate water management infrastructure and high local sensitivity to broad-scale changes in climate. In addition, water use is subject to the competing demands of domestic water users, agriculture, hydropower generation and industry; and increasingly, flow requirements to support ecosystem health. The efficient and sustainable use of water requires close coordination between the neighboring riparian countries, economic sectors and communities of users.

To reduce potential friction between upstream and downstream water users, the governments of Burkina Faso and Ghana have initiated governance mechanisms for integrated, trans-boundary water resource management. The Volta River Basin Authority, with its headquarters in Ouagadougou in Burkina Faso, takes guidance from international protocols, and involves regional and local stakeholders as well as water-use associations.

To ensure the success of an integrated water resources management concept and to support the political decision-making process, researchers need to provide local and regional decision-makers with scientifically sound information and analysis.

## The GLOWA Volta research project

The GLOWA Volta Project aims to provide this scientific support to enable a sustainable management of the Volta Basin's water resources. The ZEF-led project is a component of the BMBF-umbrella program "Global Change in the Hydrological Cycle" (GLOWA). Its scientists provide analysis of the physical as well as the social and economic factors determining water demand and water availability within the Volta Basin, specifically in Burkina Faso and Ghana. Data and research outputs from the three primary research clusters – atmosphere, land use, and water use – are being integrated to provide a Decision Support System (DSS). The DSS is intended as a tool for water sector decision-makers to improve water use and distribution among users, sectors, and regions. The GLOWA Volta Project commenced in 2000, and is now in its third and final research phase, concluding in 2009.



## Main scientific achievements

### *Atmosphere*

**The successful coupling of the meso-scale climate model MM5 with the physical hydrology model WaSiM:** The coupled, operational meteorological and hydrological simulation system is a critical component of the DSS. It provides basin-wide estimates of water and energy balances, allowing water managers to monitor and to anticipate river discharge, evapo-transpiration, soil moisture, groundwater recharge and other data critical to effective decision-making on water resources management.

To enable the calibration and validation of coupled meteorological and hydrological models, a dense observational network for precipitation and surface runoff was installed in the Upper East Region of Ghana under the Intensive Operations Period in 2004. The field measurement campaign was conducted in close collaboration with Ghanaian Hydrological Services.

**Calibration of WaSiM-ETH:** WaSiM simulates the hydrological response of the catchment to climatic inputs on the basis of physical principles. WaSiM calculates other components of the water balance, including evapo-transpiration, soil moisture and groundwater recharge. As WaSiM-ETH was developed for high-relief catchments in Central Europe, extensive effort was required to adjust the parameters and empirical coefficients to represent low-relief catchments and climatic conditions in West Africa. Our scientists have successfully calibrated and utilized WaSiM ETH at three spatial scales: full Volta Basin, White Volta tributary and Atankwidi research catchment in the Upper East Region of Ghana.



Project workshop in Burkina Faso, September 2006



**Forecast of the onset of the rainy season:** In West Africa, choice of crop, sowing dates and resulting yields strongly depend on the temporal and spatial distribution of rainfall, and on the date of onset of the rainy season. In recent decades, a shift in the onset date has been reported. Success in predicting the onset of seasonal rains directly influences farmers' livelihoods and regional food security: planting too early may cause crop failure, whereas planting too late may reduce crop yields. Our scientists investigated the behavior of the onset date using advanced analytical methods including linear discriminant analysis and fuzzy logic. For nine Ghanaian weather stations, the percentage of successfully predicted true starts increased from 93% by discriminant analysis to 99% by fuzzy logic. The most reliable predictor was found to be the number of wet days within 30 days prior to the onset date.

**Numerical Weather Prediction for West Africa and the Volta Basin:** Short-term precipitation and temperature forecasts are essential tools for operational water management and agricultural planning, in particular for planting and harvesting decisions. Broadband internet connections allow the rapid transfer of data-heavy numerical weather predictions at relatively low cost. We are now providing five-day operational numerical weather predictions for the Volta Basin region in West Africa. Forecasts can be accessed at <http://www.glowa-volta.de/atm/forecast.htm>.



### *Land use*

The project's scientists have developed new methodologies for up-scaling land surface parameters in **Soil-Vegetation-Atmosphere-Transfer (SVAT) Models**. Models are used to evaluate the impacts of climate on natural vegetation. Net ecosystem productivity shows high inter-annual variation in the 20th century, as growing conditions are changing from year to year. The overall rate of carbon storage in the vegetation is very low. Carbon uptake is slightly increasing in the 21st century, indicating better average growing conditions in this period than over previous decades.

Inter-annual variation is increasing, raising the risk of carbon loss associated with fires and droughts. Crop yield was simulated with the LPJ crop module for the years 1960 – 2000 for three different vegetation zones (evergreen broadleaf forest, woody savannas and savannas). Yields represent potential yield or crop suitability as a function of climate and soil conditions. Yields increased slightly over the study period due to land-use changes and better climatic conditions.



## *Water*

**Groundwater:** The spatial distribution of groundwater abstraction for domestic supply within the Volta was quantified in order to assess the impact of increasing groundwater withdrawals on the Basin water budget. A database containing information on over 30,000 geo-referenced groundwater sources in Ghana and Burkina Faso was established. Groundwater use was found to have increased substantially over the past decades. Roughly 44% of the Basin population has improved access to groundwater. Current extraction rates are estimated at less than 5% of average annual groundwater recharge, indicating that to date, groundwater extraction does not have a major impact on the hydrologic budget. Therefore, further groundwater development should be encouraged, as almost half of the population still lacks access to safe drinking water. Important exceptions include regions of fluoride contamination of groundwater.

**Water and Household Economics:** Agricultural production in the Ghanaian savannah is constrained by rainfall variability and poor soil quality. There is a growing interest in increasing the region's irrigated area. We have analyzed the welfare effects of irrigation technologies in a changing macro-economic environment. Results indicate that scarce agricultural credit facilities compose a major factor constraining farmers' investments in irrigation. Household resource endowment, particularly labor, plays a crucial role in irrigation decision-making.

## *Institutional Research*

Many improved agricultural and water management policies have been adopted in Burkina Faso, as in Ghana, but the resources and political will for implementation are often not present at national or local levels. The regulating influence of the state administration over water management is weak due to lack of finances, legitimacy, and enforcement power, which are constraints to rule compliance. This situation has already led to uncontrolled water distribution, deterioration of infrastructure and to a decrease in agricultural production.

## *Phase 3*

Phase III "GLOWA Volta Phase III: Synthesis and Transfer" (2006-2009) includes some additional components to the GLOWA Volta science plan. Significant program resources have been allocated to software engineering tasks, facilitating the integration of models, databases, and visualization tools required to construct a fully functional DSS. Another significant feature of the Phase III science plan is the building of a research consortium





in West Africa to ensure the successful transfer of the project's scientific products, infrastructure, and ongoing data collection activities to stakeholders within the Volta Basin following formal completion of the program in May 2009.

### Capacity building (as of September 2007)

- 78 participating doctoral, master and diploma students
- ca. 75 % from African countries
- 28 students completed their PhDs
- 15 students completed their master and diploma degrees

### Partnership effort

The GLOWA Volta project research infrastructure has been established and expanded into regional research networks through the integration of project activities and research sites.

Essential is the close cooperation with the United Nations University in Accra, Ghana, with the recently founded Volta Basin Authority, based in Ouagadougou, Burkina Faso, with whom ZEF has established a Memorandum of Understanding. Both institutions will have leading roles in the regional research consortium which will assume responsibility for GLOWA Volta research activities after completion of the ZEF-led project.

## Introduction

Sun, sand, and salt: These may sound like the ingredients for your perfect summer holiday. But for the inhabitants of the Aral Sea region in Uzbekistan, these elements describe the harsh living conditions impeding their access to a better life. The sun scorches the vast deserts of the Central Asian plains to temperatures of up to 50 degrees Celsius. The sandy soils do not hold nutrients. Irrigation water evaporates swiftly, leaving behind dissolved salts on the soil surface. These salts degrade the soil and impede crop growth, hindering better harvests and reducing farm income.

During the Soviet era one of the largest irrigation projects ever undertaken was started in the region. Vast tracts of former desert were put under cultivation to produce cotton, a strategic good in the Soviet Union. Until the late sixties, the Aral Sea was the fourth largest fresh water lake of the world. Since then, however, the water surface has been reduced to less than 20% of its former area. Today, the Aral Sea crisis is a showcase example of an extremely fast process of ecological degradation caused by human intervention. This process threatens the ecological sustainability of the entire catchment area of the Aral Sea.

## The ZEF project in Khorezm in Uzbekistan

In 2001, ZEF started a research project on the "Economic and ecological restructuring of land and water use in Khorezm". The project's researchers aim to enhance the lives of the rural population in the Aral Sea region in Uzbekistan by improving the economic efficiency and ecological sustainability of the agricultural sector in the region. The project is being implemented in close cooperation with local partners, prominent among them the State University of Urgench (UrSU). It is being funded by the German Federal Ministry of Education and Research (BMBF), and is supported by UNESCO.

Khorezm is a region in the northwest of Uzbekistan on the lower reaches of the Amu Darya River, the largest former tributary of the Aral Sea. Despite its modest size (0.3 million hectares, 1.3 million people), the region serves as a model case for developing concepts applicable to the entire irrigated lowlands of the Aral Sea Basin, covering approximately five million hectares with a population of about 20 million people.

## Findings on the state system

During the Soviet era, Uzbekistan primarily produced cotton. As a result, basic commodities, such as wheat and flour, had to be imported from other Soviet republics.

## Sun, sand, salinity: Combating aridity in the Aral Sea region in Uzbekistan

### *The ZEF/UNESCO project in Uzbekistan*

*Project duration:*  
2002 – 2010 (three research  
phases)

*Main donors:*  
German Ministry for Education  
and Research (BMBF), DAAD

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Since independence in 1991, agriculture continues to be the key sector of the Uzbek economy. Approximately 30 percent of the total workforce in the national economy is employed in agriculture. Driven by the government's strategic decision to achieve national food autarchy, domestic wheat production has been drastically increased since independence. In 2006, cotton and wheat accounted for about 70 percent of the complete area under cultivation. Furthermore, these commodities are still being produced under irrigation. Despite various land reforms, the state still has tight control over agricultural production. This means that the management of water, soil, and agricultural resources is based on often outdated recommendations. As a result of this state control, agricultural production cannot adapt quickly to market trends. The newly quasi-privatized farmers are often not adequately trained, and often make inefficient use of the resources for agricultural production. The demise of the former kolkhoz system has left a vacuum in service organizations, such as extension and training services or micro-credit services provided by rural banks. At the same time, demographic growth, political developments and climate change are increasing the pressure on water as the pivotal resource for agricultural production. Thus, the economic efficiency and profitability of land and water use are at risk, as deteriorating soils and dwindling water resources cannot sustain economically viable rural societies.



### Trans-disciplinary approach

Given this complex mix of man-made and natural resource constraints, trans-disciplinary and integrated research proved to be the only suitable approach to analyzing and addressing the problems in the Aral Sea region and thus to contributing to improving the lives of the rural population there.

"Our goal is to increase the economic efficiency of agriculture while at the same time preserving the ecological service functions of the natural system in a sustainable way", explains Paul Vlek, project head and director at ZEF. "Our research seeks solutions to regional problems by looking at interventions on three levels: first, decision support for improved agricultural policies on the national and regional levels, next, institutional restructuring, aiming at sustainable natural resource use, and finally, an integrated 'technology mix' for improving management of land and water use. These targets can only be achieved if natural, social and economic scientists cooperate closely, with the involvement of local partners, on working out concepts and solutions."

## Research results and achievements

ZEF's integrated research has shown that there are no simple textbook solutions to the complex problem setting in the Aral Sea Basin. Economic scientists in the project concluded that apparently obvious solutions are not always those to be pursued. Deeper insight resulting from two sound scientific studies reveals that, at the policy level, a 'blanket' adoption of liberal market mechanisms might create more problems than it would solve. The state-order system controlling the main market commodities cotton and wheat actually seems to work more as a risk-minimizing system providing subsidies, instead of being a heavy tax on the farmers as is often believed. Although the farmers have to meet certain production targets within the current system, they also receive agricultural inputs such as seeds and fertilizers at low prices. Thus, policy interventions, such as introducing water pricing or abolishing the state order altogether, are to be weighed up carefully against the shortcomings before they are implemented.

The project's scientists are working on providing better irrigation methods to improve the ecological sustainability of agriculture in Khorezm and to reduce the wastage of water. They have found, for example, that the underlying problem behind the most proximate cause of secondary soil salinization, inadequate drainage, is the non-availability of irrigation water to single farmers. This is mainly a distribution management issue that needs to be addressed at the institutional level. Obviously, dealing with the proximate cause alone would not yield the required sustainable management solutions. Thus, the project's scientists have developed a package of integrated measures to tackle soil salinization and degradation, including technology options to reclaim degraded land, as well as management options addressing the water institutions, such as water-user organizations. Soil conservation agriculture and reforestation are important elements of the technology options, as are crops which represent alternatives to the present crop portfolio of cotton, wheat and often rice. Scientists in the project have developed a technology to let local tree species grow rapidly on marginal lands. Reforestation offers a win-win solution from which both the farmers and the regional environment will profit: Trees protect against wind erosion, produce fuel wood and animal fodder which can be sold, recycle organic matter to the soil enabling a reduction in fertilization, and they improve the landscape.

In order to be able to draw sound research conclusions, our scientists have compiled high-resolution maps, showing all major features of the region: Soil, groundwater, crops, land use, as well as economic and social indicators. This was made possible by a





laboratory for Geographic Information Systems (GIS) that was built at the project's office site in Urgench. This GIS database forms a basis for integrative decision-making in order to optimize the management of water, crops, land use, and soil salinity. Furthermore, researchers from the German Aerospace Center (DLR), an important project partner on the German side, are developing tools to forecast cotton and other crop yields, based on remote sensing data from satellite images. These tools are being developed to assist local decision-makers with their planning.

Social scientists in the project took a closer look at the impact that the collapse of the former Soviet Union had on the agricultural sector. One of the unexpected effects was the creation of a considerable "knowledge gap" at farm level. "In Khorezm alone, there are around 17,000 newly privatized farmers, who did not use to be farmers before. The majority of them is ill-prepared for their new role and lacks the most basic skills and training to be capable of using natural resources in a sustainable way. Farmers even know little about the quality of their soil and its salinity", complains Ruzimbay Eschanov, Rector of UrSU and a long-standing cooperation partner in the project. "We therefore welcome the fact that the project addresses this problem by developing improved farm management methods, a rational use of inputs such as fertilizers, and better rotations of crops, including some lucrative novel crops. We also welcome the plan to integrate fish production in small ponds so that farmers can increase their income".



### Capacity building (as of mid 2007)

The project has invested much effort and many resources into building capacity, particularly among people from the region. More than 80 scientists are now involved in the project. Thirty-three have received a BSc and 46 an MSc degree in Uzbekistan. Ten of a total of 23 PhD students involved in the project have graduated, six of them from Uzbekistan. Most of these students received their doctoral degree from Bonn University, one from an Uzbek University.

A modern office building, which also hosts the above mentioned GIS laboratory, has been built on the campus of the University of Urgench with support from UNESCO. This building provides optimal laboratory and office facilities and thus represents an optimal basis for carrying out the regional academic capacity-building effort.

## Partners

"All research will remain without effect if it is not accepted and implemented by the local, regional, and national decision makers in Uzbekistan", says Vlek. "That is why we put so much emphasis on cooperation with our local partners. Partners such as the University of Urgench, the regional governor (hakim) of Khorezm, but also the Uzbek Ministry of Agriculture and Water Resources realize that this project offers a great opportunity and therefore they give us all the support we need. This will be increasingly important in the ongoing research phase, in which we will apply the recommendations derived from the research done so far. In the end, it is our partners who will have to translate the project's findings into practice".

"This project and the possibilities it offers for building scientific capacity among the young Uzbek academic generation is an enormous gain for our University, the region of Khorezm, and for Uzbekistan", says Azimbay Sadullayev, the former Rector of the University of Urgench. "We especially appreciate the high level of professional training our PhD students receive during their education at ZEF, at the University of Bonn and in the project. After finishing their PhDs, these students contribute substantially to enriching and improving academic life and standards in Uzbekistan. All these efforts could form the foundation for the anticipated 'Center of Excellence' that is to emerge from this project".

## Perspective

The third phase of the project (2007-2011) will result in the verification and demonstration of a series of alternative policies, institutional arrangements, and integrated technologies. These will be integrated into a new land use concept and will allow the implementation of an improved economic and ecological resource management. This restructuring process will certainly exceed the lifetime of the project and will have to be accepted and carried out by the people of Khorezm themselves. To prepare for this final transition phase, ZEF will put emphasis on enabling the University of Urgench to take the lead in this process. To fulfill this role, the university does not only have to be a leading scientific institution in the region, but also a role-model institute for extension and rural development consultancy. Initially, UNESCO will play a key role as a "broker" between the national and international partners in this process. Additional important players will be the local decision makers, the water administration and the GTZ. In this way, the project may become a blueprint to be followed in other irrigated landscapes in Central Asia.





## Summary

Whilst there is a general consensus that Uzbekistan needs to create a free market-oriented policy that supports changes in land and water use, ZEF research has demonstrated that this transformation process has to be designed very carefully to avoid major social inequities. It has also become clear that Uzbekistan needs to strengthen the institutions responsible for land and water management. This demands capacity development, re-organization, and the enhancement of infrastructure. Careful attention must be given to the type, speed, and depth of re-structuring the region's formerly collectivized agriculture in order to avoid the pitfalls of the past and those seen in some neighboring countries. The trans-disciplinary research performed by ZEF aims at providing the scientific backbone for the necessary technology implementation as well as creating the institutional set-up needed to improve living standards and environmental protection in this region.



## Introduction

Did you know that the birthplace of coffee is Ethiopia? Did you know that this plant that we have been using for many centuries is still growing wild in the under-story of the Afromontane rainforests of Ethiopia today? This might end if we do not take measures to keep the plant alive there. Researchers at ZEF went to the rain forests in Ethiopia to start activities for preserving this unique plant.

The origin of *Coffea arabica* lies in the highlands of southwest and southeast Ethiopia. Here, it grows wild in the mountain rainforests at altitudes between 1,000 and 2,000 m. However, this wild coffee is highly endangered because the forests are being converted into agricultural land and settlements for the poor and growing human population. In addition, farmers are taking advantage of the diverse legal regulations on use and ownership of the forests and are converting forests into agricultural or pastoral land in order to secure their livelihoods. In other places, large coffee plantations are being established to increase productivity. These interventions destroy the forest habitat, irreversibly leading to the loss of a valuable resource: the wild *Coffea arabica*'s genetic diversity.

## The ZEF project on the use and conservation of wild coffee in Ethiopia

ZEF's project on the use and conservation of *Coffea arabica* (CoCE) aims at developing solutions for the sustainable use and conservation of wild coffee populations in Ethiopia. The CoCE project is being funded by the German Federal Ministry of Education and Research (BMBF) and was initiated in August 2002. It is part of the BMBF's Biosphere research program – integrative and application-oriented model projects (BioTeam).

*Coffea arabica* has a unique value for the coffee sector and is well-suited as a model species in biodiversity research. This is because its wild populations can still be found in Ethiopia's natural rainforests and it is one of the few economically important crops whose origin is restricted to one country. However, the gene pool of *Coffea arabica* is highly endangered. An irreversible reduction in the gene pool would result in huge benefits forgone in coffee breeding and production.

Ethiopia is currently the seventh largest coffee producer worldwide. Coffee has an enormous economic value for Ethiopia, being the country's most important export crop. One third of the total amount of exported coffee goes to Germany. Coffee accounts for

Wild but vulnerable – will the remaining descendents of *Coffea Arabica* soon become extinct?

*Project on the use and conservation of Coffea Arabica in Ethiopia (CoCE)*

*Project duration:*  
2002 – 2009

*Main donor:*  
German Federal Ministry of Education and Research (BMBF)

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41% of the country's foreign currency income. Seventy percent of the coffee produced in the country is cultivated privately as garden coffee, whereas 25% is collected in forest and semi-forest coffee systems. A mere 5% is cultivated as plantation coffee.

Ethiopian wild coffee populations could become important for international coffee breeding efforts aiming to improve the disease tolerance of the coffee plant and stabilize its production. Breeding and selection measures for increasing the disease tolerance so far have focused on coffee leaf rust and coffee berry disease. In the future, they will also have to focus on coffee wilt disease. Furthermore, coffee cultivation in many parts of the coffee-growing world is being moved to marginal land. Thus, coffee varieties have to be adapted to adverse ecological conditions, such as drought stress, in order to achieve production stability. To be able to adapt to these changing cultivation conditions, it is of utmost importance to have a diverse coffee gene pool for breeding. Ethiopian wild coffee populations provide highly diverse genetic material for future coffee breeding and selection.

### Trans-disciplinary research

The project's scientists have done research on the diversity and the economic value of the Ethiopian coffee gene pool and its forest habitat as well as on the institutional framework in which the forest users operate. A proper investigation of the wild coffee populations in their comprehensive biodiversity context requires a trans-disciplinary approach, taking into account natural and social sciences as well as economics.

Field studies were carried out mainly in Bonga, Berhane-Kontir, Maji and Yayu forest located to the west and in Harena forest in the Bale Mountains east of the Great Rift Valley. In its first phase from 2002 to 2006, the CoCE project covered six main research areas corresponding to six subprojects:

1. Studies on the vegetation and floristic composition of the rainforests.
2. Studies on the genetic diversity of wild coffee and genetic differences between wild coffee and land races as well as other coffee varieties.
3. Investigations on site-specific tolerance of the wild coffee populations to drought.
4. Investigations on tolerance of wild coffee populations to fungal diseases, coffee berry disease, and coffee leaf rust.



5. The economic value of the coffee-genetic resource for international breeding programs and the economic value of forests with wild coffee occurrence.
6. The institutional framework: investigations on how the conservation and use of wild coffee and forest resources are organized, regulated, and managed.

## Main scientific findings

The vegetation surveys found more than 700 plant species on the sites of the field studies. That amounts to 10% of the Ethiopian flora. The vegetation analyses reveal that the montane forests of the five study regions show floristically significant differences. However, the floristic compositions of forest areas with wild coffee occurrence are cross-regionally very similar. That is why these areas can be defined as coffee forests. The occurrence of wild coffee depends on altitude and the intensity with which the local coffee collectors manage the forest. Forest management includes measures such as removing competing vegetation from the undergrowth. This has an impact on species composition as well as on the structure of the coffee forests.

Molecular-genetic analyses conducted in the course of the project confirm the high genetic diversity of wild *Coffea arabica*. The analyses also show that wild coffee is genetically clearly different from land races and varieties. Moreover, in some regions there are genetically similar, in other regions very different wild coffee populations. In general, there is a high level of diversity within regions. We found that the forest management measures carried out by coffee collectors often include enrichment plantings which lead to the abundance of wild coffee plants. However, increased harvesting of coffee berries does not seem to have negative impacts on the genetic diversity of coffee.

Eco-physiological studies reveal that the coffee plants' tolerance to drought is site-specific. Moreover, the water use efficiency of wild coffee plants increases with decreasing mean annual rainfall. In addition, drought-stressed coffee plants recover faster at the end of dry spells when they originate from dry environments, such as Harenna or Bonga. Another outcome was the variability of coffee plants and populations regarding their tolerance to coffee leaf rust and coffee berry disease. In wild coffee populations, 30 to 70% of the plants are infected by coffee leaf rust. However, no major damage could be found, let alone the total eradication of a coffee stand as happens in plantations in other parts of the world. Field experiments with plants artificially infected with the fungus which causes coffee berry disease demonstrate that 53-100% of the coffee berries are tolerant to coffee berry disease.





The research team dealing with the economic value of wild coffee genetic resources carried out a cost-benefit analysis to assess its global economic value for coffee breeding. This analysis was based on the assumption of the following benefits of a breeding program for wild coffee populations: (1) reduction of yield losses due to diseases and pest attacks amounting to 2.5 billion US\$ per year, (2) reduction of costs for decaffeination through the provision of low-caffeine plants amounting to 300 million US\$ per year and (3) 10% yield increase. The costs comprise a breeding program of more than 15 years and the introduction of newly bred varieties. Based on these assumptions, the resulting potential economic value of coffee genetic resources amounts to between 0.42 and 1.46 billion US\$.

The economic valuation of the coffee forests was carried out from the perspective of the farmers as well as society as a whole. An income analysis reveals that, from the farmers' perspective, the conversion of forests into arable land is more profitable than the sustainable management of forests - in the short run. After all, forest conversion allows them to sell timber and produce maize and therefore generates income immediately. The income from measures aiming at sustainable forest management would only amount to 65-75% of the benefits from conversion measures. Private and social economic analyses differ with regard to the type and amount of values taken into account. Under certain conditions, sustainable forest management achieves higher net benefits as compared to exclusionary conservation or conversion into arable land. These achieve, respectively, only 50% and 70-85% of the benefits from sustainable forest management.



Management concepts aiming at the simultaneous conservation and use of natural resources might create conflicts. In Ethiopia, all forests are nationalized. Most coffee forest areas are located in so-called National Forest Priority Areas. Here, local forest users have limited rights of access and use, which conflict with traditional property rights. The project's research group focusing on institutional issues found that traditional use and ownership rights are still being practiced in the communities. The ambiguous legal situation in combination with a shortage of incentives, as well as absent monitoring and enforcement activities has led to an open access situation in many places. Although there are a lot of functioning traditional and informal community-based institutions, there is hardly any co-ordination between the informal and formal institutional levels. Such institutional links are, however, necessary to develop effective concepts for the conservation and management of natural resources.

With the help of CoCE research it could be shown in particular that

- There is a high degree of species diversity in the mountain rainforests, both at local and cross-regional level.
- There is also a high degree of genetic diversity in wild *Coffea arabica* populations, differing from region to region, and the differences in its disease and drought tolerance exemplify the genetic diversity.
- Wild coffee, the coffee genetic resources and coffee forests have a considerable potential economic value at global and local scale.
- From the farmers' perspective, the conversion of forest into agricultural land is an economically sound decision under current institutional settings.
- There is a multitude of local, regional, and national stakeholders involved in the use and management of forest resources with conflicting interests, mandate discontinuities, changing responsibilities as well as diverging property rights.

## Conclusions

Four basic problem areas have to be tackled in the ongoing second research phase in order to achieve the conservation and use of wild coffee populations in the mountain rainforests of Ethiopia:

- As natural forest areas are shrinking in Ethiopia and coffee production is increasingly based on modern coffee varieties, practical measures have to be developed to preserve the wild coffee gene pool in situ, i.e. in the species' habitat of origin. Different types of in situ gene banks are envisaged. The advantage of conservation in the species' habitat of origin is that it maintains the plant's natural selection and adaptation mechanisms with regard to changing site and environmental conditions.
- The potential economic value of the wild coffee-genetic resource has to be transformed into real economic benefits for the rural population through adequate incentives and financing mechanisms.
- Implementation strategies have to be developed. These include communication and public awareness building, education as well as strengthening institutions for the conservation and sustainable use of forest resources. To realize this, a non-governmental organization, the Ethiopian Coffee Forest Forum (ECFF), was founded at the end of 2005.





- In the course of the first research phase, new research questions have evolved which require further attention. These include genetic diversity, coffee diseases, coffee quality as well as the relationship between rules and regulations of forest management and the condition of the forests.

### Capacity building (as of September 2007)

In the CoCE project, nine students have finished their PhDs so far, among them five young Ethiopian and four German scientists. Four Ethiopian doctoral students and an Ethiopian master student are still involved in the project. Furthermore, the field research of ten Ethiopian MSc students was supported by the project. Also, a molecular-genetic laboratory has been set up at the University of Addis Ababa by the project.

Since the 1980s, development policy interventions in post-war societies have been guided by the idea of "democratic peace". The introduction of democratic principles advanced to become a generally recognized legitimization of both internal and external power. The view prevails that democratic states are more peaceful towards one another than authoritarian states. Central elements of democratic peace are the introduction of democracy, good governance and rule of law. These instruments are intended to make the state machinery accountable and transparent. Decision-making and control processes should not be implemented by the state alone, but should involve the participation of civil society.

Along with the paradigm of democratic peace, the concept of "good local governance" also gained significance among the strategies of the donor community. The World Bank alone spends approximately 2 billion US\$ each year on such projects. Good local governance incorporates the fiscal and administrative self-governance of local communities. Concepts vary slightly depending on the organization concerned. They may be labeled "community driven development" or "participatory development".

Good local governance has been playing an outstanding role in the development agenda of post-war societies since the end of the 1990s. On the one hand, it attaches importance to the local level because this is the level faced with everyday political decisions. On the other hand, however, legitimate contact partners are often lacking at the local level due to weak statehood. But these local partners are extremely important for the activities of development organizations. The process of good local governance combines the establishment of modern institutions in accordance with the precept of democratic peace with the implementation of development projects. The intention of such projects is that village communities should be able to administer themselves, adopting a participatory and democratic approach. As an incentive, the communities are allowed to identify potential development projects themselves, which are then financed by the donor community.

ZEF studied inter alia the prospects and difficulties of the good local governance approach within the framework of a project funded by the Volkswagen Foundation entitled "Local Governance and Statehood in the Amu Darya Region". Various international donors have been implementing good local governance projects in Afghanistan since 2002 under the heading National Solidarity Program. International organizations involved include UN-Habitat and Deutsche Welthungerhilfe (German Agro Action) under the direction of the Afghan government. Evaluations of the fiscal and technical dimension of the projects consider the approach to be successful. Research which ZEF has conducted on the

## Local governance in post war societies – a dead end story?

*ZEF's project on local governance and statehood in the Amu Darya borderlands (Uzbekistan, Tajikistan and Afghanistan)*

*Project duration:*  
2005 – 2008

*Main donor:*  
Volkswagen Foundation

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project's sociological aspects in Kunduz over the last two years takes a rather critical view, however. According to ZEF's findings, there is often a huge gap between the aims of the participatory projects and their actual implementation.

One successful aspect of the good local governance approach is certainly the fact that development projects – usually infrastructure measures – are implemented quickly at the local level. This means that the local population, particularly in remote rural areas, can be offered a peace dividend. Such projects act as beacons in development cooperation and demonstrate quickly and visibly that reconstruction is making progress. The international development organizations hope that this will increase their acceptance and their physical safety.

However, this safety factor is thwarted by the fact that the rules for establishing the projects are laid down in far-off Kabul. These rules stipulate democratic elections and a gender balance in the local councils (*shuras*) of the development projects. It is sweepingly assumed that a power vacuum prevails at the local level or that the existing power structures are illegitimate. Institutional research, however, reveals that this assumption ignores the fact that certain rules always exist and power structures are often based on spiritual or charismatic legitimization or origin. The introduction of good local governance projects therefore questions the prevailing power and legitimization structures. Reactions to such projects vary considerably, as our research shows: Usually the ruling elites manage to influence elections in such a way as to undermine democratic principles. The elites thus consolidate their power structures. However, there are also examples where the elites are not elected and this often leads to new conflicts. There are also cases where the local elites attach so little importance to the projects that they send their representatives to sit on the councils – often teachers who can read and write. Summing up, it can be said that good local governance projects in Afghanistan either serve to consolidate the prevailing power structure, often accompanied by an erosion of democratic principles, or they destabilize prevailing local power structures. Although this development marks the introduction of elections as a democratic instrument, it also contradicts the “do no harm” approach.



One important side effect, which has received little attention in the past, is the fact that good local governance projects begin a state-building process. For example, the rural regions of Afghanistan below district level have never been registered for administrative purposes. As a rule, communities are organized through social networks. There are no standard concepts or names for settlements. There are no typical village communities



of the kind development workers are familiar with. In order to nevertheless be able to conduct projects, the implementing organizations identify, name and territorialize villages and communities. And so good local governance, which regards itself as a grass roots approach, turns out to be quite the opposite: the administrative and territorial registration and structuring of rural areas by an external organization.

The problem is that this covert state-building process is not performed by the state itself, but by international organizations. These organizations are in the difficult position of having to shape processes of negotiation which ultimately concern the distribution of power and the enforcement of external values and standards. But they lack the instruments which the state has at its disposal to enforce its will. They have neither the monopoly of power nor co-opting strategies. They are exposed to a high security risk because they represent the enforcement of a new order in power relations. At the same time, the organizations are agents in a state-building process, performing a concrete project over a limited period of time. This means that they do not establish long-term relations with the local population as is the case with the state.

The example of the introduction of good local governance in Kunduz not only reveals inconsistencies with regard to establishing security, but also indicates that projects are having to compensate for the lack of statehood in post-war societies. Despite the euphoria prevailing in the donor community, good local governance projects reveal similar difficulties to those encountered with the all too rash introduction of democratic peace at the national level. Many societies are proving resistant to the introduction of new political mechanisms. As a result of this experience, critical voices can already be heard describing the introduction of good local governance in post-war societies as problematic. They advocate that such projects should not be introduced until efficient state structures have been established. This would mean adopting a two-step sequencing approach, establishing state structures in a first step and then rolling them back in a second step. The question arises of whether there is a happy medium between the introduction of good local governance projects and the total rejection of this type of project in fragile states. Research could provide an important contribution to solving this question in future.



# Economic reform and good governance: A challenge for Arab countries

*ZEF research on governance*

*Project duration:*  
2001 – 2004

*Main donor:*  
German Federal Ministry for Economic Cooperation and Development (BMZ)

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According to former UN Secretary-General Kofi Annan, "good governance" is one of the main factors in combating poverty and attaining sustainable human development.

However, the components of good governance, such as state accountability, institutions based on the rule of law, the scope for participation and an efficient public administration are poorly developed in many countries. Arab countries in particular show enormous deficits. The political, economic, and social power structures in this region also pose a problem in the field of development cooperation. At ZEF, a comparative study has recently been conducted exploring the opportunities to participate in legislative procedures concerning the issue of economic reform in Morocco, Jordan, and Egypt. In cooperation with the Economic Research Forum in Cairo, and with the support of three interdisciplinary research teams in the three countries, the study analyzed the role of the executive, the parliaments, and civil society.

Three major trouble zones were identified:

## Political-economic impediments

- The three countries suffer from a lack of economic competitiveness, also owing to weakly developed human capital.
- Despite the introduction of neo-liberal reform policies, economic structures have been only partly liberalized. State and private monopolies blurring the economic policies of the countries represent a particular problem.
- The private sector consists mainly of a multitude of informal micro- and small enterprises. It suffers from a lack of productivity and political-organizational weakness. Public life is dominated by personal rather than collective relationships.
- The reform process has certainly been accelerated by the heads of state directly interfering with economic policies. However, the sustainability of such reforms remains doubtful. A coalition of bureaucrats and economic actors has grown that stubbornly opposes reforms while benefiting from too little regulation in some areas and too much in others.
- Austerity measures and misguided employment and investment expenditure have resulted in an unequal distribution of social benefits, causing social polarization.

## Weaknesses in participation

- The reforms are pushing the executive beyond its capacities. Informal or short-term solutions such as special industrial zones and consultancy offices set up at ministry level to boost the reform are in fact obscuring institutions.
- The heads of state in the three countries have rendered the opposition powerless with their electoral systems (in Jordan and Egypt) and restrictive regulations (in Egypt) and by integrating the opposition in a manner that undermines its credibility, as is the case in Morocco.
- Basically, the parliaments lack the technical-administrative capacities to elaborate and adopt the multitude of economic laws. Indeed, working on them keeps the parliaments from fulfilling their true political role. Thus, they are neither in a position to represent the interests of the different groups in society nor to examine the impact the new economic laws are having on the market. Only in a few cases, such as in family or labor law, does parliament play a relatively active role.
- Parliaments have a bad reputation as legislative institutions in the three countries. Rectifying this state of affairs would require several improvements regarding electoral systems and the right to vote as well as strengthening the role of political parties.
- There are increasing numbers of civil society organizations in the Arab countries (especially employers' associations, lobby groups, and development organizations). While they appear to make the landscape of semi-state associations and unions more pluralistic, in reality, they are usually poorly organized and politically reticent. This is especially the case in Egypt and Jordan.
- A recurrent problem in implementing what are basically good government programs is the lack of incentive for most political actors to carry through their constitutional rights and functions in a proper manner. But the poor technical, administrative and political competences of the different actors are usually not sufficient for them to participate in the complex political-economic reform processes in an adequate manner.





## A poor information and knowledge basis

- Active participation in legislative procedures requires a broad information and knowledge base. The ability to collect data and develop indicators, scenarios, and options for action is a further important prerequisite. These competencies can only develop in a well-functioning network of policy-making and market and research institutions. But this is precisely what is missing in the three countries, despite recent and encouraging developments in the field of information and knowledge building structures.
- Although the increasing number of private economic actors has led to a growing demand for accurate economic data, this demand cannot be met since the economic structure is characterized by many small and informal family enterprises, a high level of illiteracy, and poor performance in the field of education. These factors have a negative impact on the availability of information and knowledge.
- The media play a very important role as providers of information and knowledge. However, in the absence of transparent management structures, they are an easy target for corruption by the economic and political elites.



## Conclusions and recommendations

- Enacting economic laws and signing trade agreements is no reliable indication of the level of economic liberalization in the Arab countries. A lot remains to be done before there are free, fair, and competitive domestic markets in this region.
- It is essential to boost the productivity of small and medium enterprises. But to be able to assess the effect that different liberal laws have on the market, there should be more transparency regarding the transaction costs of these enterprises, especially in the field of marketing, labor and social security agreements.
- The lack of adequate laws for the freedom of opinion and information still represents a major political impediment in the three countries. Liberal laws in this field should therefore not only be enacted, but also implemented.
- It is necessary to promote mechanisms that build consensus and mitigate conflicts. Various institutions already in existence, such as the policy council of the government party and the national councils for human and women's rights in Egypt, the consultative

economic councils in Jordan, and the dialogue forum for social affairs in Morocco, should be strengthened.

- In the field of partnerships with law-making actors, a continuation of the exchange programs between European and Arab parliamentarians is recommendable. In addition, setting up an independent parliamentary forum to advise the members of parliament in the three countries could prove useful.
- Opportunities for cooperation with civil society (such as employers' associations and research institutes) offered by the EU-MEDA partnership program should be improved by means of the corresponding committees.
- It is also important for the Arab partners to have the possibility to set up networks with other local and less cosmopolitan civil societies. Only then will there be a chance of acquired competencies trickling down to a broader basis of civil society instead of remaining in the hands of a partnership between elites.
- A European-Arab committee of journalists could be founded to address the issue of information and knowledge based societies and work out solutions for the three countries. It would make sense for it to cooperate with the recently founded Euro-Arab Chamber of Commerce.



# Contracting for forest use in post-decentralization Indonesia

*ZEF research group on the management of natural resources*

*Project duration (research group):*  
2001 – 2006

*Main donor:*  
Robert Bosch Foundation

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## Overview

State acknowledgement of community property rights over the forest originating from decentralization reforms in Indonesia led to many forest-dependent communities negotiating logging agreements with firms. This article reviews the results from a study on these agreements undertaken in East Kalimantan province, Indonesia. It discusses the main policy implications from these results, in particular those relating to forest governance and community welfare.

## Research context

Tropical forests in Indonesia account for ten percent of the world's forest stock and support the livelihoods of at least 20 million people. Since 1997–98, decentralization in Indonesia has occurred on a tremendous scale. One consequence has been that local communities received acknowledgement of their customary rights to the forest. Communities were granted forest 'use rights' by local governments. In practice, this led to logging firms negotiating directly with communities for access to commercial forest in exchange for financial and in-kind benefits. In East Kalimantan, hundreds of communities negotiated logging agreements covering thousands of hectares of forest.

## Research objective

The study first aimed to investigate whether communities benefited from decentralization. It compared the financial, social and economic impacts from mechanized logging on communities, both before and after decentralization. Second, the study aimed to explain the reasons why communities differ in terms of these outcomes.

## Methods

During 2003–04, data were collected from 65 communities in three different districts in East Kalimantan. Almost all communities were exposed to commercial logging both before and after decentralization. Statistical analysis was used to assess the impacts of decentralization. To explain why communities differ in terms of outcomes, a game-theoretic model combining conflict and bargaining theory was developed. Hypotheses from the model were then tested using econometric analysis based on the data collected.

## Results

The results show that almost all communities received financial and in-kind benefits from post-decentralization logging agreements compared with the situation before decentralization. Direct financial payoffs after decentralization ranged from about USD 0.28 to 12 per m<sup>3</sup> of log production. The average payment received by communities in the study was approximately Rp. 33,000 (USD 3.64) per m<sup>3</sup>. By contrast, timber was valued at around USD 30–70 per m<sup>3</sup> in the domestic market, so communities received 10 percent or less of log revenue. Nevertheless, in many cases these payments significantly contributed to household incomes. Additional in-kind benefits received included, for example, construction materials for community buildings such as schools and ground leveling. By contrast, only eight communities received in-kind benefits and none received any payments before decentralization.

These benefits should, however, be set off against various costs. First, there were environmental impacts from post-decentralization concessions, although these were not significantly worse than under the centralized regime.

Second, due to weak governance in the sense of a lack of state enforcement of community property rights over the forest, many communities had to self-enforce these rights vis-à-vis logging firms and other communities. A third of sampled communities experienced firm non-compliance with agreements and high rates of intra- and inter-community conflict. In these communities, it is likely that decentralization has come at a high social cost.

Why were some communities more successful in terms of receiving significantly higher payments than other communities? The results indicate that where community rights remain weak and poorly enforced by the state, the community's ability to self-enforce its rights over the forest is crucial for claiming a significant share of logging rents.

Communities with a higher valuation of the forest, in particular those that derived a larger proportion of their income from the forest, were more likely to obtain higher payoffs. This is because communities that value the forest more are more willing to fight as their livelihoods are in greater danger from damage caused by logging. In addition, the communities' valuation of the standing forest serves as a fallback position in negotiations, so that communities which value the forest more have stronger bargaining abilities vis-à-vis timber companies.





For similar reasons, wealthier communities, characterized by low discount rates, also had greater abilities to self-enforce forest rights and also greater bargaining power in negotiations.

Self-enforcement, e.g., in the form of protests or blockades, is time-consuming and requires collective action by community members. Ethnic homogeneity and high social capital within a community (proxied by the level of participation in community organizations) tend to favor collective action. Accordingly, these characteristics were found to increase a community's self-enforcement capacity and its payoffs from logging negotiations. Communities with high opportunity costs of time, e.g., due to alternative income opportunities, were found to be less able to self-enforce their rights over the forest and claim an effective share in logging benefits.

Finally, the study analyzed the possible trade-offs between the environmental and financial contractual provisions negotiated by communities. The results indicate that there is little evidence for communities trading off one set of provisions against the other. Instead, communities that negotiated environmental provisions in their agreements on average also received higher payments than those that did not. This indicates that a greater ability to establish de facto property rights over the forest is a prerequisite to obtaining any kind of benefits at all.

## Policy implications

The results highlight the important role of the state in providing secure property rights. Acknowledgement of community rights over the forest needs to be accompanied by the government enforcement of these rights in order to reduce uncertainty and conflicts relating to forest land claims. To achieve this, local government enforcement capacities should be strengthened alongside the elimination of corruption in government. Moreover, community forest rights need to be extended beyond 'use rights' in order to reduce the pro-logging bias.

Most communities in the study area were gradually moving away from forest dependence to other sources of income as a result of long-term forest degradation, rural-urban migration and the development of agri-business opportunities. The results suggest that this could be detrimental in environmental terms as a lower community valuation of the standing forest and an increase in the communities' opportunity cost of time are likely to reduce communities' willingness and ability to fight for de facto property rights. In this





sense, the role of the state in enforcing property rights becomes all the more important as economic development continues.

Nevertheless, the livelihoods of many people in the study area were still very much dependent on land that was being directly or indirectly affected by logging activities. Education and awareness building on the links between logging, environmental damages and community welfare could help to raise the communities' perceived valuation of the standing forest. More importantly, policy mechanisms are required that translate external benefits from forest conservation (e.g., climate protection, biodiversity) into real financial incentives for local people.

The result that poorer communities tend to receive lower payments implies that targeted poverty reduction and a lowering of community discount rates through improved access to credit might be conducive to raise communities' self-enforcement capacities and payoffs.

A lowering of the costs to self-enforcement through reducing the opportunity costs of time and enhancing community ability for collective action would also improve communities' enforcement capacities and payoffs. In practice, this could be undertaken via training workshops to improve community participation and leadership. Furthermore, the improvement of relations among different ethnic groups within communities may also increase the community ability for collective action, especially given constant, dynamic changes in the ethnic make-up of many communities.

## Conclusions

In a situation of insecure and incomplete rights and poverty, it is not surprising that communities use their newly established rights over the forest to negotiate logging agreements with timber firms. While some communities have clearly benefited from such actions, others have obtained relatively low financial payoffs at high environmental and social costs. The study helped to understand these differences in outcomes.

It is important to stress, however, that excessive logging in Indonesia and elsewhere may be mainly a consequence of the fact that many important benefits from the forest (such as climate protection and biodiversity conservation) occur beyond the local level. In this sense, the decentralization of decision-making over forests worsens the situation. There is a need for accompanying mechanisms that translate global forest benefits into real financial incentives for local people. Payments and emerging markets for environmental services may be promising in this regard.



Project leader Stefanie Engel with one of her graduated students

# Selected Research

## Social labeling against child labor and for fair trade: Does it work?

The research team on this topic was led by Ulrike Grote, former senior researcher at ZEF, and conducted in cooperation with Arnab Basu, College of William & Mary, USA, Nancy Chau, Cornell University, USA, Ahmed Ghoneim, Cairo University, Egypt, Assefa Admassie, former ZEF senior researcher, and Sayan Chakrabarty, former ZEF PhD student.

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Several studies have been conducted at ZEF over the last decade to examine the net costs and benefits arising from different measures on the welfare of children in developing countries. Special emphasis was put on understanding the economics of labeling and on analyzing the effectiveness of trade sanctions to combat child labor. Some of the results are highlighted in the following.

### Introduction

In the debate on international labor standards and economic globalization there is no more emotionally evocative issue than that of child labor. This is not surprising as it is estimated that throughout the world there are around a quarter of a billion children aged between 5 and 14 who work. About half of these children work full-time.

To combat child labor, many developed countries require the inclusion of social standards in trade policy, while most developing countries are strictly opposed to this idea and regard social standards as disguised protectionism.

### Main outcome

ZEF research on the effectiveness of trade sanctions to combat child labor concluded that sanctions are hardly suited for improving the situation of child laborers in developing countries. The reason for this is that 70% of the working children are employed in the agricultural sector in rural areas or in the informal sectors in cities. Therefore, only 5-7% of the economic activities that depend on child workers are actually affected by trade sanctions.

But even if trade sanctions improve the working conditions of a small percentage of child laborers in developing countries, this approach might ultimately do more harm than good. ILO research in India and Africa found that, on average, each working child contributes between 20 and 25% of their family income. This is a considerable proportion which could make the difference between survival and starvation for the family. Of even more importance is the fact that a trade sanction affecting the formal sector would compel child laborers to seek employment in the unregulated, informal sector where jobs are generally more dangerous and lower paid. This is a well-known development in Bangladesh, where thousands of children were fired from garment factories as a result of international pressure on the industry.

Another research question addressed was whether social labeling offers an alternative to trade sanctions. It is praised as market-based and voluntary and provides information via product labels whether acceptable labor standards have been adopted in the production process. Child labor-free labels have been developed especially in the carpet market, the footwear and sports industry as well as in the agricultural sector, including flowers and forestry. The labels are known under names like Rugmark, Kaleen, Step, Pro-Child, Care Et Fair or Reebok.

A simple model of north-south trade developed by ZEF researchers shows that social labeling basically addresses two market distortions: First, the market distortion on the production side in southern countries where child labor and poor working conditions exist. The price premiums paid by the consumers for the labeled product are expected to be channeled to the producers to be used for improving the working conditions for their employees.

The second market distortion exists on the consumption side in northern countries with consumers being willing to pay higher prices, but not having any information about whether goods have been produced at the cost of exploited workers or not. Social labeling would provide this kind of information, and thus remove the distortion on the consumption side by internalizing consumers' willingness to pay.

However, why have developing countries not initiated more social labeling schemes? They are presumed to gain both via a reduction of child labor employment and an increase in producer revenue for labeled products.

## Side effects of social labeling

First, there is the question of whether labeling really translates into the improved welfare of workers and especially of children. Labeling might reduce the number of children working in developing countries, but this does not mean that the welfare of the children or workers will improve. The model shows that, contrary to what may be expected, social labeling can imply that children and northern producers are worse off, while consumers and southern producers benefit. The children are worse off because the danger remains, as in the case with trade sanctions, that the child laborers will be dismissed from the exporting companies and pushed into more dangerous and hazardous jobs in the informal sector. In fact, some social labeling schemes pursue the removal of child labor without considering the consequences for these children. The consumer will benefit from increased information on the social conditions under which the products were produced. They have

Some of the above mentioned research on child labor has been presented at an international conference on "the Role of Labeling in the Governance of Global Trade", which was co-organized with Cornell University and the College of William and Mary and took place at ZEF in Bonn in March 2005. The proceedings of the conference have been published by Physica-Verlag under the title "New Frontiers in Environmental and Social Labeling".



the choice to buy the unlabeled or the labeled product at a higher price. The southern producers are expected to benefit because their labeled products will gain an increased market share at the expense of northern producers.

A second reason is the incentive problem for the producers. A mere threat of trade sanctions is not sufficient to provide incentives for the developing countries to meet certain social criteria of a labeling program. On the contrary, the producers might even be encouraged to use false labels. As more false labels appear on the market, the consumers will lose their trust in labels and the positive effect of terms of trade for the southern countries will vanish. Similarly, a lack of monitoring of labeling programs can easily lead to false labels, thus undermining the trust of consumers in the longer run. Therefore, social labeling would not materialize into any gains for the South.

### PhD study in Nepal

In his dissertation, a PhD student at ZEF analyzed empirically the effects of social labeling on the welfare of children in Nepal. He investigated which factors determine the probability of a child working in the carpet industry. He also examined the influence of non governmental organizations (NGOs) like Rugmark being engaged in the social labeling process. Based on a survey of 410 households in Kathmandu Valley in Nepal, he found that the probability of child labor decreases if (1) the carpet industry has implemented a labeling program, (2) the adult's income increases ("luxury axiom"), and (3) the head of the household is educated. However, it increases with (1) the age of the head of the household, and (2) the presence of more children (aged 5 to 14) in the household. Furthermore, labeling NGOs with a control function have a significant positive influence on sending ex-child laborers to school.



### Case study in Egypt

Further empirical results were obtained from a survey of 83 firms in the textiles and ready-made garments industry in Egypt, revealing that child labor is a phenomenon that exists with a relatively high share (16%) in the sample in that sector. All destinations receive exports derived from child labor. However, non-Western destinations seem to receive the lion's share, and many firms where children work export more than 50% of their output. Social labels indicating that no child labor has been involved in the production process are not known to the entrepreneurs in the textiles and ready-made garments industry in Egypt. In general, the attitude towards labeling is divided, however, with the majority of enterprises applying negative attributes to labeling.

Knowledge has always been an important factor in economic growth and social development. In recent decades, knowledge has moved up in importance, and today social scientists consider it to be the most important driver of development. A crucial factor is access to knowledge, which has been facilitated by rapid advances in Information and Communications Technologies (ICT). Unfortunately, knowledge does not 'travel easily' as the World Development Report 1998/99 assumes. Knowledge has to be hedged, managed and governed. Many barriers have to be removed before knowledge can be shared and put to productive use.

ZEF has taken up the challenge and is engaging in research on knowledge for two reasons: For one, knowledge plays a major role in development cooperation and, secondly, ZEF itself is a producer of knowledge, especially in the field of research on, in and with the developing world. This knowledge has to be disseminated – not only to the academic community, but also to a multitude of stakeholders in the development process, from government departments to NGOs and, last but not least, to civil society, especially to the poorer strata in the target countries.

Though the essential role and value of knowledge are now being discussed widely, the concept is still under-defined and is like other often used concepts such as development, globalisation, and markets in terms of fuzziness and opaqueness. ZEF's research interest is, however, more focused. Knowledge, we argue, is geared to action. Out of the wide range of possible domains of knowledge, we are concerned with that part of knowledge that enables purposive rational action. Empirical research creates data and information, but knowledge is needed to utilize information and turn it into action. Scientists may use data and information to create or test new hypotheses. Practitioners, however, need experience and explicit knowledge to develop strategies for action or take action based on knowledge. We are aware that this line of argument emerges out of the philosophical tradition of the age of enlightenment, as does a development policy based on human rights and poverty alleviation.

The ZEF research group "Culture, Knowledge and Development" and the "Knowledge Force" at the Lee Kong Chian School of Business, Singapore Management University (SMU), have been in the forefront of research and debate on the construction of knowledge societies, as well as on the governance and management of knowledge for development.

## (Re-) Searching for knowledge.

*ZEF's research on knowledge for development*

The ZEF research group on knowledge is led by Hans-Dieter Evers, senior fellow at ZEF and a former director (2005) of its Department of Political and Cultural Change.

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Joint research has been carried out on:

- knowledge sharing and the transfer of knowledge
- development experts and consultants
- the globalization of knowledge: local and global knowledge
- the development of knowledge societies in Southeast Asia
- science parks in Singapore, India and China
- knowledge management in development projects and in multinational corporations
- knowledge hubs and epistemic landscapes.

The transfer of scientific knowledge and the development of decision support systems have become a focus in the final stages of the larger interdisciplinary projects at ZEF. The set up of all these projects includes measures to channel the research results to the stakeholders in the respective research regions. Research on knowledge and development is therefore integrated into all major ZEF projects. For example, a PhD study conducted in the framework of the project on "Economic and ecological restructuring of land- and water use in the region Khorezm (Uzbekistan)" (see page 19) investigated the use of local knowledge in restructuring the agricultural sector. The PhD study suggested that high barriers to knowledge-sharing hinder the use of local knowledge, an important factor needed to diversify the rural economy. The removal of these barriers is an essential precondition for speeding up development in the area.



In the GLOWA Volta project, the mapping of organizations active in water management revealed an extreme complexity, overlapping tasks and disintegrated water governance, endangering the implementation of a consistent water policy. The results of this project will be integrated into the decision support system for integrated water resource management being set up by the GLOWA Volta project.

Another example of integrated knowledge research is included in the new WISDOM project: "Water Related Information System for the Sustainable Development of the Mekong, Vietnam". The project, which started in 2007, includes a long-term project component on knowledge management and capacity building.

Thus, research on knowledge for development will remain one of ZEF's main research topics in the coming decade.

Since the end of the 1990s, terms such as failed states, fragile states or anomic states have been used in the academic discourse to describe a by then global phenomenon: the weakness of central state structures. This weakness is not only reflected by endemic clientelism or corruption within the state administration, but can also result in a complete loss of state control over its monopoly of violence. Although cases of total state collapse such as Afghanistan, Somalia, Congo or Sierra Leone remain the exception, almost all states outside the OECD- framework are suffering from serious deficiencies of statehood. To contribute to the discussion on state weakness, ZEF research focussed on the question of how politics are structured on the local and national levels in conflict and post-conflict countries. To be able to give sound policy recommendations, a better understanding of these structures is needed.

A substantial result of the research done so far is that anarchy and chaos seem to be more the exception than the rule in weak states. Even in countries that suffered from a total collapse of state structures, political decision making follows certain rules. This is in contradiction to what is being reported by the media in the West. An example which has been investigated by ZEF researchers in detail is Somaliland. Here, in the 1990s, the clans agreed on a political process to regulate the governance of the country and to minimize violent conflicts. Due to this consensus, step by step self-supporting political structures emerged, which elevated today's Somaliland to the status of a quasi state, though international recognition as a state is still lacking. Similar conclusions on self-governance beyond official state structures can be drawn from ZEF research conducted in the tribal areas of Eastern Afghanistan.

Another case study on local governance dealt with the South African province of KwaZulu-Natal. Here, ZEF found that local dynamics of violence do not merely reflect political processes at the national level: The political dynamics at the local level are subject to local interpretations and can thus be modified to local interests. Frequently, these contradicting developments at the national and local levels are overshadowed by the self-dynamics of violent conflicts. This means that acts of violence create institutions and power relations which reproduce violence.

Despite the positive examples of governance in Somaliland and Eastern Afghanistan, it is generally difficult to show realistic ways of how to improve state functions and how development research can contribute. Here, ZEF is striving to transfer its academic research directly into political recommendations. Thus, ZEF participated as an academic advisor in the editorial team of the Federal Government's action plan for civil crisis prevention, which was composed in 2003/2004. The plan contains 163 measures, anchoring civil crisis prevention as a cross-cutting task in the German government's overall political frame.

## Looking for structures in chaos.

### *ZEF's research on governance and conflict*

The research group on "Governance and Conflict" was led by Conrad Schetter, senior researcher at ZEF.

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## Too much money business.

### Gender research at ZEF

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Gender has become a mainstream issue in development politics and practice in the past decade. Research has made substantial contributions to this field and ZEF has also taken up this issue in the framework of several case and PhD studies. Research on gender issues exceeds the boundaries of a single discipline, like economics, sociology, ethnic studies, etc., as it considers all aspects of daily life, such as the constraints women face and their implications for the development prospects of a country or region.

Among economists, it is a well known fact that women are often disadvantaged in obtaining credits. Due to a lack of financial means, women cannot purchase technologies such as fertilizers which could enhance their income from agricultural production. A recent study, however, finds that even marriage does not imply that husbands necessarily support their wives in the household and with farm work. Women and men often run farms or small enterprises that are not connected to each other and therefore do not yield synergy effects. This finding casts doubts on the assumption that households should be treated as the smallest unit of analysis, since household members do not fully share their productive resources. The outcome of a household decision, for example, on which crop to produce or which goods to purchase and many other issues depends on the relationship between women and men inside the family.

A PhD study conducted at ZEF in 2005 using household data from Ethiopia found that the number of children of a married couple is determined by the power women have to accomplish their personal goals in household decision making. Women in Ethiopia face tremendous health risks during pre- and post-natal periods as well as at the time of delivery and therefore have good reasons to reduce the number of children to a bearable limit. As the data shows, men on the other hand generally want more children compared to their wives, which leaves room for negotiation among couples. This finding has substantial implications for the functioning of public programs aimed at reducing birth rates. These programs will only work if both women *and* men are addressed in an adequate way.

Different roles of women within the household have implications for the demand for certain goods. Analysis of large-scale survey data from Tanzania, which was performed in the framework of a further PhD study conducted in 2007, has revealed that households headed by women purchase less alcohol and tobacco. At the same time, they spend more money on food and clothes for their children as well as on their education. This higher spending on food, clothing and education implies better investment in human capital which affects the future prospects for the growth of a country. This finding can



be explained in part by different old-age security considerations, although this result is ambiguous and requires further research.

Other case studies were conducted in Kenya, where the number of female-headed households is increasing and now amounts to almost 30 percent of all households. In Eastern Africa, land rights are strongly associated to marriage and thus for many women the only option to gain access to land is through marriage. As long as the conjugal arrangement lasts, women have relatively secure land-use rights, but as soon as the marriage is dissolved – e.g. through divorce or the death of the husband – the husband's family may reclaim the land, leaving the woman without any means of production. The data shows that widows are particularly disadvantaged in this regard. In cases where a male relative took over the farm management, the farm's land endowment is larger and the take-up of modern fertilizers and pesticides better. However, when a widow has no support from relatives, the use of improved production technologies is much lower compared to male-headed households.

On the basis of the research done so far, we can conclude that the role and status of women within households have certain policy implications and therefore need further attention from policy makers and researchers.



# Cooperation partners

Seeking solutions to the world's water problems.

*The Global Water System Project (GWSP)*

by Eric Craswell (GWSP director from 2004 – 2006) and Lydia Gates (current GWSP director)  
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GWSP and ZEF colleagues in 2006

Following the 2001 Amsterdam Declaration on the need for an integrated systems approach to global environmental change, the four international global change research programs of the Earth System Science Partnership (ESSP) (i.e. the International Geosphere-Biosphere Program, the International Human Dimensions Program on Global Change, the World Climate Research Program, and DIVERSITAS) established the Global Water System Project (GWSP) as one of a series of these joint projects addressing carbon, food, health, and water issues.

Recognizing the international importance of the water issue, the German Federal Ministry of Education and Research (BMBF) decided to support the establishment of the GWSP International Project Office at a research center in Germany. Considering the growing importance of water in developing countries, ZEF had already established major international water projects in Uzbekistan and Ghana – the GLOWA-Volta project – and readily offered to host the GWSP office. Thus in early 2004, the international project office was launched with the appointment of the first Executive and Administration Officers. The launch added weight to the development of Bonn as a major international center for international research programs and coincided with the initiation of the United Nations University Institute for Environment and Human Security (UNU-EHS). Enhancing Bonn's role in this area is a key policy of the government of North Rhine-Westphalia, which also provided significant support to the GWSP office.

ZEF and GWSP research programs on water problems intersect at a number of key points. These were explored in Bonn in February 2005 at the International Conference on the "Integrated Assessment of Water Resources and Global Change: A North-South Analysis", which was the first major joint activity organized by ZEF and GWSP. The published proceedings of the conference include major papers from ZEF staff on the use of multi-agent frameworks and on the development of a decision support system for the Volta basin, as a model for transnational river basins. The ZEF research provides valuable insights and understanding of the hydrological and socioeconomic complexity of water uses and water users in a river basin or sub-basins. In addition, ZEF staff have collaborated with the GWSP in a number of areas through contributions to a number of workshops and jointly published papers, including one on global nutrient flows in relation to virtual water in international food trade.

Perhaps the most significant area of collaboration between ZEF and the GWSP has been in education and capacity-building. The need to build developing country capacity to apply science and scientific solutions to resolve water management problems emerged

from the 2005 Bonn conference as a high priority. Consequently, GWSP staff members have contributed to University of Bonn lecture courses on integrated water management and to the inter-disciplinary course of the ZEF doctoral program. In each case, the GWSP staff introduced the concept of the global water system in the context of earth system science, and emphasized the need for an inter-disciplinary systems approach to address complex water problems at all scales. These are central elements of the philosophy and paradigms adopted by both the GWSP and ZEF. In this spirit, GWSP and ZEF also joined forces with UNU-EHS in 2006-2007 to sponsor a public lecture series on water issues. These lectures, largely presented by speakers visiting Bonn, have covered a wide range of topics including water governance, ecology, conflict and economics. The GWSP has found ZEF to be a relevant and generous host, and hopefully both institutions will continue to build collaborative activities and reap the rich rewards of mutual collaboration.



In October 2007, the Center for Development Research (ZEF) of the University of Bonn celebrates its 10th anniversary. On December 1st 2007, the United Nations University Institute for Environment and Human Security (UNU-EHS) will be four years young. Although there is a substantial difference in age, both ZEF and UNU-EHS are still young institutions by academic standards.

Looking for their respective niches and implementing their respective mandates in multidisciplinary and multicultural contexts are features of both ZEF and UNU-EHS. The fact that they focus on young professionals from developing countries as their foremost target audience adds to the multitude of similarities characterizing both ZEF and UNU-EHS.

Yet, similarities alone do not explain the reasons behind the successful cooperation between ZEF and UNU-EHS during the last four years. There are several key elements which need to be highlighted to appreciate the width and depth of joint endeavours. These are:

- an enabling institutional framework
- the pragmatic "jump-start" of the joint PhD programme
- complementarity
- joint (externally funded) projects (UNU-INRA; water lectures; graduate school)
- personal affinities.

## Synergies and More.

*The United Nations University Institute for Environment and Human Security (UNU-EHS)*

by Janos Bogardi (Director of UNU-EHS)

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## Enabling institutional framework

The University of Bonn and ZEF in particular followed the creation of the new UNU Institute for Environment and Human Security in Bonn with keen interest. Even before UNU-EHS was established, the rector of Bonn University (Prof. Klaus Borchard) and the rector of the United Nations University in Tokyo (Prof. Hans van Ginkel) signed a Framework Agreement which stipulated close cooperation between their two universities. Key features of this Agreement included the envisaged close collaboration between ZEF and UNU-EHS (including mutual participation in management meetings) and the academic co-optation of UNU scholars in the respective faculties.

As newly appointed UNU-EHS director, the Framework Agreement provided me with the first, very powerful instrument to embed UNU-EHS in the academic life of Bonn. Since early 2004, the UNU-EHS Director has been a permanent invited member of the ZEF Directors' Meetings. Prof. Vlek of ZEF advised on the build-up phase of UNU-EHS and participated in all selection committees for the scientific staff of UNU-EHS. In Summer 2004 I was invited to serve as co-opted member of the Faculty of Agriculture as professor of the University of Bonn.



The Framework Agreement was thus not only a Declaration of Intent. It provided an excellent basis for real cooperation. Its stimulating power can also be measured by the further development of formal institutional links between the University of Bonn and UNU.

In March 2007, Rectors Matthias Winiger and Hans van Ginkel signed an Agreement on the association of the University of Bonn with UNU, with the respective approval of the Senate of the University of Bonn and the UNU Council.

This association is not only an even stronger link than the Framework Agreement, but is also the acknowledgement of the established joint projects with ZEF. ZEF has also reached out and started to cooperate with other UNU entities, first and foremost with UNU-INRA, the Institute for Natural Resources in Africa. Likewise UNU-EHS has developed links with the Faculties of Medicine and of Agriculture and Natural Sciences of the University of Bonn. In this respect ZEF's strong links with the various faculties were again very helpful.

## The joint PhD Program

Compared to the over 100 PhD candidates working at ZEF, UNU-EHS – irrespective of its strong growth within three years – has about 10 PhD candidates on its campus. As UNU does not award degrees and the ZEF PhD program already existed, it may be more accurate to call it a “joined” rather than a “joint” programme. Moreover, auditors would have difficulty recognising this program as no specific agreement has been drafted beyond the above mentioned two general agreements. It was decided back in early 2004 that UNU PhD scholars would follow courses together with their ZEF peers. UNU-EHS staff members regularly lecture in these courses and for two years now have been offering an annual specialized block course on vulnerability and risk management. This course is not only open for ZEF PhD candidates, but draws students from other universities as well.

## Complementarity

ZEF stands on “three feet” represented by the three chairs addressing the questions of societal changes, technological and economic changes and natural resource use within the development context. UNU-EHS concentrates on the interaction of society and environment from the point of view of human security, with special emphasis on vulnerability and risk management studies, aspects which are very much relevant in the development and poverty eradication contexts.

Very aptly ZEF organigrams display UNU-EHS as its “fourth foot”. While administratively this is “extended ownership”, it is certainly true as far as substance and mutually beneficial contributions are concerned.

## Joint projects

Besides the joint PhD program, UNU-EHS and ZEF have several ongoing cooperative projects and have been jointly engaged in high profile acquisition projects, like the attempt to establish a graduate school for development research in Bonn.

Our joint projects and collaborative schemes are in Africa (Ghana, Volta Basin), in Viet Nam (Mekong Delta) and in Central Asia (Khorazm). Each of these projects would warrant an entire chapter. The most challenging is probably the youngest project, “WISDOM” (Water Related Information System for the Sustainable Development of the Mekong Delta) where, in a multiactor – multiple stakeholder – context, ZEF and UNU-EHS colleagues, together with other partners from the University of Bonn, are engaged in a truly interdisciplinary endeavour. Pesticide dispersion, endocrine disruptors, salinity intrusion, land use changes,



PhD students 2007



Joint PhD course at ZEF in 2007



Bonn UN day 2006: Janos Bogardi and Alpha Oumar Konaré, President of the African Union, at ZEF stand

migration, institutional settings are just headings to indicate the main areas of concern which we are addressing. Besides the multidisciplinary dimension of cooperation within WISDOM, it is also a capacity building project underlining our common philosophy on how development projects can be made sustainable by educating during the "active" project phase those colleagues who are supposed to be the main "personal beneficiaries" and future core personnel of follow up activities. Fourteen PhD students, 9 of them from Viet Nam, will start their PhD studies this fall, very much in the known and tested spirit of ZEF and UNU-EHS.

### Personal affinities

Common academic objectives, vicinity of locations, similarity in profiles, cooperation-mindedness and facilitating framework agreements are all necessary ingredients of mutually satisfactory cooperation which is beneficial for the target audience. However, these alone are not sufficient. True partnership needs trust, friendship and reciprocity in appreciating each other. When we talk about synergies between ZEF and UNU-EHS, we can refer to the preceding sections. When we talk about "more", this certainly incorporates personal affinities and the productive excitement of working together.

I find it interesting that this affinity does not only prevail between two or three persons. I sense the presence of this affinity across disciplines and academic ranks involving all those who work together.

Thus congratulating ZEF on its 10th anniversary is a very personal matter for me, but also for the whole UNU-EHS. Our good wishes for strength and the achievement of the objectives ahead come from the heart, but are not without self-interest. We want ZEF to remain our strong "older brother", to continue its success story and keep up the friendship so that we can make more "more" and deepen our synergies.

The process of degrading drylands, which we call "desertification", is a growing global threat that may one day affect and concern us all. Maintaining the ecological functioning of drylands and securing their sustainable management are crucial activities in a globalized world haunted by climate change, and threatened by water wars, migration, and conflict. Since the by now legendary Rio 1992 conference, desertification has become one of the three major environmental concerns beside climate change and biodiversity. The Convention on Combating Desertification (CCD) and the UN Secretariat for Combating Desertification (UNCCD) were set up in Bonn, Germany as visible results of this concern.

But concern about desertification has not only been the business of large institutions, but has also remained the business of individual scientists. Thus, a group of concerned scientists founded Desert\*Net Germany in 2000. The aim of this German competence network for research on desertification and on dryland management was to provide scientific support to the UNCCD and other bodies dealing with desertification. Desert\*Net Germany has gained both many new members as well as profile through its activities, which comprise the provision of policy advice, the organization of scientific conferences and the hosting of events on dryland management policy. ZEF has played an active and prominent role in Desert\*Net Germany from the onset.

In April 2007, Desert\*Net Germany reached a new level of organization: In a foundational meeting held at the premises of ZEF, the network was formally institutionalized as an association and has since been sanctioned according to German law (Desert\*Net Deutschland e.V.). This has many operational advantages: Desert\*Net Germany can now collect financial contributions and thus provide more professional services to its members and to society as a whole. ZEF took over the secretariat of Desert\*Net Germany in mid 2007, which had been hosted by the Biocentre Klein Flottbek and Botanical Garden at the University of Hamburg since 2001.

Desert\*Net Germany has also set up its larger partner, the European DesertNet ([www.european-desertnet.eu](http://www.european-desertnet.eu)). The idea of a European DesertNet was first put forward by Belgian, French and German scientists during the third session of the Committee for the Review of the Implementation of the Convention (CRIC3) held in Bonn, Germany in May 2005. It then took further shape at a meeting held in Bonn during which the "Declaration of the European DesertNet" was launched in early 2006. Finally, in October 2006, the Network was officially launched at a conference held for this purpose at the premises of the UNCCD in Bonn and organized with the help of members of Desert\*Net Germany and the French and Belgian partners. Since then, European DesertNet has been growing

## A joint effort to combat desertification.

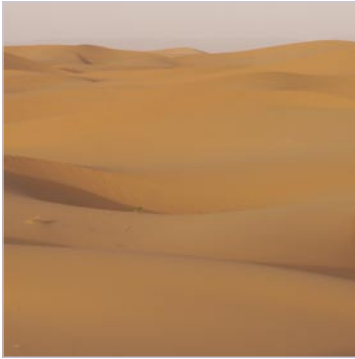
### *Desert\*Net*

by Christopher Martius (senior researcher at ZEF and current chair of Desert\*Net Germany)

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[www.desertnet.de](http://www.desertnet.de)





steadily into a network now consisting of 222 members from 36 countries (July 2007). It has been a very active network from the start, providing policy advice to the German Federal Ministry for Economic Cooperation and Development, to the UNCCD and its bodies, and to the European Union. European DesertNet has also been collaborating very closely with the Consultative Group on International Agricultural Research (CGIAR) to set up a new challenge program called 'OASIS' (<http://www.oasisglobal.net>). The secretariat of European DesertNet has been established at the Biocentre Klein Flottbek, University of Hamburg. European DesertNet and Desert\*Net Germany are also collaborating with and supported by the CCD program of the GTZ (German Technical Cooperation).

The rapid growth of both networks (Desert\*Net Germany and European DesertNet) shows that there was a real need for sound scientific advice on the rather complex problem of desertification research. ZEF is proud to be a partner in these two important networks, and to have played its role in creating them. However, the activities should not stop there. Both networks are to become important players in international desertification research.

## Networking for development.

### *GDN and EUDN*

by Ulrike Grote (former senior researcher at ZEF)

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[grote@iuw.uni-hannover.de](mailto:grote@iuw.uni-hannover.de).

The Global Development Network (GDN) and the European Development Research Network (EUDN) are networks to promote research at global and European scales, respectively.

ZEF is closely associated with the two networks, since the EUDN Secretariat was located at its premises in Bonn, Germany from 2000 to mid 2006.

It all started in December 1999, when the World Bank organized a conference in Bonn to launch the Global Development Network (GDN). About 600 researchers, policy-makers, and representatives from more than 300 organizations from 111 countries worldwide used the conference to exchange ideas, network, share experiences and thoughts about development issues. As a follow-up to the First GDN Conference in Bonn and with the support of the EU Commission, the World Bank and the State of North Rhine-Westphalia, Joachim von Braun, then director of ZEF, took steps to facilitate the establishment of a European hub of GDN in Bonn.

On 15 September 2000, a small academic roundtable of reputable European development economists took place in Bonn to brainstorm about the idea of forming the European hub of GDN. There was a common understanding that



- there is need for a formalized development network within Europe, and
- GDN may offer a good ground and function as a facilitator for the establishment of such a globally linked network.

Thereafter, the group was formalized by confidential elections of the Executive Committee, and by-laws were developed. The core of the network initially consisted of 17 development economists.

The official announcement of the new European network was made at the Second GDN Annual Conference in Tokyo in December 2000. While in Tokyo, it was also decided at the first meeting of the Executive Committee

- to call the new European hub the European Development Research Network, *EUDN* for short and
- to expand the network by carefully enlarging the group of 17 development economists by further development researchers to get a better balance by discipline, gender and European countries.

In the following years (June 2001, December 2002, April 2004), three rounds of nominations and elections of new members took place. The network expanded to about 50 fellows.

The objectives of *EUDN* are

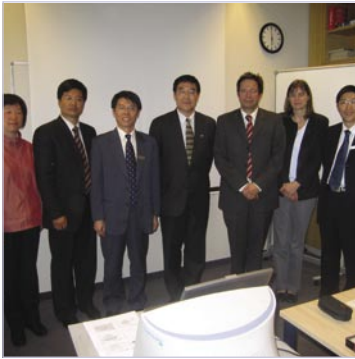
- to generate knowledge related to development research and development policy with special focus on strengthening the research capacity and training in developing countries;
- to promote cooperation among development researchers and institutions within Europe and with developing countries;
- to establish a "center of information" which attracts new ideas related to development research and delivers high-quality and up-to-date information to researchers and policy-makers;
- to improve the use of European development research in Europe and at the international level; and
- to increase transparency by promoting and supporting networking between think tanks in cooperation with development organizations and networks in Europe and all over the world.



InWent video conference at ZEF, April 2006



Video conference on fair trade at ZEF, September 2005



ZEF senior staff with visitors from China

In order to achieve these objectives, a number of different events were organized as workshops or annual conferences. They allowed a continuous dialogue among researchers and with policy-makers about burning development issues, and they offered opportunities for establishing partnerships between European development research institutes and/or individual researchers.

As one of its major activities, Annual AfD/*EUDN* Conferences were organized in close cooperation with the Agence française de Développement (AfD) in Paris. The First Annual AfD/*EUDN* Conference took place in 2003. The *EUDN* Secretariat provided organizational support to the conference, which was followed by a member meeting and a two-day academic workshop. Between 300 and 400 development practitioners and academics from the North and the South listened to speeches and participated in lively discussions. Due to this success, further Annual AfD/*EUDN* Conferences and academic workshops followed in subsequent years.

*EUDN* also offered two-day workshops on development economics for doctoral students from the period 2001-2004 and in 2006. These workshops were all organized in Bonn, Germany. They gave young researchers, who mainly came from developing countries but were affiliated with European research institutes, the opportunity to present their advanced research studies. The students were selected on the basis of the quality of their submitted research papers.

There was also close collaboration with GDN and its other regional networks. From 2000-2004, *EUDN* supported GDN and the Regional Development Networks in the generation and sharing of knowledge for development. The global and regional partner networks jointly organized and conducted research projects, workshops, or review processes of papers and proposals.

*EUDN* members participated as speakers, discussants or as reviewers and evaluators of research papers in GDN Annual Conferences. On these occasions, the *EUDN* Secretariat organised an information booth at the "Knowledge fair" to provide information about *EUDN* activities.

ZEF's young researchers were also invited to participate at several of these GDN Annual Conferences, and won several prizes for research on development issues. The Global Development Awards is the largest international contest for researchers on development, offering prizes to scholars and practitioners from developing countries. Adama Konseiga, a former doctoral student at ZEF, was awarded the Global Development Network's "Global

Development Medal for Outstanding Research on Development". He received the prize for his work on "Regional integrity beyond the benefit of traditional trade: the role of labor mobility in the cases of Burkina Faso and Côte d'Ivoire" in 2005 in Dakar, Senegal. Another former ZEF student, Bhagirath Behera, received a second prize for his thesis on "Determinants of Sustainable Management of Natural Resources: The Case of Joint Forest Management (JFM) in India". This prize was awarded to him at the GDN Annual Conference in St. Petersburg, Russia, in 2006. But other former doctoral students and affiliated researchers at ZEF, including, among others, Abay Asfaw, Shyamal Chowdhury, and Maximo Torero, also participated in the contest and received GDN awards.

Apart from organizing these activities, the EUDN Secretariat at ZEF also created a new website at <http://www.eudnet.net> which provides information about the history of EUDN, its activities and latest news, as well as about its members.

Funding for the workshops and the Secretariat was mainly provided by the State of North Rhine-Westphalia, Germany, and the German Technical Agency (GTZ). Funding for the Annual AfD/EUDN Conferences was provided by the Agence française de Développement.

## The Bonn International Graduate School for Development Research (BIGS-DR)

by Günther Manske, Academic Coordinator BIGS-DR

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First batch of PhD students in 1999

Through its Bonn International Graduate School for Development Research, ZEF intends to strengthen the development research community in Germany, Europe, and worldwide. The program aims at educating future decision-makers from developing countries and Europe for international careers. It is an initiative to provide high qualifications for upcoming young scientists, academic staff, advisers, and managers in both the private and public sectors. The program offers training for doctoral degrees in social and natural sciences, economics, and agriculture at the University of Bonn and other universities.

Development is an expanding field of research and professional employment. Working in this field requires interdisciplinary skills and competences. The Bonn International Graduate School for Development Research safeguards disciplinary excellence while requiring an understanding of and an ability to work in other development-related fields. Combining theories, methods, and practical experience in the areas of social, economic, and ecological change enables students to explore new fields and be competitive on an international job market. The performance of field research in a developing country or a development-related institution is part of the BIGS-DR program in accordance with ZEF's philosophy of practice-oriented research.

The structure of the doctoral program is tailored to the individual academic needs of the students, in particular of those coming from developing countries. ZEF provides intense supervision and academic support services from tutors and mentors.

The program has become internationally renowned since its inception in 1999. It is unique in Germany and Europe in its size (around 140 PhD students a year), internationality (students from around 72 different countries) and interdisciplinarity.

### Educational Concept and Timeframe

Although the structure of the doctoral program is tailored to individual needs, the timeframe is limited to three years in duration. Normally, students will qualify for entry to the research phase within six to 12 months, followed by a field research phase of one to two years. A final period of six to 12 months for synthesis and writing completes the program. Thesis writing is done in Bonn under the close supervision of a committee whose members are experts in the student's research field.

## The PhD Course Program

The BIGS-DR course program consists of a set of block courses. These are conducted by professors, fellows, and senior researchers of ZEF as well as by professors of participating faculties at the University of Bonn and affiliated institutions and guest professors, mainly from Germany and Europe. The courses include the classical fields of environmental disciplines within natural sciences, and the economic, political, and social-cultural dimensions of development. They are offered in three modules, divided into periods of one to three months. Successful participation in the courses and passing an interim exam are a prerequisite for pursuing a doctoral degree supported by ZEF.

During the first 6–12 months of residence in Bonn, the students are also expected to work with their tutor and supervising professor on fine-tuning their proposals, working out the necessary budgets, and organizing the infrastructure as well as the institutional arrangements for their field research in the host-countries. The field research proposal is presented to the scholars in Bonn and to the interested faculty for comments and suggestions before clearance is given to travel abroad.

## PhD Research Areas

The doctoral students of BIGS-DR are integrated in ZEF's cross-disciplinary research groups and often conduct their field research in one of ZEF's large long-term research projects abroad. This gives the students an opportunity to work closely with experienced scientists and use the project's infrastructure. ZEF's doctoral research is closely aligned with ZEF's three core research programs: economic resources, ecological resources, and political and cultural resources.

## Facts and Figures BIGS-DR (as of mid 2007)

- Since 1999, 375 students from 72 countries participated
- 163 received a doctoral degree
- Currently around 140 students participate in the program
- In the framework of PhD research, ZEF cooperates with around 100 organizations and universities worldwide

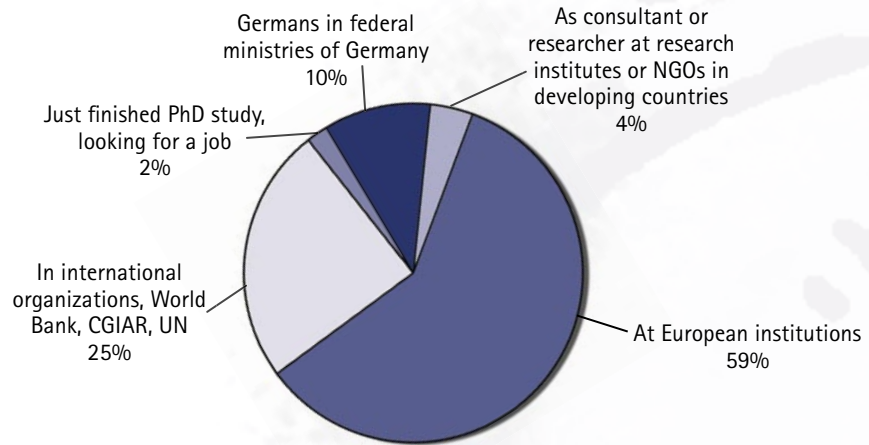


Dilys Kpongor from Ghana receiving her doctoral degree in June 2007

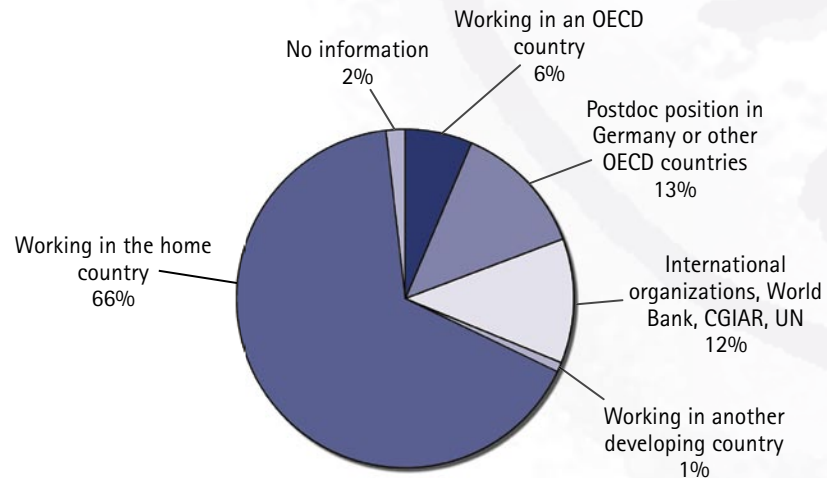


PhD students of batch 2006 attending a course

## Careers of European ZEF alumni (n=49) (as of May 2007)



## Careers of ZEF Alumni from developing countries (n=109) (as of May 2007)



# Interview

*What, in your opinion, were the main challenges facing ZEF as an international development research institute in 1997 when you took on the position as a director?*

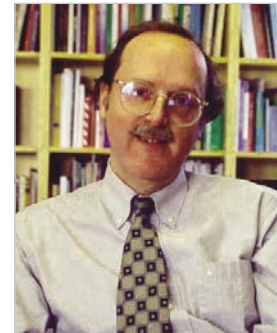
ZEF began with high expectations, an innovative concept, sound federal funding and strong support from the University leadership, the State of NRW and the City of Bonn, an excellent building with lots of empty rooms and one telephone on the floor. Sitting on that floor, I had my first contacts with potential partners, co-workers, and suppliers on the first three days. Getting an institute started under such conditions was a great opportunity. Germany certainly needed a strong development research institute, addressing development issues from a solid research base in a multi-disciplinary fashion. Initially, the Center for Development Research was called "North-South Center". In view of the challenges of globalization and the complexities of development, this was too narrow a concept and the name and concept were changed to what became the "Center for Development Research - ZEF-Bonn". Narrow research priorities had to be set within the broad concept in order to quickly gain a profile. The innovative teaching concept for doctoral studies was also a top priority. Most important, however, was the recruitment and formation of administrative and research teams. We were soon joined by a group of highly qualified young researchers committed to developing the Institute, who worked enthusiastically to make ZEF a success. Today, most of them are in leadership positions in research and political organizations. I believe that the opportunity to work at ZEF shaped their visions and capacities.

*And what do you consider were the main achievements of ZEF and your Department for Economic and Technological Change by the time you left?*

ZEF's main success is its combination of the English-language doctoral studies program, which provides an innovative framework for learning, and its focussed and relevant development research programs. The network approach with many university institutes in Germany, elsewhere in Europe, and abroad was key to linking innovators addressing cutting edge issues. In the Economics and Technical Change team, these issues were in the fields of the economics of poverty reduction, resource economics, the development issues of information technology and biotechnology, social innovation, and trade policy research.

Looking back at the beginning:

*Interview with  
Joachim von Braun*



Joachim von Braun was Director of ZEF's Department on Economic and Technological Change from 1997 – 2002.

The interview was conducted by Alma van der Veen.



Von Braun with his students



ZEF workshop with Erich Stather,  
November 2000

### *What did you personally find the most remarkable research done by ZEF during your term as a ZEF director?*

Many of the individual and small team research products won awards, were published in recognized journals, and are widely appreciated internationally. Innovation in development research is a tricky matter: some insights are only appreciated and their relevance recognized after a long time. An external evaluation of ZEF after its first 5 years pinpointed excellence in various areas and was very positive. Now, with a bit more distance, one can point at examples, such as the research on telephones and the poor which was seen by most development practitioners 10 years ago as an irrelevant curiosity but pioneered today's high impact of ICT in rural Bangladesh and India. Other examples include research that developed frameworks for the evaluation of biotechnology employed in health, which is used today by large programs of the Gates Foundation; innovative and internationally much debated theoretical work on migration and development; health insurance for poor people that has strong impacts in Africa and China; the economics of bio-diversity that influences thinking about the future of genebanks; trade research and product and process labeling, eco and social labeling that was initiated well before the issue was perceived as relevant as the world food system globalizes. An updated and refined "world hunger index" recently disseminated by the International Food Policy Research Institute (IFPRI) was developed at ZEF 7 years ago and has triggered world wide media attention in 2007 as well as a debate in the Indian parliament. So, it is too early to say what was the most remarkable. The whole flow of innovative research originating from ZEF is "most remarkable".

### *What do you consider to be ZEF's main strengths and assets?*

I am often greeted at a meeting somewhere in a developing country, say in Africa or Asia, by a researcher who tells me "I studied at ZEF" or "I would love to go to ZEF". This suggests that the outreach and impact of ZEF in the international development research community was and is strong. ZEF's main assets are its past and present researchers and the network capital which they embody. This needs to be nurtured. Sustained funding for a strong research agenda and for establishing partnerships is needed in the long run to maintain and expand these assets.



*What, in your opinion, are the main issues in international development research that ZEF will have to address in the coming 10 years?*

ZEF, like any development research institute today, needs to take into account the fast growing capacities for research in emerging economies. China and India are not the only countries with much stronger research capacities than 10 years ago. ZEF will need to constantly adapt and evolve with a strong focus on international partnerships, not as a “developing countries” center, but as an excellent development research center. Attention to poverty and inequality issues is “a must” for a development research center. ZEF can make a difference by focussing on maybe three or four of the big global development challenges: globalization; climate change and natural resources; governance and institutional innovation; conflict prevention; science and technology policy; urbanization and rural change, but – unless it becomes much bigger – not on all of these at the same time. For Germany as a major trading nation, a globally oriented ZEF agenda – rooted in strong research – would seem desirable.

I whole-heartedly congratulate ZEF and its friends and supporters on the Center’s 10th anniversary!



Reception at a ZEF policy workshop, 2000

# Conferences & Workshops



Development Dialogue, March 1999



UNIFEM conference, November 1999

## Selected ZEF events between 1997 – 2007

June 12–13 1998

Conference on New Growth Theories. Bonn. In cooperation with "Verein für Sozialpolitik".

July 13–14 1998

Conference on Russia's Food Economy: Towards truly functioning Markets. Bonn. In Cooperation with IET Moscow and IAMO Halle.

May 3–4 1999

Conference on Governance in China, India and Russia. Bonn.

May 31–June 1 1999

ZEF Conference on Information and Communication Technologies (ICT). Bonn. Organized in cooperation with DETECOM and German Watch.

A workshop on the role of ICTs in economic development with a special focus on Africa, Bangladesh, China, Peru and India.

June 7–10 1999

Workshop on Managing Organic Matter in Tropical Soils: Scope and limitations. Bonn. Workshop on the possibilities and research needs for a sustainable management of organic matter in tropical soils

June 23–26 1999

Workshop on Migratory Species. Bonn.

On the occasion of the 20th anniversary of the Convention on Migratory Species (CMS or Bonn Convention) ZEF organized and sponsored an international workshop on New Perspectives for Monitoring Migratory Animals – Improving Knowledge for Conservation. Forty-five conservationists and scientists from 16 countries presented new results on the biology of migratory species.

August 26–27 1999

Workshop on Women Farmers: Enhancing Rights and Productivity. Bonn.

November 11–12 1999

Conference "Weltachsen" 2000. (World Axes 2000). Bonn. Organized by ZEF in cooperation with the Center for European Integration Studies (ZEI) and the City of Bonn.

- November 15–16 1999 Conference on Agricultural Biotechnology in Developing Countries: Towards optimizing the benefits for the poor. Bonn. In cooperation with the International Service for the Acquisition of Agri-biotech Application (ISAAA), AgrEvo GmbH, and the German Foundation for International Development (DSE).
- August 15–17 2000 Panel discussion and event at the EXPO 2000 in Hannover on The Role of the Village in the 21<sup>st</sup> century – Crops, Jobs and Livelihood. Hannover.
- September 11 2000 6<sup>th</sup> Bonn Dialogue on Development Policy: Globalization and Equity with Kemal Dervis, Vice President of the World Bank. Bonn.
- November 9–10 2000 Workshop on Human Rights. Bonn.
- December 4 2000 Conferment of the German UNIFEM Prize for sustainable projects on women's self help with Heidemarie Wiczorek-Zeul, Minister for Economic Cooperation and Development. Bonn.
- December 14–16 2000 International Conference on Facing Ethnic Conflicts – Perspectives from Research and Policy-making. Bonn.
- May 10–12 2001 Conference on Legal Space: Law, Culture and Development (in German)  
In cooperation with DGS (Development sociology and social anthropology)
- June 19–20 2001 Conference on Does Culture Matter? Bonn. In cooperation with the Center for European Integration Studies (ZEI).
- November 7–9 2001 Second Conference on Tropical Agriculture in Transition – Opportunities for Mitigating Greenhouse as Emissions? Bonn. In cooperation with the Fraunhofer Institute for Atmospheric Environmental Research.



Facing Ethnic Conflicts,  
December 2000



Weltachsen 2000



Expo Hannover August 2000



Project workshop in Uzbekistan,  
May 2006

May 6–8 2002

GLOWA Status Conference on the first Research Phase. Munich.

May 23–25 2002

Workshop on Paradigms of Change. Bonn.

December 16 2002

ZEF Video Conference series Global Dialogue I: Impact on Information and Communication Technologies on Rural Households and Small and Medium Enterprises. Participating countries: Ghana, Jamaica and USA (IFPRI, Washington).

December 18 2002

ZEF Video Conference Global Dialogue II  
Participating Countries: India, Uzbekistan, Tanzania

January 2003

Workshop on Afghanistan: From a War Economy towards Economic Reconstruction. Bonn.

May 30–June 1 2003

Conference on Afghanistan. Bonn. In cooperation with the London School of Economics.

June 2003

Workshop on How to deal with Africa's war economies? Bonn.

October 22 2003

Workshop on Water & Security in Southern Africa – Conflict and Co-operation in Transboundary River Basins. Bonn. In cooperation with BICC (Bonn International Center for Conversion).

February 10–13 2004

Kick-off Workshop for the second research phase of the research project on Economic and Ecological Restructuring of Khorezm, Uzbekistan. Bonn.

June 2004

Workshop on How can Renewable Energies play a more important Role for People in Developing Countries? In the framework of the Higher Education Forum on Capacity Building in Developing Countries – Bringing Renewable Energies to the People. Bonn. Organized in co-operation with the German Academic Exchange Service (DAAD).

February 23–25 2005

Conference on Integrated Assessment of Water Resources and Global Change: A North-South Analysis. Organized by the Global Water System Project (GWSP) and the ZEF GLOWA-Volta project, sponsored by UNESCO, BMBF (the German Federal Ministry of Education and Research), the government of NRW (North Rhine-Westphalia), and INWENT (Capacity Building International, Germany).

March 18–19 2005

Conference on The Role of Labeling in the Governance of Global Trade with participants from academia, international organizations, the private sector and the government. In cooperation with Cornell University and the College of William and Mary.

May 17–19 2005

GLOWA- Status Conference on the second research phase, Cologne.

June 2005

Evaluation trip to the ZEF project in Uzbekistan.

March 24–28 2006

Workshop of the ZEF project on Conservation and Use of Wild Coffee in Ethiopia (CoCE). Ethiopia.

October 2006

Evaluation of the third research phase of the Uzbekistan project. Bonn.

January 2007

Scientific kick-off workshop for the third phase of the GLOWA Volta project. Bonn.



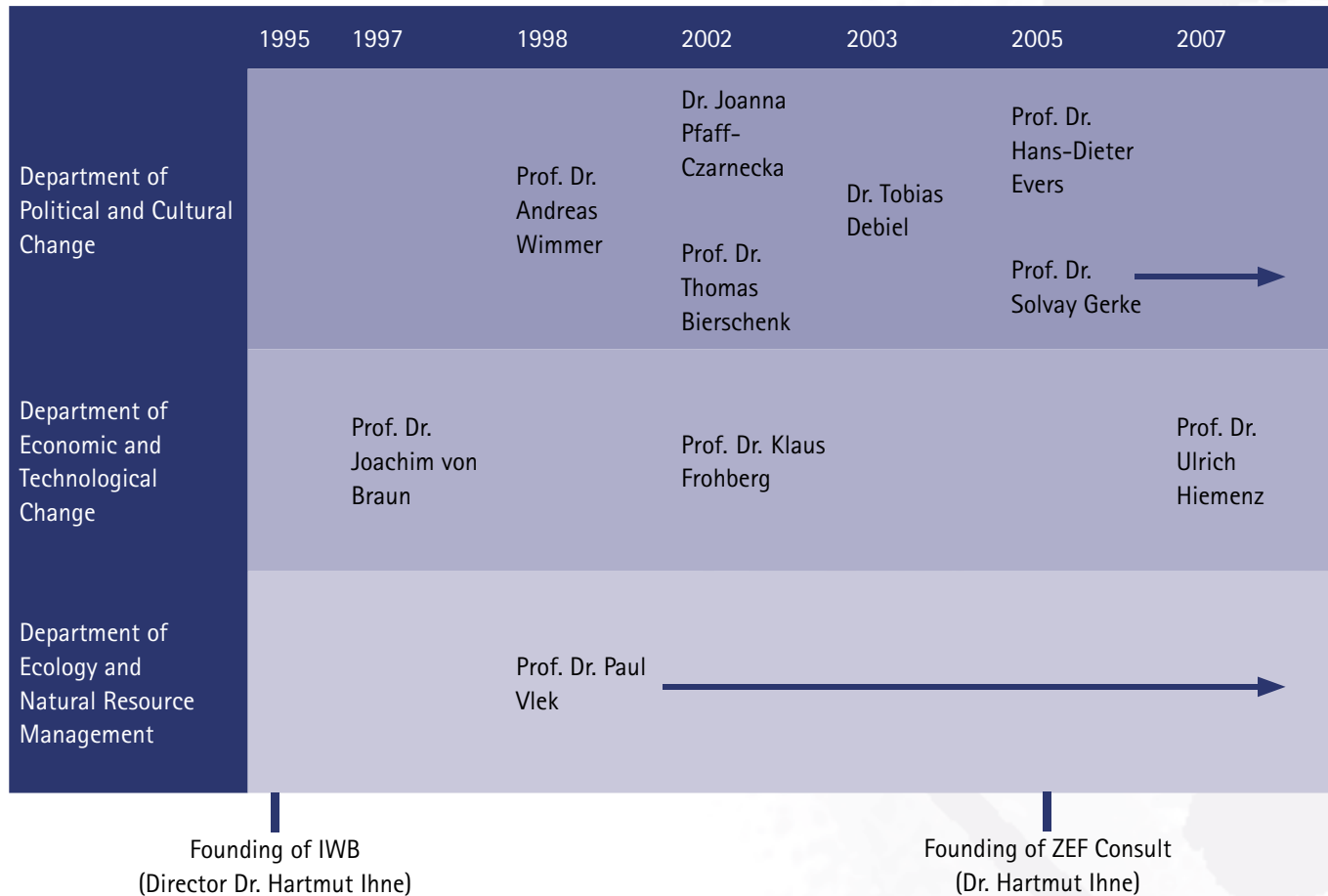
Project workshop in Ethiopia, March 2006



GLOWA Volta kick-off workshop, January 2007

# Facts & Figures

## Directors at ZEF



# The International Advisory Board of ZEF

## *Current members of ZEF's International Advisory Board*

Maritta von Bieberstein Koch-Weser

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Michael Bohnet

Former General Director, Federal Ministry for Economic Cooperation and Development (BMZ). Representative of BMZ for the new EU Member States, Germany

Gisbert Dreyer G. Dreyer

Planungsgesellschaft m.b.h. Founder of the Dreyer Foundation, Germany

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Under-Secretary General of the UN and Rector of the United Nations University in Tokyo (Chairman of the Board), Japan

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German Federal Ministry of Education and Research (BMBF), Research for Sustainability, Germany

Donald L. Horowitz

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Armin Laschet

Minister of the State Ministry for Generations, Family, Women, and Integration of North Rhine-Westphalia, Germany

Hans-Dietrich Lehmann

General Director, Federal Ministry for Economic Cooperation and Development (BMZ), Germany

Eitaro Miwa

President NARO (National Agricultural Research Organization, Japan)

Günther Schlee

Director at the Max Planck Institute of Social Anthropology in Halle, Germany

Matthias Winiger

Rector of the University of Bonn, Germany



Board meeting 2005



Board meeting 2000



Board meeting 1999



Board meeting 2000

## Former members of ZEF's International Advisory Board

Jürgen Asshauer

Former Member of the Board of Aventis Crop Science, Lyon, France

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Corporación Colegio Verde de Villa de Leyva; former member of the Brundtland Commission and the Club of Rome; former Minister of Environment, Colombia.

Christiane Friedrich

Staatssekretärin of the Land of North Rhine-Westphalia, Ministry of Environment and the Protection of Nature, Agriculture and Consumers' Rights.

Dong Fu-Reng

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UNESCO-Cousteau Professor in Ecotechnology and Chairman of M.S. Swaminathan Research Foundation, India

Klaus Töpfer

Former Executive Director of the United Nations Environment Programme (UNEP), Kenya



## Selection of Awards to ZEF Staff 2000 – 2007

Year	Award	Name	Issue
September 2000	GIL Prize awarded by the German Association for Informatics in Agriculture, Forestry and Nutrition (GIL)	Dr. Thomas Berger, former ZEF senior researcher	For his PhD thesis on multi-agent systems.
October 2000	Developing Countries Prize of the University of Giessen endowed by the German Development Bank (Kreditanstalt für Wiederaufbau, KfW)	Dr. Katinka Weinberger, ZEF alumna from Germany	For her PhD thesis on the participation of women in Chad and Pakistan.
October 2000	Josef G. Knoll Research Prize awarded by the Eiselen Foundation, Ulm	Prof. Dr. Matin Qaim, ZEF alumnus and former senior researcher from Germany	For his PhD thesis on the impact of biotechnology on agriculture in developing countries.
2000 / 2001	Alexander von Humboldt Research Award	Prof. Dr. Oded Stark, ZEF senior fellow	In recognition of his economic work in the field of migration research.
2001 / 2002	Albrecht Thaer Prize from the Faculty of Agriculture and Horticulture, Humboldt University, Berlin	Dr. Frank Mussnug, ZEF alumnus and Robert Bosch Foundation scholar	For the best diploma thesis and the best student of the year 2000.
2001 / 2002	Highest award at the summer colloquium at the International Center for Theoretical Physics, Trieste, Italy	Dr. Joseph Intsiful, ZEF alumnus from Ghana	For his presentation "Study of the Impact of Land Cover Change on Soil-Vegetation-Atmosphere Interactions".
2001 / 2002	Forster-Award of Humboldt Foundation	Prof Dr. Maximo Torrero, former ZEF fellow from Peru	To support his research cooperation with ZEF.
2001 / 2002	Alexander von Humboldt Research Award	Prof. Dr. Ramón Lopez, former ZEF senior fellow	

2002 / 2003	Josef G. Knoll Research Prize awarded by the Eiselen Foundation, Ulm	Dr. Rolf Sommer, ZEF alumnus and former senior researcher from Germany	For his PhD thesis on "Water and Nutrient Balance in Deep Soils under Shifting Cultivation with and without Burning in the Eastern Amazon".
October 2002	Josef G. Knoll Research Prize awarded by the Eiselen Foundation, Ulm	Dr. Abay Asfaw, ZEF alumnus and former senior researcher from Ethiopia	For his PhD thesis on "Costs of Illness, the Demand for Medical Care, and the prospect of Community Health insurance Schemes in the Rural Areas of Ethiopia".
October 2002	Best Poster at the "Deutscher Tropentag" at the University of Kassel, Witzenhausen	Dr. Darya Zavgorodnyaya, ZEF alumna from Uzbekistan. Co-authors: Prof. Dr. Holm-Müller and Dr. Wehrheim	For her poster on the Uzbekistan Project "Organizational Efficiency of Water Users Associations in Uzbekistan".
January 2003	Internationaler DLG-Fortbildungspreis of the Deutsche Landwirtschaftliche Gesellschaft (DLG), München	Dr. Darya Zavgorodnyaya (see above)	For her work in the Uzbekistan Project
2003	Theodor Brinkmann-Förderpreis by the Theodor Brinkmann Foundation. This prize is awarded annually to the best dissertation at the Faculty of Agriculture of the University of Bonn.	Dr. Abay Asfaw (see above)	For his PhD thesis (see above).
2003	Hans H. Ruthenberg Award of the Eiselen Foundation, Ulm	Dr. Jens Liebe, ZEF alumnus from Germany	For the best master thesis published in Switzerland, Austria and Germany that addresses the development of farming and reduction of hunger in the world.
August 2003	Nils Westermarck Prize at the 25 <sup>th</sup> International Association of Agricultural Economists (IAAE) Conference in Durban, South Africa	Prof. Dr. Matin Qaim (see above)	For the "best poster paper" presented.

August 2003	T.W. Schultz Prize at the 25 <sup>th</sup> IAAE Conference in Durban, South Africa	Prof. Dr. Nancy Chau, Prof. Dr. Arnab K. Basu , ZEF fellows and Prof. Dr. Ulrike Grote, former ZEF senior researcher	For the "best contributed paper".
November 2003 (effective from January 2004)	Election as one of five foreign fellows of the National Academy of Agricultural Sciences of India	Prof. Dr. Paul Vlek, director at ZEF	
2004 / 2005	Fellow American Society of Agronomy (2004-today)	Prof. Dr. Paul Vlek	
June 2005	Distinction of Honorable Professor of Urgench State University in Uzbekistan, official inauguration ceremony in May 2006	Prof. Dr. Paul Vlek	For "the successful development of the scientific and technical cooperation between Urgench State University and Bonn University (...)".
2005	Global Development Medal for Outstanding Research on Development, St. Petersburg, Russia	Dr. Adama Konsiega, ZEF alumnus from Burkina Faso	For his PhD thesis on „Regional integration beyond the traditional trade benefits: Labor mobility contribution, the case of Burkina Faso and Côte d'Ivoire".
2005 / 2006	Honorary Membership of the Geographical Society of Hamburg	Prof. Dr. Eckhart Ehlers, senior fellow at ZEF.	
September 2005 - May 2006	GEO-4 Fellowship by UNEP	Dr. Caleb Wall, ZEF alumnus from New Zealand	
2006 January	Global Development Medal for Outstanding Research on Development, St. Petersburg, Russia	Dr. Bhagirath Behera, ZEF alumnus and senior researcher from India	For his PhD thesis on "Determinants of Sustainable Management of Natural Resources: The case of Joint Forest Management in India".
2006	Prize of the friends of ZEF for the best doctoral thesis	Dr. Edilegnaw Wale, ZEF alumnus and senior researcher from Ethiopia	For his PhD thesis on "The Economics of On-Farm Conservation of Crop Diversity in Ethiopia: Incentives, attribute preferences and opportunity costs of maintaining local varieties of crops".

2006	Asian Public Intellectuals (API) Fellowship for a one year period (September 1 2006 - August 30 2007) from the Nippon Foundation.	Dr. Ketut Gunawan, ZEF alumnus from Indonesia	
2006	Poster award (session 8e) at the Deutscher Tropentag at the university of Bonn	Dr. Jörg Szarzynski, former ZEF senior researcher. Co-authors: Dr. Charles Rodgers and Prof. Dr. Paul Vlek	For his presentation of "Impact of Climate Variability and Land Cover Changes on Agriculture and Biodiversity in West Africa".
2006	Josef G. Knoll Research Prize awarded by the Eiselen Foundation, Ulm	Dr. Lulseged Tamene Desta, ZEF alumnus and senior researcher from Ethiopia	For his PhD thesis on „Reservoir Siltation in the Drylands of Northern Ethiopia: Causes, Source Area and Management Options".
2006	Selected as a finalist in the Global Development Awards and Medals Competition 2006 in the category "Global Health Concerns, Domestic Responses and Reforms"	Dr. Adama Konseiga (see above)	For his paper on „Assessing the Effect of Mother's Migration on Childhood Mortality in the Informal Settlements of Nairobi".
2006	Prize at the contest of "Entwicklung & Ländlicher Raum" (Agriculture & Rural Development)	Dr. Maria-Andrea Kern, former ZEF senior researcher from Germany. Co-author: Prof. Dr. Paul Vlek	For her paper on "Azolla as an Alternative Technology to Improve the Nitrogen Use Efficiency of Lowland Rice".
2007 April	Award for an outstanding contribution in the World Bank Committee at the conference of the International Model United Nations at Münster University (MUIMUN) from April 1-5 2007	Joy Mueni Maina Kiiru, ZEF doctoral student from Kenya	She represented the United States of America in the World Bank Committee.
2007 January	Africa Good Governance Network Award	Dr. Felix Asante, ZEF alumnus from Ghana	

2007	Alexander von Humboldt Research Award	Prof. Dr. Arnab Basu (see above)	
2007	Nominated for the Robin Cosgrove Prize	Joy Mueni Maina Kiiru (see above)	For her paper „Microfinance: Getting Money to the Poor or Making Money out of the Poor: what was the Promise?“

## Main donors of ZEF research and stipends

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 Diversitas - International Programme of Biodiversity Science  
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 German Academic Exchange Service (DAAD)  
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 German Agro Action (DWWH)  
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 German Federal Ministry of Education and Research (BMBF)  
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 German Foundation for Peace (DSF)



African Summer School with DAAD at ZEF, 2005



High level representatives of African University Associations visit ZEF, 2005



Conference on Capacity Building & Renewables with DAAD, June 2004

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 United Nations University / Institute for Environment and Human Security (UNU-EHS)  
 Consultative Group on International Agricultural Research (CGIAR)  
 World Climate Research Programme (WCRP)

## Publications of 10 Years of Development Research at ZEF

Research area	Peer reviewed articles	Book articles	Books	ZEF Discussion papers	Theses	Total
Land Use	103	38	3	4	44	192
Water	43	46	11	13	15	128
Climate	27	12	1	2	2	44
Health	31	9	2	3	5	50
Energy	2			1		3
Methods	31	3			5	39
Theories of Development	14	21	5	15		55
Development Politics	10	25		5	1	41
Knowledge and Development	17	11	3	9	2	42
Decentralization & Reforms	13	14	3	5	5	40
Politics & Democracy	8	28	1		1	38
Conflict & Governance	25	35	11	10	2	83
Cultural Diversity	4	15	2	2	2	25
Gender	2	10	2		3	17
Human Rights	9	4	2	4		19
Institutions and Strategic Groups	13	21	1	7	7	49
Risk & Vulnerability	13	5		2	1	21
Poverty Reduction	12	11	2	2	5	32
Food & Aid Policy	10	19	5	5	4	43
New Technologies	37	34	2	10	15	98
Trade and Globalization	22	44	5	9	5	85
Migration	20	6		14	2	42
Macroeconomic Issues	16	7		12	1	36
Microfinances	8	3		3	1	15
Ecosystems	34	14		1	11	60
Biodiversity	39	30	6	3	9	87
Conflicts over Natural Resources	8	13		1	5	27
Environmental Impact Analysis	7	2	1	1	1	12
Urbanisation	4	2	2		1	9
<b>Total</b>	<b>582</b>	<b>482</b>	<b>70</b>	<b>143</b>	<b>155</b>	<b>1432</b>

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