

ZEF Annual Report 2018 - 2019

Interacting with the Global South



zef
Center for
Development Res
University of Bonr



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- 2. Shapara
- 3. Land outland
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Diagram on the paper:

- 1. Redacted
- 2. Selling animals
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You can find an overview of publications by ZEF researchers at zef.de/publications

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MESSAGE BY

PROFESSOR MUHAMAD HASSAN, ZEF BOARD CHAIRMAN

This past year has been an ongoing success story for Bonn University, of which ZEF is a part. The University succeeded in achieving the so-called Excellence status, considered an accolade for German Universities. This status enables the University to invest more in excellent research and teaching, as well as to sharpen its profile. ZEF has been engaged in developing one of the six successful interdisciplinary research clusters with which

the University applied for the status of Excellence: The so-called 'Phenob' research cluster deals with the role and potential of robots in agricultural sciences and practices. It follows an interdisciplinary research approach. Interdisciplinarity is

one of the key features of the University's strategic road map for the upcoming seven years during which it will hold its status of Excellence. This means that ZEF, with its longstanding and international experience in bringing together and combining expertise from the social, economic and natural sciences, is in an excellent position to contribute.

ZEF has not only developed expertise in interdisciplinary research on the challenges faced in the Global South, but has also invested in developing academic, institutional and human capacities over the past two decades. ZEF's

international doctoral program, called 'Bonn International Graduate School on Development Research' (BIGS-DR), remains at the core of ZEF's capacity building efforts. As you can read in this report, 134 doctoral researchers from 54 countries are currently enrolled in ZEF's doctoral program. They conduct research in 47 countries worldwide. ZEF's alumni network currently numbers 379 alumni.

Among the reasons for ZEF's considerable scientific output are its strong networks and the commitment of its directors, junior and senior researchers, its alumni, senior fellows and its various international and national partners. ZEF's International Advisory Board members, in their manifold professional capacities, are supporting the institute in conducting research in, with and for the Global South in every possible way. Only through joint efforts can we find the right responses to the huge social, economic and environmental challenges faced by people across the globe.

Unlike previous annual reports, this one highlights a good number of successful projects conducted by ZEF research teams in different countries, especially in Africa. The report also lists, under each theme, the relevant SDGs that relate to ZEF's research.

ZEF remains successful in acquiring competitive grants from a variety of national and international donors and is deeply grateful for their continuous support, which contributes to over 80% of the Center's overall budget and thus

constitutes the backbone of ZEF's scientific success and outreach. Among our major donors are the German Federal Ministry of Education and Research (BMBF), the German Federal Ministry for Economic Cooperation and Development (BMZ), the German Federal Ministry for the Environment (BMUB), the German Federal Ministry of Food and Agriculture (BMEL), the State of North Rhine-Westphalia, the German Academic Exchange Service (DAAD), the European Union, the Robert Bosch Foundation, and the Foundation fiat panis.

Prof. Dr. Mohamed H.A. Hassan (Chairman of ZEF's International Advisory Board) is President of the World Academy of Sciences (TWAS), Trieste, Italy and President of the Sudanese National Academy of Sciences (SNAS), Khartoum, Sudan.

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ZEF'S RESEARCH AGENDA FOCUSSES ON SIX CORE THEMES



LAND, WATER,
FOOD AND
ENERGY

MARKETS AND
PUBLIC SERVICES



HEALTH,
NUTRITION AND
ECOSYSTEMS

GOVERNANCE,
CONFLICTS AND
NATURAL RESOURCES



INNOVATION,
KNOWLEDGE AND
SCIENCE POLICY

MOBILITY,
MIGRATION AND
URBANIZATION



The Center's core research areas are based on the disciplinary strengths of its three departments, as well as on its interdisciplinary expertise. In addition, ZEF aim to ensure transdisciplinary stakeholder

involvement across all research activities, i.e. in the definition of research topics and the perception of scientific findings at different levels with regard to their technical, political and societal implementation.

THE GLOBAL GOALS For Sustainable Development



With its work, ZEF's research contributes to achieving the UN SDGs. Relevant SDGs related to ZEF's research are listed per theme.

2.1 – LAND, WATER, FOOD, AND ENERGY: COMPETING USES

Research on land, water, food and energy is broadly based on nexus thinking. Water and food security, the most basic human demands, are the central elements from which many other development demands derive. In our globalized world, these problems cannot be solved by using purely national or regional approaches. We need to consider the sustainability of growth and the use of land and water for competing purposes. Humankind faces the pivotal challenge of eliminating hunger and extreme poverty. In addition, there is a need to create and expand efficient systems of energy supply and use in emerging economies. All this highlights the need for research on alternative forms of energy use, in particular the role of biomass. These topics are therefore included in ZEF's research agenda.



In Focus:

LAND, FORESTS, BIODIVERSITY

ZEF's research on land, water, food and energy tackles, among others, competing demands and uses of these core natural resources.

As a member of the DAAD Quality Network Biodiversity and "**Partnerships for Supporting Biodiversity in Developing Countries**", ZEF is investigating how to reconcile human livelihood needs and nature conservation in Kenya. The main method applied by this interdisciplinary project with German and Kenyan partners is the conducting of landscape assessments that can help to develop forest management strategies in different Kenyan biodiversity hotspots.

Based on such scientific assessments scientists come up with possible solutions for areas such as the Kenyan biodiversity hotspot Taita Hills. However, stakeholders from governmental, non-governmental and civil society organizations will have to collaborate closely, so that they can develop and implement land management plans that accommodate for two often conflicting interests: namely the creation of space for the restoration and conservation of primary forests and simultaneously, for a growing population in need of agricultural land and timber resources.

INSIGHT

Biodiversity in Kenya

Taita Hills, located in southeastern Kenya, is one of Kenya's major biodiversity hotspots. The area comprises several mountain chains that rise dramatically from the savannah lowlands up to 2,228 m above sea level. The Hills are home to many unique endemic plant and animal species. Once covered by cloud forests, most of the Taita Hills are today dominated by subsistence farmlands. Taita Hills, in particular its tree diversity, was assessed in autumn 2018 by a group of German and Kenyan scientists. As land use change continues, the big issue for nature conservationists is how much of this area's unique biodiversity can be preserved or regained. Changes in land use began in the seventies, when much of the primary forest vegetation was turned into eucalyptus, pine and cypress plantations. Wood and timber production for the national market was economically more profitable for local farmers than the preservation of indigenous forest vegetation.

In adjacent agricultural lands indigenous tree species were replaced by fast growing and economically profitable exotic species. Possible solutions developed by the research group include harvesting the eucalyptus trees and restoring the area with indigenous tree species despite technical and governance challenges (for example, the question of who should financially benefit from the harvest). Meanwhile, there are also positive developments. For instance, 'Nature Kenya' and partners were granted the right to convert exotic plantation patches into natural forest. This will contribute to securing the habitat for endemic and other forest-dependent plant and animal species. There is also a growing awareness among local experts and communities that land use changes and the excessive planting of eucalyptus in the Taita Hills might have contributed to the drying up of natural springs.

Read more about this in the blog by ZEF senior researcher Christine Schmitt: blog.zef.de/?p=3474

In Focus:

BIOMASS AND FOOD SECURITY

International demand and trade in agricultural commodities is growing while governments have started to shift from petroleum-based to bio-based economies. Hence, the rising demand for biomass for food, feedstuff, energy and material use is leading to a rising competition between the different biomass uses in the context of limited availability of arable land, water and energy.

ZEF's research on biomass provides solutions to the trade-offs between biomass uses, such as food, fibers and bioenergy production on the one hand, and the trade-offs between competing claims on inputs, including land, on the other. This research field also tackles the social and environmental impacts of biomass production.

ZEF's research project BiomassWeb has worked with the concept of "biomass-based value webs" in Ghana, Ethiopia, and Nigeria. In close cooperation with local partners and stakeholders in Africa the following crops were selected as focus crops in the value webs: maize, manioc (cassava), plantain, banana, enset, and bamboo. The project's overall goal was to increase food security in Africa by integrating all value web components including the production, processing, trade and consumption of food and non-food biomass.

See: biomassweb.org

INSIGHT

Cassava Peels value chains

The BiomassWeb research project initiated a program called Demand Driven Research and Development with six topics. One of them focused on the use of cassava peels in Ghana.

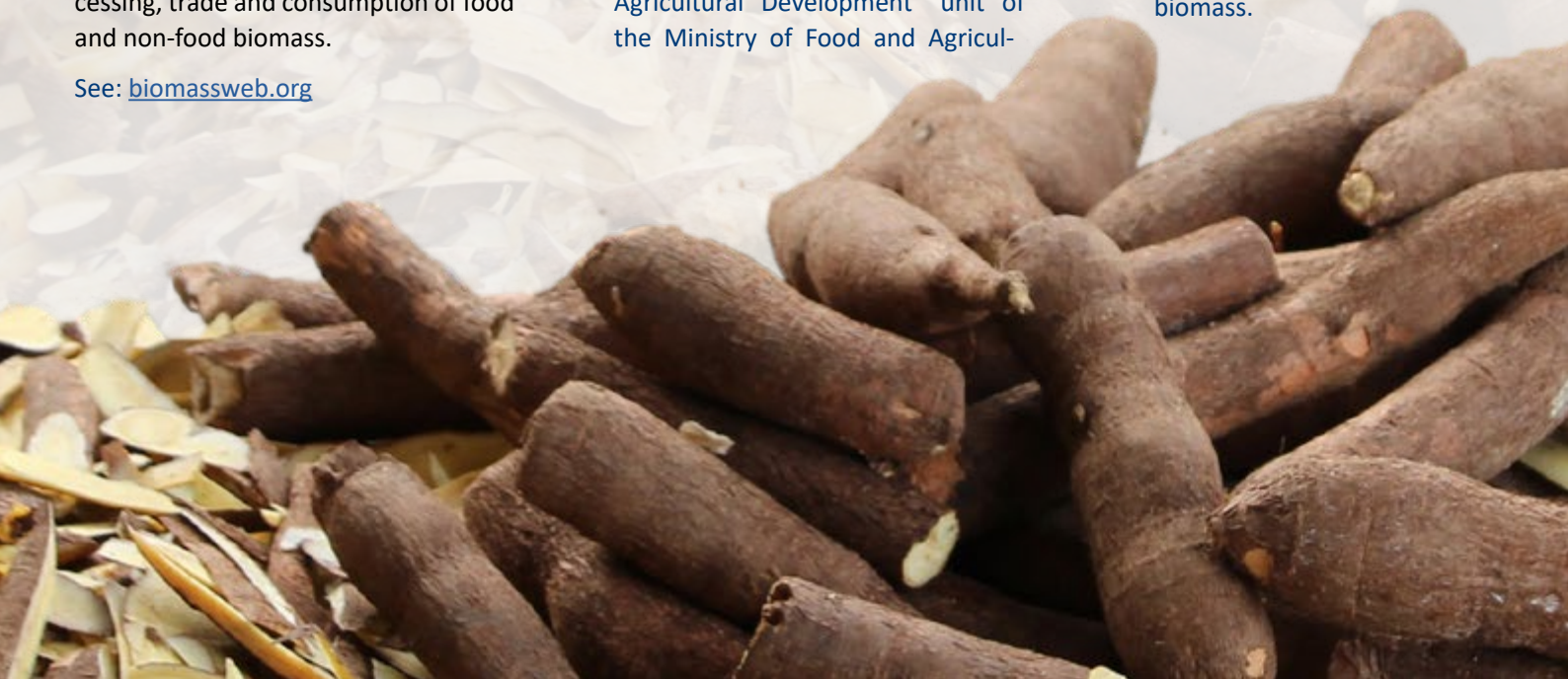
Cassava is the most important tuber plant in Ghana and is grown for food and non-food purposes. Over 70% of the country's farmers produce cassava, constituting 22% of the agricultural gross domestic product (GDP).

Cassava peels can account for up to 15 percent of the tuber. They are an organic waste and spoil very quickly. They are inedible, due to their high hydrogen cyanide content, but can be used as animal feed as well as for biogas or compost production.

Cassava peels came into the focus of the project because they formed an enormous biomass waste, even posing a burden on the local environment. The "Ghanaian Women in Agricultural Development" unit of the Ministry of Food and Agricul-

ture came up with an initiative to use cassava peels as a substrate for the cultivation of oyster mushrooms. The procedure is as follows: the peel is dried; subsequently water, lime and sawdust is added; the substrate is bundled, turned and moistened so that mycelium can grow; after one month the substrate bag is opened; on contact with air, mushrooms start to grow; after detachment, the mushrooms can be eaten, dried or sold.

The mushrooms have a high nutritional value. This is an opportunity for a new small-scale industry and shows how through a value chain that uses organic waste, farmers' income can be generated and nutrition of consumers improved. It should also serve as an employment opportunity for young people and as a means to improve food security and environmental protection through the use of biomass.



Bio-economy

The bio-economy, or bio-based economy, is a new model for industry and the economy. It involves using renewable biological resources sustainably to produce food, energy and industrial goods. It also exploits the untapped potential stored within millions of tons of biological waste and residual materials. The transition from a fossil fuel-based to a bio-based economy is expected to reduce our dependency on fossil fuels and achieve more sustainability as well as contribute to climate and environmental protection.



In Focus:

COMPETING USES: BIOMASS AND FOOD SECURITY STANDARDS

To avoid competition between achieving local food security and exporting agricultural products for profit, the EU and the German federal government grant food security primacy over all other biomass uses in their bio-economy strategies.

Yet until now, even in most certified biomass production schemes, there are no food security criteria and verification instruments. Since mid-2017, the World Wildlife Fund (WWF), Welthungerhilfe (WHH) and ZEF have bundled their expertise and worked to address these issues and provide hands-on solutions.

The Food Security Standard (FSS) project takes up the right to food as a new component for sustainability standards and certification schemes. It develops practicable and measurable criteria for all kinds of traded agricultural and

forestry-based products, independent of their later use.

ZEF plays several crucial roles in the FSS project. It conducts accompanying research that provides the conceptual background, evaluations and tools to address food security. It is also heavily involved in the further development of criteria for the Food Security Standard, audit tools and field testing in Africa, Asia and Latin-America.

Research has so far been conducted on food security and smallholder cotton certification in Zambia, on smallholder coffee production sites in Kenya, on smallholder oil palm production sites in Malaysia, on certified palm oil plantations in Indonesia, on large-scale sugar cane plantations in Guatemala, and on small and medium-scale sugar cane plantations in Bolivia.

First results show that the Food Security Standard criteria regarding the human right to adequate food can be implemented by most certified plantations with reasonable efforts. Some plantations, typically smaller and medium sized ones, are likely to face higher investment costs compared to larger plantations which usually already have quite high certification standards. However positive impacts are also expected to be higher for such smaller plantations.

Non-poor smallholders are able to comply but need some external support for the implementation. However poor, food insecure smallholders are unable to comply and as a result, the project seeks to identify ways to avoid their market exclusion.

Read more: zef.de/project/FSS-project



“The trip offered us a great opportunity to see how food security can be addressed in a better way in oil palm production”

- Tina Beuchelt, ZEF Senior Researcher

INSIGHT

Food Security standards

In the research phase of the Food Security Standard project, ZEF developed food security criteria, which can be integrated into sustainability standards for different crops. This research was conducted with the support of the NGO Welthungerhilfe. Such sustainability standards ensure that the human right to food is not violated at a local level and that the European consumer of palm oil or other crops is complying with good purchasing practices as required by international bodies such as the UN, OECD, the EU as well as by national governments. The follow-up Food Security Standard project aims to use field trials to test and to subsequently implement the criteria. Under the project, ZEF senior researcher Tina Beuchelt visited the first voluntarily certified smallholders and medium-sized oil palm growers in Sabah, Malaysia. The palm oil producers are organized in a group certification scheme which is run by a social enterprise.

Tina Beuchelt said, “The trip offered us a great opportunity to see what is going on at smaller production scales and how food security can be addressed in a better way in oil palm production”. (Read more in her blog at blog.zef.de/?p=3022).

In Focus:

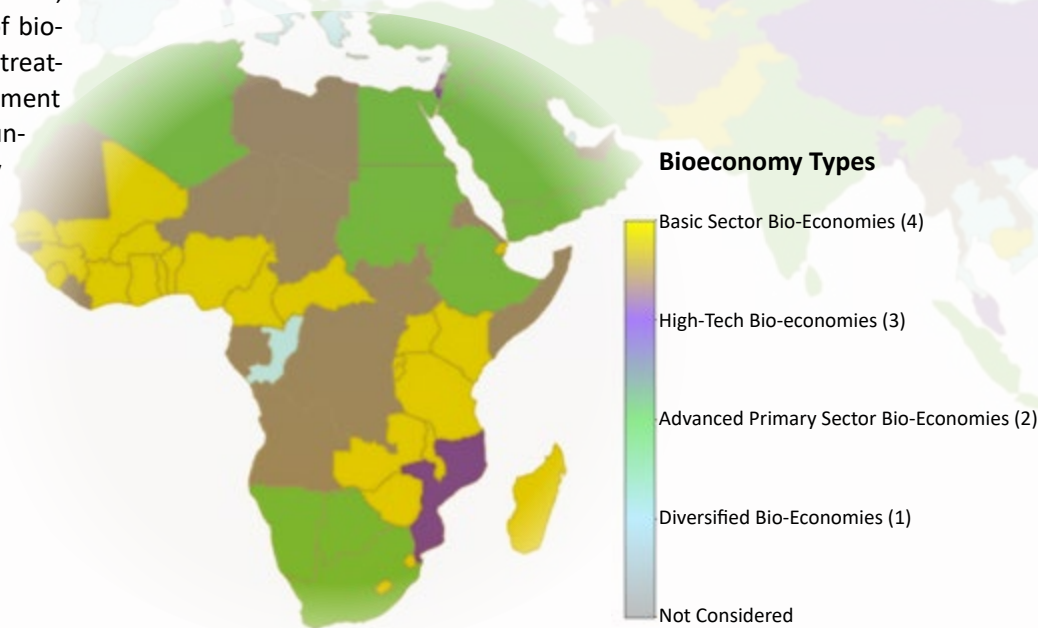
BIO-ECONOMY

The bioeconomy or bio-based economy is an approach to production and consumption using renewable biological resources to produce food, energy, and industrial and consumer goods. It includes the more sustainable production of energy from millions of tons of biological waste and residual materials from agriculture, the development of biopharmaceuticals, bioplastics, and the application of bio-based principles to waste water treatment. While bioeconomy development strategies vary greatly across countries, they are all underpinned by a central purpose: the use of products, processes and principles derived from biological resources to provide alternatives to current unsustainable patterns of production and consumption. This transition from a fossil fuel-based to a bio-based economy not only

contributes to climate and environmental protection but is also associated with achieving greater societal sustainability.

In ZEF's STRIVE – standing for 'Sustainable trade and innovation transfer in the bio-economy' – project, an international team of researchers is investigating the trade-offs in the use of biological material in competing value chains.

The interdisciplinary STRIVE research team are measuring and mapping bio-economies through ecological and economic modeling and analysis techniques. A series of case studies are being conducted in Africa, South-East Asia and South America to investigate existing frameworks for bioeconomy policy and governance.



INSIGHT

Bio-Plastic: production vs. recycling

A STRIVE team led by Neus Escobar conducted research on bioplastic, a small but growing sector in the global bioeconomy. The study, which considered both direct and indirect land use changes, quantified global greenhouse gas emissions caused by the increased demand for bioplastics which are produced from arable crops.

Escobar and her group assessed the potential net economy-wide impacts of a 5% bioplastic target relative to current plastic consumption in the main producing regions. Two alternative policy strategies to achieve the target were compared: a subsidy on bioplastics versus a tax on fossil-based

plastic consumption. Both policy strategies would reduce world demand for petroleum products, by 0.37% and 0.07% respectively, which would boost demand for sugar- and starch-based feedstock in the bioplastic industry. This would in turn lead to emissions from land use change at the global level, corresponding to a carbon payback time of 22 years on average. The associated annual abatement costs are more than US\$2000 per tonne of CO₂-eq. The results show that, if based on conventional feedstock, the promotion of bioplastic consumption is not a cost-effective strategy for climate change mitigation. In other words, just because they are bio-based, bioplas-

tics are not necessarily more sustainable than conventional polymers.

In an interview with *Physics World*, Escobar endorsed a stronger focus on recycling of all plastics and drew attention to the recently approved "European Strategy for Plastics" (European Commission 2018), which prioritizes recycling over biodegradation to simultaneously increase the sustainability of the plastic industry and curb plastic waste.

This research by Neus Escobar was published in Environmental Research Letters (iopscience.iop.org/article/10.1088/1748-9326/aaefb).

"Purely technical solutions will not bring the necessary changes - they need to be part of a broader political approach of inclusiveness"

Quote from experts on key enabling technologies for the bioeconomy
(Laibach et al. 2019)

Analyzing bioeconomies across the globe

A global comparative analysis of national bioeconomy strategies shows that 41 countries have developed a bio-economy strategy. The specific bioeconomic focus revealed by national strategy documents ranged from comprehensive and diversified bio-economy development pathways to strategies emphasizing a sectoral focus. Generally speaking, more diversified and advanced economies have more comprehensive national bio-economy strategies.

However, the STRIVE team of Thomas Dietz and Jan Janosch Förster found that besides having elaborate bio-economy strategies, the potential risks are not well addressed within national frameworks for policy and governance. These risks arise from the implementation of bioeconomy policies for competing uses of land and related aspects of food security, biotechnology and biosafety, and CO2 emissions from agricultural and industrial practices in bio-refineries.

STRIVE researchers including Lisa Biber-Freudenberger have developed a country-based bio-economy typology.

The typology shows not only considerable differences in underlying socioeconomic conditions and natural resources endowments in the respective countries, but also variations in terms of sustainability performance. The analysis suggests that diversified high-tech economies such as Germany have experienced a slight sustainability improvement over the past years, especially in terms of reduced resource consumption. However, and compared to other types of bioeconomies, such countries' ecological footprints remain at the highest levels because import volumes of resources and raw materials are larger than in other countries.

Checking one's own findings against those of distinguished experts in the field is key to scientific research. STRIVE research has also investigated the perceptions of global bioeconomy experts as negative or positive for sustainability thresholds.

Hereby, agricultural improvements were seen as the most important pathway for a bio-based transition. Research results indicate that social aspects should be the most important goal of technological advance in primary-sector-focused bio-economies. For high-tech bio-economies, economic benefits

are more desirable. Technologies for genetic engineering, biotechnology and waste utilization can be key to enabling such high-tech bio-economies.

As with all of ZEF's projects, collaboration with international partners is key. STRIVE researcher Jan Janosch Förster and project leader Jan Börner organized a high-level workshop with global bio-economy experts mainly from Europe and Africa at the Global Bio-economy Summit 2018 in Berlin, Germany. During this workshop, collaboration between Africa and Europe, particularly in knowledge and technology transfer and joint financing efforts, were highlighted as crucial for inclusive bio-economic growth. The Sustainable Development Goals play a central role in this potential development pathway for both African and European countries. In collaboration with the Stockholm Environment Institute, the outcomes were summarized in a ZEF Policy Brief.

The main findings of the workshop at the Global bio-economy summit 2018 in Berlin were published in: ZEF-STRIVE policy brief no. 29, see

zef.de/uploads/tx_zefportal/Publications/ZEF_Policy_brief_29_web.pdf



Brazilian soy and CO₂

STRIVE researchers estimated the spatially-explicit carbon footprints of supply chains of Brazilian soy covering the entire export volume. In order to do so, they developed a green house gas calculation module based on a Life Cycle Assessment. The module is going to be implemented on the platform: <https://trase.earth/>. This research on Brazilian soy provides numerical evidence on

how to optimize the country's supply chain and mitigate climate change in the country. Climate change is triggered by the logging and replacement of Amazonian rain forests by soy plantations for economic reasons. The researchers recommend that national policy efforts should focus on strengthening conservation policies to prevent illegal deforestation, optimizing fertilizer applica-

tion doses, and shifting to rail freight transport instead of building and using roads.

See trase.earth

ZEF'S PROJECTS ON LAND, WATER, FOOD AND ENERGY

PROJECT NAME	DESCRIPTION	DURATION	MAIN FUNDER	WEBSITE
BiomassWeb	Improving food security in Africa through increased system productivity of biomass-based value webs	2013-18	BMBF / BMZ	biomassweb.org
CB4SoilReha	Research and capacity building for inter-sectorial private sector involvement for soil rehabilitation	2016-19	BMZ via IWMI	zef.de
CIREG	Climate Information to support integrated Renewable Electricity Generation	2018-21	ERA4CS (BMBF)	cireg.pik-potsdam.de/en
CLIMAFRI	Implementing CLIMate-sensitive Adaptation strategies to reduce Flood Risk in the transboundary Lower Mono River catchment in Togo and Benin	2019-22	BMBF	bmbf-client.de/projekte/climafri
WASCAL-PAUWES cooperation project	The cooperation project links the two African capacity building centers WASCAL-Graduate School Program and PAUWES.	2017-20	BMBF	zef.de
Cooperation Water-Energy with PAUWES–ZEF–UNU–ITT	A consortium consisting of ZEF, UNU-EHS and ITT/TH Köln is cooperating with the Pan African University – Institute of Water and Energy Sciences (PAUWES)	2017-18	DAAD	zef.de
Doctoral Studies Support Program (DSSP)	Bilateral SDG Graduate Program on environmental peace-building and development in Colombia	2017-20	DAAD	idea.unal.edu.co/DSSP
EntoNUTRI	Development and implementation of insect-based products to enhance food and nutritional security in sub-Saharan Africa	2015-18	BMZ	icipo.org
Forests in the global bioeconomy	Contributing to the design of policies and measures that promote synergies between global bioeconomy development, forest ecosystem service provision and poverty alleviation at tropical forest margins in Brazil and Indonesia.	2015 -18	BMZ via BEAF	zef.de
FSS Project	Implementation of food security criteria within bio-mass sustainability standards	2017-20	BMEL	zef.de

Analyzing global bio-economies:

Case study

South Africa

The analysis of national-level bio-economy case studies shows that policy makers in developing countries often consider the concept of bio-economy as a potential development pathway for inclusive economic growth and poverty reduction. In doing so they acknowledge the Sustainable Development Goals.

In the case of South Africa's national bio-economy strategy, according to ZEF senior research Jan Janosch Förster, the idea of a potential development pathway had not materialized. His analysis of the country's bio-economy strategy reveals the societal and policy challenges to its implementation: the limited knowledge, skills and financial resources of policy implementers in public agencies and civil society organizations. In addition to this, country-

specific factors, such as the historically-contested access to natural resources (i.e. land and water) and poor health, poverty and hunger, play a crucial role in bioeconomy developments. So national policies and governance that empower the poor, improve livelihoods,

and strengthen professional capacities are key to any developmental bio-economy policy. Förster concludes that bio-economy per se is not going to solve the ever-pressing classical development problems, rather it is only one possible way to address them.

Improved application strategies for entomopathogenic fungi as biological control agents in integrated pest management	Developing models for the virulence of EPF isolates, linking virulence models to regional and continental climate data for spatial mapping of the potential zones of efficacy for pests control under current and future climatic conditions	2014-18	VW Foundation	zef.de
InoCottonGROW	Innovative impulses reducing the water footprint of the global cotton-textile Industry towards the UN-Sustainable Development Goals	2017-20	BMBF / GROW	inocottongrow.net
Integrated Water Governance Support System	Improve the transboundary water governance as an essential component of the natural ecosystems governance in the Kruger and Limpopo national parks.	2017-20	BMBF	zef.de
NOURICITY	Partnerships for healthy diets and nutrition in urban African food systems - evidence and strategies	2018-21	EC H2020 ERA-Net	zef.de
NutriHAF-Africa	Diversifying agriculture for balanced nutrition through fruits and vegetables in multi-storey cropping systems	2015-18	BMEL	zef.de
ProciNut	Production and processing of edible insects for improved nutrition - innovative approaches to process local food in sub-Saharan Africa and South-East Asia	2018-2021	BMEL	zef.de
RARSUS	Risk assessment and adaptation strategies for sustainable urban resource supply in Sub-Saharan Africa	2017-2019	BMBF / DAAD	zef.de
Shaping environmental policies for sustainable tropical forest bioeconomies	Bio-economic scenario analyse with insights from econometric impact and policy case studies as well as spatial overlay and simulation techniques from environmental geography.	2012-2018	Robert Bosch Stiftung	zef.de
WABES	Supporting IPBES capacity building in West Africa	2017-2022	IKI via BMU	wabes.net
WESA	Water and energy security for Africa	2016-2019	BMBF	zef.de

2.2 – HEALTH, NUTRITION, AND ECOSYSTEMS

Health, nutrition, and ecosystems represent different but interconnected angles of a holistic view on development from a socio-ecological perspective, where the social and ecological systems are regarded as a single entity. These items hold an intrinsic and instrumental value in this regard. Research on indicators for the

resilience of socio-ecological systems is therefore crucial to a better understanding of the sustainability of such systems. This also includes research on agro-ecosystems and agricultural technologies as well as their linkages to human and ecosystem health.



In Focus:

ONE HEALTH: A GLOBAL ISSUE AFFECTING HUMANS, ANIMALS AND THE ENVIRONMENT

Human health remains at the core of the ONE HEALTH research and policy concept. The **NRW Forschungskolleg 'One Health and Urban Transformation - identifying risks and developing sustainable solutions'** (zef.de/onehealth.html) is a transdisciplinary graduate school that investigates various dimensions and transformations of urban systems and their impact on human, animal and environmental health. The graduate school is hosted at ZEF. Currently, 15 doctoral students conduct research in four global metropolitan regions: Ruhr Metropolis (Germany), Ahmedabad (India), Accra (Ghana), and São Paulo (Brazil).

On-going doctoral research in São Paulo focuses on: resilience of urban agriculture production systems and urban parks for mental health and biodiversity support. One Health and ZEF doctoral student Jéssica Felappi, is conducting research on "Reconciling mental health promotion and wildlife conservation in a megacity: the importance of urban parks' qualities". Jéssica is carrying out her field work in São Paulo, Brazil, a megacity of over 12 million people. The aim of her research is to understand the impact of urban parks' qualities on the mental well-being of visitors and biodiversity support. Finding synergies and trade-offs between these two dimensions could inform better design and management of these spaces, maximizing benefits to all. From March to July 2019, nineteen urban parks in different parts of the city were surveyed resulting in around one thousand questionnaires. Data on biodiversity in the same urban parks was collected with the municipality and through citizen science platforms. After

Jessica has analyzed the data at ZEF, she will go back to São Paulo to hold a workshop with stakeholders during which she will present the results and recommendations of the project to plan and improve urban green spaces to maximize their benefits to human

INSIGHT

Human health research in São Paulo

health and urban biodiversity conservation.

Read more about the One Health research at ZEF's blog: blog.zef.de/?p=5744

Also recommended: Blog by doctoral student Anna Brückner about One Health field research in India: blog.zef.de/?p=4464

In Focus:

Insects!

TALKING ABOUT SMALL ANIMALS WITH A HUGE IMPACT

Entomophagy is a difficult word with a simple meaning: the human practice of consumption of insects as food. Entomophagy offers crucial advantages over conventional food sources, because edible insects are able to provide high amounts of nutrients such as protein, and their production has a significantly better feed conversion and causes substantially lower CO₂ emissions in comparison to livestock. ZEF has a number of research groups working on this issue.

One of them is the new **ProciNut project** (Processing of edible insects for improved nutrition). This new project aims to improve the utilization of the nutritional and economic potentials of edible insects in Myanmar, Thailand and Madagascar. Through testing different processing techniques of local insect species (e.g. insect flours, dried insects) the team of international sci-

entists will help to expand commercial small-scale farm and processing activities for the production of safe and nutritious end products.

The project's objectives are to close seasonal nutritional gaps, increase nutritional security of households, and improve the income stability of poor women. A special feature is the South-

South-Cooperation between South-East Asia (Myanmar, Thailand) and eastern Africa (Madagascar). The mutual exchange of advanced knowledge regarding the organized sector of insect rearing and processing (i.e. mini farms) from South-East Asia will facilitate a knowledge transfer and capacity development of farmers, extension agents and policy makers across continents.





Chasing edible insects in South-East Asia

In her blog “In search of yummi insects, insect-eaters and mini-farmers in Myanmar and Thailand” ZEF senior researcher Sarah Nischalke tells about her two month travel across Myanmar and Thailand. She tried more than a dozen of different insects, talked to many fellow insect-eaters and soon-to-be mini-farmers, and came back to ZEF to share lots of packages of cricket pasta, silk worms and crispy rolls with her colleagues. She summarizes:

Our mission was to identify insect collectors and breeders, and to convince them to work with us to test new insects for rearing and processing for consumption. When we arrived in Central Myanmar we quickly learned that insect-eating was all about one insect that everybody loves: the GIANT cricket.

Giant crickets are transported long-distances across the country. Usually they are stored in ice and put in large insulated plastic boxes until they reach their final destination, including Mandalay, Yangon and other cities in the country. We also learned that people only like to eat the whole insect.

Palm weevil larvae, one of the most expensive delicacies on the market. Photo: Ingo Wagler

The idea of eating insects as a powder was as strange an idea to the people we met, as the idea that insects could be farmed for livelihoods. We quickly

learned that in Central Myanmar people eat “crickets, not insects”. Many ethnic Barmar (Burmese) are unwilling to touch any other insects but rather leave their consumption to the other ethnic groups that comprise Myanmar’s famous rich ethnic diversity, such as the Chinese, Shan, Pao, and others.

Furthermore, we quickly realized that in Myanmar, even though everybody was munching the yummy insects that were available on the market during the season, no one could ever imagine that insect rearing would be possible, viable and attractive – or even necessary.

The only reared insect that we came across during our trip to Myanmar was the silk worm. We were warmly welcomed by the government’s silkworm egg production and mulberry research farm in the city of Pyin Oo Lwin. There we saw large green mulberry plan-

tations for feed, comfortably warm-breeding rooms full of caterpillars, and laboratories.

We were also invited to the silk factories, where cocoons are reeled producing silkworm pupae as an edible byproduct, which is appreciated by many people in the region. To our disappointment, the silk worms were only consumed by the laborers and their families whereas most of the yummy worms (the whole cocoons) are exported to China. There, they are extracted with the help of modern facilities. Some of them are then re-imported to the markets of Myanmar.

This text is of blog part 1 (Myanmar)
blog.zef.de/?p=4502

Continue reading blog part 2 (Thailand): blog.zef.de/?p=4538



How the Black Soldier Fly larvae reduces ecological and economic footprint of livestock feed in Africa

Further research on edible insects conducted at ZEF is looking into the potential of **Black Soldier Fly larvae** to reduce the ecological and economic footprint of livestock feed in Africa. With amazing results!

In Africa, livestock production currently accounts for about 30% of the gross value of agricultural production. However, production is struggling to keep up with the demands of an expanding human population, rise in urbanization and associated shifts in diet habits. High cost of feed prevents the livestock sector from thriving and meeting rising consumer demand. In recent years, researchers identified insects as potential alternatives to the conventionally used protein sources in livestock feed.

The ZEF researcher assessed that insects have rich nutrients content and can be reared on organic side streams.

Moreover, substrates derived from organic by-products are suitable for industrial large-scale production of insect meal.

A laboratory experiment with three different organic substrates, i.e. chicken manure, brewers' spent grain and kitchen waste, showed that commonly available organic waste streams in urban environments of the developing world can be successfully used to produce high quality Black Soldier Fly larvae.

The larvae have the potential to substitute other animal- or plant-derived protein sources in commercial livestock feed. Wide-scale application of this approach would greatly reduce the ecological and economic footprint of feed to an enormous extent, thereby contributing to more sustainable animal husbandry systems. Moreover, it could provide valuable ecosystem services

through the bioconversion of municipal and organic waste streams into biocompost. To achieve this, appropriate and cost-effective mass-rearing technologies for the Black Soldier Fly larvae should be developed. Kenya and Uganda recently approved dried insect products for use in all animal and fish feed. Following in their footsteps, a regional African insect feed policy that ensures safe production within adequate hygiene standards could be introduced.

Excerpt from article in [Nature.com](#): "The nutritive value of black soldier fly larvae reared on common organic waste streams in Kenya" with first author Marwa Shumo, doctoral researcher at ZEF. Read the full article here: [nature.com/articles/s41598-019-46603-z](https://www.nature.com/articles/s41598-019-46603-z)

Read more about Marwa Shumo's research in her blog posts at blog.zef.de





INSIGHT

German consumers: Are they willing to pay for insect-based burger patties?

Insects represent an excellent source of food because they are rich in unsaturated fatty acids, vitamins, and minerals. In addition, their production is associated with lower emissions of greenhouse gases and resource use compared to other conventional protein sources. However, in most Western countries the human consumption of insects is very low and often perceived as culturally inappropriate.

In this study, we analyzed the preferences of German consumers for insect-based products. Our goal was to increase our knowledge about which

specific consumer segments are willing to adopt insects into their diet. For this purpose, an online-based choice experiment was conducted in 2016, in which respondents chose between an ordinary burger and a burger with a beef burger patty fortified with insect flour.

We detect several homogeneous consumer segments in our sample. The largest group of respondents is willing to consume insect-fortified burgers with only a small price discount, while the remaining respondents had a prohibitively low willingness-to-pay. The readiness of consumers to adopt in-

sects into their diet is strongly related to attitudinal variables, such as preferences for environmentally friendly production methods and health aspects. On the other hand, disgust and an aversion towards eating insects seem to be the main reasons to abstain from eating insects.

This text is based on the peer-reviewed journal article published by Lukas Kornher, Martin Schellhorn and Saskia Vetter in Sustainability 2019, 11(7), 1878; doi.org/10.3390/su11071878

In Focus:

MORE ON CONSUMERS' CHOICES: HEALTH AND FOOD

The recently launched research project NOURICITY, in which ZEF is a leading partner, focuses on the consumption side of food and health issues. The project's researchers look specifically into urban food systems and the drivers of malnutrition in three urban areas in Africa: Accra in Ghana, Cape Town in South Africa and Kampala in Uganda.

The 'eco-system' within which the urban consumer lives has a socio-economic nature that includes the types, safety and nutritional quality of the food available for purchase and consumption in the urban food system. Factors such as information, price, and convenience provide incentives to consumers influencing their choices.

The interdisciplinary project works closely with food safety specialists for the laboratory analysis of products along a few main value chains. In addition, social scientists explore related

social norms and cultures, including poor consumers' perceptions and understanding of nutrition and health messages. Geographers are also included to facilitate the representation and integration of urban food systems into urban planning.

INSIGHT

Research and stakeholder involvement

Urban food markets in Ghana

This study looks into the food and nutrition security status of urban households in three of Ghana's largest cities: Accra, Kumasi and Tamale. It examines the linkage between supply of food at markets, and households' food consumption decisions and behaviors with regards to dietary diversity, food safety and seasonality.

The markets visited by the research team in Accra, namely the Agbogboshie and Makola markets, can be described as

"organized chaos". A first timer does not readily see the organization of the market. As one moves through the markets, however, one notices how sellers are segmented based on the type of products sold, quantity, and set-up.

There is food diversity in the market; from fresh produce to processed foods. However, sanitation and food safety issues are noticeable concerns in these markets. Similar concerns were raised at the first stakeholder workshop organized at the Ashiedu Keteke sub-metro of the Accra Metropolitan Assembly. The participants included leaders of various food stuff sellers such as vegetables and fruits, maize, groundnuts, beans, tomatoes; and officers of the assembly in charge of the environment, waste management, community development and public health.

At the workshop leaders of the food stuff groups complained that the assembly does not do a good job in

keeping the market clean. The officers of the assembly rejected these accusations and said they were doing their best given the major constraints they face.

Most of the workshop participants were concerned about the safety of the food stuff they are selling. They are aware that food safety issues run along the entire value chain. Contamination comes from the production side, through the poorly regulated use of herbicides, pesticides and other chemicals.

Another challenge is the handling of food stuff in the market. The products are not well protected from dust and flies. Interestingly, some customers specifically request the damaged or spoiled vegetables because they are sold cheaper by market women to help reduce their losses. Monitoring and enforcement of laws to curtail these practices are weak.

Author: Makafui Dzudzor, ZEF junior researcher.



Three African urban sites, three food stories

A NOURICITY workshop in Cape Town, South Africa, attended by all European and African project partners, led the team to realize how different the socio-economic contexts are in Cape Town, Kampala and Accra.

Malnutrition and its drivers for instance, take various forms and follow different pathways in the three urban research sites in Accra, Cape Town and Kampala. This makes for an interesting comparative project. For example, poverty in Cape Town is driving consumers to purchase fast and highly processed food (i.e. high sugar, fat and salt content).

Levels of soft drink consumption per capita in South Africa is higher than in the United States of America, encouraged by very low prices, cheaper than water. Further, intra-household food consumption and preparation are strongly influenced by the family set-up: in South Africa about half the children have never met their father and grow up only with the mother, giving a different context to parental care, thereby re-enforcing a vicious circle of poverty, low parental care, poor health and nutrition, as well as lack of educational achievement.

In Ghana, the mothers' occupation and employment profile is researched as a driving cause of dietary choice and food purchases. Here the poverty issue is expected to play less of a role, but mechanisms of intra-household time allocation to food behavior will be at the center of our analysis.

From the food system perspective, early activities have already highlighted large differences among the three cities. In particular, open markets in Accra are dispatching food products coming from all corners of the country and beyond. This creates specific issues related to food safety and quality for fresh products (e.g. tomatoes, cabbage or maize) that have travelled long distances and time without appropriate protection. The issue is compounded by lack of appropriate storage facilities at the market sites.

In Cape Town, open markets are linked to much shorter value chains in terms of time and distance the products have to travel. Research in Kampala is expected to provide yet more contrast to the cross-country comparison.

ZEF PROJECTS ON HEALTH, NUTRITION, AND ECOSYSTEMS

PROJECT NAME	DESCRIPTION	DURATION	MAIN FUNDER	WEBSITE
NOURICITY	Partnerships for healthy diets and nutrition in urban African food systems - evidence and strategies	2018-21	EC H2020 ERA-Net Co-fund, through LEAP-Agri	zef.de
One Health and Urban Transformations	Identifying risks and developing sustainable solutions	2016-20	MIWF-NRW	zef.de/onehealth.html
Strengthening Citrus production systems through the introduction of IPM measure	Integrated pest management is an integral component of the project to increase citrus production for improving the livelihood of producers and consumers in the target countries	2015-18	BMZ	icipe.org

2.3 – INNOVATION, KNOWLEDGE, AND SCIENCE POLICY

Innovations can have different facets, ranging from technical and institutional innovations to societal innovations such as new governance structures or incentive schemes. Research on processes leading to the generation, local contextualization, implementation and adoption of innovations is key to developing policy recommendations. This is closely linked to ZEF's other five research areas but in particular provides application-oriented tools and approaches for the 'real-life'-situations of practitioners, policy-makers or potential end-users. The research focuses on the perception of new societal and ecological challenges across different stakeholder groups, information and communication technology utilization, and effective awareness-raising and capacity-building to foster the implementation of promising innovations in societies.



BUNDLING RESEARCH, POLICY AND PRACTICE TO FIGHT HUNGER IN AFRICA AND INDIA

Agricultural innovations in Africa and India are at the core of one of ZEF's major research projects on innovations, the Program of Accompanying Research for Agricultural Innovation (PARI). The program is part of the "One World, No Hunger" Initiative of the German Federal Ministry for Economic Cooperation and Development (BMZ).

The original idea of PARI was to add value to the ten Green Innovation Centers that were established to improve food security and sustainable agricultural value chains in Africa and India.

The Green Innovation Centers in Africa form the core of a comprehensive German-African collaborative approach to enhance the continent's agricultural-food sector. PARI was specifically set up in response to the demand for research outputs from end users and other actors in the various value chains.

PARI's specific research questions are as follows: Targeting investments in in-

novations and framework conditions; Mechanization and skill development for productivity growth, employment and value addition; Digitalization in agriculture, food and nutrition; Enhancing opportunities for the youth in the rural economy; and Improving the policy context and contributing to evidence-based policy.

Globally, PARI aims at identifying which investments have the potential to bring the best results in terms of reducing poverty and enhancing food security, with an emphasis on employment creation. The latter specifically for the youth, and in this respect, the potential of mechanization and digitalization is studied in more detail.

Importantly, the focus of PARI has extended over the years, from agriculture to the whole food sector, thus including its post-harvest segments.

INSIGHT:

On bulls and bulbs in Zambia

In this study of Zambian youth, PARI researcher Thomas Daum worked with mainly qualitative methods (interviews, drawings). His conclusions show that Zambia's rural youth have very diverse opinions and aspirations. In contrast to the impression given by literature on the subject, young people were found to carefully reflect on the positive and negative aspects of farming, rural and urban life, and perspectives abroad. With regard to their future in farming, they showed a large diversity of aspirations and perceptions, some of which have been neglected both by policymakers and development-prac-

tioners. While policymakers and development-practitioners highlight the need for modern technologies and advocate the use of information and communication technologies, young respondents gave more emphasis to low-tech solutions such as increasing farm diversity (e.g., by planting fruit trees and growing vegetables), using draft animals (bulls) and applying more fertilizers, in addition to having electricity (bulbs). This suggests that policymakers and development-practitioners need to pay more attention to the actual aspirations of the rural youth to avoid well-intended but misguided policies. In

addition, the findings suggest that there cannot be just one policy for 'the youth'. The empirical findings of this paper on Zambia is relevant for a larger set of African countries that aim to make farming more attractive to rural youth.

Based on a journal article by Thomas Daum, published at doi.org/10.1080/09614524.2019.1646209 and as ZEF Working Paper no. 171 Of Bulls and Bulbs. Aspirations and perceptions of rural youth in Zambia, see zef.de/fileadmin/user_upload/ZEF_WP_171.pdf

In Focus:

SCIENCE AND POLICY JOINING FORCES: THE IPCC REPORT ON CLIMATE CHANGE AND LAND

The report "Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems" was presented by the Intergovernmental Panel on Climate Change (IPCC) in Geneva on August 8, 2019. The report was not only anticipated by scientists and policy-makers alike, but received widespread media coverage worldwide.

Climate change has finally become a widely debated issue of concern to the general public, a development that has been helped by the school children's 'Fridays for Future' movement.

ZEF senior researcher Alisher Mirzaev was lead author of the desertification chapter of the IPCC land report and a member of working group 2 on impacts, adaptation and vulnerability.

Alisher attended the press conference in Geneva on August 8 and gave several interviews to international media representatives.

In an interview with Carbon Brief he is quoted as saying, "Climate change interacts with the other human drivers of degradation, such as unsustainable land management and agricultural expansion, in causing or worsening many of these desertification processes. The result is a decline in crop and livestock

productivity, loss of biodiversity, increasing chances of wildfires in certain areas. Naturally, these will have negative impacts on food security and livelihoods, especially in developing countries."

For more ZEF-related information look at our Website [zef.de](https://www.zef.de)

ZEF-Director Christian Borgemeister was live at the German Broadcaster Phoenix on August 8, 2019 as an expert commenting on the launched IPCC report.



More **foreign** direct investments for **more food?** FDI in Africa

The food and agriculture sector in Africa presents a great potential for prospective private sector investors. Agriculture plays a key role in the context of rising food demand, which is a result of population growth, urbanization, and growing incomes. However, despite this positive outlook, the current level of investment is still too low. More investment is necessary in order to keep pace with the rising demand. Foreign direct investment (FDI) has the potential to fill this gap, especially

where local private-sector investment is insufficient because of financing constraints. Over the past 15 years, the total amount of FDI inflow into the African food and agriculture sector totaled USD 48.7 billion. However half of this was investment in fertilizer production. Perceptions of extensive land-grabbing by foreign investors in Africa are popular. Nevertheless, investments in crop production, involving land acquisition, constitute only 10% of total food and agriculture FDI

inflows to the continent. The low levels have spurred public-private initiatives, such as Grow Africa, to bolster investments. The African Continental Free Trade Area agreement is also expected to boost FDI inflows to the continent. Apart from providing capital, FDI is also expected to create quality employment, bring new technologies that increase productivity, improve infrastructure, and affect domestic investors through spillover effects. The research conducted by ZEF suggests that the investing companies are primarily driven by the potential of an emerging domestic consumer class. As a result, they target mainly local and regional markets rather than global markets. Other determinants of investments are a country's supply of agricultural land and the quality of its infrastructure and institutions. Importantly, the latter factors are amenable to policy-makers' interventions. Additionally, because of agglomeration economies, past investments further attract new FDI inflows due to production linkages and knowledge spillovers. Further research is essential in helping policy-makers to make informed decisions on how to attract the best kind of investment and how to maximize the beneficial impacts of these investments for the people they serve.

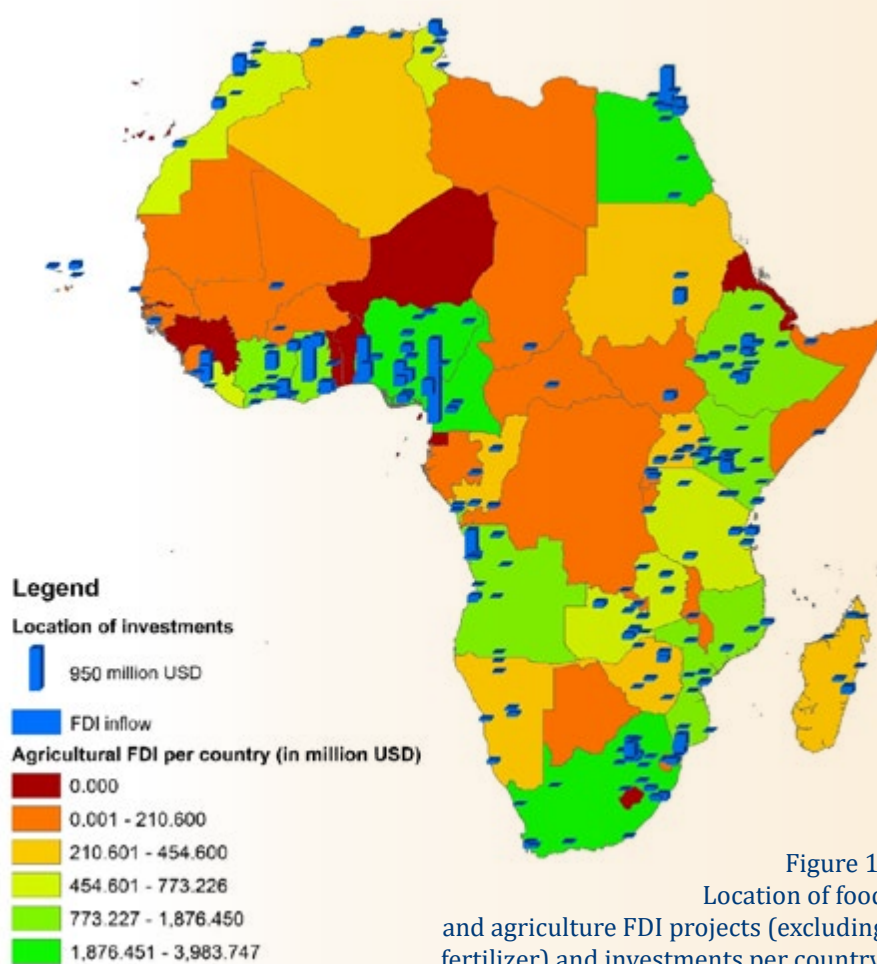


Figure 1: Location of food and agriculture FDI projects (excluding fertilizer) and investments per country.

Published as ZEF-Discussion Paper on Development Policy No. 274. Foreign direct investment in the African food and agriculture sector: trends, determinants and impacts 2019, C. Husmann, Z. Kubik.

2.4 – GOVERNANCE, CONFLICTS AND NATURAL RESOURCES

Collective decision-making and governance as well as the absence of appropriate governance structures have a tremendous impact on development processes. The assessment of centralized as well as decentralized, functional, organizational and segmentary forms of governance arrangements is pivotal in addressing the challenges of natural resource management, including the prevention and management of conflicts. Moreover, inequality is a major concern calling for inclusive development approaches. The sustainable use and management of natural resources are the major linking elements between this and the other research areas.



After five decades of armed conflicts, Colombia still faces the challenges of achieving sustainable peace, securing land rights for much of the rural population, and finding solutions to environmental conflicts. Furthermore over 5.7 million internally displaced people are yet to be resettled.

Although a peace agreement was signed in 2016 by the Government and the Revolutionary Armed Forces of Colombia (FARC), obstacles such as compensation, and land and property restitution remain. These are difficult to address in a context of diverse forms of violence and deeply entrenched structural inequalities.

To address these issues, ZEF and the Institute for Environmental Studies at the National University of Colombia in Bogotá established the Doctoral Studies Support Program with the support of the German Academic Exchange Service (DAAD) under its program 'bilateral Sustainable Development Goals

Graduate Schools'. The ZEF-led Doctoral Studies Support program focuses on 'Environmental peace-building and development in Colombia'.

The way that knowledge is produced and shared will play a crucial role in the process of overcoming the challenges mentioned above. Teaching and training is therefore a key element of the bilateral program. South-south cooperation is also an important asset, and therefore students from Nicaragua and Cuba, as well as those from Colombia, are enrolled in the program.

In addition to teaching activities, a data information system has been created that consists of a database for research data files and a meta-database containing descriptive information of the data in the database. Both are accessible via a public data portal on the web. The data covers survey data from different academic disciplines, and consists of reports, statistics, as well as geo-referenced (spatial) data. By mak-

ing these data accessible to scientific as well as non-scientific communities the doctoral program seeks to support further research, political decision making, and activism aiming to protect the environment, particularly in regions formerly affected by the military conflict between the army, the FARC and other paramilitary forces.

The data information system is based on an open source software framework widely used in so-called Spatial Data Infrastructures, which provide means for publishing and sharing map-based information by use of standardized geo-web-services. The Instituto de Estudios Ambientales eventually plans to take over the system to create an own "System for Environmental Information".

Website Database: bit.ly/2HdaxUP

INSIGHT

Poverty and environment research in Colombia

Juliana Sabogal is one of 14 PhD students registered with the German-Colombian bilateral Doctoral Studies Support Program. She is conducting her research on social and power relations in a specific municipality, Nariño, a rural area located in southwest Colombia. Her doctoral research asks why peasants are suffering from hunger even though the environmental conditions in which they live and farm are ideal for food production. In fact many of the campesinos (farmers) produce enough food to sell a part of their harvest on the market. Juliana Sabogal believes that there are social and political causes to this problem.

Juliana came to ZEF for a summer school in 2018. She says, "The summer school in Bonn offered many academic and social opportunities. We met researchers from other parts of the world who are working on similar topics. These included doctoral students from Africa, and I was surprised to learn that they deal with similar issues. We even talked about possible collaborations on specific projects."

Read more about the project in a blog post written by ZEF junior researcher Emilia Schmidt and acting ZEF-director Eva Youkhana at: blog.zef.de/?p=3434

2.5 – MARKETS AND PUBLIC SERVICES

ZEF's research theme "Markets and public services" focuses in an inclusive way on the developmental roles of markets and the political, infrastructure, and institutional constraints on access to public services by the rural and urban poor. Access to markets is a major precondition for farmers and rural landless people to overcome subsistence and to enhance their individual economic situation, making them more resilient to fluctuating boundary conditions as induced by global and national changes, for instance under international trade and investment arrangements and related regulatory regimes. The development of markets is partly related to the expansion of public services, as the latter often serve as a precondition for people to participate in markets.

INSIGHT:

Cash or subsidy? Research on Indian food distribution

Historically, India has relied on subsidizing staple food as a major instrument for improving food security. Recently, cash transfers have entered the debate as an alternative, as they are associated with lower market distortions, less leakages and fiscal costs. This study contributes to this debate by analyzing India's Targeted Public Distribution System (TPDS). Our main objective was to explain the under-purchase, or low take-up, from the TPDS. This is typically attributed to 'leakage', i.e. the diversion of foodgrains from eligible consumers. We provide an alternative

solution based on self-targeting; while poorer households increase their consumption from the TPDS, wealthier households restrain from consuming subsidized commodities. Using a large household dataset, we estimated that such a voluntary opt-out system, based on income, would save a minimum of 6.5% of grains released through the TPDS. Besides these demand-driven aspects, our analysis indicates that poor regions perform better at lowering the diversion of grains and that large targeting errors exist among female-led households. Finally, we find substantial

regional price differences that would benefit the poor and rural population under a uniform cash-transfer system that does not correct for regional price levels.

This is an excerpt from an article published by Kozicka, M., Weber, R., & Kalkuhl, M. 2019. Cash vs. in-kind transfers: the role of self-targeting in reforming the Indian food subsidy program, in: Food Security, doi.org/10.1007/s12571-019-00942-x (Open Access).

ZEF's major research activities in this field is covered by a research group that conducts an analysis and recommends measures to reduce price volatility in national and international markets for improved food security in developing countries. Research has been conducted in a **number of case studies: Bangladesh, Ethiopia, Ghana, India and Indonesia as well as in China.**

The project started after the Food (Price) Crisis in 2007/2008 with the initial objective to understand the causes of increasing food price levels and volatility.

The research focus has later moved to analyzing the potential success and feasibility of policy responses. At the current stage the research team seeks to understand the impact of broader market risks on food and nutrition security. Another main goal is the development of an early warning system for food insecurity based on research outcomes (**FOODMONITOR.org**).

Foodmonitor.org is an early warning system that tracks global food prices and supply risks which could potentially lead to food insecurity.

The functioning of markets is essential to achieve SDGs 1 and 2. Factor and product markets generate income for the poor. Food markets are also important to provide food and nutrition security. Guaranteeing functionality of markets needs to be in concordance with other SDGs, e.g. the environmental and climate related SDGs.





Social capital and maize trading in Malawi

Running a small business in Malawi can be quite challenging. A trader should have a good network of family, friends, brokers and other traders from near and beyond to strike a profit and remain afloat for long. Small businesses such as those that sell maize grain are often operated by traders with very similar characteristics" says ZEF junior researcher Henry Kankwamba about his research in Malawi.

Informal relationships that nurture cooperation among members embedded within them are called social capital. They can affect the allocation of economic resources such as food.

In this study, answers were sought to the following questions: 1) Does social capital make a business more profitable? 2) Does social capital help a business stay afloat when affected by shocks?

In 2017 and 2018, 172 traders and other industry experts in central Malawi were interviewed regarding these two questions. It was easily observed that a few traders systematically control the operations and outcomes of local markets. These traders decide upon the setting of the local price and in some cases maize supply at the market. At a regional level too, real decisions on prices are driven by just a few influential persons.

The research results provide evidence that wider networks of family, friends and other associates correlate with more profitable businesses. However, insufficient evidence was obtained to support the idea that family members make one's business resilient. In fact, we found a negative association albeit not statistically significant. The evidence was also inconclusive about the effects of tribal and religious affiliation on business resilience.

What mattered for a business' resilience to shocks was the number of traders and brokers with which the trader actively interacts, and also the level of innovation by the trader in terms of whether he or she engages in value addition, replaces assets with more technologically advanced tools, and has other businesses.

Although social capital plays an important role in determining market outcomes, it is clear that the markets in our study did not reflect fairness. Efforts to facilitate fair trading and competition, therefore, should focus not only on formal business arrangements but also on local informal markets.

This is an excerpt from research published by ZEF junior researcher Henry Kankwamba: Performance, behaviour and organization of maize trading in Malawi in the Journal of Agricultural and Food Economics 7:14 (2019). More: buff.ly/2YlinvF



ZEF'S PROJECTS ON: INNOVATION, KNOWLEDGE, AND SCIENCE POLICY

PROJECT NAME	DESCRIPTION	DURATION	MAIN FUNDER	WEBSITE
German-Bolivian Partnership on biodiversity measures	Partnership between the Department of the Universidad Católica Boliviana in Cochabamba and ZEF	2014-19	DAAD	zef.de
PARI	Program of Accompanying Research for Agricultural Innovation	2017-22	BMZ	research4agrinno- vation.org/
Montpellier Malabo Panel (MaMo Panel)	Policy guidance to accelerate progress towards food and nutritional security in Africa	2017-21	IFPRI	https://www. mamopanel.org
Study on SDG2 re G7 Elmau	Study on scope and factors of success regarding agreements of G7 summit in Elmau to reduce hunger and malnourishment	2019-20	BMZ	
WABES	Supporting IPBES capacity building in West Africa	2017-22	IKI via BMU	wabes.net

MARKETS AND PUBLIC SERVICES

PROJECT NAME	DESCRIPTION	DURATION	MAIN FUNDER	WEBSITE
CIREG	Climate Information to support integrated renewable electricity generation	2018-21	ERA4CS (BMBF)	cireg.pik-potsdam. de/en
Food Price Volatility (Phase II)	Analysis and implementation of measures to reduce price volatility in national and international markets for improved food security in developing countries	2015-20	BMZ	zef.de/volatility. html

GOVERNANCE, CONFLICTS, AND NATURAL RESOURCES

PROJECT NAME	DESCRIPTION	DURATION	MAIN FUNDER	WEBSITE
CIREG	Climate Information to support integrated renewable electricity generation	2018-21	ERA4CS (BMBF)	cireg.pik-potsdam. de/en
Doctoral Studies Support Program (DSSP)	Environmental peace-building and development in Colombia	2017-20	DAAD	idea.unal.edu.co/ DSSP
Forests in the global bioeconomy	Contributing to the design of policies and measures promoting synergies between global bioeconomy development, forest ecosystem service provision and poverty alleviation at tropical forest margins in Brazil and Indonesia.	2015 -18	BMZ via BEAF	zef.de
Integrated Water Governance Support System	Improve the transboundary water governance as an essential component of the natural ecosystems governance in the Kruger and Limpopo national parks.	2017-20	BMBF	zef.de
STRIVE	Sustainable TRade and InnoVation transfer in the bio-Economy: from national strategies to Global Sustainable Development Goals	2016-21	BMBF	strive-bioecon.de
WABES	Supporting IPBES capacity building in West Africa	2017-22	IKI via BMU	wabes.net
Waterfront Metropolis Abidjan	Between everyday urbanity, spontaneous urbanisation, town planning and real estate development	2017-19	DFG	zef.de

2.6 – MOBILITY, MIGRATION, AND URBANIZATION

Mobility has many different facets, ranging from geographic, social, and economic to cognitive forms of mobility. Their complex determinants and consequences are studied as key elements for sustainable development. Mobile societies are quicker in adapting to changes but not necessarily in a beneficial and sustainable way. Migration is becoming an ever more relevant challenge, and strongly affects rural as well as urban and peri-urban societies. Within-country migration is one of the key determinants of urbanization, and growing urban and peri-urban areas with steadily increasing numbers of inhabitants are facing tremendous challenges.

In Focus:

WHY DO POOR PEOPLE MOVE WITHIN THE CITY? AN ETHNOGRAPHIC CASE STUDY ON INTRA-URBAN MOBILITY IN COTE D'IVOIRE'S METROPOLIS ABIDJAN

The research project “Waterfront Metropolis Abidjan. Between everyday urbanity, spontaneous urbanisation, town planning and real estate development” analyzes the social and political dynamics in Abidjan, which is the economic capital of the Côte d’Ivoire with more than 5 million inhabitants. The research looks into how poor residents organize themselves and navigate through residential insecurity.

The Southern geography of the city is dominated by a lagoon and the Atlantic Coast. The project’s focus is Adjahui-Coubé, a spontaneous settlement located on a central peninsula where a village of Ebrié fishermen surrounded by farms and forests slowly has grown up since the end of the 19th century.

The settlement is legally an urban village associated to the municipality of Port Bouët. Until a few years ago, when the masterplan of an eco-airport city was developed under the leadership of the District of Abidjan, the peninsula had remained a blank spot in urban planning.

Plans to construct houses on it during the 1970s were not realized. In 2011, the population grew drastically when settlers from Moussakro, a settlement along the Airport Road, were forcefully evicted and took refuge on the peninsula. The rental housing market for the poorer strata in Abidjan is tense and in short supply, exacerbated by forceful evictions and destruction of existing housing stocks. Prices for rental housing have increased, pushing people

from poor and precarious quarters in the South of the city into super-precarious living conditions in Adjahui-Coubé, where private investors started to build simple courtyards for tenants.

Adjahui-Coubé has a dense and heterogeneous population reaching the number of around 60,000 inhabitants by mid 2018. Most of them are people without financial means as well as families who lost their homes due to eviction and demolitions. Many cannot afford security deposits and rents in other neighborhoods, either. But, Adjahui-Coubé has also turned into an attractive settlement for low-paid workers from the industrial, service and transport sectors, as well as for young adults searching for housing when starting a family.



WOODEN FERRIES in Abidjan.

Opportunistic MARKET RESPONSE

Five million Abidjanais face transport challenges every day, such as long detours to cross bridges, congestion, high cost and air pollution. The mode share of public road transportation is distributed between mini buses, taxis and buses. No rapid bus transit system is in place, and the construction of an elevated train service connecting the north of Côte d'Ivoire's metropolis with the Atlantic coast is not expected to start before 2022. Development of waterways could help improve the peoples' transport woes. Boats have been a mode of public transit in Abidjan since 1974 when the Société de Transport Lagunaire introduced waterbuses across the inner city lagoon. Several private companies are competing for new concessions, yet the potential of water

transit is much higher. In the past decades, the growing demand for cheap and fast water transit has instigated private investors to establish wooden ferry lines (pinasses). The diesel-driven pinasses outnumber waterbuses in terms of offered services and passenger volumes, and are especially important to poor urbanites. After an informal settlement was established on the Adjahui peninsula between the municipalities Koumassi and Port Bouët in 2012, the demand for water transit grew steadily. Many of the new residents depend on crossing the lagoon for their commute between home and work. Eleven new ferry lines were opened by individual private investors looking for a mid-term investment opportunity for their savings. These pinasses, which mainly

employ Adjahui residents though often under precarious work conditions, offer an efficient, safe and sustainable transit system with high passenger volumes (> 54,000 travels every day). Our study within the Waterfront Metropolis Abidjan Project shows that this paratransit system with its pinasses has not gained much attention by urbanists and planners yet. The sustainability and popularity that the transit system is enjoying among its users could be improved considerably. Profits are actually large enough to reinvest proceeds into the improvement of services, such as board security, quays, and environment-friendly gears, however such investments are discouraged because contractual periods are unclear.



ZEF'S PROJECT ON MOBILITY

PROJECT NAME	DESCRIPTION	DURATION	MAIN FUNDER	WEBSITE
Waterfront Metropolis Abidjan	Between everyday urbanity, spontaneous urbanisation, town planning and real estate development	2017-19	DFG	zef.de

CAPACITY DEVELOPMENT

3

3.1 - NUMBERS AND FIGURES OF ZEF'S BIGS-DR PROGRAM 2018-2019

ZEF has
379
alumni

134
doctoral researchers from 54 countries are currently enrolled in the program

ZEF-alumni come from Latin America, Middle East and North Africa, Central Asia, Europe, U.S.A., Asia and sub-Saharan Africa



Our doctoral researchers currently conduct research in
47 countries

57%
of our current students are female

59 %

of ZEF-alumni from the Global South are now working there

74%
of our current students come from the Global South

23
doctoral theses were defended successfully at ZEF mid2018 - mid2019

3.2 - DOCTORAL GRADUATIONS MID 2018 - MID2019

Richard Kyalo, Kenya, 10.07.2019

Challenges and opportunities of using ecological and remotely sensed variables for crop pest and disease mapping.

Darius Mwingyine, Ghana, 10.07.2019

Emergent land commodification and inter-generational land relations in North-western Ghana

Rabia Chaudhry, Pakistan, 09.07.2019

An army with a country: How the Pakistan military imposes hegemony via the infrastructure and welfare sectors

Isaac Mbeche Nyang'au, Kenya, 28.05.2019

Boundary work and agricultural innovation systems: Stakeholder interaction and learning using an example of push-pull technology in Ethiopia

Till Ludwig, Germany, 09.05.2019

Consumption choices. The effects of food production, markets and preferences on diets in India

Olabisi Sakirat Badmos, Nigeria, 19.03.2019

An integrated remote sensing and urban growth model approach to curb slum formation in Lagos Megacity

Ephraim Sekyi-Annan, Ghana, 04.02.2019

Performance evaluation of reservoir-based irrigation schemes in the Upper East region of Ghana

Helen Berga Paulos, Ethiopia, 25.01.2019

The water-energy-food nexus in the Eastern Nile Basin: Trans-boundary interlinkages, climate change and scope for cooperation

Ernesto Fabián Santos García, Ecuador, 26.11.2018

A Landsat-based analysis of tropical forest dynamics in the Central Ecuadorian Amazon: patterns and causes of deforestation and reforestation

Anna Schwachula, Germany, 22.11.2018

Sustainable development in science policy-making. A discourse analysis of the German Federal Ministry of Education and Research's policies for international cooperation in sustainability research

Justice Nana Inkoom, Ghana, 20.11.2018

Spatial interaction of agricultural land uses and their impacts on ecosystem service provision at the landscape scale

Janina Kleemann, Germany, 05.11.2018

An expert-based ecosystem services assessment under land use and land cover changes and different climate scenarios in northern Ghana, West Africa

Ruchi Vangani, India, 29.10.2018

Water, sanitation and agriculture linkages: Impact on health and nutrition outcomes in peri-urban Gujarat, India

Hernaude Agossou, Benin, 12.10.2018

Performance assessment and optimization of a bamboo-drip irrigation system: A contribution to water productivity improvement in rural and peri-urban West-Africa

Varun Gaur, India, 12.10.2018

Decentralized energy in India and its synergies with water-energy-food security nexus

Gebrelibanos Gebremedhin Gebremariam, Ethiopia, 12.10.2018

Sustainable Agricultural Practices (SAPs) in northern Ghana: Impacts on welfare, environmental reliance and agricultural land expansion

Emmanuel Nshakira, Rukundo, Uganda, 11.10.2018,

Effects of community-based health insurance on child health outcomes and utilisation of preventive health services: Evidence from rural South-Western Uganda

Essa Chanie Mussa, Ethiopia, 10.10.2018

Long-term effects of childhood work on human capital formation migration decisions, and earnings in rural Ethiopia

Bagavathinathan Karan Singh, India, 27.09.2018

Essays on women and historically disadvantaged social groups, and Indian development policy

Pablo Ernesto Evia Salas, Bolivia, 26.09.2018

The effect of government transfers on poverty and inequality: Three different perspectives about decentralization and social policies in Bolivia

Andreas Mandler, Germany, 11.09.2018

Agricultural expertise and knowledge practices among individualized farm households in Tajikistan

Gerba Leta Dufera, Ethiopia, 01.09.2018

The Ethiopian agricultural extension system and its role as a "development actor": Cases from Southwestern Ethiopia

3.3 - SELECTION OF ZEF'S CAPACITY DEVELOPMENT ACTIVITIES (IN ADDITION TO BIGS-DR)

WEST AFRICA

- **WABES:** since 2017 more than 200 network participants from 20 countries
- **SPIBES:** 15 MSc students from 14 African countries
- **WESA:** 8 PhD students
- **DAAD Excellence Ghana GGCDs:** 35 PhD students, 31 alumni
- **WAC-SRT:** summer school with 39 MSc students from 6 African countries. Batch 2019: 18 MSc students
- **WASCAL-PAUWES:** 20 Msc and 20 PhD students. Summerschool in Tlemcen with 40 participants.

GERMANY

• **ZEF:** 134 PhD students from 54 countries in 47 research countries

• **Right Livelihood Campus** 5 PhDs from 5 countries; 3 workshops with 51 participants from 29 countries; 2 RLC alumni workshops (1 in India) with 24 participants from 16 countries

• **One Health:** 15 PhD students, four research countries

LATIN AMERICA

- **Colombia DSSP Bilateral Doctoral Support Program.** 14 PhD students from 3 Latin American countries.
- **Brazil: Workshop One Health** 25 participants

EAST AFRICA

• Several workshops, stakeholder workshops

• **PARI/AERC:** 15 MSc and two PhD students at Universities of Pretoria and Nairobi

SOUTH AFRICA

- **NOURICITY** workshop
- **STRIVE** Summer school enviropreneurship with 45 participants

3.4 - FURTHER PHD AND MSC PROGRAMS (IN ADDITION TO BIGS-DR)

ZEF runs in addition to its BIGS-DR program Capacity Development activities in Africa, Asia and Latin America consisting of PhD and MSc courses, summer schools, workshops, conferences, work visits to ZEF and internships.

PROJECT NAME	DESCRIPTION	DURATION	MAIN FUNDER	WEBSITE
Bilateral Doctoral Studies Support Program (DSSP)	Environmental peace-building and development in Colombia.	2017-20	DAAD	idea.unal.edu.co/DSSP
German-Ghanaian Center for Developments Studies (GGCDS)	The center is a collaboration with the Institute of Statistical Social and Economic Research (ISSER) at the University of Ghana for educating future leaders from Ghana and other African countries.	2008-2020	DAAD	zef.de
Graduate School Programs PAUWES and WASCAL	Cooperation with the Pan African University – Institute of Water and Energy Sciences (PAUWES) educates MSc and Phd students in Algeria, Niger and Burkina Faso.	2017-2018	BMBF/DAAD	zef.de
SPIBES (and WABES)	WABES fosters exchange and cooperation between IPBES and Biodiversity and Ecosystem Services Experts in West Africa.	2017-2022	IKI/BMU	zef.de
WESA	WESA works on research agenda for PAUWES with eight PhD students.	2016-2019	BMBF	zef.de
One Health and urban transformation	The 'One Health' concept adopts an integrative perspective of health, recognizing the intrinsic interconnections between human, animal and environmental health in Brazil, India, Germany and Ghana.	2016-2020	MIWF-NRW	https://www.zef.de/onehealth.html
African Economic Research Consortium (PARI-AERC)	The capacity building through research and graduate training in economics will be mainly implemented in South Africa and Kenya.	2019-2022	BMZ	http://research4agrinnovation.org/
Right Livelihood College Campus Bonn at ZEF (RLC)	The aim of the RLC Campus Bonn is to promote exchange and synergies between the Right Livelihood Foundation's laureates' work and applied interdisciplinary research and education.	2011-ongoing	Robert Bosch Foundation, DAAD	www.rlc-bonn.de

Welcome to Niamey Niger's academic boom town

Interview with Professor Adamou Rabani, Vice Chancellor for Research and Foreign Affairs of the Université Abdou Moumouni (UAM) of Niamey, Niger. (Website: uam.refer.ne)

Prof. Rabani, can you tell us something about the international collaborations your university is involved in?

Université Abdou Moumouni is the largest in Niger, with 27,000 students enrolled, and approximately 1,000 lecturers and technical staff members. We are the first address for the German Embassy in Niger regarding higher education and research. Since we started cooperating with ZEF in the context of the WASCAL project in 2013 the number of international collaborations has increased considerably. We are currently participating in five ZEF capacity development and research projects, namely WASCAL, RARSUS, WASCAL-PAUWES, WAC-SRT and CIREG. Between 2017–2019 we have been involved, as key partners, in the mobilization of around 6 million euro in grants provided by international partners to conduct research on issues related to energy, water, food security and climate change in Niger and other West-African countries, and to organize high-level training workshops. The most recent workshop session at UAM was attended by graduate students from fifteen West, Central, East and North Africa countries.

How does the university and in particular its students benefit from these kind of collaborations?

Generally speaking Nigerien and African universities receive state funds for teaching, but not for conducting research. So the whole process of how to develop a research proposal and apply for funds, which is business as usual in the global academic community, is

"These experiences enrich your academic and personal perspectives. Education brings mobility, first of all of the mind."

something we ourselves have to learn and teach one another. To do so we have to develop the right skills. This is one of the things we learn in our collaborative efforts. These collaborations also allow us to establish a long-term, research-based higher education partnership between the university and German universities and research centers.

How does the government of Niger respond to these activities undertaken at your university?

They are very interested, as our practice-oriented research fits very well into multiple aspects of the National Economic Development Plan (PDES 2017-2021), such as energy, water, ag-

riculture and food security, education, rural development, and climate change. More than 80% of Niger's population live in rural areas, and less than 1% of them have access to electricity. To handle the issue of West Africa's rural underdevelopment, the West African Center for Sustainable Rural Transition project developed by UAM and Ghanaian Universities with the support of ZEF, focuses on technological, socio-economic, socio-political, administrative and cultural aspects to sustainably transform rural areas. However, the main initiatives aim to develop the human skills and resources in West Africa, namely of students, researchers and administrative staff.

What are the career prospects of the students of the different collaboration programs at your university?

Well, we want our students to continue to contribute with their skills to national and regional development. Some of our first batch of MSc students work with national and regional agencies (water, rural electrification, energy, climatic and meteorology, etc.). Others have ideas for start-up enterprises for water and electricity production and distribution in remote areas. Some of these have received international scholarships to pursue their PhDs.

Read the full interview with Professor Adamou Rabani on zef.de

Engaging and provoking

The Summer School 2018 was very engaging and thought-provoking. It was amazing to learn about what other peers were researching on while at the same time sharpening my own research and business idea.

lasting impact

I am excited and optimistic! The Summer School developed a network of young African professionals that will have a lasting impact.

Share innovative ideas

I found the summer school to be an excellent platform to share innovative ideas around conservation, business and sustainability.

Quotes of participants

Summer School on 'enviropreneurs' in South Africa

In November 2018, forty-five academics, development practitioners and so-called enviropreneurs from Europe and southern Africa came together in the town of Howick, situated in the heart of the region Kwa-Zulu-Natal in South Africa. During the one-week summer school they discussed opportunities, challenges and examples of green and social entrepreneurship for biodiversity conservation and local development.

ZEF senior researchers Lisa Biber-Freudenberger and Jan Janosch Förster, both member of the STRIVE research project focussing on bioeconomy, organized this Summer School. The group of participants consisted of early-career researchers

and senior scientists from European and sub-Saharan countries. They shared concepts, stories and experiences of green and social entrepreneurship. In collaboration with South African partners of the Wildlands Conservation Trust, the University of Kwa-Zulu-Natal, the University of Zululand, as well as German partners of the Global Nature Fund and the Bonn Rhein-Sieg University of Applied Sciences, this networking, but also capacity building workshop was highly successful and well-received within a South African development context.

Read more about the summer school at: socialenviropreneur.wordpress.com

Perfect opportunity...

The summer school provided the perfect opportunity to meet people from a great variety of contexts, who all have similar interests, motivations and goals: contributing to the protection of the environment and to enhancement of social security.

...

... Lots of motivation

.... It was a privilege to exchange with these amazing people, on an academic as well as on a personal level! What I am taking home is a lot of motivation to continue working in this field.

4

SELECTED OUTREACH & SOCIAL MEDIA

July 09, 2019.

"Bedrohliche Vorfälle gehören zum Alltag" Interview with ZEF Alumnus Dr. Fazlullah Akhtar in: *Forsch*, July 2019.

July 08, 2019.

A boost for regional sustainable development: West African Centre for Sustainable Rural Transformation launched in Ghana with more than 100 high-ranking participants, students and researchers from six West African countries and Germany.

July 3, 2019.

Right Livelihood College Campus Bonn organized international workshop with public event at the VHS in Bonn on "Sustainable development vs. local livelihoods. 'Alternative Nobel Prize' talk on alternative development pathways in Africa.

June 25, 2019.

Launch Event of the Innovation Campus Bonn (ICB) by the Bonn Alliance for Sustainability Research in Bonn.

June 05, 2019.

ZEF director Joachim von Braun participated in a hearing of the German federal parliamentary committee on

climate change and hunger on the topic of "World Food Supply and Climate Change".

May 22, 2019.

ZEF alumna Anna Schwachula won the Campus Prize of the University of Bremen for sustainability research with her dissertation on German science policy for research cooperation with developing countries and emerging economies in sustainability research.

May 20, 2019.

"Für die Kids – Landwirtschaftliches Wachstum und Ernährungssicherheit in Afrika fördern", interview with ZEF senior researcher Dr. Oliver Kirui.

May 13, 2019.

Amazonian and Cerrado Biomes in danger. Soy plantations threaten larger areas of rainforest and its habitats with the improvement of infrastructure, study shows - MapBiomass awards research of ZEF-scientists Gabriel Frey and Jan Börner.

May 10, 2019.

The Global Biodiversity Summit An urgent call to action. More than 800 scientists and policy makers from

all across the globe met at the 7th plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) in Paris from April 28 to May 4, 2019 hosted by UNESCO.

March 28, 2019.

"We want the Bonn Alliance to be an additional opportunity". Interview with Jakob Rhyner, Scientific Director of the Bonn Alliance for Sustainability Research / Innovation Campus Bonn.

December 5, 2018.

ZEF-researcher Jan Börner gave his public "inauguration" talk during the Dies Academicus of Bonn University. This is the final official step of Professorship at a German University. Jan Börner is now holding a professorship at the Faculty of Agriculture of Bonn University.

December 3, 2018.

200 years of Bonn University: ZEF organizes public panel discussion on the topic of migration and migration research: International scholars studying in Bonn talk about migration and migration research.



More:

zef.de/media-center.html



KEEP IN TOUCH WITH ZEF THROUGH SOCIAL MEDIA AND JOIN US!



ZEFUNIBONN

Stay up-to-date about our latest and upcoming events and institute related news and pictures on our [Facebook](#) page. Some events are recorded live, where you can join us.



ZEFBONN

Start or keep [tweeting](#) @ZEFbonn and follow us to see where we are and what we're doing.



ZEFBONN

If you missed an event you can head over to our [YouTube page](#) to re-watch talks and lectures.

ZEF's Alumni Network

All alumni and former researchers are listed under the staff section on the ZEF website. More information and contact: docp.zef@uni-bonn.de



COMPANY/ZEFBONN

Connect with us via [LinkedIn](#). Here, you have the opportunity to network with other researchers connected to ZEF.



ZEFBONN

Our [Instagram](#) account gives you a snapshot of working and studying at ZEF. Share with us by tagging #ZEF!



BLOG.ZEF.DE

Read the ZEF blog, a researcher-run space where individual junior and senior researchers share stories about their work, both in and out of the field.

BUDGET 2018/2019

ZEF'S FUNDING PARTNERS

5

Indirect Support*)	in Euro	in %
German Academic Exchange Service (DAAD) / German Federal Ministry of Economic Cooperation and Development (BMZ)	616,564	63.3
Own funds of students	158,500	16.3
DAAD Regional Program / German Foreign Office (AA)	43,050	4.4
SENACYT, Panama	37,869	3.9
Schlumberger Stichting Fund	34,530	3.6
Katholischer Akademischer Ausländer-Dienst (KAAD)	34,300	3.5
HEC Pakistan	11,450	1.2
Sudan Ministry of Higher Education and Scientific Research Scholarship	11,000	1.1
Thünen Institute and the German Ministry of Food and Agriculture (BMEL)	11,000	1.1
ProEcoAfrica/OFSA, Switzerland	8,100	0.8
Nnamdi Azikiwe University, Nigeria	7,700	0.8
Total	974,063	100

External Funds**) Projects	in Euro	in %
German Federal Ministry of Economic Cooperation and Development (BMZ)	3,296,679	38.6
<ul style="list-style-type: none"> • BMZ 	PARI Volatility Study on SDG2 re G7 Elmau	
<ul style="list-style-type: none"> • BMZ/GIZ to International Research Centers 		
International Centre of Insect Physiology and Ecology (<i>icipe</i>)	Ento NUTRI	
International Food Policy Research Institute (IFPRI)	Montpellier Malabo Panel Water-Energy-Food Nexus	
International Water Management Institute (IWMI)	Soil Rehabilitation	
German Federal Ministry of Education and Research (BMBF) via		1,517,445 17.8
<ul style="list-style-type: none"> • German Aerospace Center (DLR) 	CIREG Desertification NOURICITY PRODIGY RARSUS RARSUS-SEMALI STRIVE WASCAL-PAUWES WESA	
<ul style="list-style-type: none"> • Forschungszentrum Jülich (FZJ) 	STRIVE	
<ul style="list-style-type: none"> • Karlsruher Institut für Technologie (PTKA-WTE) 	GROW InoCottonGROW	

External Funds - cont.	Projects	in Euro	in %
German Academic Exchange Service (DAAD)		1,243,849	14.6
• DAAD	International Doctoral Studies Program		
• DAAD / BMBF	RARSUS-DAAD		
• DAAD / BMZ	Bilateral SDG-Graduate School Greening Environmental Impact Assessments in Bolivia RLC Alumni Program		
• DAAD / BMZ/GIZ/ African Union	Cooperation Water-Energy (PAUWES-ZEF-UNU-ITT, II)		
• DAAD / AA	DAAD/ZEF Centre of Excellence, Ghana RLC Campus		
North Rhine-Westphalia / MIWF-NRW	One Health and Urban Transformation	630,000	7.4
German Federal Ministry of Food and Agriculture (BMEL) via		626,779	7.3
• Federal Office for Agriculture and Food (BLE)	PROCINUT		
• Fachagentur Nachwachsende Rohstoffe (FNR)	FSS-ZEF		
German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)	IKI: IPBES Support, West Africa	552,669	6.5
German Research Foundation (DFG)	SFB/Transregio 228 Virus Waterfront Metropolis	311,192	3.6
Third-Party Project Funds available after Project End	Third-Party Project Funds available after Project End	102,743	1.2
Robert Bosch Foundation	RLC Network	72,860	0.9
Fiat Panis Foundation	Dr. Hermann Eiselen Doctoral Program	66,765	0.8
Volkswagen Foundation	Research Funds Senior Fellowship Summer School KwaZlu-Natal	50,550	0.6
Alexander-von-Humboldt Foundation	Research Funds	23,052	0.3
Stockholm Environment Institute (SEI)	Research Funds	20,721	0.2
European Union via		12,706	0.1
• Welthungerhilfe (WHH)	Fostering Smallholder Agriculture in Sierra Leone		
Foundation Sparkasse KölnBonn	Research Funds	5,000	0.1
Total		8,533,010	100

Core Funds***)	in Euro	in %
Personnel Costs	1,401,716	78.5
Administrative Costs	283,530	15.9
BMBF & DFG Overhead Shares****)	99,380	5.6
Total	1,784,626	100
Indirect Support & External Funds & Core Funds	11,291,699 Euro	

*) Scholarships directly funded by the donors.

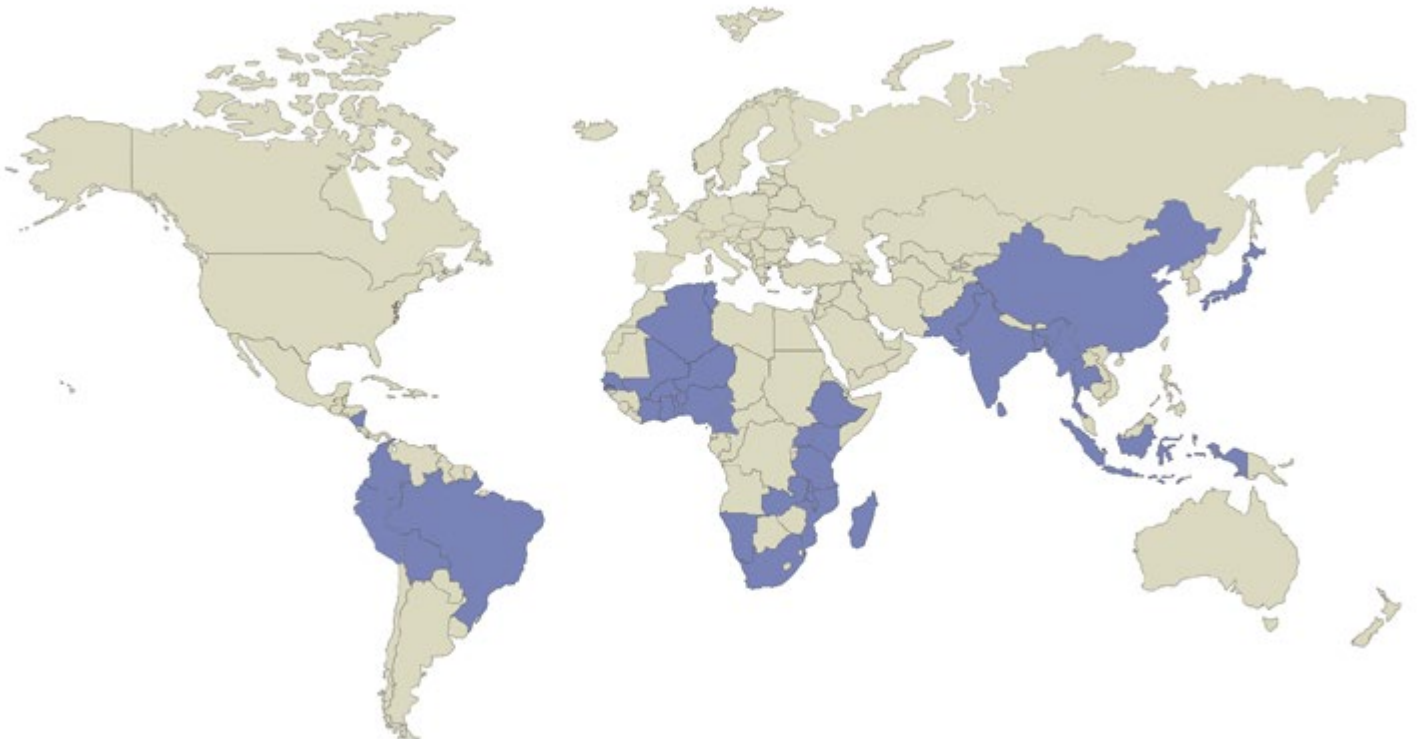
**) Third-party projects of ZEF. Funds budgeted i.a.w. annual financing plans.

***) University of Bonn, State of North Rhine-Westphalia funds for ZEF.

****) Partial BMBF & DFG Overhead Shares.

6

ZEF'S MAIN RESEARCH COUNTRIES



ABBREVIATIONS*



BEAF Advisory Service on Agricultural Research for Development

BMBF German Federal Ministry of Education and Research

BMEL German Federal Ministry of Food and Agriculture

BMU German Federal Ministry of the Environment, Nature Conservation, and Nuclear Safety

BMZ German Federal Ministry for Economic Cooperation and Development

BIGS-DR Bonn International Graduate School of Development Research

CIFOR Center for International Forestry Research

DAAD German Academic Exchange Service

DFG Deutsche Forschungsgemeinschaft

DLR German Aerospace Center

EC H2020 European Commission Horizon 2020

ERA-Net Networking the European Research Area

ECOWAS Economic Commission of West African States

ERA4CS European Research Area for Climate Services

EU European Union

FARA Forum for Agricultural Research in Africa

FONAP Forum for Sustainable Palm Oil

Globe BMBF'S Global Food Security Initiative

GIZ German Federal Enterprise for International Cooperation

icipe International Centre of Insect Physiology

IDEA Institute for Environmental Studies of National University Bogotá

IFPRI International Food Policy Research Institute

IITA International Institute of Tropical Agriculture

IKI International Climate Initiative of the German Federal Ministry of the Environment, Nature Conservation, and Nuclear Safety

IPADS International Program in Agricultural Development Studies, University of Tokyo, Japan

IPBES Intergovernmental Platform for Biodiversity

ISSER Institute of statistical, social and economic research at the University of Ghana

ITT Institute for Technology and Resource Management in the Tropics and Subtropics

IWMI International Water Management Institute

LEAP Agri A Long-term EU and Africa research and innovation Partnership on food and nutrition security and sustainable Agriculture

MIWF-NRW Ministry for Innovation, Science and Research of the State of North Rhine-Westphalia

OECD Organization for Economic Cooperation and Development

PARI Program of Accompanying Research for Agricultural Innovation

PAUWES Pan African University - Institute of Water and Energy Sciences

SDGs Sustainable Development Goals

UAM Abdou Moumouni University, Niger

UDS University of Development Studies of Tamale, Ghana

UN United Nations

UNU-EHS United Nations University - Institute for Environmental and Human Security

UNAL National University Bogotá

VW Foundation Volkswagen Foundation

WASCAL West African Science Service Center on Climate Change and Adapted Land Use

WHH Welthungerhilfe

WWF World Wildlife Fund

*) in alphabetical order.

UNIVERSITÄT **BONN**

