



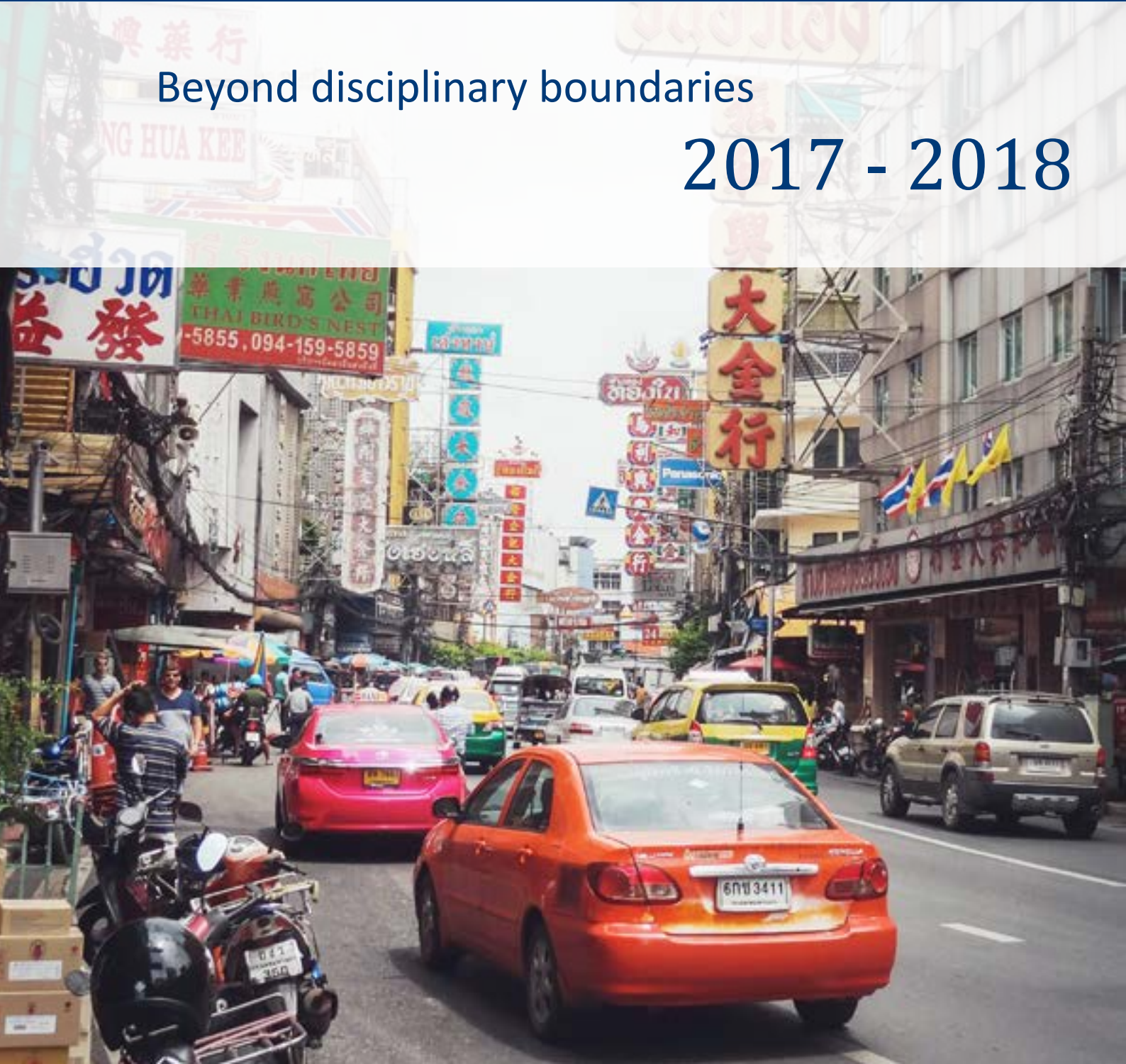
zef

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Annual Report

Beyond disciplinary boundaries

2017 - 2018



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You can find an overview of publications by ZEF researchers at zef.de/publications/

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INTRODUCTION BY ZEF'S DIRECTORS

[Christian Borgemeister, Joachim von Braun,
Eva Youkhana]

ZEF looks back on another productive and fruitful year. In 2018, Bonn University celebrated its 200th anniversary. On this occasion ZEF was part of a long series of events such as the Science Night of Bonn University in May and the Open Day at Villa Hammerschmidt, the official residence of Federal Germany's President in Bonn, in June. President Frank-Walter Steinmeier paid a visit to ZEF's "World of Insects" tent, overall more than 20,000 visitors came to the event. In the fall, ZEF co-organized a Youth Townhall Meeting with the Chairman of the Alliance for a Green Revolution in Africa (AGRA), the African Entrepreneur Strive Masiyiwa in Berlin, which was attended by around 200 people, a quarter of them young African students from Bonn. An impressive number of 3.3 million people watched the event via livestream or afterwards on youtube. You can read about these and other activities in detail in this report.

ZEF stabilized its financial and research basis by acquiring new projects such as "Processing of Edible Insects for Improved Nutrition" (ProciNut) about utilizing nutritional and economic potentials of edible insects in Myanmar and Madagascar, funded by the German Federal Ministry of Food and Nutrition; and the "Partnerships for healthy diets and nutrition in urban African food systems: evidence and strategies" (NOURICITY). DAAD gave a financial boost for the Right Livelihood Campus based



at ZEF to enhance its alumni program, in addition to DAAD funds for a series of Summer schools, alumni meetings and workshops in the context of capacity building programs in Ghana and Colombia.

ZEF's international doctoral program, BIGS-DR, remains at the core of our capacity building efforts and we are proud of another 21 new graduates in 2018 who are eager to contribute to sustainable solutions for the world's challenges.

One of the reasons for ZEF's considerable scientific output are its strong networks and the commitment of its International Advisory Board, directors, junior and senior researchers, its alumni, senior fellows and its various international and national partners.

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 the 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.

MORE INTER- AND TRANSDISCIPLINARY RESEARCH NEEDED IN AGROECOLOGY

By Lisa Biber-Freudenberger, Cory Whitney and Manfred Denich

[This article was published in *Rural21*, Vol 52 2/2018]

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Agroecology embraces a collection of different disciplinary fields, ranging from agriculture and ecology to political theory. A stronger recognition of agroecology in agricultural research, which often has a strong production focus, could help to achieve sustainable development if more holistic and transdisciplinary research approaches are adopted.

According to UN projections, the current population of around 7.6 billion people is expected to reach nearly ten billion by 2050. The latest assessment on land degradation by the Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES) forecasts a reduction of global crop yields by up to 50 per cent in different regions in Central and South America, sub-Saharan Africa and Asia by that time, mostly due to land degradation and climate change. Agroecology will play a major role in meeting the challenge to nourish the human population, taking into consideration the need for healthy functional ecosystems as a prerequisite for sustainable livelihoods. This is reflected by the increasing relevance of agroecological issues in current political initiatives such as IPBES and the SDGs (Sustainable Development Goals). Many of the SDGs can only be achieved if food and feed are produced sustainably for the world's growing population. This however requires research to expand the often narrow concepts of agricultural systems. It calls for a more holistic

view of the overall socio-ecological systems, the interconnectedness of their components, and the relevance of nature's contribution to people for sustainable development

In this context, agroecological research provides a framework to assess concepts and strategies such as the water-energy-food nexus, the sustainability of national and international bioeconomies and the potential of alternative agricultural practices (such as organic farming) to nourish the world's growing population. Moreover, the field helps to identify favourable development pathways by analysing and identifying trade-offs between food production and biodiversity conservation, between local livelihoods and global consumer interests and between short-term economic gain and long-term natural risk management. Assessments on pollination and land degradation offer examples of the need for such research capacity. In particular, the social, economic, and ecological changes in developing countries require research that considers problems from different scientific and cultural perspectives. Therefore, collaboration among diverse disciplines and actors is crucial to bringing together multi-faceted knowledge, approaches, and methods in agroecology for i) reliable estimations of developmental changes, ii) realistic assessments of the adoptability of research-based innovations, and iii) practice-oriented recommendations for rural development.

Understanding agroecological systems

Despite recent advances, research gaps are still looming that hinder our understanding of agroecological systems and functions. The complexity and diversity of agroecological systems, together with the uncertainty of determining the benefits of ecosystem functioning and services for human development, are major challenges in agroecology research. For example, the suitability of many agroecological interventions for small farmers in Africa is not fully understood. The applicability of ecological management strategies for the control of invasive species, diseases and pests such as the fall armyworm, or complementary irrigation to adapt to changing climatic conditions, such as dry spells and shifts in the duration and timing of the rainy season, are just two examples of pressing research topics. Furthermore, a heated discussion is currently taking place on the overall sustainability benefits of different agricultural production systems such as organic, low external input supply, mixed or intercropped, conservation or conventional farming practices. Better methods to evaluate total farm productivity, integrate external effects and evaluate the non-commercial ecosystems services in agriculture are desperately needed. Diverse inter- and transdisciplinary approaches are required for understanding the trade-offs between agricultural productivity and

biodiversity conservation in extensively and intensively managed agroecological systems and for consideration in land use decision-making. These can be applied in the processes of identifying research agendas, developing applications of research outputs and implementation strategies. Such approaches offer a more holistic understanding of system functions and processes, and may help to develop pathways to implement sustainable solutions. The One Health concept, for instance, integrates environmental with animal and human wellbeing to address complex health issues in agroeco-systems. The control of zoonoses (diseases that can be transmitted between animals and humans) or the mitigation of mycotoxins (toxic substances produced by fungi colonising crops) with agroecological interventions are examples of the potential benefits of inter- and transdisciplinary One Health approaches.

Integration of traditional knowledge is key

Holistic approaches in agroecology require the incorporation of farmers' knowledge and experience. Their knowledge often reflects the time-tested experience of rural communities. Incorporating this knowledge into the research process sustains scientific efforts by providing a locally embedded broader view on agroecology. From the perspective of agroecological research and practice, the engagement with rural communities in the research process helps all actors to define their role in working together to achieve practical solutions. It facilitates trust between

scientists, policy-makers and practitioners. Farmers are considered partners in research rather than merely sources of information, objects to be researched, or adopters of technologies. Their knowledge can be used to identify and address challenges in agroecological systems so that outputs are relevant and adoptable. They also guide future research directions by determining appropriate research agendas and offering critical feedback on scientific solutions.

Implementation research to accompany practical application

Much research-based agroecological knowledge has already been generated. This includes innovations such as best practices for soil management or internalising the economic value of pollination services. Yet in most cases, these innovations find their way into agricultural practice either very slowly or not at all. This is because research-based innovations and related interventions often fail to consider the traditional knowledge and practices of farmers. As a consequence, adoption of agricultural innovations can take several years (e.g. new varieties, transport facilities) or even decades (e.g. irrigation facilities). Implementation research is transdisciplinary in nature and can be applied to ensure the uptake of relevant research outputs. It aims to understand barriers and develop respective solutions for putting research findings into practice and should be done together with the stakeholders that will make use of the innovations. Considering the importance of women as well as demographic trends in many rural areas of

developing regions, implementation research must be gender-sensitive and include the rural youth. It should involve researchers from a diversity of fields such as agronomists, social scientists, economists, psychologists, education researchers, social anthropologists and communication experts, among others. Besides researchers, stakeholders to be included are farmers, extension workers, local and national authorities, agricultural and trading companies, banks, wholesalers, retailers and consumers. Implementation research practices have broad applications in agroecology. For example, the practices are indispensable for connecting the discovery and proof-of-concept phases, on the one hand, and the piloting and up-scaling phases, on the other, within the "Research-for-Development Continuum" of the CGIAR system

North-South-cooperation

Agroecological problems are complex and require the engagement of all stakeholders to define meaningful research questions for local socio-economic and ecological contexts. Determining who defines and prioritises agroecological research questions is highly relevant for North-South cooperation and for achieving development aims. Research that is demand-driven ensures the commitment of all partners and puts collaborators on equal footing. Intercultural competence is required to facilitate joint problem identification and priority setting so that realistic and applied research agendas are developed. In practical terms, this requires appropriate funding and longer timelines so that exploratory field visits and stakeholder meetings can be conducted to define meaningful research questions and to align them with farmers' priorities. Furthermore, research findings should be shared in venues beyond scientific publications so that they are accessible to policy-makers and practitioners. At the end of the research project, additional time, funding and continued commitment from all partners is necessary to facilitate the implementation of research outputs through science-policy, science-practice and policy-practice processes.



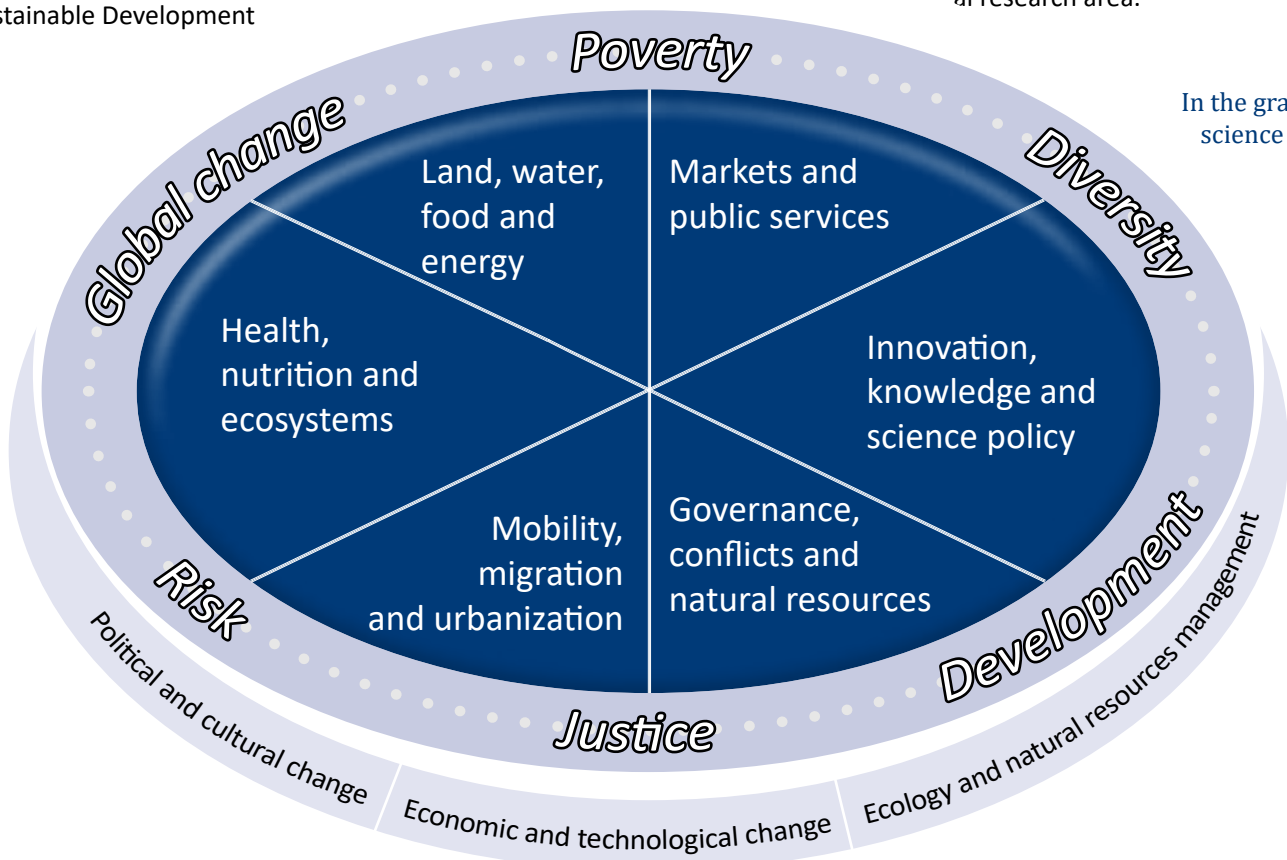
RESEARCH AGENDA 3

ZEF's work is dedicated to development research in its different and interlinked components. The Center's core research areas are based on the disciplinary strengths of our three departments, as well as on our interdisciplinary expertise. In addition, we 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 a view to their technical, political and societal implementation.

ZEF's six core research areas take the Sustainable Development

Goals into account which are succeeding the 2000-2015 Millennium Development Goals. In this regard, the six core research areas ensure the full thematic integration of ZEF's science program and contribute in a sustainable way to the Center's global research and development objectives which focus on global change, poverty reduction, justice, maintaining diversity, and risk management. ZEF's development objectives are to be implemented via inter- and transdisciplinary research, emphasizing gender issues.

The manifold aspects of global change such as continued human population growth, climate change and geopolitical developments build an overarching frame under which the research agenda has been developed. As such, each of the six core research areas relates to the overall sustainable development goals, while accentuating a specific bundle of topics on which a particular focus is set. All areas are closely interlinked and sometimes overlap thematically, also allowing for the continuous amplification of thematic arrangements beyond the given frame of the individual research area.



In the graph: ZEF's science program.

3.1 INNOVATION KNOWLEDGE SCIENCE POLICY

Program of Accompanying Research for Agricultural Innovation (PARI)

PARI brings together partners from Africa, India and Germany to contribute to sustainable agricultural growth and food and nutrition security in Africa and India. The PARI project offers independent scientific advice to the German government's "One World, No Hunger"-Initiative (SEWOH). The latter is one of the most significant initiatives to improve food and nutrition security in Africa. It does so by stimulating the generation and implementation of innovations in agriculture and the food sector. Among other activities, SEWOH seeks to achieve its objectives by establishing Green Innovation Centers in Africa and India. Countries covered by PARI include Benin, Burkina Faso, Cameroon, Ethiopia, Ghana, Kenya, Mali, Malawi, Nigeria, Togo, Tunisia, Zambia and India.

Research activities

1. Innovation research with future-oriented impact analyses

- The modelling team further extended and applied a crop model to assess the impact of selected innovation scenarios on maize yields in Ethiopia, Ghana, Kenya, Malawi and Burkina Faso. In addition, an Africa-wide crop modelling exercise evaluated the yield impacts of innovations in maize cultivation for specific countries and across the continent.
- The GIS-based eAtlas mapping tool was updated with new enhanced features. Rural typologies to identify investment opportunities and

Sustainable agricultural growth, food and nutrition security in Africa and India

gaps at the subnational level were finalized for eight countries and made accessible via the eAtlas.

- The dossiers that provide in-depth information about the innovation environment in the 12 African PARI partner countries were updated.
- Cross-cutting thematic research focused, inter alia, on smallholder mechanization, skill development, seed systems, nutrition and employment.

2. Identifying and stimulating technological and institutional innovations

- The PARI Agricultural Innovation Database was expanded with innovations from the national partners in Ethiopia and Kenya.
- Farmer innovation contests were implemented in Cameroon and Mali. In addition, a study reviewed the experiences and outcomes of the contests implemented in 2016.
- A PARI study documents and compares strategies for scaling agricultural innovations in Africa. Various studies also focused on innovations and investment opportunities in specific value chains in Africa, with a focus on value chains supported by the Green Innovation Centers. In addition, a study tour of African researchers for PARI's partner organizations to India sought to foster Indian-African knowledge exchanges on promising innovations.

3. Engaging with food and agriculture policy making to enhance approaches for innovation that improve food and nutrition security

Partners in the PARI consortium organized and participated in several events to engage key stakeholders, including national policy workshops organized by PARI in Ghana and Ethiopia, as well as major African, German and international events. Outreach activities were supported by several Information and Communication Technology (ICT) tools and publications.

Events

October 22-29, 2017: Study tour of African research to visit developers and users of agricultural technologies in India.

February 7-9, 2018: PARI National Policy Roundtable on Agricultural Innovation and PARI Annual Research and Planning Meeting, Cotonou, Benin.

July 11, 2018: PARI National Policy Roundtable on Agricultural Innovation, Lilongwe, Malawi.

Publications

Tambo, J.A. and Mockshell, J. (2018) Differential Impacts of Conservation Agriculture Technology Options on Household Income in Sub-Saharan Africa, *Ecological Economics*, Volume 151, September 2018, Pages 95–105.

Rezaei, E. E., Siebert, Hüging, H. and S., Ewert, F. (2018) Climate Change Effect on Wheat Phenology Depends on Cultivar Change. *Nature Scientific Reports*, 8:4891, DOI: 10.1038/s41598-018-23101-2

Rezaei, E.E. (2018) Quantifying the response of wheat yields to heat stress: The role of the experimental setup, *Field Crops Research*, 217: 93–103.

Tambo, J.A. and Wünscher, T. (2018) Building farmers' capacity for innovation generation: Insights from rural Ghana, *Renewable Agriculture and Food Systems* 33(2): 116-130.

Baumüller, H. (2018) The Little We Know: An Exploratory Literature Review on the Utility of Mobile Phone-Enabled Services for Smallholder Farmers, *Journal of International Development* 30(1): 134–154.

Boansi, D., Tambo, J.A. and Müller, M. (2017) Weather and Climate Extremes 16: 1-13.

Main funder

Federal Ministry for Economic Cooperation and Development (BMZ)

Main cooperation partners

Forum for Agricultural Research in Africa (FARA) and its national partners, the African Growth and Development Policy Modeling Consortium (AGRODEP) facilitated by the International Food Policy Research Institute (IFPRI, Africa Office), University of Hohenheim, Technical University Munich, and research collaborators in India.

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German-Bolivian Partnership for integrating biodiversity measures in environmental impact assessments

Biodiversity Research in Bolivia

The project is a cooperation between the Universidad Católica Boliviana in Cochabamba, and ZEF. The aim of the project is to strengthen biodiversity conservation in Bolivia as part of environmental impact assessments involving environmental engineers, nature conservation practitioners and policy makers.

Research activities

- Development of an indicator set and specific instruments for evaluation of biodiversity, adapted to local conditions.
- Preparation of a book on environmental impact assessment in Bolivia and ways to better integrate biodiversity measures.
- Elaboration of a Mini Symposium entitled: "Environmental assessment and biodiversity within the framework of Bolivia's environmental planning and management".
- First design of the joint university module in environmental impact assessments techniques.
- Outcomes and presentations of investigations carried out in Bolivia:

(1) Relational analysis between Environmental Impact Assessment and Strategic Environmental Assessment, and (2) Situational and relational analysis of Juridical-Political Systems and their effects on Environmental Management.

- Presentation of advances on the publication "Guide for the inclusion of critical ecological factors, biodiversity and environmental analysis units in Environmental Impact Assessment and Strategic Environmental Assessment procedures".

Furthermore, three workshops were held giving opportunities to the participants to discuss and evaluate results and further steps to accomplish the project objectives: From July 17-21, 2017 in Bolivia; September 25-29, 2017 in Bonn; July 10-14, 2018 in Bonn.

During the workshops, the relevant outputs of the project were developed, by excursions in order to give practical examples of biodiversity conservation and the different methods for the environmental impact assessments implementation in both countries.

Publications

Rodríguez Osuna, V., Navarro Sánchez G., Sommer J.H., Biber-Freudenberger, L. (2017): Towards the Integration of the Biodiversity in the Evaluation of Environmental Impact in Bolivia. Self-published book for stakeholders and students in Bolivia.

Doctoral researchers

Vanessa Gandarillas: "Developing biodiversity indicators for impact assessment – The case of hydropower in the Bolivian Amazon" (ongoing).

Candan Ergeneman: "Biodiversity offsetting framework for Bolivian EIAs" (ongoing).

Ericka Lafuente: "Proposal of strategies to determine and quantify compensation measures for biodiversity loss in Bolivia's environmental units" (ongoing).

Main funder

German Academic Exchange Service (DAAD)

Main cooperation partner

Universidad Católica Boliviana



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LAND, WATER, FOOD AND ENERGY

3.2

Supporting the West African Contribution to the Intergovernmental Platform on Biodiversity and Ecosystem Services

WABES

The West African Contribution to the Intergovernmental Platform on Biodiversity and Ecosystem Services WABES makes use of the experience of its international partners in (a) bringing together interdisciplinary expertise in a science-based context, (b) facilitating West African expert networks and interfaces, (c) implementing graduate programs in West Africa, and (d) developing and disseminating tools and approaches to support the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) work programme.

Research activities

The overarching goal is to connect Biodiversity and Ecosystem Service experts from West African universities, research institutions, and existing science-policy interfaces. Annually conducted workshops will act as exchange platforms and as distribution hubs for IPBES developments, supplemented by discussion groups to connect experts and policy makers across West Africa and beyond. Complementarily, a Master of Science program on Biodiversity and Ecosystem Service assessments is being established in Abidjan, Côte d'Ivoire, addressing participants from all 15 West African ECOWAS countries. Altogether, the framework acts as pioneer for strengthening the sub-regional expert pool to support and disseminate assessments within the scope of IPBES.



Events

- First West African Expert Workshop in Abidjan, Côte d'Ivoire, Nov. 28 – Dec. 3, 2017 with 77 participants from 20 countries. Goals: (a) Give opportunities to experts in the region to exchange information on IPBES-relevant topics and to be informed about IPBES activities and its developments; (b) Establish or strengthen connection between West African Biodiversity and Ecosystem Service Experts in the context of IPBES; (c) Exchange about the role and relevance of Indigenous Local Knowledge (ILK) and other knowledge available in the region; (d) Present the WABES project and launch officially its activities.
- Beginning of 2018, the Master of Science program “Managing the Science-Policy Interface on Biodiver-

sity and Ecosystem Services for sustainable development in West Africa (SPIBES)” was launched by WABES. Concept: 2-year interdisciplinary course designed to provide students with broad, high-quality understanding, knowledge and skills needed to facilitate science-policy interfaces such as IPBES, and achieve sustainable development goals in West Africa. SPIBES is dedicated to people interested in sustainable biodiversity and ecosystem services management through science-based policy and decision-making. The master degree is issued by University Félix Houphouët, Abidjan, Cote d'Ivoire in with international key players in Biodiversity and Ecosystem Services such as ZEF and others (see cooperation partners).

- From June 19-22, 2018, the 2nd regional workshop of the West African Biodiversity and Ecosystem Services project was held under the theme "Uptake of the Africa Assessment: Regional and National views from the West African experts Network" at University of Ghana, Legon (Accra, Ghana). There were 66 participants from 20 countries including representatives from IPBES and its Technical Support Unit for Capacity Building.

Doctoral researchers

Jasmin Ziemacki: Bridging the gap between science, policy and demand: Using IPBES policy support tools and methodologies on national level to identify feasible reforestation scenarios for Côte d'Ivoire (ongoing).

Main funder

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

Main cooperation partners

University of Félix Houphouët-Boigny, Abidjan, in Côte d'Ivoire.

Helmholtz-Centre for Environmental Research GmbH

UN Environment World Conservation Monitoring Centre

West African Science Service Centre on Climate Change and Adapted Land Use

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The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services IPBES: Home for science policy

IPBES is a young science-policy interface platform offering courses and trainings to prepare interested experts for participation in working groups and/or participation in IPBES plenary sessions.

This applies to structural issues (e.g., the role of the IPBES bodies, coordination processes, rules and procedures as well as the possibilities of national interventions) as well as content-related issues (thematic and methodological assessments, integration of indigenous and local knowledge, etc.).

Training and capacity building for participating in IPBES currently exist almost exclusively for industrialized countries and to a small extent through the IPBES's own Fellowship program open to the international community.

Initiatives targeting exclusively experts from the UN-region Africa, especially West- and Sub-Saharan Africa have been missing so far.

WABES strives for a high multiplication potential by linking West African universities, experts and international institutions and bridging the gap between basic and applied research, between different disciplines through interdisciplinary knowledge and by targeting at the science-policy interface.

Lessons learned will be processed in an easily replicable way for adaptation of similar participatory planning, knowledge management and capacity building activities of the partners and other institutions.



Improving food security in Africa by harnessing productivity and efficiency gains in the biomass-producing, processing and trading system

BiomassWeb and BiomassNet

BiomassWeb has the overall goal to improve food security in Africa through harnessing productivity and efficiency gains in the whole biomass-producing, processing and trading system.

Research activities

After five successful years of interdisciplinary research and cooperation, the researchers from the BiomassWeb project focused in 2017/2018 on writing, publishing and outreach activities to make their results available to the public. The first of BiomassWeb's 21 doctoral students successfully defended their theses, while their fellows are in the final stages of writing.

To support young researchers beyond their doctoral degree and to offer opportunities for early career scientists from Africa, BiomassWeb created the Young Post-Doc Program (YPDP): The aim of YPDP is to enable young African scientists to work with BiomassWeb to gain specific expertise and establish themselves as experts for biomass-related topics. Five young African scientists joined BiomassWeb in July 2017 and finished the program in June 2018. They were based at the University of Ibadan, Nigeria, the Forum for Agricultural Research (FARA), in Ghana, and at ZEF.

Events

Presentations, Film and Exposition at the GlobE Status Seminar

As part of the GlobE (Global Food Security) program of BMBF, the BiomassWeb team participated together with the other five projects of the program in the GlobE Status Seminar 2017. The project members presented their research results in Berlin, Germany, on October 16-17. Besides oral and poster presentations, exhibits were showcased at the GlobExpo exposition, and a short film about the project was screened.

Launch of the first Pan-African expert network on food and non-food biomass

African and German researchers launched BiomassNet - the first Pan-African expert network for food and non-food biomass in Bonn, Germany, in July 2017, and in Accra, Ghana, in December 2017. The network aims at ensuring that food security and environmental sustainability are not compromised in the development of new biomass uses. It will thus help to strengthen the emerging African bio-economies. The core of the network is the interactive internet portal www.biomassnet.org. Both events were well received, including by representatives of several German Federal Ministries and the Ghanaian Ministry of Food and

Agriculture. Further participants represented Ghanaian, German, Ethiopian, and Nigerian institutions including International Institute of Tropical Agriculture IITA, the International Centre of Insect Physiology and Ecology icipe, Gratis Foundation, Women in Agriculture Development of the Ministry of Food and Agriculture in Ghana, the Council for Scientific and Industrial Research- Food Research Institute, the International Network for Bamboo and Rattan, University of Ibadan, Federal University of Technology Akure, YOM Institute of Economic Development, and other national and international entities.

BiomassWeb Science-Policy Dialogue

On December 8, 2017, the BiomassWeb project held a Science-Policy Dialogue at the Forum for Agricultural Research in Africa (FARA) in Accra, Ghana. The aim of the workshop was to discuss research findings as well as developed technologies and innovations on food and non-food biomass with stakeholders from policy and practice and to obtain their feedback. This initiative is part of the BiomassWeb project's Follow the Innovation Work Package, led by ZEF senior researcher Girma Kelboro Mensuro, to bridge the gap between science and policy in order to translate scientific findings into practical solutions for food and non-food biomass.

Doctoral researchers

Getachew Legese Feye: Family Farming and Food Insecurity in Ethiopia: The Role of Risk Perceptions of Family Farmers in Maize Biomass-Based Value Webs in Jimma area (finalized).

Omarsherif Mohammed Jemal: The role of local agroforestry practices for enhancing food and nutrition security of small-holding farming households: The case of Yayu area, south-western Ethiopia (finalized).



Marcos Jimenez: Temporal Dynamics of Biomass Provision from Agricultural and Agro-Forest Land Use Types at Landscape Scale (ongoing).

Francis Mwambo: Energy Efficiency Analysis of Biomass Production. Considering African land use schemes, human labor and draft animals (ongoing).

Isaac Mbeche Nyang'au: Boundary Work and Agricultural Innovation Systems: Developing a Conceptual and Methodological Framework for Science-Practice Interaction and Knowledge Generation using an example of Push-pull Technology in Ethiopia (ongoing).

Daniel Akoto-Sarfo: Bamboo agroforestry for household energy and food security in Ghana: An exploratory study (ongoing).

Gerba Leta Dufera: The Ethiopian Agricultural Extension System and its role as a "Development Actor": the case of Bako and Yem Woredas, South-western Ethiopia (ongoing).

Publications

Feye, G.L., Van Assche, K., Stellmacher, T., Teklewold, H., and G. Kelboro (2018): Land for food or power? Risk governance of dams and family farms in Southwest Ethiopia. *Land Use Policy* 75: 50-59.

Jemal, O.; Callo-Concha, D.; van Noordwijk, M. (2018): Local Agroforestry Practices for Food and Nutrition Security of Smallholder Farm Households in Southwestern Ethiopia. *Sustainability* 10: 2722.

Leta, G., Kelboro, G., Stellmacher, T., Van Assche, K., and A.-K. Hornidge (2018): Nikinake: the mobilization of labour and skill development in rural Ethiopia. *Natural Resources Forum*. doi:10.1111/1477-8947.12145.

Nyang'au, I.M.; Kelboro, G.; Hornidge, A.-K.; Midega, C.A.O.; Borgemeister, C. (2018): Transdisciplinary Research: Collaborative Leadership and Empowerment Towards Sustainability of Push-Pull Technology. *Sustainability* 10: 2378.

Kamau, J. W.; Stellmacher, T.; Biber-Freudenberger, L. and C. Borgemeister (2018): Organic and conventional agriculture in Kenya: A typology of smallholder farms in Kajiado and Murang'a counties. *Journal for Rural Studies* 57: 171-185. <https://doi.org/10.1016/j.jrurstud.2017.12.014>.

Neumann K., Anderson C., and M. Denich (2018): Participatory, explorative, qualitative modeling: application of the iMODELER software to assess trade-offs among the SDGs. *Economics: The Open-Access, Open-Assessment E-Journal* 12: 1–19. <http://dx.doi.org/10.5018/economics-ejournal.ja.2018-25>.



Sharing experiences and expertise: Connecting biomass experts in Africa

Under the umbrella of the Biomass-Web project, German and African scientists have addressed the question of how biomass can be used more effectively and efficiently in Africa. In order to improved exchange of knowledge and experience, as well as discussions between scientists, politicians, businesses and civil society, ZEF, together with the Forum for Agricultural Research in Africa (FARA), has set up the first Pan-African expert network on food and non-food biomass. The network aims at ensuring that food security and environmental sustainability are not compromised in the development of new biomass uses. It will thus help to strengthen the emerging African bio-economies.

The network is aimed at experts from science, policy and practice. It is open to users from all over the world and all disciplines interested in biomass-related topics in Africa to promote the exchange of knowledge and information on the African continent and to help initiate new collaborations, approaches and innovative solutions for the African biomass sector beyond the boundaries of sectors and traditional expertise.

The core of the network is the interactive internet portal BiomassNet. To become a member, kindly visit our website at www.biomassnet.org and register for membership and also join the BiomassNet Discussion group: biomassnet.org/dgroup/

Main funders

Federal Ministry of Education and Research (BMBF), Federal Ministry for Economic Cooperation and Development (BMZ)

Main cooperation partners

Forum for Agricultural Research in Africa (FARA), University of Hohenheim, Research Center Juelich, International Centre on Insect Physiology and Ecology (icipe), International Institute for Tropical Agriculture (IITA)

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The project focuses on the sustainability implications of transnational biomass trade, technological innovation, and innovation transfer in selected bioeconomy sectors with an emphasis on major biomass and knowledge producing countries and regions. Impacts of bio-based transformations will be evaluated against relevant sustainability dimensions, such as the Sustainable Development Goals (SDGs) on poverty eradication (#1), food security (#2), reduced inequality (#10), responsible consumption (#12), climate action (#13), and terrestrial ecosystems (#15).

Research activities

- Global classification and sustainability evaluation of bioeconomy types.
- Qualitative analysis of national policy documents regarding bioeconomy strategies.
- Analysis of a global bioeconomy expert survey and patents to identify promising technologies.
- Field research project in South Africa on access and benefit sharing regulations in bioprospecting and biotrade.
- Analysis of Health and well-being impacts of large-scale gene-modified soy production in Argentina, Bolivia and Uruguay.

Events

- Workshop “Land use spillover and leakage effects: Towards integrating concepts, empirical methods, and models”, November 9-10, 2017, Berlin. Organized by ZEF, Université catholique de Louvain, the Sustainable Development Solutions Network and Stockholm Environment Institute.
- 5th Green Growth Knowledge Platform Annual Conference November 27-28, 2017, World Bank, Washington.

- Global Bioeconomy Summit April 19-20, April 2018, Berlin: Workshop organized with African and European partners.

Doctoral researchers

Salwa Haddad: Assessing potential economic and environmental implications of the growing bioeconomy using a global Computable General Equilibrium model (ongoing).

James Henderson: Drivers of new agro-industrial frontiers: identifying actor behaviors, mechanisms, and incentives of soybean expansion in South America (ongoing).

Gabriel Ponzoni Frey: Modern agricultural frontier development and pasture restoration in the Brazilian Amazon: implications for biodiversity and ecosystem services (ongoing).

Anyokwu Evelyn Ewere: Bio-economic transition in Nigeria: identifying impacts and potential trade-offs in land use and food security (ongoing).

Publications

Gardner, T. A., M. Benzie, J. Börner, E. Dawkins, S. Fick, R. Garrett, J. Godar, A. Grimard, S. Lake, R.K. Larsen, N. Mardas, C.L. McDermott, P. Meyfroidt, M. Osbeck, M. Persson, T. Sembres, C. Sua- vet, B. Strassburg, A. Trevisan, C. West, P. Wolvekamp. 2018. Transparency and sustainability in global commodity supply chains. *World Development*, DOI: 10.1016/j.worlddev.2018.05.025.

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Basukala, A. K., Oldenburg, C., Schellberg, J., Sultanov, M., & Dubovyk, O. 2017. Towards improved land use map-

ping of irrigated croplands: performance assessment of different image classification algorithms and approaches. *European Journal of Remote Sensing*, 50(1):187-201.

Börner, J., K. Baylis, E. Corbera, D. Ezzine-de-Blas, J. Honey-Rosés, U. M. Persson and S. Wunder. 2017. The Effectiveness of Payments for Environmental Services. *World Development*, 96: 359–374.

Biber-Freudenberger, L., Whitney, C., Beuchelt, T., Jaenicke, H., Kelboro, G., Schmitt, C. B., Sommer, J.-H., Denich, M. (2018) More inter- and transdisciplinary research needed in Agroecology. *Rural* 21, 52(2):31-33.

Bruckner, M., Giljum, S., Fischer, G., Tramberend, S. and J. Börner. 2018. The global cropland footprint of the non-food bioeconomy. *ZEF Discussion Paper* 253.

Biber-Freudenberger, L., Basukala, A.K., Bruckner, M., Börner, J. Sustainability Performance of national Bio-economies (forthcoming).

Dietz, T., Börner, J., Förster, J.J., v. Braun, J. (forthcoming) Governance der Bioökonomie – ein weltweiter Vergleich nationaler Bioökonomie-Strategien. In *Das System Bioökonomie*. Springer Verlag (forthcoming).

Main funder

German Ministry for Education and Research (BMBF)

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Implementation of food security criteria within biomass sustainability standards

The FSS|Project focuses on food security and the Human Right to Adequate Food as new elements for sustainability standards and certification schemes. It provides practicable and measurable food security criteria for all kind of traded agricultural products. The aim of the FSS|Project is to develop, test and implement food security criteria and related tools in food insecure regions in Africa, Asia and Latin-America. Countries: Malaysia, Burkina Faso, Kenya, Guatemala, Bolivia, Papua New Guinea.

Research activities and events

- Further development of food security criteria, indicators and verifiers including a handbook and checklist for sustainability standards.
- Development of a food security risk assessment tool.
- Development of a tool to monitor quickly and simply local food security changes.

- Benchmarking of food security criteria with sustainability standards and integration into standards.
- Pilot study in Malaysia showed food insecurity among smallholder farmers despite common agreement that this would not be an issue in Malaysia's palm oil sector.
- First pilot test in Malaysia in February 2018.
- Organized a large stakeholder workshop on food security and sustainability certifications in Malaysia's palm oil production (February 2018).
- Presentation of research results at the multi-stakeholder platform "Forum for Sustainable Palm Oil" (FONAP) in Berlin (May 2018).

Main funder

German Federal Ministry of Food and Agriculture (BMEL) via "Fachagentur für Nachwachsende Rohstoffe"

Main cooperation partners

Welthungerhilfe, World Wildlife Fund

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zef.de/project/FSS-project
welthungerhilfe.de/food-security-standard.html



Innovative impulses reducing the water footprint of the global cotton textile Industry towards the UN Sustainable Development Goals in Pakistan

InoCottonGROW



InoCottonGROW aims at reducing the water footprint and advancing the water footprint concept towards a tool to facilitate decision-finding by irrigators, textile producers, traders, and consumers. The objective is to reduce water consumption and save resources along the entire value chain from field to hanger.

Research activities

- Joint irrigation experiments with the University of Agriculture, Faisalabad, Pakistan.
- Data collection and compilation on irrigation water distribution of irrigation schemes in Punjab with the Punjab Irrigation Administration.
- Assessing the performance of cotton irrigation in Punjab in terms of efficiency, effectiveness and productivity.
- Working out options to improve irrigation performance by appropriate irrigation scheduling and advanced handling of irrigation techniques.

Events

Discussion with representatives from University of Agriculture, Faisalabad and Punjab Irrigation Administration on first results (May 8-15, 2018).

Lecture on Agricultural Water Management at UAF (May 10, 2018).

Main funder

Federal Ministry of Education and Research (BMBF)

Main cooperation partners

University of Agriculture, Faisalabad, Pakistan; Punjab Irrigation and Power Department, Pakistan; Research Institute for Water and Waste Management and Institute of Hydraulic Engineering and Water Resources Management at Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen; University of Würzburg, Department of Remote Sensing; IWW Water Centre, Mülheim/Ruhr; Hochschule Ruhr West, Institute of

Business Administration; Technical University Berlin, Sustainable Engineering Department; SEBA Hydrometrie GmbH & Co. KG

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Risk Assessment and Reduction Strategies for Sustainable Urban Resource Supply in Sub-Saharan Africa and Focus on Sustainable Energy Supply in Mali

ZEF is contributing to RARSUS and RARSUS-SEMALI mainly by conceiving options towards sustainable water and food provision systems and strategies for adapting to changing environments (mainly flood risk reduction through adapted management in urban settings and their environment,

Research activities

To strengthen the resilience of urban/peri-urban supply systems, which is RARSUS' overall objective, ZEF's research focus is on:

- (i) deriving options to compensate disadvantageous impacts of urbanization on the water cycle;
- (ii) managing (flood) risks;
- (iii) working out strategies to strengthen (peri-)urban agriculture.

For that purpose and related to the study regions in Niamey/Niger and Bamako/Mali, major activities of the project comprised so far:

- (i) selecting and delineating regions for surface and groundwater modeling and first parameterization of models;
- (ii) inventory of monitoring systems;
- (iii) working out monitoring and modeling concepts jointly with the partners;
- (iv) preparing the roadmaps for the various MSc studies in Niger and Mali.

Events

- Kick-off meeting of the RARSUS-SEMALI project in Bamako/Mali, December 7-10, 2017.
- Field trip to Niamey/Niger in March 2018.
- Mid-term meeting/workshop and RARSUS-SEMALI Summer School at ITT/Cologne (July, 16-18 2018).
- MSc students from Abdou Moumouni University of Niamey started their courses.

Main funders

German Federal Ministry of Education and Research (BMBF) for research component and German Academic Exchange Service (DAAD)

Main cooperation partners

Pan African University - Institute of Water and Energy Sciences (PAUWES); Abdou Moumouni University of Niamey (UAM)/WASCAL Master Program on Climate Change and Energy; Institute for Technology and Resources Management in the Tropics and Sub-Tropics (ITT) and Technische Hochschule Köln (project lead); Institute for Environment and Human Security of the United Nations University in Bonn (UNU-EHS)

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The project on Water and Energy Security for Africa WESA is a first step towards the establishment and implementation of a research agenda for the Pan-African University, Institute of Water and Energy PAUWES at Tlemcen, Algeria. It is also offering the first master graduates of PAUWES an opportunity to enroll in a PhD research.

The WESA project consists of five work packages. ZEF contributed during the reporting period as follows:

- Discussion and development of a research agenda for PAUWES in collaboration with University of Tlemcen, Algeria through a series of meetings.
- Support to WESA PhD students for development of their PhD research proposals.
- Constant discussion with and guidance to WESA PhDs in their research work.
- Several WESA coordination meetings with the project partners
- Purchase of softwares, equipments, data, and books for the WESA PhD students.

Events

- Visit of WESA PhD students at ZEF, Bonn for participation in ZEF PhD disciplinary courses and development of their PhD research proposal (January 4-March 31, 2017)
- Several project coordination meetings with the project partners and constant guidance to the WESA PhD students in their research.
- Contributing to the Research to Practice Forum held in Tlemcen, Algeria, (April 16-18, 2018).

Doctoral research

Sadame Mohammed Yimer: Modelling the Impacts of Land Use/Cover Changes and Climate Change on Water Balance and Soil Erosion. Case study; Upper Atbara-Tekeze river basin, Ethiopia.

Bougara Hanane: Hydrological modelling of the Tafna basin Algeria (Northwest Algeria).

Main funder

Federal Ministry of Education and Research (BMBF)

Main cooperation partners

Pan African University - Institute of Water and Energy Sciences, including climate change (PAUWES), Tlemcen, Algeria; Abou Bakr Belkaid University of Tlemcen, Algeria; Center for Development Research (ZEF), University of Bonn, Germany; Technische Hochschule Köln, Institute for Technology and Resources Management in the Tropics and Subtropics (ITT), Cologne, Germany; United Nations University, Institute for Environment and Human Security (UNU-EHS), Bonn, Germany.

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Diversifying agriculture for balanced nutrition through fruits and vegetables in multi-storey cropping systems

NutriHAF Africa is a research and capacity building project carried out in biodiversity hotspots in South-West-Ethiopia and in South-East-Madagascar. NutriHAF conducts research together with rural female and male farmers to find ways to improve the nutrition of families, especially through a more diverse diet including more fruits and vegetables. At the same time, the biodiversity of forests should be preserved. Therefore, the idea of NutriHAF is to find and test in a participatory way vegetables that can grow under shade in the forest to make better use of the limited land resources and hopefully help preserve the forest.

Research activities

- Experimental sites of pumpkin and cowpea on shaded areas implemented, comparing the leaf yield at different plant densities and harvesting methods.
- Leafy vegetable seeds produced on Farmer Training Centers demonstration areas to promote and expand planting of leafy vegetables.
- Database (over 2,000 variables out of a total of 334 households) of the survey created and analyzed.
- Varied participatory training on nutrition, hygiene, processing of fruits and vegetables as well as cooking classes and cooking competitions with tasting and evaluation of cultivated leafy vegetables in Ethiopia and Madagascar carried out.
- Qualitative research carried out on women's workload at the introduction of nutrition-sensitive agriculture by developing a role playing game.
- Events
- Roundtable discussions were held with government officials at the national level in Ethiopia to promote nutrition sensitive agriculture.
- A "Vegetable booklet" was launched in Ethiopia (in English and Oromifa),

in which topics such as cultivation, processing and consumption of vegetables in multi-storey cropping systems are presented in a didactic way.

- In cooperation with the International Centre for Sustainable Development at the University of Applied Sciences Bonn-Rhein Sieg (IZNE), workshops were carried out on food safety and hygiene, as well as methods of nutrient conservation for smallholder farmers and extension workers to improve knowledge on processing and preservation of vegetables.

Students

NutriHAF has and supervises 21 MSc students from three Ethiopian universities (Jimma, Bahir Dar, Wollega) and eight MSc students from the University of Antananarivo, Madagascar, covering topics such as livelihoods, value chains, gender, extension sector, biodiversity, dietary diversity.

Main funder

Bundesanstalt für Landwirtschaft und Ernährung (BLE)

Main cooperation partners

The World Vegetable Center (AVRDC), Centre National de la Recherche Appliquée au Développement Rural (FOFIFA), Competence Center Horticulture at the University of Bonn (KoGa), International Centre for Sustainable Development at the University of Applied Sciences Bonn-Rhein Sieg (IZNE), University of Antananarivo, Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN), The Global Horticulture Initiative (GlobalHort), Environment and Coffee Forest Forum (ECFF), Welthungerhilfe

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HEALTH, NUTRITION AND ECOSYSTEMS

3.3

Recognizing risks, developing sustainable solutions in Ruhr Metropolis in Germany, Ahmedabad in India, Accra in Ghana and São Paulo in Brazil

Fortschrittsskolleg One Health and urban transformation

The graduate school was launched in July 2016 and investigates the various dimensions and transformations of the urban systems and their impact on human, animal and environmental health.

The One Health approach adopts an integrative perspective of health, recognizing the interactions between environmental, social and economic systems shaping human, animal and environmental health.

Each student addresses one of the following overarching research questions:

(1) How to ensure health-sensitive food systems?

(2) How to develop One Health governance systems?

(3) How to promote health through management of water systems?

Within the domain of these overarching questions, the individual students develop specific research questions including aspects of antimicrobial resistance, zoonotic disease transmission, vector-borne diseases, mental health and well-being, food system sustainability, health governance, blue and green infrastructure, ecosystem services, etc.

Research activities

Since the start of the project, the doctoral students underwent the structured program of the Bonn International Graduate School of Development Research (BIGS-DR) as well as specific One Health courses and seminars. During the One Health

Framework Workshop, the group of students and supervisors assessed available frameworks and developed a project-specific One Health framework. Next to the course obligations the students developed their research plans and engaged with the partner institutes and local stakeholders. To ensure the local relevance and interests of the proposed research, as well as obtaining feedback from partner institutions, stakeholder workshops were organized in each research location. The doctoral students initiated their 12 months field research in September 2018.

Events

October 15-17, 2017: Global Health Hackathon (World Health Summit, Berlin).

December 14, 2017: One Health Framework Workshop (ZEF, Bonn).

April 11, 2018: Stakeholder Workshop India (Indian Institute of Public Health, Ahmedabad)

April 18, 2018: Stakeholder Workshop Germany (Ruhrverband, Essen).

May 15, 2018: Stakeholder Workshop Brazil (University of São Paulo).

October 29, 2018: One Health Framework Workshop (ZEF, Bonn).

November 19, 2018: Stakeholder Workshop Ghana (University of Ghana, Accra).



Doctoral researchers

Kayleigh Bleymann: Investigating the Impacts of Diet on Gut Microbial Antibiotic Resistance Among Distinct Adult Populations Living in Brazil.

Anna Brückner: Blue health for all? Investigating urban blue spaces as potentially therapeutic landscapes for elderly people in deprived communities. Learning from cases in Ruhr and Ahmedabad Metropolis.

Jessica Fellappi: Reconciling mental health promotion and wildlife conservation in a megacity: the importance of urban parks' qualities.

Juliana Minetto Gellert Paris: Shifting towards sustainable and healthier dietary patterns in the Metropolis Ruhr, Germany.

Ana Perez Arrendondo: Role of networks in insuring health shocks. The case of poor communities in Accra.

Samara Evangelista Gomes: Urban green infrastructure and human health: an assessment of ecosystem services provided at the lot-scale in São Paulo, Brazil.

Joshua Ntajal: Linking land use dynamics and surface water systems in Accra, Ghana: a human health risk perspective.

Krupali Patel: Investigating the epidemiological determinants and transmission pathway of Microbial Antibiotic Resistance among urban livestock keepers' community in Ahmedabad, Gujarat, India.

Silvia Quintana Sagarnaga Fischer: Vulnerability to drought in São Paulo City – a socio-ecological assessment.

Yasobant Sandul: Convergence model for effective prevention and control of zoonotic diseases: A health system study on 'One Health' approach in Ahmedabad, India.

Merveille Koissi Savi: Host-Vector-Parasite System Dynamics Analysis for Enhancing Malaria Control in Accra, Ghana.

Dennis Schmiede: Risk assessment of source and dissemination of multidrug-resistant Enterobacteriaceae in the catchment area of a wastewater system in the Ruhr Metropolis, Germany.

Philipp Swoboda: Turning rocks to

bread? Agricultural application of rock dust in the context of One Health.

Vivek Kumar: Spatio-temporal assessment and mapping of health risk due to climatic and non-climatic factors in Patna, India.

Annie Nana: Heavy metals contamination and assessment of cancer risk related to wastewater irrigation in Yaoundé city.

Publications

Sandul, Bruchhausen, Saxena, Falkenberg (2018) Convergence model for effective prevention and control of zoonotic diseases: a health system study on 'One Health' approach in Ahmedabad, India. *Health Research Policy and Systems* 16:124. doi:10.1186/s12961-018-0398-6.

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Main funder

Ministerium für Kultur und Wissenschaft des Landes NRW

Main cooperation partners

University of Applied Sciences Bonn Rhein-Sieg; United Nations University – Institute for Environment and Human Security; Department of Geography, Bonn University; Agricultural Faculty, Bonn University; Medical Faculty, Bonn University; Institute for hygiene and Public Health, Bonn University; Indian Institute of Public Health, Gandhinagar; Institute of Statistical, Social and Economic Research (ISSER), University of Ghana; University Sao Paulo, Brazil.

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Innovative approaches to process local food in sub-Saharan Africa and Southeast Asia

Malnutrition and food insecurity remain two crucial challenges in Madagascar and Myanmar even today. Marginalized groups like rural women and children are especially vulnerable due to their exclusion from certain work opportunities and lack of inclusion in extension services. Given their rich biodiversity both countries have unexplored potential to fight food insecurity and gender inequalities-

Entomophagy, the human consumption of insects for nutritional purposes, is a major potential which offers crucial advantages over conventional food sources, as edible insects:

- provide a high amount of nutrients like protein or amino acids,
- are a significantly better feed conversion,
- substantially lower CO₂ emissions in comparison to livestock.

High impact insects

Based upon experiences with commercial exploitation of entomophagy in Myanmar and Thailand, insects also proved to have a high economic value, if processed and sold.

The innovative ProciNut project aims to use these nutritional and economic potentials of edible insects by:

- establishing and improving small scale farming and the production of safe, nutritious end products with increased shelf-life,
- thereby increasing the nutritional security of households, especially with regard to seasonal insecurity,
- improving the economic situation of rural women and close gender gaps,
- facilitating capacity building and knowledge exchange for development agents and consumers, in particular by using the potential of a South-South-Cooperation between Madagascar and Myanmar.

Methodology

The ProciNut project uses a transdisciplinary and participatory approach to cover and respect all cultural, social, economic, and material aspects of processing and using edible insects. To achieve this goal a variety of different methods are used:

- A mainly qualitatively, gender-disaggregated analysis of the collection, mini farming and (commercial) processing practices of smallholders.
- In-depth analysis of the food and consumption behavior, sociocultural role of insects, gender roles and relations.
- Gender-disaggregated value chain and market analysis.
- On-farm or community trials on insect rearing established in communities within the two target countries using gender-sensitive participatory action research.
- Adaption of different existing processing techniques and testing of newly developed or transferred processing, preservation and storage techniques.
- Laboratory analysis of insect material before and after processing for key amino acids, minerals and microbiological or chemical contamination.
- Policy analysis to identify constraints to streamlining of the edible insect sector in the target countries.
- Policy dialogue at local and regional level and round-table forums including legislative and food safety regulatory bodies.
- Promotion of and training in safe insect processing, nutritional value of insects and balanced diets.

Main funder

German Federal Ministry of Food and Agriculture (BMEL)

Processing of Edible Insects for Improved Nutrition (ProciNut)

Main cooperation partners

International Centre for Sustainable Development at the University of Applied Sciences Bonn-Rhein Sieg (IZNE); Yezin Agricultural University; Spectrum; Mahidol; University of Antananarivo; The National Center for Applied Research and Rural Development in Madagascar (FOFIFA); Welthungerhilfe, Germany

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3.4

GOVERNANCE, CONFLICTS AND NATURAL RESOURCES

CIREG

Interdisciplinary Climate Information for Integrated Renewable Electricity Generation

The aim of the interdisciplinary Climate Information for Integrated Renewable Electricity Generation (CIREG) project is the co-development by scientists and stakeholders of climate-resilient and sustainable renewable electricity generation (REG) systems.

The project sets out to:

1. Develop short-, medium- and long-term regional projections for renewable energy deployment in West Africa in the context of sustainable development, current and future climate variability and climate change based on integrated energy, water and land-use models.
2. Develop and apply a methodological framework for aligning renewable energy deployment and sustainable development goals, and to provide quantitative and qualitative policy options based on regional modelling and local cases.
3. Test local technical performance, governance, social and economic aspects of a small-scale renewable energy option.
4. Establish research-based climate services reflecting demands from local decision makers and stakeholders engaged in renewable energy deployment in West Africa.
5. Provide a framework for the systematic identification and valuation of REG potentials to national, regional and international investors in the West African energy sector.
6. Develop the eco-hydrological Soil-Water-Integrated-Model towards a fully integrated REG-assessment model by incorporating modules to simulate wind and solar energy potentials in addition to hydropower.

Research activities

CIREG's activities started in early 2018. ZEF's activity within CIREG is mainly concerned with the collection of socio-economic information on the countries where CIREG will operate (Ghana, Togo, Burkina Faso, Niger). The current, early phase of research has mainly focused on literature review and the development of specific research proposals for ZEF field studies. Such proposals include the selection of study sites, refinement of data collection methods, as well as the preparation of a submission of the proposals to the ZEF ethical committee.

Events

- Project kick-off conference at PIK, Potsdam, Feb. 28-March 2.
- Presentation of CIREG at "Capitalising on the Sun" conference, Edinburgh, Scotland, UK, May 25-27; and at "7th STS Italia Conference", Padua, North Italy, June 13-16.

Publications

Cantoni, Roberto, and Marta Musso (eds.), "African energy policies: a general assessment / Les politiques énergétiques en Afrique: une évaluation générale". Afrique contemporaine.

Main funders

European Research Area Consortium (ERA4CS), Federal Ministry of Education and Research (BMBF)

Main cooperation partners

Potsdam Institute for Climate Impact Research (PIK, leader of the consortium); Stockholm Environment Institute (SEI); Technical University of Denmark (DTU); Vrije Universiteit Brussel; West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL)

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MARKETS AND PUBLIC SERVICES

3.5

Analysis and implementation of measures to reduce price volatility in national and international markets for improved food security in developing countries



The price development in international and domestic commodity markets is the result of changes in market fundamentals and resource scarcity. Food grains are the basic food of the poor, who spend up to 60% of their income on food, but also represent an important source of income for smallholder farmers. The project looks at solutions to improve the resilience of food systems, the functioning of food markets, and to contribute to the early detection of risks for food security. Countries of research are, among others, India, Bangladesh, China, Ethiopia, and Malawi.

Research activities

The food crisis early warning system website Food Monitor (www.food-monitor.org) was launched in 2017. It continues to provide timely information on the regional and local food security situation in many developing countries. One focus of the project is to assess whether international food price changes (through early warning signals) affect food and nutrition security and child mortality in developing countries. Further, the project will contribute to the broadening of the current research on rural food markets. The project also engages in the research of rural labor

markets and the potential of income diversification to improve the resilience of the food system by increasing the purchasing power of the poor. For this purpose, a High Frequency Panel Survey is conducted to assess the seasonality of income opportunities and nutritional status of smallholder farmers and to identify successful coping strategies against seasonal food insecurity. Another research focus of the project involves governance aspects of commodity price volatility in sub-Saharan Africa. This includes the assessment of the effectiveness and efficiency of social protection programs and research on the impact of conflicts on the performance of food markets.

Events

The project organized the Track Session Food Prices and Price Volatility in Africa South of the Sahara at the Annual Meeting of the Agricultural and Applied Economics Association (AAEA) in Chicago in June 2017. Lukas Kornher and Adebayo M. Shittu presented their papers "The Fortune of Birth at the Right Time: Long Term Health Impacts of Food Price Shocks in Sub-Saharan Africa" and "Food Price Hikes and Volatility: Drivers, Policy Responses and Vulnerability Mapping across the States in Nigeria".

The text-message-based food security monitoring system was launched in Kenya in January 2018. The system provides real time information of local food security risk collected via SMS

from local field officers in Kenya. During a workshop with the Kenyan Food Security Steering Committee the system was presented to stakeholders in Kenya, which include Welthungerhilfe and the National Drought Management Authority (NDMA).

Fuad Hassan, Saiful Islam, Till Ludwig, and Regine Weber attended the International Conference of Agricultural Economists (ICAE) in Vancouver, Canada in August 2018. They presented their research on rice prices and rural wages in Bangladesh, the benefits of integrated aquaculture-agriculture systems, production diversity determines dietary diversity in India, and early warning systems for food security risks.

Doctoral researchers

Till Ludwig: Consumption Choices. The effects of food production, markets and preferences on diets in India (ongoing).

Fuad Hassan: Interlinkages between food prices and agricultural wages and impact on farm mechanization: Evidence from Bangladesh (ongoing).

Isaac Bonuedi: Enhancing Food and Nutrition Security Through Cash Crop Promotion and Nutrition Education in Sierra Leone (ongoing).

Henri Kankwamba: Economic disruptions, commodity and factor market linkages in eastern Africa: Implications for income distribution, food and nutrition security (ongoing).

Pablo Evia: The Role of Government Transfers, Decentralization and Social Policy in Bolivia (ongoing).

Publications

Algieri B., Leccadito A. (2018). Price volatility and speculative activities in futures commodity markets: A combination of combinations of p-values test. *Journal of Commodity Markets*, June 2018. <https://doi.org/10.1016/j.jcomm.2018.05.008>.

Algieri B., Kalkuhl M., Koch N. (2017). A Tale Of Two Tails: Explaining Extreme Events In Financialized Agricultural Markets. *Food Policy*, 2017, Vol. 69, pp. 256–269. <https://authors.elsevier.com/a/1V3Qr15oGox12c>.

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Bhopal, A., Blanchard K., Weber R., Murray V. (2018). Disasters and Food Security: The Impact on Health. *International Journal of Disaster Risk Reduction*, <https://doi.org/10.1016/j.ijdr.2018.05.008> (forthcoming).

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Main funders

Federal Ministry for Economic Cooperation and Development (BMZ), European Commission (FOODSECURE project)

Main cooperation partners

International Food Policy Research Institute (IFPRI), Matthias Kalkuhl (Mercator Research Institute on Global Commons and Climate Change, Berlin), Ethiopian Economics Association, Indian Council for Research on International Economic Relations, ILR Bonn, Center for Chinese Agricultural Policy, Bernardina Algieri.

Contact

Project Coordinator: Lukas Kornher

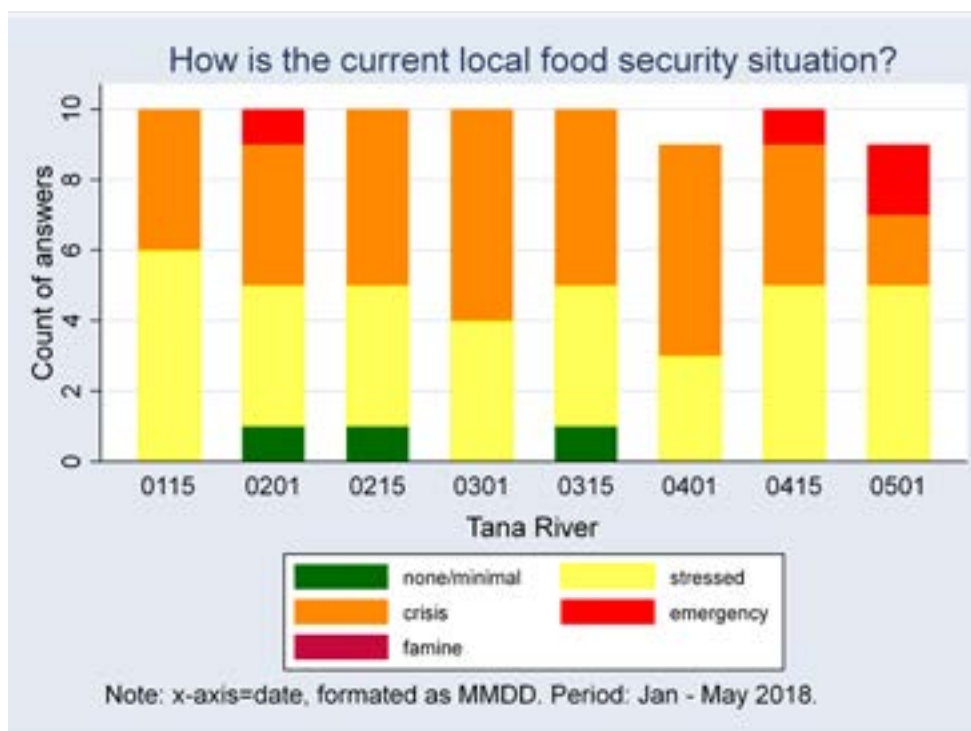
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An SMS-System for Food Security Risk Identification based on local Knowledge

Assessing food security risks requires fast and disaggregated data for the timely detection of emerging challenges, yet many developing countries lack this information. The very populations who are most at risk have not been systematically integrated into food security monitoring systems. Utilizing native population observations has many advantages. For instance, the food security of a community can be accessed via a local's daily routine, i.e. when purchasing food on the market or when engaging in subsistence farming, allowing for instantaneous data collection not requiring significant transaction costs. Tapping into this information could provide valuable near-real time information for early warning, ultimately equipping the population at-risk with direct communication channels to warning systems. Particularly in complex situations, this knowledge can directly inform decision makers about changes in the food security status and may therefore play a vital role in timely and sound assessments, which, combined with further indicators, has the potential to improve early warning processes.

To gather bottom-up food security assessments, we implemented an innovative SMS-system in four Kenyan counties. This system, which runs on Safaricom, Kenya's largest network provider, is connected to an algorithm that automatically filters and disaggregates the data received and makes it available in near-real time. The pilot study was rolled out in cooperation with Welthungerhilfe, a large German NGO and the Kenyan National Drought Management Authority; both have an interest in near-real time food security monitoring, as they tackle food security emergencies on the ground. Participants, who have been trained on how to interact with the SMS system and how to monitor the food security situation, are reporting on the food security status of their community twice per month.

For example, a first look at the data received for the county Tana River (see Figure), shows how the floods, which affected East Africa in April and May of 2018, directly impacted the food security situation of the local population. Already in mid-April, some affected participants were showing signs of a deteriorating food security situation within their community, with an increase of situations rated as "food crisis" and "food emergency". The information gain acquired through the system seems to be a promising and direct snapshot of the situation and needs on the ground. The pilot study concluded in August 2018.

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MOBILITY, MIGRATION AND URBANIZATION

3.6

Between everyday urbanity, spontaneous urbanization, town planning and real estate development in Côte d'Ivoire

Waterfront
Metropolis Abidjan

Objectives:

- Writing an ethnography about the spontaneous settlement Adjahui the middle of the metropolis.
- Contextualizing the case by analyzing the interplay of every day urbanism, unplanned urbanization, town planning and real estate development.
- Analyzing discourses on sustainable waterfront development and citizenship in Abidjan.

- Estimation of Adjahui's population number (Geographic Information Systems + census data).
- Collection and analysis of relevant newspaper articles (Fraternité Matin 2010-2017) and other media.
- Remote sensing of waterfronts in Abidjan.

Events

- Nine weeks of field research in Abidjan, January-February, July 2018.
- "Social-spatial navigation and doing the city in 'the other Abidjan'." Presentation at the VAD Conference in Leipzig, Panel 06: Doing the City. Social-spatial navigation in urban Africa, June 2018.
- "'Pearls of the Lagoon.' Post-conflict rehabilitation of a tattered urban brand in Abidjan." Presentation at the EASA Conference in Stockholm, Panel 42: Urban temporalities, August 2018.

Research activities

- Ethnographic census in Adjahui covering 591 housing units in 52 courtyards and interviews with 304 households.
- 20 expert and other interviews.
- Transect walks and photo documentation 2016, 2018.
- Study on ferry transport to Adjahui.



ZEF blog posts

- **Waterfronts and green spaces in central Cairo.** What's the way forward?
- **Postcard from Paris/Rive Gauche:** Urban renewal and controversies about the Right to the City in the South.
- **Twelve months – twelve books:** My 2018 reading list on cities.

Main funder

German Research Foundation (DFG)



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4

CAPACITY DEVELOPMENT



ZEF'S DOCTORAL STUDIES PROGRAM (BIGS-DR)

4.1

ZEF's doctoral studies program BIGS-DR (Bonn International Graduate School for Development Research) offers an interdisciplinary and international three-year doctoral education. Since its inception in 1999 around 685 students from more than 100 countries have participated in the program.

This year ZEF welcomed a batch of 18 new doctoral students from 16 countries.

Interdisciplinary training

Tackling development issues requires crossing the boundaries of individual disciplines. Therefore, development research requires integrative thinking among approaches derived from a variety of disciplines. The doctoral education and research in ZEF's program therefore bridges and combines interdisciplinary skills as well as expertise. The interdisciplinary training at ZEF prepares the doctoral graduates to work in other multi-faceted teams and cooperate with partners from various professional and cultural backgrounds in an international partnership effort for sustainable development. This enables participants to explore new academic fields and be competitive on an international job market.

The structured course program

The teaching program includes two blocks of courses spread over the first and third year of the program, (1) an interdisciplinary course which provides a sound theoretical background, including knowledge and skills to address

the complex and interlinked problems of development, and (2) courses structured along disciplinary lines in economics, social sciences, and ecology, with a special emphasis on theory and methodology of each field. ZEF also offers special short courses in topics such as GIS, remote sensing, mathematics and statistics etc. Individual students may visit laboratories at the University of Bonn or other cooperating institutes in Germany or abroad. Key skills are trained in workshops on intercultural competence, research ethics and leadership development.

Besides the course work, during the first phase, the doctoral students have to spend time preparing and finalizing their research proposals. After their supervisors approved the research plans, the students travel abroad to conduct field research in a developing country, which takes one to two years. Subsequently, the students return to ZEF to write up their doctoral theses during the last six to 12 months of the program.

Awards and Prizes

Denise Margaret Matias is one of the winners of the Josef G. Knoll European Science Award-2018 by the Stiftung fiat panis. Dr. Matias received the award in the amount of 10,000 Euro for her dissertation on "Sustainability of community forestry enterprises: indigenous wild honey gathering in the UNESCO Man and Biosphere Reserve Palawan, Philippines". She is the fifth graduate from ZEF to win this prestigious award

after Abay Asfaw and Rolf Sommer in 2002, Luseged Tamene Desta in 2006 and Abu Hayat Md. Saiful Islam in 2016. The prize was awarded during the conference Tropentag in Ghent, Belgium, on September 17.

Janina Kleemann won the Bernd-Rendel-Prize 2018 for her dissertation "An expert-based ecosystem services assessment under land use and land cover changes and different climate scenarios in northern Ghana, West Africa". The German Research Foundation (DFG) awards the Bernd-Rendel-Prize annually to early career scientists who have not yet obtained a doctorate. The prize was handed over in Bonn during the GeoBonn-Conference 2018 on September 2-6.

Marco Elias Cisneros Tersitsch won the Prize for the Best Dissertation at ZEF of the years 2014-2017 by the Friends of ZEF for his thesis on "The impact of public policies on deforestation in the Brazilian Amazon". The prize was awarded during the meeting of the International Board of ZEF on September 19 (see middle picture on page 31).

For general information about the ZEF doctoral program and the application and registration procedure please look at:

zef.de/application_doc.html

4.2 DOCTORAL GRADUATIONS 2018

All doctoral theses available at:

zef.de/publications/zef-doctoral-theses/doctoral-theses

February 9, 2018. Marcos Glauser (Paraguay): Angaité's responses to deforestation: Political ecology of the livelihood and land use strategies of an indigenous community from the Paraguayan Chaco. BMZ (DAAD), Stiftung fiat panis.

March 9, 2018. Said Abdul Wali Dadshani (Germany): Genetic and physiological characterization of traits related to salinity tolerance in an advanced backcross population of wheat. BMZ (ICARDA).

March 23, 2018. Getachew Legese Feye (Ethiopia): Perception and Governance of Food Insecurity Risks among Family Farmers in Southwestern Ethiopia. BMBF (BiomassWeb).

May 14, 2018. Bibiana Betancur Corredor (Colombia): Agroforestry as a post-mining land-use approach for waste deposits in alluvial gold mining areas of Colombia. BMZ (DAAD), Stiftung fiat panis.

June 14, 2018. Juliet Wanjiku Kamau (Kenya): Sustainability of organic and non-organic smallholder farms in Kenya. BMZ (DAAD), Stiftung fiat panis.

July 6, 2018. Daniel Tutu Benefoh (Ghana): Assessing land-use dynamics in the Ghanaian cocoa landscape. BMZ (DAAD), Stiftung fiat panis.

July 6, 2018. Florent Anguilles Dèhogbè Noulekoun (Benin): Sapling ecology and management in multi-species afforestation system on degraded cropland in the Sudano-Sahelian zone of Benin. BMBF (WASCAL).

July 17, 2018. Omarsherif Mohammed Jemal (Ethiopia): The role of local agroforestry practices for enhancing food and nutrition security of smallholding farming households: The case of Yayu area, south western Ethiopia. BMBF (BiomassWeb), Stiftung fiat panis.

September 1, 2018. Gerba Leta Dufera (Ethiopia): The Ethiopian agricultural extension system and its role as a "Development Actor": Cases from Southwestern Ethiopia. BMBF (BiomassWeb)

September 11, 2018. Andreas Mandler (Germany): Agricultural Expertise and Knowledge Practices among Individualized Farm Households in Tajikistan. Stiftung fiat panis.

September 26, 2018. Pablo Ernesto Evia Salas (Bolivia): The effect of government transfers on poverty and inequality: Three different perspectives about decentralization and social policies in Bolivia. BMZ (DAAD).

October 10, 2018. Essa Chanie Mussa (Ethiopia): Long-term effects of childhood work on human capital formation, migration decisions, and earnings in rural Ethiopia. BMZ (DAAD).

October 11, 2018. Emmanuel Nshakira Rukundo (Uganda): Effects of community-based health insurance on child health outcomes and utilisation of preventive health services: Evidence from rural South-Western Uganda. BMZ (DAAD), Stiftung fiat panis.

October 12, 2018. Gebrelibanos Gebremedhin Gebremariam (Ethiopia): Sustainable Agricultural Practices (SAPs) in northern Ghana: Impacts on

welfare, environmental reliance and agricultural land expansion. BMBF (WASCAL).

October 12, 2018. Varun Gaur (India): Decentralized energy in India and its synergies with water-energy-food security (WEF) nexus. BMZ (Bioenergy, bioeconomy and food security).

October 12, 2018. Hernaude Agossou (Benin): Performance assessment and optimization of a bamboo-drip irrigation system: A contribution to water productivity improvement in rural and peri-urban West-Africa. BMZ (DAAD), Stiftung fiat panis.

October 29, 2018. Ruchi Vangani (India): Water, sanitation and agriculture linkages: Impact on health and nutrition outcomes in peri-urban Gujarat, India. Bill and Melinda Gates Foundation (AG-WATSAN Nexus).

November 5, 2018. Janina Kleemann (Germany): An expert-based ecosystem services assessment under land use and land cover changes and different climate scenarios in northern Ghana, West Africa. BMBF (WASCAL)

November 20, 2018. Justice Nana Inkoom (Ghana): Spatial Interaction of Agricultural Land Uses and their Impacts on Ecosystem Service Provision at the Landscape Scale. BMBF (WASCAL).

November 22, 2018. Anna Schwachula (Germany): 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. Stiftung fiat panis.

In the pictures:

Essa Chanie Mussa (middle, wearing corner cap) from Ethiopia celebrating his doctoral graduation with colleagues and friends.

He graduated on the topic of childhood work and its long-term effect on human capital formation, migration decisions, and earnings in rural Ethiopia.

His research was funded by the Federal Ministry of Economic Cooperation and Development BMZ via the German Academic Exchange Service DAAD.



Marco Elias Cisneros Tersitsch received the price for the best thesis at ZEF of the years 2014-2017 by the 'Friends of ZEF' for his thesis on "The impact of public policies on deforestation in the Brazilian Amazon".

In the picture from left to right: ZEF-Director Christian Borgemeiser, Professor Jan Börner (supervisor), Marco Elias Cisneros Tersitsch and 'Friends of ZEF' member Ursula Schäfer-Preuß, who gave the laudation.



Academic coordinator of BIGS-DR Günther Manske in the midst of his students at ZEF.



REGIONAL CAPACITY DEVELOPMENT PROGRAMS

4.3

Capacity Building in Ghana

Ghanaian-German Centre for Development Studies GGCDs

The Ghanaian-German Centre for Development Studies, which is run by ZEF and the Institute of Statistical Social and Economic Research (ISSER) at the University of Ghana, continued its PhD program in development studies. Besides, it engaged in staff capacity building, funded research and conference travel of lecturers, students and alumni, and provided the basis for joint workshops and research projects. Since 2008, 68 PhD students have been admitted and 25 have graduated. For 2017 and 2018 all in all 20 master students will be supported with scholarships of the German Academic Exchange Service DAAD.

Events

- PhD students from the Institute of Statistical Social and Economic Research and the Faculty of Planning and Land Management took part in the Summer School 2017 at ZEF from May 31 to July 28.
- PhD students from the Institute of Statistical Social and Economic Research and the Faculty of Planning and Land Management participated in the Summer School 2018 at ZEF from May 31 to August 1.
- At a workshop in Ghana in August 2017 with participants from ISSER, FPLM and the Université Abdou Moumouni Niamey, Niger took place in which the follow-up project West African Center for Sustainable Rural Transformation was initiated.

Doctoral Researchers

Philip Aniah: Investigating the Effects of Land Use Changes on Ecosystem Services Conditions and Indigenous Ecosystem Management Systems in the Upper East Region, Ghana.

Stephen Yir-Eru Engmen: Community-Based Management Revisited: Examining the determinants of Sustainable water supply systems in rural Ghana.

Miriam Afi Kosi: Assessing the Effects of Climate Change on Immobile Populations in Climate-change-prone areas in Upper East Region of Ghana: Challenges and Prospects for Adaptation.

Patience Gyamenah Okyere Asante: Who is counting? The economic and psych-social burden of living with cancer in Ghana.

Emmanuel A. Wedam: Livelihoods, mobility and transport: an exploratory study of the use of Intermediate Means of Transport in rural northern Ghana

Main funders

German Academic Exchange Program (DAAD), Engagement Global (funding of the post-graduate resource center at University for Development Studies UDS)

Main cooperation partners

Institute of Statistical Social and Economic Research (ISSER), University of Ghana, and Faculty of Planning and Land Management (FPLM), University for Development Studies (UDS)

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PhD Students' comments on the GGCDs Summer School 2018 at ZEF

“ The summer school was generally very educative and a good platform to learn and exchange ideas with people from all walks of life. I also got the opportunity to meet organizations doing great things in Ghana and possibly collaborating with them on some future projects. My ability to access the university's online library even after I will have returned to Ghana is such a relief for me and I am truly grateful for the opportunity to be here. ”

(Miriam Afi Kosi)

“ My general impression of the 2018 Summer School: An illuminating insight into development research within a well-connected and diverse cultural context. Thank you. ”

(Stephen Yir-Eru Engmen)

“ The summer school has been an amazing experience for me. The part I enjoyed most was the opportunity to participate in the Right Livelihood College workshop to present a poster on my thesis topic and received positive feedback to make it better. The RLC workshop also offered the opportunity to network with people from Asia, Latin America, and other African countries. I also enjoyed the exposure to German history through visits to museums and the visit to see the Berlin wall. The training sessions on Medley, Atlas.ti and other software were very insightful. The visit to the Ghanaian embassy and the boat cruise were memorable. The coordinators of the summer school did a great job with the excellent coordination and timely assistance which is greatly appreciated. ”

(Patience Gyamenah Okyere Asante)

“ This year's summer school has been terrific. First, the proposal presentation organised by Dr. Laube provided me with the opportunity to streamline certain aspects of my research. The Right Livelihood College workshop was another fineness opportunity for knowledge sharing, skills acquisition and development. Field visits have also been very great, providing the space for scholarly development and collaboration. I am very indebted to DAAD for making this happen. ”

(Emmanuel A. Wedam)



The project West African Center for Sustainable Rural Transformation (WAC-SRT) is a cooperation between universities in Germany, Ghana and Niger. In the long term other West African countries should be included. It is a follow-up of the German Ghanaian Center for Development Studies. Established in 2017, WAC-SRT develops interdisciplinary, transnational research and teaching programs. The center aims at generating expertise, applicable technological solutions, locally adapted business models and development management approaches for sustainable rural development and political stability in West Africa. To do so, the center enhances research and teaching capacities as well as the infrastructure of three African partner faculties at universities in Niger and Ghana, which are addressing natural science/engineering, agribusiness and rural economics, as well as development governance. Bridging rural-urban and Anglophone-Francophone divides are also two of the main objectives of the program.

Research activities

WAC-SRT is currently considered as an educational program for Master candidates, including an improvement of research infrastructure (e.g. the solar energy testing station). Apart from that the projects also funds research activities of experts like Dr. Samuel Bonye from University for Development Studies, Ghana, who has done a research about “Multi Stakeholder Players in the

Land Sector in Peri-Urban Wa; competition, conflict complementarity?”

Events

The West African Center for Sustainable Rural Transformation was initiated in August 2017 at a workshop with participants from Institute of Statistical Social and Economic Research (ISSER), University of Ghana, the Faculty of Planning and Land Management of the University of Ghana, and the Faculty of Science and Technology of the Université Abdou Moumouni in Niamey, Niger. The WAC-SRT inception meeting with participants from all partner universities and the new ambassador of Ghana in Germany took place at ZEF in November 2017.

WAC-SRT short courses for lecturers and administrative staff took place at ISSER in June 2018. The focus lied on data management and e-Learning for administrative staff, while academics were trained in academic writing as well as poverty measurement and analysis.

Publications

[Neues Zentrum schult Experten in Afrika](#) (Bonner Rundschau, January 24, 2018, German only).

[Schulung für Experten in Westafrika](#) (General-Anzeiger Bonn, January 23, 2018).

[Nachhaltige ländliche Transformation: Neues Programm schult Experten in](#)

[Westafrika](#) (Kooperation International, January 23, 2018).

[Uni Bonn vernetzt sich mit Hochschulen in Westafrika](#) (Agrarzeitung, January 22, 2018).

Main funders

German Academic Exchange Service (DAAD) and the German Ministry of Foreign Affairs (AA)

Main cooperation partners

Institute of Statistical Social and Economic Research (ISSER) and Faculty of Planning and Land Management (FPLM) of the University of Ghana, Faculty of Agribusiness and Communication Science (FACS) of the University of Development Studies (UDS) in Wa/Tamale, Ghana, Faculty of Sciences and Technology, Université Abdou Moumouni (UAM) Niamey, Niger.

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Bilateral Doctoral Studies Support Program on Environmental peace building and development in Colombia

DSSP

The bilateral Doctoral Studies Support program is run by ZEF and the Institute for Environmental Studies (IDEA) at the National University in Bogotá, Colombia and started by the end of 2017. The Program brings together partners from Colombia, Nicaragua and Germany to contribute to environmental peace building and development. The new research and scientific cooperation program focuses on implementing interdisciplinary, integrative and innovative scientific approaches, concepts and methods on environmental relations, natural resources and conflict.

Research activities

The project introduces a number of interdisciplinary, innovative and integrative teaching programs.

- Organizing meetings and teaching activities in high quality (inter)disciplinary modules.
- Initiating a stakeholder network, and selecting and training personnel for coordination, assistance and scientific training (lecturers).
- Discussing an internationalization strategy for comparative analysis and to realize first teaching activities
- Developing an e-learning platform and training.
- Developing a research agenda addressing the Sustainable Development Goals (SDG's).
- Internationalizing science and fostering comparative analysis of research sites and regions with transnational and regional partners.
- Internationalizing science at IDEA and at ZEF to foster comparative analysis on conflicts in natural resources management. Therefore the two partners agreed on conducting the teaching and capacity building in Spanish but also English language where necessary and required.
- Exploring and reflecting the role of higher education for the SDGs.

Events

April 21 – May 25, 2018: Researchers from ZEF taught interdisciplinary modules at the collaboration institute IDEA of the National University in Bogotá, Colombia.

May 30 – July 30, 2018: Summer School at ZEF.

October 16-19, 2018: Project Kick off workshop and ceremonial inauguration of the bilateral doctoral studies support program in Bogotá, Colombia.

Doctoral research

Carolina Tobón Ramirez: Social metabolism, sustainability and territory in the upper basin of the Bogotá River (ongoing).

David Zamora Ávila: Analysis of the distribution of ecosystem services in a hydrographic watershed through the ecohydrological and hidroeconomic modeling coupled (ongoing).

Dayra Blandón Sandino: Basis of community resilience in the face of drought in the agricultural sector: a case study in the dry corridor of Nicaragua (ongoing).

Ingrid Quintero Silva: Estructura Agroecológica Principal, dung beetles (Coleoptera: Scarabaeinae), functional activity and soils fertility in Andean livestock agroecosystems (ongoing).

Julián Vivas García: Criteria for a framework of public policies of transition toward agro-ecology in Colombia (ongoing).

Juliana Sabogal Aguilar: Food sovereignty in Colombian agrarian policy: An approach from a historical perspective (ongoing).

Mauricio Ángel Macías: Air pollution and health in Bogotá during the second half of the 20th century: An environmental history (ongoing).

Rommel Zambrana Areas: Methodology to assessment urban resilience, the context of earthquake hazard in the city of Managua, Nicaragua (ongoing).

Emilia Schmidt: Preserving past – Building future? Local and indigenous communities and their cultural heritage at the

National Archaeological Park Tierradentro in South Colombia (ongoing).

Main cooperation partner

Institute for Environmental Studies (IDEA) of the National University (UNAL) in Bogotá, Colombia

Main funder

German Academic Exchange Service (DAAD), Federal Ministry for Economic Cooperation and Development (BMZ)

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As a partner in a consortium with United Nations University Institute for Environment and Human Security (UNU-EHS), the Institute for Technology and Resources Management in the Tropics and Subtropics (ITT/TH Köln), ZEF is providing targeted support to the Pan-African University, Institute of Water and Energy (PAUWES) in teaching, strengthening network integration, developing institutional capacities and contributing to a Research to Practice Conference.

Research activities

- Targeted support in teaching (i.e. supporting Winter School 2018 at PAUWES).
- Supporting PAUWES in expanding and intensifying the integration into African Research- and Capacity building networks (i.e. WASCAL).
- Contributing to prepare research proposals with PAUWES and partners on water and energy issues.

- Identifying and utilizing synergisms between and for the proposals (and later projects).

Events

- PAUWES Winter School on Water in Tlemcen during February 14-22, 2018.
- Research to Practice Forum at PAUWES, organized by PAUWES and UNU-EHS with support by Institute for Technology and Resources Management in the Tropics and Subtropics ITT and ZEF during April 16-18, 2018

Main cooperation partners

Pan African University, Institute of Water and Energy PAUWES; Pan African University (PAU); Institute for Technology and Resources Management in the Tropics and Subtropics (ITT)/TH Köln;

Institute for Environment and Human Security /United Nations University (UNU-EHS); Deutsche Gesellschaft für Internationale Zusammenarbeit GIZ GmbH.

Main funder

German Academic Exchange Service (DAAD)

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With ZEF as facilitator, the project aims at establishing and strengthening co-operation in education and research between West African Science Service Center for Climate Change and Adapted Land Use (WASCAL) Graduate School Programs (mainly on Water in Cotonou and Energy in Niamey) and the Pan African University, Institute of Water and Energy Sciences (PAUWES) by conducting joint workshops and internships.

Research activities

Utilizing the regional as well as thematic overlap and the complementary features of both organizations in the fields of water and energy and its relations on climate change to create a 'win-win-situation' mainly for students in terms of advancing research and capacity building. Key activities include:

- Interlinking both institutions towards synergisms.
- Diversifying and specifying teaching programs (e.g. exchange of students and staff, learning materials, etc.).
- Fostering internationalization by providing a platform to students and staff to interact and learn from each other, to tap, extend and intensify networks and to provide the base for a scientific network for the future.

Events

- Summer School at PAUWES took place September 15-29, 2017 and enabled deepening, disseminating and implementing of the knowledge acquired in the preceding workshops and internships of the joint project.
- Project-meeting with all partners in Accra, Ghana, in December 2017.
- Extension of the project and budget raise (07/2018-06/2020).
- Kick-off meeting for extension phase in Accra (09/2018).

Main funder

German Federal Ministry of Education and Research (BMBF)

Main cooperation partners

WASCAL Capacity Building Department; WASCAL Graduate School Program on 'Climate and Water Resources' at Université d'Abomey-Calavi, Cotonou, Benin; WASCAL on 'Climate Change and Energy' at Université Abdou Moumouni in Niamey, Niger; Pan African University, Institute of Water and Energy Sciences (PAUWES).

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Cooperation between ZEF and IPADS, University of Tokyo, Japan

Collaborative research and education on agricultural and environmental issues in developing countries

The collaboration between ZEF and the International Program in Agricultural Development Studies (IPADS), University of Tokyo, is based on a Memorandum of Understanding signed in January 2016. IPADS is an international program at master's and doctoral level that offers its candidates the opportunity to develop inter- and transdisciplinary expertise to tackle agricultural and environmental problems in developing countries around the world. The collaboration includes exchange of staff and students as well as joint research and lectures.

Research activities

- In September 2017, ZEF senior researcher Manfred Denich taught IPADS master and doctoral students on such topics as inter- and transdis-

ciplinarity, development research, agroforestry systems, forest-based land-use systems of the tropics, and fundamentals of scientific collaboration between the Global North and South.

- February/March 2018, Professor Kensuke Okada (IPADS) and Taro Takahashi (formerly IPADS, now Rothamsted Research and University of Bristol, UK) gave lectures and taught ZEF junior researchers in the topic of "Plant and Soil Management" and "Economics for Ecologists". Professor Okada's visit to ZEF was used to develop first ideas and possible topics of a joint graduate research program on "Biomass-based value chains for income generation in small-scale structured rural areas".

- In April 2018, the academic coordinator of ZEF's doctoral program BIGS-DR, Günther Manske, and four ZEF junior researchers visited IPADS and University of Tokyo to participate in a crop modeling course and discuss agricultural and development issues with their counterparts of the program.

Main cooperation partner

University of Tokyo, IPADS

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THE RIGHT LIVELIHOOD COLLEGE 4.4

The Right Livelihood College (RLC) is a global science and capacity building network of universities and the "Alternative Nobel Prize", the Right Livelihood Award (RLA) Foundation. RLC provides inter- and transdisciplinary education and research on sustainable development in the Global South. There are RLC Campuses at nine universities in Africa, Asia, the Americas and Europe. The RLC Campus Bonn at ZEF was established in 2011. In 2014, the Global Secretariat of the RLC moved from Malaysia to ZEF. The RLC Global Secretariat at ZEF coordinates and promotes the global RLC education and research activities.

Research activities

- Empirical research projects in Chile, Nigeria, Kenya and India on aspects of environmental sustainability and social justice in cooperation with Laureates and other partners.
- Inter- and transdisciplinary education of international PhD students.
- Conferences, workshops and public events with Laureates of the Right Livelihood Award and other experts.

Events

Opening of new RLC Campus at the Chulalongkorn University in Bangkok, Thailand, on July 20, 2018

RLC Workshop with all RLC Campus Coordinators at University of California, Santa Cruz, USA, on May 15-18, 2018

Workshop on "Mobilization for Change: Human Rights, Governance and the Empowerment of the Marginalized" at ZEF, September 2-7, 2017, including

a public panel discussion with Laureate Juan Pablo Orrego, President of the Chilean NGO Ecosistemas, and Dr. Imme Scholz, Deputy Director of the German Development Institute (DIE), at the Adult Education Center Bonn.

Doctoral researchers

Wan Teng Lai: We come. We work. We relate. The migrant labourers in Penang (defended in October 2017).

Juliet Wanjiku Kamau: Productivity and sustainability of ecological organic agriculture systems in Kenya (defended in June 2018).

Alejandro Mora Motta: Fundamental human needs in the context of large tree plantations in Los Ríos, Chile (ongoing).

Amit Kumar: Marginality at the interface of contemporary development processes in urban India (ongoing).

Evelyn Ewera Anyokwu: Bio-economic transition in Nigeria: identifying impacts and potential trade-offs in land use and food security (ongoing).

Publications

Juliet Wanjiku Kamau, Till Stellmacher, Lisa Biber-Freudenberger, Christian Borgemeister (2018): Organic and conventional agriculture in Kenya: A typology of smallholder farms in Kajiado and

Murang'a counties. *Journal for Rural Studies*. Volume 57, 171-185. Elsevier.

Wan Teng Lai (2017): We come. We work. We relate. The migrant labourers in Penang. PhD thesis. University of Bonn.

Willis Okumu, Kaderi Noagah Bukari, Papa Sow, Evans Onyiego (2017): The role of elite rivalry and ethnic politics in livestock raids in northern Kenya. *The Journal of Modern African Studies*. Volume 55, Issue 3, pp. 479-509. Cambridge University Press.

Main funders

German Academic Exchange Service (DAAD), Robert Bosch Foundation

Main cooperation partners

Right Livelihood Award Foundation, Stockholm; Tata Institute of Social Sciences, Mumbai; Lund University Centre for Sustainability Studies; Universidad Austral Valdivia, Chile; University of Port Harcourt, Nigeria; University of California, Santa Cruz, USA; College of Development Studies, Addis Ababa University; Chulalongkorn University, Bangkok; City of Bonn; Deutsche Welle

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SELECTED OUTREACH & SOCIAL MEDIA



December 11, 2018. **Sustainable Development in Africa: The Role of Science and Education.** Alumni Conference of DAAD African Excellence Centres in Accra, Ghana.

December 6, 2018. **Youth Townhall Meeting with Zimbabwean entrepreneur Strive Masiyiwa** (pictured above) in Berlin. Around 200 visitors discussed with Strive Masiyiwa about Africa's (green) future, among them 50 students from Africa studying in Germany. 3.3 Million people watched the event per live stream or later on Youtube and Facebook.

December 5, 2018. **Inauguration lecture at Bonn University's Dies Academicus** of ZEF senior researcher Jan Börner, who is now officially professor for economy of sustainable agriculture and bio-economy at the University.

December 3, 2018. 200 years of Bonn University: **ZEF public panel discussion on migration research** at the Forum Internationale Wissenschaft FIW Bonn.

November 4-11, 2018. ZEF co-organized a **Summer school on Green and Social Entrepreneurship for Biodiversity Conservation and Local Development** in KwaZulu Natal, South Africa, Around 50 people attended.

October 22, 2018. Public Panel Discussion at ZEF on "**Forests in the Global Bioeconomy**" with policy makers from Brazil, Indonesia, and Germany.

October 16, 2018. **Environmental peace-building and development in Colombia:** Official kick-off of the ZEF-led Doctoral Studies Support Program. The workshop took place in Bogota, Colombia.

October 2, 2018. 200 years of Bonn University: Public lecture by ZEF's director **Christian Borgemeister on global change and emerging infectious diseases** at the Forum Internationale Wissenschaft FIW Bonn.

September 25, 2018. Public Lecture at ZEF: **SDG 15 – How Land Degradation Neutrality can help integrate and accelerate other SDGs.** Speaker: Barron Joseph Orr, Lead Scientist, UNCCD.

September 19, 2018. **Professor Carolina Vera**, ZEF Board member and Vice-Chair of Work Group 1 "Physical Science Basis" of the Intergovernmental Panel on Climate Change as well as a Member of the Scientific Committee of Future Earth gave a talk on her work for IPCC.

September 17, 2018. ZEF alumna Denise Margaret S. Matias obtained the **Josef G. Knoll European Science Award** of the foundation fiat panis for her doctoral thesis. It was awarded at the Tropentag at University Ghent, Belgium.

September 12, 2018. Panel Discussion at ZEF on the **Future of Global Forest Governance** with leading international experts in forest policy.

September 10, 2018. Mobilization for Change: In Conversation with "**Alternative Nobel Prize**" Laureates from: Nnimmo Bassey from Nigeria, Hina Jilani from Pakistan and Martín von Hildebrand from Colombia at the Volkshochschule VHS in Bonn. An event by the Right Livelihood College Campus Bonn in cooperation with Association of German Development Services (AGdD).

June 24, 2018. ZEF at **Open House Day at Villa Hammerschmidt**, official Residence of the President of the Federal Republic of Germany in Bonn, who visited the event (photo below: Christian Borgemeister with Eckart von Hirschhausen).



For more events and news
please visit www.zef.de



May 18, 2018. ZEF's research showcased under the banner "**Try and taste bio-economy**" at the 11th Science Night of Bonn University (see photo above).

May 16, 2018. Jochen Dürr gave a Public Lecture at **Dies Academicus** of Bonn University on the topic "Gemüse im Kaffeewald?" about vegetable and fruit cultivation in the tropical rainforests of Ethiopia.

April 23-26, 2018. The Board of Trustees of the **International Institute of Tropical Agriculture** met at ZEF and talked with international and German experts about the crucial role of and measures for Africa's agricultural development. Around 100 people attended the public panel discussion.

April 26, 2018. ZEF senior researcher Jan Börner with colleagues James Henderson and Maximilian Meyer talked about sustainable consumption at **Kinderuni Bonn**: "Wo kommt unser Essen her? Und was hat das mit dem Urwald zu tun?".

January 31, 2018. ZEF again ranked among **the world's leading Think Tanks**. The ranking is performed by the University of Pennsylvania, USA.

January 19-28, 2018. ZEF was represented at "**Green Week**" 2018 in Berlin with panels and presentations (see photo below).



December 14, 2017. "**Think Landscape**": International course on how to think and act landscape. The course took place at ZEF in the context of the Global Landscapes Forum in Bonn.



December 08, 2017. ZEF-director Joachim von Braun was awarded the **Theodor Brinkmann Prize** by the eponymous Foundation for his achievements in the fields of global economic growth and trade, food, nutrition and poverty as well as technological innovations (see photo above).

ZEF's social media

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.



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.

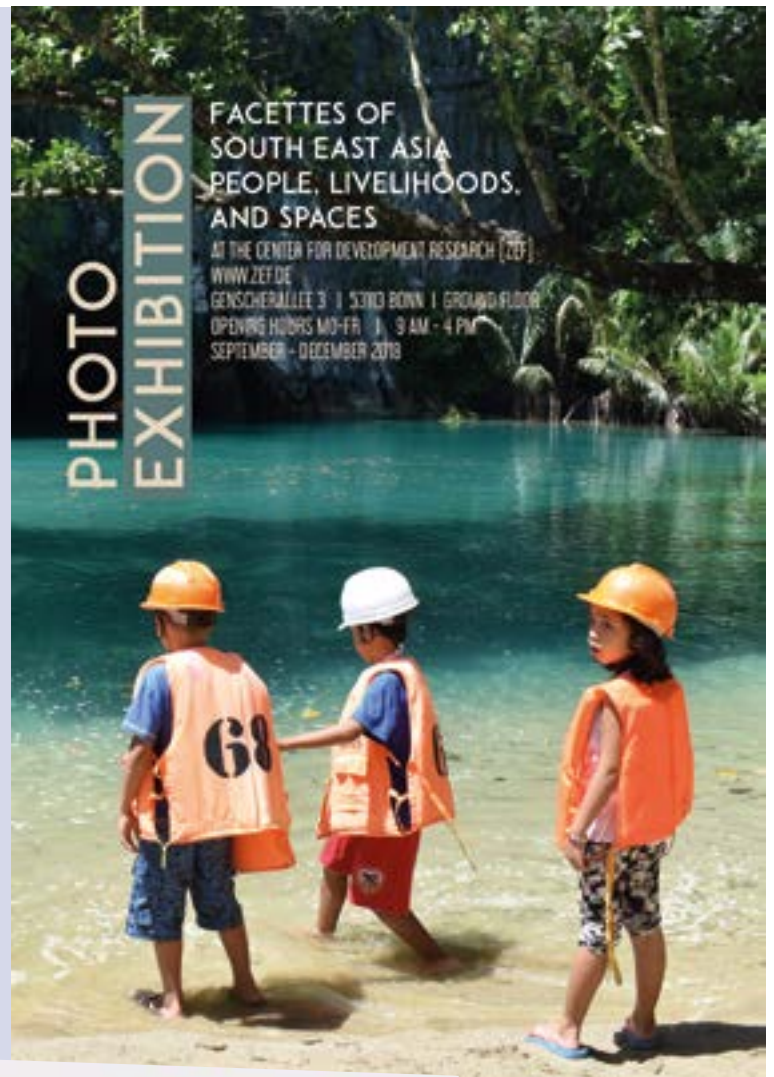
ZEF's Alumni Network

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

Field research impressions reflected in a photo exhibition @ ZEF

In 2018, **Till Stellmacher, Allen Lemence, Lenny Martini, Fatima Alfariany, Zheina Ottong, Shelley Medina and Stephanie Sangalang** had been or were conducting field research in South East Asia. Their photographic impressions of the diverse and multi-faceted region were captured in a photo exhibition at ZEF. Centered around the themes of “Urban & Rural Spaces”, “Livelihoods”, “Places of Faith and Worship” and “People” more than 30 photos were shared in the public spaces of ZEF’s foyer and entrance.

Background: ZEF's doctoral students conduct between six to twelve months field research as part of their three-year doctoral education at ZEF. Equipped with an approved research plan about what and how they want to investigate and with which local partners and, in addition, a budget for what to spend on what, they go abroad, often to their home countries, where they look into specific research questions. Depending on their academic discipline they may measure crop yields and soil matter, analyze materials in the lab, or conduct surveys among households, interview experts as well as decision and policy makers, evaluate literature and media coverage, and so on.



BUDGET 2017/2018 ZEF'S FUNDING PARTNERS

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Indirect Support*)	in Euro	in %
German Academic Exchange Service (DAAD) / German Federal Ministry of Economic Cooperation and Development (BMZ)	508,172	60,5
Own funds of students	146,800	17,5
DAAD Regional Program / German Foreign Office (AA)	57,878	8,1
SENESCYT, Panama	41,170	4,9
Katholischer Akademischer Ausländer-Dienst (KAAD)	33,300	3,9
CONACYT, Mexico	10,800	1,3
ProEcoAfrica/OFSA, Switzerland	8,100	1,0
Total	839,660	100

External Funds**)	Projects	in Euro	in %
German Federal Ministry of Economic Cooperation and Development (BMZ)	PARI Volatility II	3,526,969	32,6
• Andreas Hermes Academy (AHA)	Farmer Empowerment		
• World Vegetable Center (AVRDC)	NutriSenseProm		
• Center for International Forestry Research	Forests in the Global Bioeconomy		
• International Center of Insect Physiology and Ecology (icipe)	SCIPM		
• 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		2,200,004	20,4
• German Aerospace Center (DLR), or	CIREG RARSUS RARSUS-SEMALI STRIVE TelePath WASCAL-Consolidation WASCAL-Coordination WASCAL-PAUWES WESA		

External Funds - cont.	Projects	in Euro	in %
• Forschungszentrum Jülich (FZJ)	Globe: BiomassWeb PASIT STRIVE		
• Karlsruher Institut für Technologie (PTKA-WTE)	GROW InoCottonGROW		
German Academic Exchange Service (DAAD)		1,191,744	17,8
• DAAD	International Doctoral Studies Program Intercultural Weekend Seminar Leadership Development Seminar Research Funds		
• DAAD / BMBF	RARSUS-DAAD		
• DAAD / BMZ	Bilateral SDG-Graduate School Greening Environmental Impact Assessments in Bolivia RLC Alumni Programm		
• 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	1,001,070	9,4
German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)	IKI: IPBES Support, West Africa	681,948	6,3
German Federal Ministry of Food and Agriculture (BMEL) via		564,466	5,2
• Federal Office for Agriculture and Food (BLE)	NutriHAF Africa PROCINUT		
• Fachagentur Nachwachsende Rohstoffe (FNR)	FSS		
German Research Foundation (DFG)	SFB/Transregio 228 Virus Waterfront Metropolis Guest Researchers	333,155	3,0
Robert Bosch Foundation	RLC Network Junior Professorship	235,162	2,1
Volkswagen Foundation	Healthcap Project Research Funds	136,821	1,3
Third-Party Project Funds available after Project End	Third-Party Project Funds available after Project End	112,704	1,0
Fiat Panis Foundation	Dr. Hermann Eiselen Doctoral Program	43,720	0,4
European Union via		36,000	0,3
• Welthungerhilfe	Fostering Smallholder Agriculture in Sierra Leone		
Alexander-von-Humboldt Foundation	Research Funds	24,510	0,2
Total		10,826,253	100

Core Funds***)	in Euro	in %
Personnel Costs	1,364,603	76,9
Administrative Costs	283,530	16,0
BMBF & DFG Overhead Shares****)	126,039	7,1
Total	1,774,172	100

Indirect Support & External Funds & Core Funds **13,440,085 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.

ZEF'S INTERNATIONAL ADVISORY BOARD

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Chair of ZEF's Board

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Chair InterAcademy Partnership, Chair United Nations University Council, UNICONS

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Professor of Development Economics and Environment, University of Manchester, UK

Dr. Ernest Aryeetey

Vice Chancellor University of Ghana

Dr. Florence Chenoweth

Former Minister of Agriculture, Liberia and Director of the Food Agriculture Organization (FAO) of the United Nations Liaison Office in New York (LON)

Dr. Maria Flachsbarth, MdB

Parlamentarische Staatssekretärin beim Bundesminister für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ)

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Dr. Michael Rabbow

Senior Advisor, E&P Focus Africa Consulting GmbH, Hamburg, Germany

Prof. Dr. Günther Schlee

Direktor des Max-Planck-Instituts für Ethnologische Forschung Halle

Susanne Schneider-Salomon

Außeruniversitäre Forschungsorganisationen, EU; Internationales Ministerium für Kultur und Wissenschaft des Landes NRW

Prof. Dr. Frances Stewart

Centre for Research on Inequality, Human Security & Ethnicity, University of Oxford, UK

Prof. Dr. Holm Tiessen

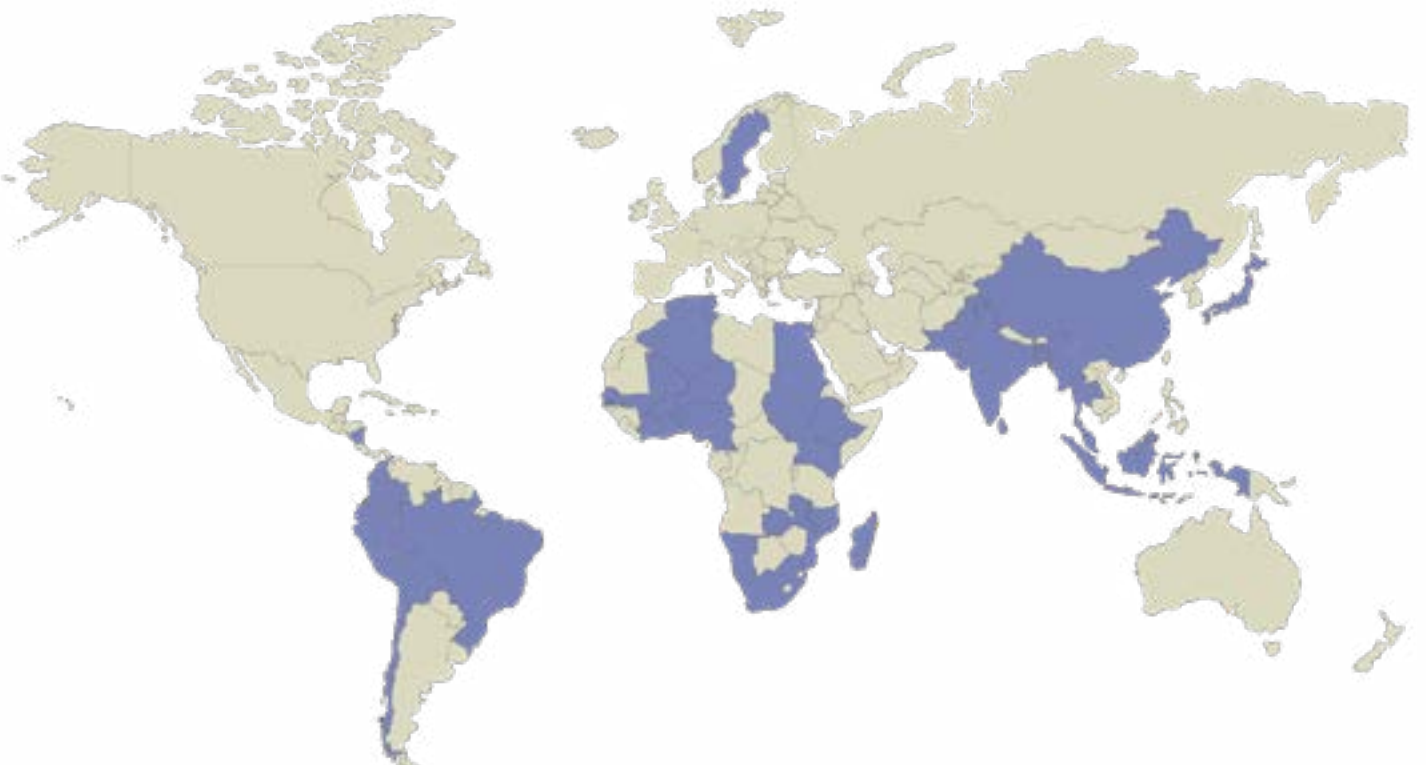
Former Director of the Inter-American Institute for Global Change Research (IAI)

Prof. Dr. Carolina Vera

Director Centro de Inv. Del Mar y la Atmósfera (CIMA), Buenos Aires, Argentina

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ZEF'S MAIN RESEARCH COUNTRIES



ABBREVIATIONS

9

AGRODEP African Growth and Development Policy Modeling Consortium

ASARECA Association for Strengthening Agricultural Research in Eastern and Central Africa

AVRDC World Vegetable Center

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, Building 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

DIE German Development Institute

DLR German Aerospace Center

DTU Technical University of Denmark

ECFF Environment and Coffee Forest Forum

ECOWAS Economic Commission of West African States

FARA Forum for Agricultural Research in Africa

FANRPAN Food, Agriculture and Natural Resources Policy and Analysis Network

FOFIFA National Center for Applied Research in Rural Development

FONAP Forum for Sustainable Palm Oil

FZJ Research Centre Jülich

GlobE BMBF'S Global Food Security Initiative

GlobalHort Global Horticulture Initiative

GIZ German Federal Enterprise for International Cooperation

HEALTHCAP Health Research Capacity and Water-Related Diseases

IFPRI International Food Policy Research Institute

ISSER Institute of statistical, social and economic research

ICARDA International Center for Agricultural Research in the Dry Areas

ICAE International Conference of Agricultural Economists

ICT Information and Communication Technologies

IDEA Institute for Environmental Studies of National University Bogotá

IITA International Institute of Tropical Agriculture

IKI BMZ's International Climate Initiative

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

IPADS International Program in Agricultural Development Studies

IPBES Intergovernmental Platform for Biodiversity

ILR Institute for Food and Resource Economics, University of Bonn

IZNE International Center for Sustainable Development

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

KoGa Horticulture Competence Centre

MCC Mercator Research Institute on Global Commons and Climate Change

PAUWES Pan African University - Institute of Water and Energy Sciences

PIK Potsdam Institute for Climate Impact Research

RWTH Aachen University of Technology

SDG Sustainable Development Goal

SEI Stockholm Environment Institute

SEWOH Special Initiative "One World Without Hunger"

UAF University of Agriculture, Faisalabad

UAM Abdou Moumouni University, Niger

UDS University of Development Studies of Tamale

UNAL National University Bogotá

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

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

WHH Welthungerhilfe

*) in alphabetical order.

