

**German Academic Exchange Service Program:
“Higher Education Excellence in Development Cooperation”**

Proposal

Full-Scale Application
of the
University of Hohenheim
for a
Development Cooperation Competence Center
denoted
Food Security Center

Hohenheim, April 30, 2009

Table of Contents

1	MILLENNIUM DEVELOPMENT GOALS AND THE ROLE OF AGRICULTURE	2
2	PERFORMANCE	2
2.1	International Study and Research Programs.....	3
2.1.1	<i>Master of Sciences Programs</i>	3
2.1.2	<i>Doctoral Schools</i>	4
2.1.3	<i>Interdisciplinary Graduate Research</i>	5
2.3	Knowledge Transfer to End-Users in Developing Countries.....	5
2.4	Knowledge Transfer to Development Policy-Actors	6
3	FUTURE CONCEPT.....	7
3.1	Conceptual Framework	7
3.2	Mission	9
3.3	Organizational Structure and Staff	9
3.4	Networking Strategy.....	11
3.4.1	<i>Partnerships in the South</i>	12
3.4.2	<i>Partnerships in the North and with International Research Centers</i>	14
3.5	Activities.....	14
3.5.1	<i>Teaching and Training</i>	17
3.5.2	<i>Research</i>	18
3.5.3	<i>Human capital formation</i>	19
3.5.4	<i>Capacity Strengthening at Development Country Universities</i>	20
3.5.5	<i>Knowledge Transfer and Brokerage</i>	20
4	PROSPECTS	21
	REFERENCES	22
	ANNEX.....	23

1 MILLENNIUM DEVELOPMENT GOALS AND THE ROLE OF AGRICULTURE

In September 2000, more than 170 heads of State and Government and heads of all the world's leading development institutions gathered at the United Nations headquarter in New York to adopt the United Nations Millennium Declaration, committing the world's nations to a new global partnership to combat extreme poverty and other scourges of humanity impeding economic and social development in the developing world (UN 2000). They identified eight key goals – known as the Millennium Development Goals (MDGs) – to be realized to meet basic needs of the world's poorest and set out a series of time-bound intermediate targets, with a deadline of 2015. In defining the Millennium Development Goals, first priority was given to “eradicate extreme poverty and hunger”, i.e. MDG1.

The World Bank's latest estimates (WB 2008) indicate that one in four people, or 1.4 billion, in the developing world are affected by extreme poverty. The number of undernourished people living in developing countries reached 923 million worldwide in 2007, particularly as consequence of the world food crisis (FAO 2008). Yet, the large number of undernourished people marks only the peak of the global food problem. A great many more suffer from food insecurity in general – a situation characterized by an inadequate access, both in physical and economic terms, to sufficient, safe, and nutritious food (FAO 1996). Aside from undernourishment in severe cases, food insecurity often leads to a less evident form of malnutrition than the simple lack of sufficient food quantities, namely to micronutrient malnutrition ('hidden hunger') that is mainly caused by a lack of food of adequate dietary quality. Rough estimates suggest that about one-third of the world's population – mostly children and women – are deficient in at least one essential vitamin or trace mineral (UNICEF/MI 2004).

In spite of a strong trend of urbanization and increasing food insecurity among urban populations in the developing world, extreme poverty and food insecurity largely remain rural problems that are closely related and may even reinforce each other. In this context, agriculture plays a crucial role, given that farming is the direct and often sole accessible source of food in subsistence households, and by far the dominant activity for income generation (WB 2007). Despite extended efforts, progress towards achieving MDG1 with respect to hunger has been especially low for the Sub-Saharan African region. Thus, further efforts are needed encompassing integrated approaches, involving all stakeholders, and driven by knowledge-based, focused, and concerted sustained actions. Higher education and science can critically contribute to the problem of hunger eradication by generating new knowledge, which helps to identify more effective and sustainable policy, institutional, and technological measures. Given the multidimensionality of the food security problem, an interdisciplinary approach with strong partnerships utilizing expertise from agricultural, natural, economic, social, and political sciences is mandatory.

2 PERFORMANCE

The University of Hohenheim (UHOH) has a long-standing experience in cooperation with Higher Education Institutions (HEIs) from developing countries as well as with national and international research centers and development organizations. UHOH has a strong proven track record in teaching and research in development-oriented agricultural sciences and related disciplines. Its expertise in this academic field is in the vanguard of German universities and has achieved an outstanding reputation in the international context (WR 2006). The German Council of Science and Humanities (WR) acknowledges UHOH's efforts accordingly: “The major in [Agricultural Sciences in the] Tropics and Subtropics with its Special Research Program is formidable. The combination of specific issues of tropics and subtropics oriented and general agricultural professorships cooperating in the Center for Agriculture in the Tropics and Subtropics seems to have been successful in

particular” (WR 2006, p. 129).¹ Furthermore, the council argues that the Faculty of Agricultural Sciences in Hohenheim is “the most networked and thematically broadest one of its kind in Germany,” and “the faculty has the ability to successfully implement and administer large-scale projects.” In addition, “both the university management and the faculty possess clear concepts and a vision for the future medium and long-term development as well as the instruments necessary for its realization” (p.128-9).

In the following, we demonstrate that UHOH has excellent competencies and ideal conditions for establishing a Development Cooperation Competence Center that aims at expanding MDG-relevant teaching and research activities in cooperation with national and international partner organizations and HEIs in developing countries. For some 30 years, UHOH’s teaching and research related to development issues have been essentially coordinated by its Center for Agriculture in the Tropics and Subtropics (TROZ) that is also of central importance for establishing the planned Development Cooperation Competence Center, hereinafter referred to as Food Security Center (FSC).

Since its foundation in 1982, the backbone of TROZ are ten chairs exclusively working on development issues in the fields of plant and animal sciences, agricultural economy and sociology, and agricultural engineering in the tropics and subtropics. As cross-sectional and interdisciplinary center, TROZ welcomes scientists as associated members from all three UHOH faculties (Faculty of Agriculture, Faculty of Natural Sciences, and Faculty of Business, Economics, and Social Sciences), who are also engaged in development-oriented teaching and research. Currently, about 100 members across more than 42 disciplines are associated with TROZ, thus strengthening development-related education and training of international students in the fields of agricultural, environmental, and food sciences and related disciplines at Master of Sciences (MSc) level and being actively involved in interdisciplinary development-oriented research and transfer of this knowledge to developing countries. TROZ’s management board is the decision making body between the member’s assembly that meets once a year. The advisory board – comprised of representatives from industry, science, civil society organizations and political parties – promotes the work of the center to the general public.

2.1 International Study and Research Programs

The agricultural faculty can demonstrate its outstanding experience in education of international students and from developing countries in particular. Last winter semester, 192 of 250 students (77%) enrolled in MSc programs offered in English and taking reference to development issues were non-Germans, of whom 15 students were from Latin America (3%), 58 from Africa (23%), and 85 from Asia (34%). Of 540 PhD students enrolled at the agricultural faculty, more than 40% were of foreign nationality and about 20% from developing countries (cf. Table A1 in the annex).

2.1.1 Master of Sciences Programs

In 1999, TROZ initiated the first MSc program offered in English in Hohenheim, i.e. “Agricultural Sciences in the Tropics and Subtropics” (AgriTropics). The course program is interdisciplinary and designed to provide students of all nationalities with scientific training in all areas of the agricultural sector and related fields. Skills in communication, negotiation, and project implementation are taught in addition. In recent years, an interdisciplinary case study has been added to the curriculum that is preferentially carried out in developing countries with the support of partner organizations. In 2008, the AgriTropics course was awarded by the German Academic Exchange Service (DAAD) as one of the ten best international MSc programs in Germany.

¹ All quotations in this paragraph were translated from German. The report of the German Council of Science and Humanities (WR 2006) is available in German only.

Since the dawn of the new millennium, another three MSc programs taught in English with direct reference to development-related problems and focus on different specializations along the food chain have been established at the agricultural faculty, supported by TROZ. These are “Agricultural Economics” (AgEcon), “Environmental Protection and Agricultural Food Production” (EnviroFood), and “Organic Food Chain Management” (OrganicFood). Since 2007, the AgEcon program has been supported by DAAD, recognizing its international and development-oriented focus.

TROZ fosters the internationalization of all four MSc programs by taking the lead in establishing an Alumni network. This activity is currently funded by the DAAD AlumniPlus program. The center is regularly organizing field excursions to developing countries to provide hands-on experience on development-oriented research and project implementation strategies. Moreover, TROZ supports the participation of international students in the yearly Tropentag conference, seminars and workshops in Germany dealing with development issues. In close cooperation with partner HEIs in developing countries, UHOH’s efforts in expanding interdisciplinary development-oriented education and training will also continue in the future. For example, Chiang Mai University (Thailand) and UHOH have implemented the first international MSc program with a joined degree on “Sustainable Agriculture and Integrated Watershed Management” (SAIWAM) in Chiang Mai, which has been partly funded by DAAD. The first batch of students from Germany, Thailand, and neighboring Asian countries enrolled in March 2009. Students are not only able to complete courses both in Chiang Mai and Hohenheim, but UHOH professors also share core courses with their counterparts and thereby foster closer collaboration. In Africa, UHOH is partner of Sokoine University of Agriculture (SUA) and support its MSc program in Agricultural Economics to become accredited under the regional “Collaborative Masters Program in Agriculture and Applied Economics”. The regional program mainly addresses students from Eastern and Southern Africa and is funded by DAAD for the period 2009-12. In 2008, Hohenheim became a member of the “International Platform for Asian Agricultural Education”. This association aims at establishing international standards for higher education in agricultural sciences and is sponsored by the Japanese Government. In this framework, partner universities are Kyushu, Kobe, and Tokio University in Japan and Chiang Mai and Kasetsart University in Thailand.

Thanks to the support by external donors, UHOH’s development-related engagement has been intensified and will be further extended in the future, in compliance with the strategic plan of the university. In addition to the grants from third-party funded research programs and projects (see below), the Father and Son Eiselen Foundation in particular has contributed in a dedicated manner to the success of TROZ in training young, international development experts at MSc level. The Eiselen Foundation provides grants for scholarships to students for travels to developing countries in the frame of their MSc theses to conduct innovative research for fighting hunger and poverty. To date, the foundation has awarded grants to 475 MSc students for carrying out field research in developing countries. Until 2008, another 65 students of the AgriTropics program received scholarships from a matching fund program, jointly offered with DAAD.

2.1.2 Doctoral Schools

Aside from the wide range of international MSc programs, the agricultural faculty currently offers seven doctoral schools (“Promotionskollegs”), of which two have a strong development focus, namely “Tropical Agriculture, Food, and Resource Sciences” and “Economic and Social Sciences of the Agriculture-Food System”. Besides, there are two research training groups (“Graduiertenkollegs”).² The international research training group “Modeling Material Flows and Production Systems for Sustainable Resource Use in Intensified Crop Production in the North China Plain” was jointly established by the German Research Foundation (DFG), the Chinese Ministry of Education, and the China Agricultural University at UHOH in 2004. Another research

² Cf. <https://agrar.uni-hohenheim.de/promotionsstudiengang.html?&L=1>.

training group is planned by TROZ in Laos and/or Cambodia in collaboration with local partners and Chiang Mai and Kasetsart University in Thailand. The research project will address climate change, food security, and watershed management issues in this dynamically developing area of Southeast Asia. With the help of the planned FSC, the research training group will be developed to address issues of competition between natural resources use for industry and biofuel and food security, and thus enhance the capacity and attractiveness of local partners. Furthermore, UHOH was pre-selected with its GrassNet in the DAAD call “Climate Change Networks” as best of 11 proposals submitted. GrassNet intends to initiate a research and educational network on grassland issues with partner universities in Argentina, Kenya, and China.

Nonetheless, we agree with the WR (2006) statement that – both in Germany and Hohenheim – significant improvements in attracting international, scientific excellence are mandatory to increase our international competitiveness. Therefore, establishing a highly competitive, international PhD education program is necessary. To this end, the agricultural faculty has set up a supportive framework which would ideally complement the training courses of development experts associated with TROZ (WR 2006) and the planned FSC.

2.1.3 Interdisciplinary Graduate Research

The DFG-funded Special Research Program (SFB) "Adapted Farming in West-Africa" (SFB 308, 1985-1999) was not only the first large interdisciplinary project (comprising 17 subprojects and a total funding volume of 17.5 Mio. Euro) on development-oriented research in tropical agriculture coordinated by TROZ, but also the pioneer SFB of DFG implementing large applied agricultural research in two developing countries, namely Benin and Niger. In total, 80 students from Hohenheim completed their MSc/diploma and 55 students their PhD research within the framework of this program. In 2000, the SFB 564 on “Sustainable Land Use and Rural Development in Mountainous Regions of Southeast Asia” (known as “The Uplands Program”) in northern Vietnam and northern Thailand was initiated with partner universities in both countries. To date, 74 MSc and 72 PhD students from Hohenheim and some more from the partner universities have been involved in the program. In February, the fourth phase of the SFB 564 (2009-2012) was positively pre-evaluated. Thus, UHOH is the only German university consecutively running SFBs focusing on development-oriented research in agriculture since 1985.

Other larger interdisciplinary projects of UHOH involving MSc and PhD students are, for example, dealing with genetic and plant breeding aspects related to climate change, development of decision-making tools for sustainable landscape management, and bioenergy issues. Table A2 in the annex gives an overview on past and ongoing development-oriented research projects with individual budgets above 100 tsd. € and List A3 shows selected publications with relevance to development issues in peer-reviewed journals that largely emerged from the past and ongoing research programs/projects. Furthermore, the project finding phases for two succeeding SFB’s have started already. One of these projects is focusing on climate change adaptation strategies for the agricultural sector in Eastern Africa; the other SFB initiative is dealing with underutilized plants in Latin America.

2.3 Knowledge Transfer to End-Users in Developing Countries

Researchers of TROZ are addressing development issues with partner organizations worldwide by participatory and interdisciplinary research approaches aiming at generating new approaches and transferring them to developing countries. SFB 564 has initiated to link farmers and retailers in fresh litchi marketing, and – to add value in litchi production of local farmers through processing – a community-based fruit-processing facility was established by the support of involved researchers from Hohenheim in Chiang Mai in 2007. Moreover, a central milestone in the plan of action for the fourth phase of SFB 564 is to intensify interaction and cooperation with local stakeholders to

transfer knowledge and innovations to the rural population in need and to make important scientific contributions towards more sustainable land use systems. In the third phase, subprojects have generated research results with large potential for beneficial innovation transfers, which will be utilized in three special transfer projects in the fourth phase. Beyond that, multi-agent system software and land use models will be coupled with other tools to analyze various scenarios and to assess innovations and policies and make an impact at the farm, household, watershed, and national level. Building on the experience in the previous phases, participatory research methods will be used in this measure, including continuous feedback loops between software developers and stakeholders.

Other examples of UHOH's engagement in transferring knowledge to end-users include the following activities:

- The project "Fostering Rural Development and Environmental Sustainability through Integrated Soil and Water Conservation Systems in the Uplands of Northern Vietnam" addresses the complex issue of viable soil and water conservation. Since such natural sciences dominated projects had only limited practical impacts in the past, the project focuses on training of district and province extension workers, conduct of field visits, multi-stakeholder workshops, and the production of extension material in Vietnamese and local languages.
- Within the project "Living Landscapes China" (LILAC), approaches for better participatory land use planning are developed in which both economic development and the maintenance of natural and cultural heritage can be reconciled. Local stakeholders will work together with researchers from Hohenheim to develop 'storylines', which will be converted into scenarios of future land use. The resulting integrated model based on a geographic information system (GIS), can be used at local, regional, and even national level for land use planning.
- Within the community-based initiative on Ready to Use Food (RUF) products for extremely malnourished Indonesian children, the Department for Biological Chemistry and Nutrition in cooperation with the Department for Gender and Nutrition has developed nine recipes for RUF products by utilizing local food sources, so to prevent children to be hospitalized as a result of undernutrition. Recipes were tested with needy children, and the two most favored RUF biscuits (made of wheat flour, peanut, soy bean/mung bean, oil, sugar and micronutrient premix) have been produced and distributed in specific intervention programs.
- Researchers of UHOH discovered a new cooking stove design that allow for use of plant oils as fuel. Bosch-Siemens adopted the technology and developed it for mass production. People were trained in usage of the stoves and their experience was utilized in fine tuning the technology.
- In close cooperation with the nature foundation EuroNatur, researchers of UHOH and Leyte University (Philippines) developed the "Rainforestation Farming Technology". The project successfully encouraged farmers to plant indigenous tree species, including fruit trees and multi-purpose trees, and fiber plants such as abaca (*Musa textilis*) and thus provide the rural poor with a sustainable and diversified source of income.

2.4 Knowledge Transfer to Development Policy-Actors

UHOH is embedded in national and international development policy networks and engages in a large variety of communication activities to place rural development issues at the forefront of the international agenda. These activities include the following selection of events:

- Conference "Stuttgarter Wissenschaften – Lösungen für die Eine Welt", jointly organized by UHOH, the City of Stuttgart, and the German Agency for Technical Cooperation (GTZ) to strengthen a holistic view on development problems and solutions: Participation of more than 180 representatives of political parties, governmental and non-governmental development organizations, and the general public

- Conference “Tropentag” 2008 on “Competition for Resources in a Changing World: New Drive for Rural Development” in Hohenheim:³ Participation of more than 600 scientists, representatives from political parties, governmental and non-governmental development organizations, and the media
- Regular meetings between TROZ members and members of the Parliament (“Landtag”) of Baden-Württemberg and from the private sector to share information on ongoing research and recent research findings; e.g., scientific policy advice to the German liberal party FDP on its meeting on “EU Guideline on Bioenergy Production and Use”
- Various scientific contributions to program “Bioenergy” by the Federal Ministry of Development Cooperation (BMZ) and GTZ, including policy advice, briefing papers, and consultancy reports on socio-economic and biophysical impacts of bioenergy production and related issues

3 FUTURE CONCEPT

Based on the magnitude and urgency of the global problem and the existing wide competence in agricultural, natural and socio-economic sciences, UHOH proposes to establish a Development Cooperation Competence Center that orients towards the eradication of extreme poverty and hunger (MDG1). The center will focus on the third target of MDG1, which entails to halve the proportion of people who suffer from hunger by 2015, in particular, but it will also consider food security aspects other than extreme poverty and hunger, so that the planned center has been referred to as Food Security Center (FSC).

The FSC concept was developed by a working group that consists of professors from all three faculties of UHOH, including representatives of TROZ, the Competence Center for Gender and Nutrition (KGE), and the Life Science Center (LSC).⁴ A fact finding mission (FFM) workshop with six representatives from African, Asian, and Latin American partner HEIs was held in Hohenheim on March 30-31 to identify educational needs in the regions and common interests and capacities for teaching and research cooperations, as well as to plan possible joint activities.⁵ In addition, the visions and needs of two representatives of our national and international partner development organizations, namely of the FoodFirst International Action Network (FIAN) and Bread for the World, expressed on a meeting in Hohenheim entered the concept as well.⁶ Integrated suggestions of responsible persons at GTZ and the centers of the Consultative Group on International Agricultural Research (CGIAR) were voiced in face-to-face and email communications.

3.1 Conceptual Framework

The FSC engagement concentrates on the problem area of hunger and food insecurity as shown in Figure 1. The concept of the center’s mission follows the universally accepted definition of food security as agreed on the World Food Summit in 1996, i.e. „food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their

³ To date, the “Tropentag” conference has become the most important conference on development-oriented research in rural and peri-urban areas of the tropics and subtropics on the European continent. It is alternately organized by German and Swiss universities.

⁴ Cf. Table A5 in the annex.

⁵ Attendees of the workshops were E. Adipala (Regional University Forum for Capacity Building in Agriculture) and A. Temu (Sokoine University, Tanzania) for Africa, W. Chongrattanameteekul (Kasetsart University, Thailand) and D. Boonyakiat (Chiang Mai University, Thailand), H. Jensen (University of Costa Rica) and D. Stoian (Centro Agronomo Tropical de Investigacion y Ensenanza) and M. Zeller, G. Cadisch, O. Ecker, L. Kammesheidt, A.C. Bellows, K. Biesalski, T. Grune, H. Grethe, J. Müller, and J. Wünsche from UHOH.

⁶ Attendees of the meeting were F. Valente (Secretary General of FIAN International), M. Windfuhr (Human Rights Director of Bread for the World), and M. Zeller, G. Cadisch, A.C. Bellows, L. Kammesheidt, and O. Ecker of UHOH.

dietary needs and food preferences for an active and healthy life” (FAO, 1996). Thus, FSC activities address issues that also go beyond the challenge of eradicating hunger and malnutrition. The competence center considers the food problem in a multidimensional context, making the link to poverty and accounting for direct and indirect causes and consequences of the problem and the interactions of determining factors.

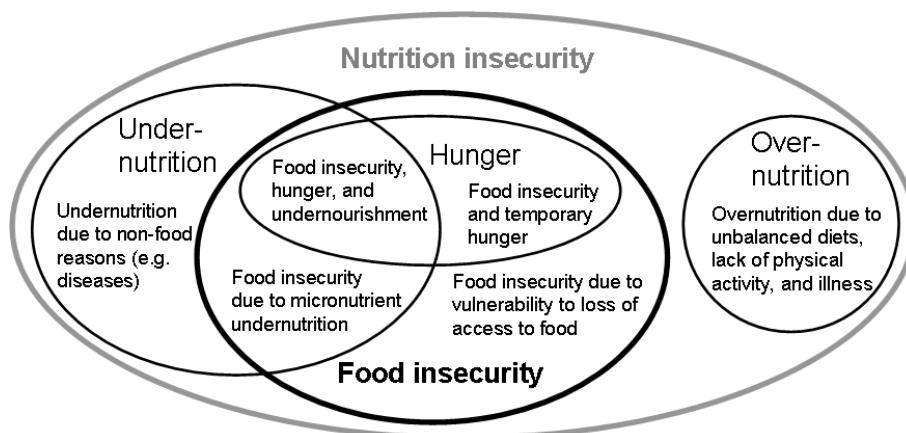


Figure 1: Overlapping concepts within the context of nutrition insecurity

Source: Adapted from Benson 2004.

More precisely, FSC’s competence includes aspects of (sustainable) food availability, (economic) food access, food use (storage, processing, preparation), food safety (contamination, freshness, etc.), food quality (micronutrient content, dietary diversity, etc.), and food utilization (i.e. interaction of dietary and health factors). Given that achieving food security requires actions at the micro-, meso-, and macro-level, the individual and household perspective as well as the local, national, regional, and global perspective is taken into consideration. In view of the special role of women for achieving food security, particular emphasis is given to gender issues, linking aspects of MDG3 (i.e. promoting gender equality and empowering women) and MDG1. Moreover, especially with regard to the food and nutrition situation of future generations, comprehensive investigations of the ecological sustainability of agricultural production in the tropics and subtropics are mandatory for FSC. This perspective links MDG7 (i.e. ensuring environmental sustainability) to MDG1. Given the multidimensionality of the food security problem, an interdisciplinary approach utilizing expertise from agricultural, natural, economic, social, and political sciences is needed.

Strategic research themes of the FSC have been identified in consultation with partners in the developing and developed world. They are:

- Undernourishment, malnutrition, and vulnerability of individuals and households and the role of gender, ethnicity, minorities, voice and indigenous knowledge in the formulation and implementation of food, agricultural, and safety net policies,
- Food quality and safety along the food chain (social responsibility, social, and environmental food standards),
- Climate change and increasing water scarcity and impacts on local and global food security and sustainable agricultural production and ecosystem resilience in the tropics and subtropics,
- Synergies and conflicts between food security and the production of renewable resources and bioenergy,
- Utilization of biotechnology and genomic diversity for achieving future food needs in terms of quantity and quality,
- Food security in the context of global and local markets and consumer policy, and
- Monitoring and impact analysis of food and agricultural policies and projects.

For these strategic themes, the research by FSC and its partners seeks to identify technological, institutional, and policy measures that can contribute to the reduction of hunger and malnutrition by the dissemination of enhanced knowledge to decision makers at global, national, regional, and local level.

3.2 Mission

FSC's mission is to provide innovative and effective contributions in the areas of teaching, research, and policy advice in cooperation with national and international development organizations and partner HEIs in the developing world to achieve MDG1 and to tackle the global problem of food insecurity. The objectives of the proposed FSC and expected achievements by end of DAAD funding in June 2014 are summarized in Table A6 in the annex. With these objectives, FSC and its partner institutions seek to make a contribution to the development cooperation strategy of the German Government and to the national and regional development policies aiming at reducing hunger and malnutrition in developing countries (cf., for example, references to MDG1 in the national Poverty Reduction Strategy Papers and initiatives taken by regional organizations, such as the New Partnership for African Development, NEPAD).

The primary target group of FSC's engagement comprises people affected by hunger and/or malnutrition or people being at risk of food insecurity. Prior research identified children, women, and elderly as being particularly vulnerable to hunger and malnutrition. The secondary target group includes decision makers in development-oriented governmental, donor, and civil society organizations both in industrialized and developing countries that are involved in the formulation and implementation of food, agricultural, and related development policies and projects aimed at fighting poverty, hunger, and malnutrition in the developing world. The tertiary target group consists of scientists and graduate students at partner HEIs in Sub-Saharan Africa, South and Southeast Asia, and Latin America.

Improving knowledge and skills of scientists and students in developing countries seeks to benefit the primary target group directly or indirectly via the secondary group. The direct knowledge and technology transfer from the tertiary to the primary target group is achieved by targeting research projects to the needs of people affected by food insecurity, involving them in the process of knowledge generation, and giving them feedback on research findings. The indirect knowledge and technology transfer via the secondary target group involves two main pathways. First, better educated scientists and students especially in the developing world can improve the performance and efficiency of governmental and non-governmental development organizations, when they continue their career with those, and second, enhanced expertise of HEI scientists improves their policy advice to relevant organizations. The above pathways regarding the role of strengthening higher education in the food and agricultural sector for combating hunger and malnutrition have gained increasing recognition during recent years by national governments and international donor organizations, after a period of about 20 years of decline in real spending for research and training related to food, agriculture, and rural development. For example, the Comprehensive African Agricultural Development Program of NEPAD earmarks strengthening of agricultural research and training in Africa as one of its four pillars. NEPAD has elected the Forum for Agricultural Research in Africa (FARA) as the lead institution to implement this pillar, and has engaged the Regional University Forum for Capacity Building in Agriculture (RUFORUM) – one of UHOH's strategic partners – in implementing a capacity strengthening program with African agricultural universities. Hence, FSC builds on existing networks through which the above identified target groups are effectively reached. Our networking strategy is discussed in section 3.4, and the plan of action to achieve FSC's mission and planned activities are presented in section 3.5 in detail.

3.3 Organizational Structure and Staff

Similar to TROZ, the proposed FSC will be organized as an interdisciplinary, cross-cutting institution that bundles the competences of professorships with expertise in food security issues from all three faculties of UHOH. More precisely, FSC assembles all department divisions that are members of the TROZ and thus have a focus on agriculture in the tropics and subtropics as well as

those members of KGE and LSC with development-relevant expertise in the field of food security. Overall, the FSC membership comprises 54 divisions from 26 departments.⁷

FSC will be administered as independent institution with own management and self-supporting budget. Nonetheless, it is affiliated to TROZ to ensure a close cooperation between the two centers and to utilize synergies in organization and coordination of joint activities. TROZ and FSC share the same advisory and management board. For the inception of FSC, the current management board of TROZ will be extended by inclusion of the newly appointed director of the FSC and by three additional professorial board members strengthening its competence in FSC-related issues (cf. Figure 2).⁸ The boards meet within the framework of the annual planning and monitoring workshop at year's end together with regional coordinators and strategic partners. Besides, the management board regularly meets in a video conference biannually during the summer semester. The advisory board will also be expanded by three members from partner organizations (including those from the south); its responsibility is to provide guidance and feedback to the management board strategic issues, especially with respect to strengthening and expansion of FSC's network, activities, and impact. The management board is composed according to UHOH guidelines and responsible for award of scholarships and identification and promotion of strategic partnerships including fund-raising (together with regional coordinators), review of budget and personnel, monitoring, and liaison with stakeholders in the North and South.

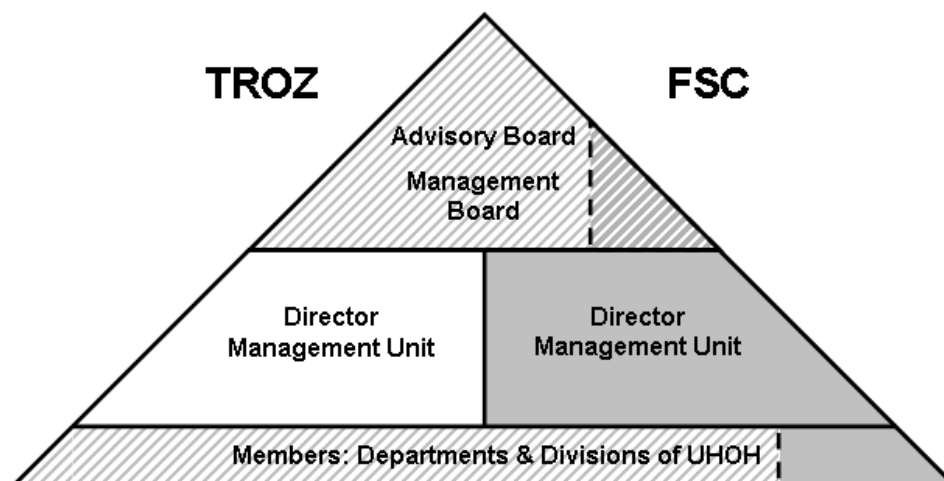


Figure 2: Organizational structure of TROZ and FSC

FSC's director is elected twice during the five-year DAAD funding period. The FSC management unit consists of two full-time staff positions, namely the executive manager and a managing assistant. The executive manager's responsibilities require a PhD degree in an area directly relevant to food security research as she or he has to also represent the mission, vision, and activities of FSC to stakeholders, partners, and the general public. The manager is responsible for coordination of FSC activities in collaboration with the regional coordinators, the operational management of FSC, and the liaison with partners and stakeholders in the North and South. Apart from management (80%), the executive manager is expected to spend parts of her/his work time (of about 20%) for teaching of FSC courses and preparation of new fundraising initiatives in research and teaching. The managing assistant is mainly entrusted with public relations, administration including accounting and secretarial work. This full-time position might be also split into two half-time positions, as public relations and administration officer. Public relations work includes web administration, coordination of FSC communication strategy with strategic partners in the North and South, and collaboration with UHOH's press department. In addition, the management unit is also responsible for mentoring and assisting FSC students in non-academic affairs. Four graduate student assistant positions (each contracted for 20 hours per month) are recruited to assist the

⁷ The member departments and divisions are listed in Table A5 in the annex.

⁸ Cf. http://www.troz.uni-hohenheim.de/about_us/organisational_structure.

management. UHOH's rector has already pledged to provide three offices for the FSC executive manager, managing assistant, and visiting professor. Expenses for basic equipment will be met by TROZ.⁹

The FSC visiting professorship funded by DAAD is filled in rotation by scientists from developing countries with core competence in the field of food security for an initial period of one year. The position is renewable for one additional year on the basis of performance review. The professorship rotates across different, relevant disciplines (e.g., economics, agricultural, nutritional sciences) and geographical regions (Africa, Asia, and Latin America). In general, FSC wishes to attract scientists who are either internationally well-known senior experts with distinct networks in the developing world or internationally outstanding young experts demonstrating superior competence for innovation, especially with respect to empirical methods in the field of food security. The professor is primarily responsible for contributing to FSC's mission by carrying out innovative research, publications, teaching, student supervision, and outreach to development practitioners. Her/his engagement is supported by one graduate student assistants (contracted with 20 hours per month). After the FSC network is fully established, the visiting professorship might be transformed into a junior professorship so that young, talented teaching staff from developing country HEIs can gain experience and be trained for their future teaching job at their home universities and colleges. Thus, this measure also serves as a direct contribution to human capital formation in the higher education of developing countries, from which students might benefit in first instance.

To coordinate FSC activities in Africa, Asia, and Latin America, to network activities of partner HEIs within the regions and with those of FSC, and to expand the FSC network, one regional coordinator position (part-time, 25%) in each of the three regions is planned. In cooperation with FSC management unit, the regional coordinators are in charge of identification, communication, and organization of FSC activities and events, arrangement of research and teaching cooperation between local and FSC affiliated institutions, and identification of persons to be sponsored. In region-specific issues, the regional coordinators advice the management board (that together assemble to the management committee). The coordinator positions are affiliated with the regional strategic partner institutions and might hence rotate in the course of the project. The coordinators' work is assisted by a graduate student assistant (contracted for 20 hours per month). In 2009/10, the regional coordinator for Africa is based in the RUFORUM headquarter on the campus of Makerere University in Kampala (Uganda), for Asia at Kasetsart University in Bangkok (Thailand), and for Latin America (V. Jiménez) at the University of Costa Rica in San Jose.

3.4 Networking Strategy

The proposed FSC builds on existing long-term partnerships of UHOH with development institutions in Germany and Europe, with international agricultural research centers such as those of the Consultative Group on International Agricultural Research (CGIAR), and with universities and regional scientific networks in the developing world. A guiding principle of all partnerships is that mutual learning on the basis of equal partnership and knowledge exchange as well as demand-driven research and teaching is critical for effective human capital formation, problem-oriented capacity strengthening, and forward-looking setting of research and teaching priorities that decisively respond to the knowledge needs of development institutions (i.e., national and international donors, national governments, and non-governmental organizations) in combating hunger and malnutrition. Another guiding principle of FSC's networking strategy is to collaborate with and to strengthen existing scientific and development-oriented networks in the South rather than creating new networks from scratch. However, our long-term strategy is to set up an alumni system that is accessible by any of the present and future partner institutions or network

⁹ FSC is an equal opportunity center. Females are particularly encouraged to apply for academic and non-academic positions.

organizations so as to facilitate decentralized services in knowledge brokerage and transfer. Hence, it is expected that FSC's graduates will assume leadership functions in international organizations, national governments, private sector, non-governmental organizations (NGOs), and other civic organizations, involved in the food, agriculture, and nutrition sector. These graduates can then provide catalytic functions in the further deepening and/or expansion of the network while at the same time utilizing the knowledge brokerage function of the center.

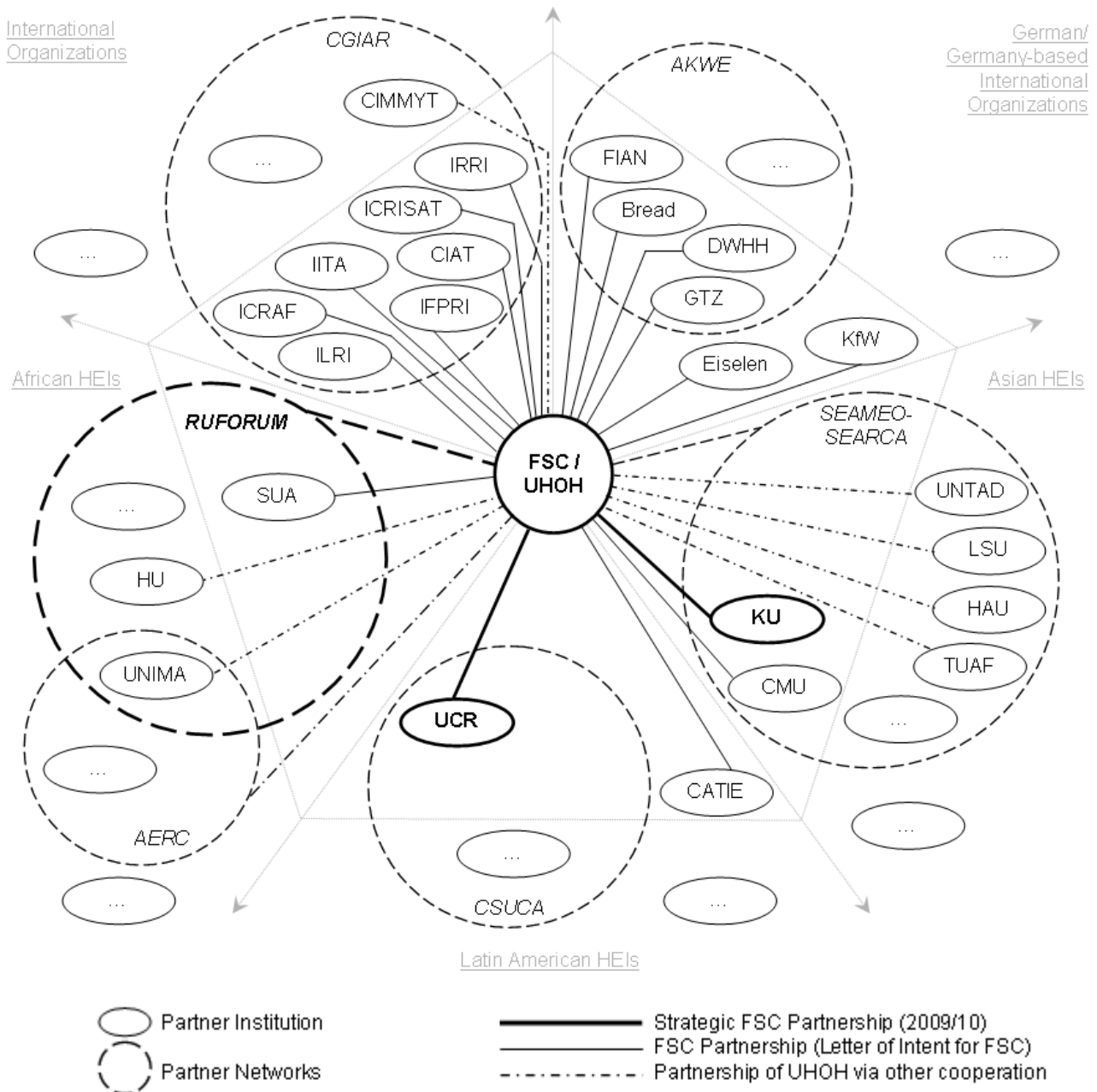
Figure 3 presents the structure of FSC's network. With each partner shown in Figure 3, long-term formalized cooperation with UHOH either exists or has been discussed and agreed upon for the establishment of FSC.¹⁰ The hyphenated circles represent existing institutional networks, namely CGIAR, comprising the institutions having already agreed to collaborate with FSC; the working group on World Nutrition (i.e. "Arbeitskreis Welternährung", AKWE), convened by GTZ and consisting of major governmental and non-governmental; RUFORUM; the Southeast Asian Ministers of Education – Southeast Asian Center for Graduate Study and Research in Agriculture (SEAMEO-SEARCA); the African Economic Research Consortium (AERC); and the Consejo Superior Universitario Centroamericano (CSUCA).

3.4.1 Partnerships in the South

In each region, FSC will closely work with one strategic regional partner (marked bold in Figure 1) and another strategic partner in Africa, Asia, and Latin America, respectively. A main task of the strategic regional partner institutions is to foster the regional expansion of the FSC network and particularly expand the outreach to and inreach from organizations that directly represent the target group (e.g., farmers organizations, women groups) or organizations that implement development policies or projects aiming at hunger and malnutrition reduction in the region. Strategic partnerships might rotate in the further course of the project. The work of the additional strategic partners in the regions will complement the work of the regional strategic partners in research, teaching, and outreach activities.

For Sub-Saharan Africa, RUFORUM has agreed to perform the coordinating role at the regional level. In addition, Sokoine University of Agriculture – as a member university of RUFORUM and as a partner in the already DAAD-funded university collaboration regarding postgraduate education in agricultural economics – will perform teaching and research functions. In Latin America, FSC works with the University of Costa Rica, which is also a member university of CSUCA. In addition, FSC has entered into a formal partnership with CATIE, which is a major regional player not only in postgraduate research and training, but it has also strong links – as a member of the Inter-American Institute on Agriculture (IICA) – into networks that review and formulate development policies in the area of food, agriculture, and nutrition. In Asia, FSC will focus first on the Southeast Asian region. Kasetsart University is a leading university in Southeast Asia with regional outreach due to its English language teaching program. The university is also a member university of the regional network of SEAMEO-SEARCA. Because of the long-term partnership between UHOH and Kasetsart University in the frame of the Special Research Program in Northern Thailand and Northern Vietnam, Kasetsart University with its regional mandate and mission is an ideal regional strategic partner for FSC. In collaboration with Kasetsart University, Chiang Mai University, and university partners in Cambodia and Laos, FSC plans to establish a regional PhD program focusing on food security. This planned FSC activity has already been initiated through first consultative talks at Kyushu University in Japan in February. Moreover, SEARCA has agreed to perform additional services as a strategic partner of FSC by taking its comparative advantage as a network with outreach to universities in all Southeast Asian countries.

¹⁰ Table A4 in the annex lists the institutions holding formalized cooperation agreements with UHOH specifically for cooperations in the frame of FSC. The Letters of Intent are attached. Box A7a, A7b, and A7c in the annex presents the profiles of the strategic partner institutions in Africa, Asia, and Latin America, respectively.



AKWE = World Food Working Group; FIAN = FoodFirst International Action Network; Bread = Bread for the World; GTZ = German Agency for Technical Cooperation; DWHH = Deutsche Welthungerhilfe; Eiselen = Father and Son Eiselen Foundation; KfW = KfW Bankengruppe; SEAMEO-SEARCA = Southeast Asian Ministers of Education – Southeast Asian Center for Graduate Study and Research in Agriculture; UNTAD = Tadulako University (Indonesia); LSU = Leyte State University (Philippines); HAU = Hanoi University of Agriculture (Vietnam); TUAF = Thai Ngyuen University for Agriculture and Forestry (Vietnam); KU = Kasetsart University (Thailand); CMU = Chiang Mai University (Thailand); CATIE = Centro Agronomo Tropical de Investigacion y Ensenanza (Costa Rica); CSUCA = Consejo Superior Universitario Centroamericano; UCR = Universidad de Costa Rica; RUFORUM = Regional Universities Forum for Capacity Building in Agriculture; AERC = African Economic Research Consortium; SUA = Sokoine University of Agriculture (Tanzania); HU = Haramaya University (Ethiopia); UNIMA = University of Malawi; CGIAR = Consultative Group on International Agricultural Research; CIAT = Centro Internacional de Agricultura Tropical; CIMMYT = Centro Internacional de Mejoramiento de Maiz y Trigo; ICRISAT = International Crops Research Institute for the Semi-Arid Tropics; IFPRI = International Food Policy Research Institute; IITA = International Institute of Tropical Agriculture; ILRI = International Livestock Research Institute; IRRI = International Rice Research Institute; ICRAF = World Agroforestry Center

Figure 3: Formalized partnerships within the FSC network

3.4.2 Partnerships in the North and with International Research Centers

Building on the long-term development focus of UHOH in development-oriented research, teaching, and policy advice, the university has already entered a number of partnership agreements with institutions in Germany. Basically, FSC will collaborate with four types of institutions in Germany and other industrialized countries. First, FSC has received letters of intent (LOIs) for partnerships from GTZ and KfW Bankengruppe as implementing development agencies of the BMZ for technical and potential financial assistance, respectively. It is also of note that F. Heidhues and M. Zeller are members of the German Science and Humanities Council of BMZ. Second, the FSC has concluded partnership agreements with leading German and Germany-based international NGOs in the field of sustainable agriculture, food security, and hunger eradication, including FIAN, Bread for the World, and Deutsche Welthungerhilfe. GTZ and leading NGOs in the field of food security have formed a working group (AKWE) that regularly meets to discuss emerging issues and policies regarding world nutrition. UHOH and some of its partner NGOs are represented in AKWE. Third, UHOH is well connected with other universities in Germany and Europe that engage in applied research and teaching in the food and agricultural sector through the joint organization of the annual Tropentag conference, the membership in German and European scientific organizations such as the Network of European Agricultural (Tropically and Subtropically Oriented) Universities and Scientific Complexes Related with Agricultural Development (NATURA), and the joint master program in the framework of the EURO League for Life Sciences with six other leading universities in Europe. These existing networks in the area of food and agriculture shall be strengthened by FSC so as to enhance knowledge exchange and to act as an effective knowledge broker for development organizations. Fourth, FSC has received LOIs for collaboration from selected key CGIAR centers that perform critical strategic research, especially in the main tropical and subtropical food crops and animal husbandry systems. These partnerships will allow the initiation of strategic research partnerships between FSC, CGIAR centers, and research partners in the South. In this context, a main task of FSC will be to build on recent meetings of UHOH researchers with CGIAR centers, and universities in Eastern Africa regarding a large-scale research program on food security, agricultural development, and climate change. The Eastern African region is predicted to be most adversely affected by drought and higher rainfall variability, and applied research in the area of agriculture and rural development is urgently needed to identify effective technological, institutional, and policy responses that mitigate the effects of climate change on food insecurity and malnutrition. These consultations began during visits of UHOH researchers in 2008 and were held with scientists of Eastern African universities (Sokoine University, Addis Abeba University, University of Nairobi, Bunda College of Agriculture, and Haramaya University) and with researchers from the International Food Policy Research Institute (IFPRI) and International Livestock Research Institute (ILRI) in Addis Abeba, from the World Agroforestry Center (ICRAF) in Nairobi, and the International Institute of Tropical Agriculture (IITA) in Tanzania.

3.5 Activities

Table 1 shows the plan of action for the DAAD-funded project period. For 2009/2010, milestones are listed in detail and separated according to quarters. The plan is less detailed for the remaining project period until June 2014, as detailed annual planning will be performed during regular planning meetings. Following Table A6 in the annex, milestones are assigned to the respective objectives. All planned FSC activities are targeted on improving food security and – therewith – on contributing to the achievement of MDG1. The center engages in five activity fields, namely (1) interdisciplinary teaching and training of postgraduate students (largely from developing countries) in relevant sciences, by establishing a PhD Program of excellence at the University of Hohenheim and by strengthening selected MSc and PhD programs in the field of food security at partner universities, (2) innovative, demand-driven and impact-oriented research, (3) human capital formation through award of study and research scholarships to PhD and MSc students, (4) structural

Table 1: Plan of action for project period (July 2009 - June 2014)

	Milestones	Objectives	
2009			
Q3	Establishment of FSC and recruitment of managing staff and regional coordinators	1a/b, 3a	
	Preparation of an effective FSC policy outreach and communication strategy in collaboration with UHOH's press office	5b	
	Implementation of FSC web-domain	3c, 5a	
	Job advertisement and selection of FSC visiting professor	1a	
	Presentation of FSC concept to BMZ/GTZ's AKWE and identification of joint activities	3c, 5a	
	Participation of UHOH's rector at the inter-ministerial conference on "Higher Education in Agricultural and Food Sciences", organized by RUFORUM in Lusaka, Zambia (September)	3c, 5a	
Q4	Participation of FSC staff (in the framework of AKWE) at the annual conference on "Policies against Hunger", hosted by the Federal Ministry of Food, Agriculture and Consumer Protection in Berlin	4a	
	Organization of an international conference on "Global Food Security" in conjunction with the World Food Day (October 16) in Hohenheim; Preconference workshop with German and international development organizations (including GTZ, KfW, FIAN, Bread for the World, German Agro-action) for presentation of FSC concept	3c, 5a/b	
	Participation of FSC affiliated persons at the international conferences on "The Integration of Sustainable Agriculture and Rural Development in the Context of Climate Change, the Energy Crisis, and Food Insecurity" in Agadir, Morocco (November 12-14) and "Food Security and Environmental Sustainability" in Kharagpur, India (December 17-19)	3b/c, 4a	
	Implementation of public lecture series in Hohenheim: 5 by national and international experts	5b	
	FSC annual planning and monitoring workshop (with TROZ/FSC advisory and management board meeting) in Hohenheim	3b	
	Award of 2 visiting lectureships (short-term assistant professorships): 1 South-North, 1 South-South	2a, 3d/e	
	Award of 4 Sandwich PhD scholarships: 1 African, 1 Asian, 1 Latin American, 1 German	2a, 3d/e	
	Award of ~10 MSc Eiselen scholarships to UHOH students from industrialized and developing countries	2a, 3d	
	Acquisition of third-party funds for specific activities	5c	
	2010		
	Q1	Planning workshop for establishment of a large-scale research program of UHOH in cooperation with East African universities and with CGIAR institutions on "Food security, Agricultural Development, and Climate Change in Sub-Saharan Africa" (FoodClim) in East Africa	2b, 3b/c/d
Public lecture series in Hohenheim: 5 by national and international experts		5b	
FSC management board video conference		3b	
Q2	Planning workshop for joint doctoral school "Sustainable Agriculture and Food Security in Southeast Asia", to be implemented by UHOH together with Chiang Mai and Kasetsart University (Thailand), National University and National Agriculture and Forestry Research Institute of Lao PDR, Rubber Research Institute of Cambodia, and Kyushu, Kobe, and Tokio University (Japan) in the framework of the International Platform for Asian Agricultural Education	1b, 3b/c	
	Inauguration of the YES PhD program	1a	
	YES short courses at UHOH: 3 by staff from partner HEIs (South-North)	2a, 3d	
	Short courses at partner HEIs: 3 by staff from partner HEIs (South-South)	2a, 3e	
	YES methodological seminars/workshops at UHOH: 3 by international experts	2a	
	Regional seminars/workshops at partner HEIs: 3, each with 1 invited lecturer and 9 invited attendees from the region	3c/e	
	Public lecture series at Hohenheim: 5 by national and international experts	5b	
	Biannual FSC management committee video conference (between FSC management board and strategic partners)	3b	
	Award of 2 visiting lectureships (assistant professorship, 2 month): 1 North-South, 1 South-South	2a, 3d/e	
	Award of 12 Excellence PhD scholarships to 5 Africans, 4 Asians, 3 Latin Americans	2a, 3d	
	Award of 4 Sandwich PhD scholarships: 1 African, 1 Asian, 1 Latin American, 1 German	2a, 3d/e	
	Award of ~12 MSc Eiselen scholarships to UHOH students from industrialized and developing countries	2a, 3d	
Q3	Summer school "Assessment and Treatment of Disease-related Malnutrition" (Biesalski/Grune) in Hohenheim: 12 invited PhDs/PostDocs from partner HEIs	1a, 2a, 3d	
	Summer school "Operational Methods for Measuring Food Security and Poverty in Development Policy" (Zeller) at Kasetsart University (Thailand): 8 invited PhDs/PostDocs from partner HEIs in the region	1b, 2a	

	Short courses at partner HEIs: 3 by staff from UHOH (North-South)	2a, 3d
	Public lecture series in Hohenheim: 5 by national and international experts	5b
	Award of grants for small-scale equipment to improve teaching and research facilities at partner HEIs	1b
	Award of FSC visiting professorship	1a
	Design of the FSC alumni system	3c, 5a/b
Q4	International conference on "Food Security and Climate Change" in East Africa in conjunction with the World Food Day (October 16), organized by FSC in collaboration with RUFORUM and its member HEIs	3c, 5a/b
	Support of and participation of FSC affiliated persons on the "Global Conference on Agricultural Research for Development" (GCARD), organized by the Global Forum on Agricultural Research (GFAR)	3b/c, 4a
	Submission of proposal for the FoodClim research program to prospective donors	2b, 3c/d
	Multi-stakeholder planning workshop for preparation of the RUFORUM-led regional PhD program in "Soil and Water Conservation" at Sokoine University (Tanzania)	2b, 3b/c/d
	YES short courses at UHOH: 3, by own staff	2a
	YES methodological seminars/workshops at UHOH: 3 by international experts	2a
	Regional seminars/workshops at partner HEIs: 3, each with 1 invited lecturer and 9 invited attendees from the region	3c/e
	Public lecture series in Hohenheim: 5 by national and international experts	5b
	FSC annual planning and monitoring workshop (with TROZ/FSC advisory and management board meeting) in Hohenheim	3b
	Award of 2 visiting lectureships (short-term assistant professorships): 1 South-North, 1 South-South	2a, 3d/e
	Award of 4 Sandwich PhD scholarships: 1 African, 1 Asian, 1 Latin American, 1 German	2a, 3d/e
	Award of ~10 MSc Eiselen scholarships to UHOH students from industrialized and developing countries ⁰	2a, 3d
	Acquisition of third-party funds for specific activities	5c
2011		
	Annual FSC conference in conjunction with the World Food Day in Southeast Asia	3c, 5a/b
	YES short courses, summer school, lecture series, YES seminars/workshops	2a
	Award of FSC visiting professorship, visiting lectureships, Excellence and Sandwich PhD scholarships, MSc Eiselen scholarships	2a, 3d/e
	FSC annual planning and monitoring workshop, biannual FSC management committee video conference	3b
	Acquisition of third-party funds for specific activities	5c
2012		
	Annual FSC conference in conjunction with the World Food Day in Latin America	3c, 5a/b
	YES short courses and seminars/workshops, summer school, lecture series	2a
	Award of FSC visiting professorship, visiting lectureships, Excellence (funding permitting) and Sandwich PhD scholarships, MSc Eiselen scholarships	2a, 3d/e
	FSC annual planning and monitoring workshop, biannual FSC management committee video conference	3b
	Acquisition of third-party funds for specific activities	5c
2013		
	Annual FSC conference in conjunction with the World Food Day in Hohenheim	3c, 5a/b
	YES short courses and seminars/workshops, summer school, lecture series	2a
	Award of FSC visiting professorship, visiting lectureships, Excellence (funding permitting) and Sandwich PhD scholarships, MSc Eiselen scholarships	2a, 3d/e
	FSC annual planning and monitoring workshop, biannual FSC management committee video conference	3b
	Acquisition of third-party funds for continuation of FSC activities	5c
2014		
	YES short courses and seminars/workshops, lecture series	2a
	Award of visiting lectureships, MSc Eiselen scholarships	2a, 3d/e
	Biannual FSC management committee video conference	3b

and personnel capacity strengthening of HEIs in developing countries, and (5) knowledge transfer to the project target groups as well as assuming knowledge brokerage and advisory functions for development organizations. The fifth activity may also include specific advisory and research projects that are contracted by development organizations to FSC and individual members. Such consultancy and focused research services are already successfully performed by TROZ and its members under an agreement with GTZ's Rural Development Division. This agreement is focusing on the potentials and challenges with biofuels in developing countries, and other strategic themes could be identified for FSC with development organizations.

3.5.1 Teaching and Training

FSC concentrates on teaching and training of postgraduate students to complement the well-developed education of international graduate students in Hohenheim served by TROZ and to improve the education of PhD students from developing countries at UHOH and partner HEIs. Therefore, the Young Excellence School (YES) will be established in Hohenheim and several teaching and training measures will be implemented at partner HEIs in Sub-Saharan Africa, South and Southeast Asia, and Latin America, starting in 2010.

Young Excellence School

YES invites outstandingly qualified university graduates with MSc degree and specialization in development-oriented agricultural sciences or related disciplines from both developing and industrialized countries, who are interested in an interdisciplinary and international education in food security-relevant issues. The YES PhD program is designed to complete the doctorate within three to a maximum of four years. YES is structured similar to the existing doctoral schools ("Promotionskolleg") of the Faculty of Agriculture but allows for a higher degree of flexibility in the curriculum so that students can assemble their course catalogs even more according to their individual interests and educational needs.¹¹ This is consistent with the planned PhD examination regulations of the faculty that currently undergo revision. Thus, YES also intends to be in the vanguard of the modernization process of the structured PhD study program at UHOH.¹² Successful alumni of YES receive their doctorate degree from UHOH. In addition to the regular YES PhD students, teaching and training opportunities will be available also for visiting postdoctoral scientists and PhD students from developing countries in particular.

The curriculum is composed of three course blocks (with 18 credit points in total) to be completed by regular YES PhD students in the first year, before leaving for field research. The first block is a new interdisciplinary PhD-level study module that is obligatory for YES PhD students and termed "Advanced Food Security Research". It gives elaborate introduction into the problem of food insecurity and relevant research methods and tools. The module is to be held by several professors from Hohenheim with different core competences including the visiting professor. In the second and third block, credit points can be achieved by completing either MSc or PhD-level modules of the regular course catalogue of the Faculty of Agriculture (cf. Table A8 in the annex) or – novelly – by attending graduate or postgraduate short courses or summer schools (accounting for number of credit points according to their duration). Short courses and seminars/workshops teaching soft skills relevant for the students' future career are creditable in the third block as well. YES students should be actively involved in identification of teaching contents to account for attendees' educational needs and interests as well as in other beneficial FSC activities such as in policy advice and public relations. In general, courses, modules, and seminars can be taken either in Hohenheim or at partner HEIs.

¹¹ Cf. <https://agrar.uni-hohenheim.de/phd-programme.html?&L=1>.

¹² Nonetheless, it is ensured that – in cases that reforms are implemented belatedly – the YES curriculum also comply with the present examination regulations by pooling related short courses to regular study modules for instance.

In Hohenheim, at least six short courses (lasting one week), six short-term seminars/workshops (lasting 2-3 days), and a summer school per year are newly implemented, whose numbers might be increased in the course of the project depending on the students' demand. Within the framework of the planned North-South teaching staff exchange between UHOH and universities in developing countries, three of the short courses are given by teaching staff from partner HEIs, preferably one lecturer from each region. The other three short courses are held by UHOH's staff. In 2010, these are "Valuation of Environmental Goods" (M. Ahlheim), "Agrobiological Project on Crop Plants" (J. Wünsche), and "Ecophysiology of Tropical Crops" (F. Asch). The first summer school is on the "Assessment and Treatment of Disease-related Malnutrition", offered by K. Biesalski and T. Grune in September 2010 (cf. Box A9 in the annex). The seminars and workshops impart relevant methodologies and train required soft skills such as academic writing and literature search, presentation and moderation techniques, team building and leading, project planning and management, and career planning and management. They are held by external experts.

Teaching and Training in Developing Countries

Professors from Hohenheim offer at least three one-week short courses per year at partner HEIs in developing countries, preferably one in each region. In addition to the North-South teaching staff exchange, FSC also supports the South-South exchange. Each year, at least three short courses given by scientists from a partner HEI in another region are funded by FSC, whereas an even distribution over regions is intended. Furthermore, FSC funds two regional workshops/seminars (lasting two to three days) per region that invites graduate and postgraduate scientists from partner HEIs and local stakeholders from the region. We plan to intensify the North-South and South-South teaching staff exchanges and to increase the numbers of short courses and workshops in the further course of the project. Finally, several summer schools at universities in developing countries are arranged upon request by staff from UHOH and partner HEIs. For instance, a summer school on "Operational Methods for Measuring Food Security and Poverty in Development Policy" held by M. Zeller takes place at Kasetsart University (Thailand) in September 2010 that invites PhD students and postdoctoral scientists from partner HEIs in the region.

3.5.2 Research

Research in the scope of FSC is largely accomplished by PhD students of the center's program. Interdisciplinary, empirical research projects and cooperation of several students from different disciplines in a joint project are intended. North-South or South-South cooperations are mandatory, and triangulation – meaning a German, African, and Asian student, for instance, engaging in the same project – is desirable in particular. Projects address mainly the leading topics presented in Section 3.1. PhD research projects are partly supported by MSc and BSc students.

A close cooperation with partner HEIs in the developing world participating in the projects at every stage is intended. The biannual FSC management committee meeting serves this purpose, among others. To identify demand-driven and impact-oriented research questions, FSC seeks intensive collaboration with local and national stakeholders in developing countries, national and international development organizations, and CGIAR centers. Representatives of FSC's non-university partners in Germany are invited to the annual planning and monitoring workshops, and further meetings with cooperation partners abroad are planned. Moreover, during their research phase in developing countries, PhD students are encouraged to organize local community hearings and to provide feedback on research findings to local stakeholders and target groups.

All PhD projects require double supervision, meaning that a professor at UHOH must accept the student for dissertation, and a counterpart at the cooperating partner HEI, or a scientist at CGIAR centers or development organizations must be identified, who is responsible for supervision in field work and available on site. This cooperation aims at ensuring adequate supervision both during the data collection phase in the field and the data analysis phase in Hohenheim as well as at

establishing permanent, strong relationships between the departments at UHOH and the partner institutions, also beyond the particular projects.

During the first year in Hohenheim (i.e. schooling phase), YES PhD students develop research proposals in cooperation with the supervising departments at UHOH and the project partner institution that must be reviewed by the TROZ/FSC management board for approval of funding. Besides, the YES PhD students are requested to orally present the state of research three times, namely the research proposal, mid-term review, and final report, in a PhD seminar. Visiting postdoctoral scientists and PhD students funded by FSC should also present their research work once. Moreover, special attention is devoted to the publication of papers and contributions to international conferences. Each YES PhD student is encouraged and financially supported to publish at least two peer-reviewed papers and make at least two conference contributions (e.g., one paper, one poster). For accepting visiting PhD students and postdoctoral fellows in Hohenheim, publishing a joint paper (as FSC discussion paper for instance) is a stated aim.

3.5.3 *Human capital formation*

FSC provides two types of scholarships that follow DAAD guidelines. The first scholarship is a full-time scholarship for regular PhD students of the FSC program and termed “Excellence” scholarship in the following. The second type is designed similar to the DAAD Sandwich-Model and therefore termed “Sandwich” scholarship; it is awarded for exchanging PhD students and postdoctoral fellows. In consideration of women’s underrepresentation in leading academic positions in the developing world and the gender role in food security, female candidates will be encouraged to apply for scholarships in particular.

Excellence scholarships are offered to outstandingly qualified graduates from developing countries for attending YES, doing their field research in developing countries on behalf of the FSC, and completing their doctorate in Hohenheim. On the basis of regular performance reviews, the scholarships are awarded for the full PhD period with a maximum duration of four years. DAAD funds are used to award 24 Excellence scholarships in two rounds to PhD candidates from developing countries. In the first round, scholarships are awarded to 12 students in April 2010 and to at least 12 students in the second round in April 2011. Additional rounds of scholarship awards will be initiated, when additional funding for continuing FSC activities is secured. On request of our partner HEIs, grants for Excellence scholarships also allows for third-party co-funding so that more students can be supported in total. Overall, more DAAD-funded scholarships are awarded to African (10) than to Asian (7) and Latin American (7) students to stress our intention to contribute to the development in Africa in particular and to take account of the fact that our partner HEIs in Asia and Latin America can more easily acquire third-party funds than our African partners. Upon approval of DAAD funding, third-party funds to award at least two additional, full Excellence scholarships will be acquired. For that, we plan a targeted sponsorship program so that donors from private and public sectors and from the international scientific community can entrust selected students with specific research questions in the context of food security. These scholarships will primarily benefit German PhD students, so that Germans can be integrated into FSC’s PhD program and provide informal help to foreign students to better integrate into the German university community and society.

Sandwich scholarships are awarded to PhD students and postdoctoral scientists from Hohenheim for doing field research in developing countries or from the partner HEIs to come to Hohenheim for attending YES courses, being trained in analytical techniques and methods, or carrying out analyses such as with laboratory instruments that are not available at the home university. In addition, Sandwich scholarships are provided for South-South exchanges of PhD students and postdoctoral scientists, so that, for instance, an African postdoctoral scientist is enabled to carry out joint research activities with colleagues in Latin America. Sandwich scholarships are awarded semester-wise for a maximum period of twelve month. DAAD funds will be used to award 36 Sandwich

scholarships in total and four per semester. In general, an equal allocation of grants across UHOH and African, Asian, and Latin American partner HEIs (amounting to 25% each) is intended. One of four scholarships is allocated to South-South exchanges. In the course of the project, third-party funds will be acquired to award nine additional Sandwich scholarships.

3.5.4 Capacity Strengthening at Development Country Universities

Aside from strengthening selected teaching programs at partner HEIs and training of their scientists on site and in Hohenheim, FSC also seeks to make important contributions to the institutional development of the strategic partners and especially their networks. Hereby, the emphasis of FSC's strategy lies on fostering institutional linkages and partnerships of HEIs not only with FSC (North-South), but also between the particular HEIs through the initiation of South-South exchanges and partnerships. The need for and desire of HEIs for strengthening South-South partnerships was clearly articulated by the strategic partners on the FFM workshop on March 30-31. Hence, FSC's strategy is built on the existing capacities and mandates of partner HEIs while strengthening the knowledge exchange and institutional linkages between HEIs and development practitioners in the South.

Basically, FSC pursues three main pathways through which it contributes to the development of institutional linkages and knowledge exchanges. First, the FFM workshop participants agreed that much of the regional networking within a particular development region can be most effectively performed by the existing regional network institutions themselves. FSC will thus support their engagement, for instance, by providing academic assistance to improving curricula, support of academic events in the sphere of FSC, funding of small-scale equipment at needy HEIs, publication of joint papers, and invitation of outstanding keynote speakers to international conferences. Second, the workshop participants recognized UHOH's comparative advantage in fostering institutional linkages at the global level, for example by linking partner institutions between the three developing regions and by fostering South-North linkages. A number of instruments and activities are scheduled to foster such linkages, including the FSC annual planning and monitoring workshop that enable the identification of joint fund-raising strategies such as for international donor proposals, the geographical rotation of the annual, international FSC conferences, exchange of researcher, lecturers, and students, and the dissemination of research findings at the regional and global level to development practitioners (cf. Table 1 and Table A6). Third, and in recognition that smaller developing nations will not be able to set up and/or sustain their own MSc and PhD programs in all disciplines related to field of agricultural and related sciences, FSC will support institutional linkages that aim at strengthening selected postgraduate programs with regional outreach. During the DAAD-funded project period, FSC will provide scientific, technical, institutional, and financial support for establishment or improvement of specific study programs such as the joint PhD program on "Food Security and Agricultural Development" at Kasetsart University, RUFORUM's regional PhD program on "Soil and Water Management" at Sokoine University, and the regional MSc program of East African HEIs in Agricultural Economics. Fourth, and probably most important, FSC and its partner institutions constitute a knowledge sharing and brokerage network addressing pertinent policy and research questions regarding MDG1 that provide knowledge gains for institutional development of any single partner institution, be it in the area of demand-driven research, postgraduate training, or pertinent policy advice to development practitioners.

3.5.5 Knowledge Transfer and Brokerage

FSC seeks to be the leading Think Tank for food security-related issues in Germany that internationally act as both knowledge provider and broker, utilizing the pathways named above to transfer knowledge to the scientific community, governmental and non-governmental development organizations, local stakeholders in developing countries, and the interested general public. In this context, the FSC network plays the central role for communication within and across regions (cf.

section 3.4). In addition, UHOH's alumni network is used to intensify communication with German and international actors.

Specific actions to transfer knowledge and to strengthen the visibility of FSC's engagement in addressing food insecurity nationally and internationally will include:

- Organization of an annual international conference and support of external conferences by partner institutions,
- Participation of FSC affiliated scientists in international conferences,
- Participation in external expert meetings,
- Organization of a lecture series at UHOH for the general German public,
- Establishment of a web page in English and German, informing about FSC activities and providing regional newsletters and interactive scientific blogs,
- Publication of an FSC online discussion paper series,
- Support of publications by FSC affiliated scientists,
- Support of the dissertation publication series "Development Economics and Policy" by F. Heidhues, J. von Braun, and M. Zeller,
- Support of implementation and improvement of journals in developing countries, and
- Cooperation with UHOH's press office for press releases.

In addition, FSC identifies experts at UHOH and partner HEIs in developing countries for policy advice and arranges contracted cooperations for policy briefs and other statements.

4 PROSPECTS

The presented concept fully complies with the long-term strategy of UHOH and its agricultural faculty in particular, and therefore, FSC's establishment is strongly fostered by the university's management and associated faculties. Thus, there is also a strong commitment by the university rectorate and sponsors to support FSC activities beyond the DAAD funding period, since UHOH's position in the national and international development community, and therewith the visibility of German HEIs' engagement in development cooperation, will be strengthened. Further possible funding sources include large-scale higher education and university excellence programs of the German Government as well as third-party funded research programs/projects such as by German, European, and international organizations. Depending on the funds that can be acquired and the strategic orientation of following-up projects, FSC and TROZ might be consolidated.

As discussed above, UHOH seeks to establish FSC as the leading Think Tank for food security with various pillars into further present and future high-priority research areas of central global relevance including climate change and water scarcity and with strong networks to leading international research centers and HEIs in the main developing regions, making the center crucial in the German university landscape. Finally, the hunger and malnutrition problem in the developing world will remain and probably aggravate, which can lead to associated problems such as civil unrest and state conflicts, so that the global allocation of resources – especially with respect to the production of food – might even further fade into the spotlight of the international community of states, and Germany can be well-positioned with a Think Tank providing innovative expertise to the global challenge of food security.

Place, Date, Signature of the Project Coordinator

Signature of the Rector of the University of Hohenheim

REFERENCES

- BENSON, T. 2004. Africa's food and nutrition situation: Where are we and how did we get here? 2020 IFPRI Discussion Paper No. 37. International Food Policy Research Institute, Washington, DC.
- FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO).1996. World Food Summit: Plan of Action. <ftp://ftp.fao.org/docrep/fao/009/a0750e/a0750e00.pdf>.
- FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO). 2006. The state of food insecurity in the world: Eradicating world hunger – Taking stock ten years after the World Food Summit. <http://www.fao.org/docrep/009/a0750e/a0750e00.htm>.
- WISSENSCHAFTSRAT (WR). 2006. Empfehlung zur Entwicklung der Agrarwissenschaften in Deutschland im Kontext benachbarter Fächer (Gartenbau-, Forst- und Ernährungswissenschaften). <http://www.wissenschaftsrat.de/texte/7618-06.pdf>.
- WORLD BANK (WB). 2007. World Development Report 2008 – Agriculture for development. <http://siteresources.worldbank.org/INTWDR2008/Resources/2795087-1192111580172/WDRover2008-ENG.pdf>.
- WORLD BANK (WB). 2008. Press Release No. 2009/065/DEC. “New data show 1.4 billion live on less than US\$1.25 a day, but progress against poverty remains strong”.
- UNITED NATIONS (UN). 2000. United Nations Millennium Declaration, Resolution adopted by the General Assembly. <http://www.un.org/millennium/declaration/ares552e.pdf>.
- UNITED NATIONS CHILDREN'S FUND / MICRONUTRIENT INITIATIVE (UNICEF/MI). 2004. Vitamin and mineral deficiency: A global progress report. <http://www.micronutrient.org/CMFiles/PubLib/VMd-GPR-English1KWW-3242008-4681.pdf>.

ANNEX

Table A1: Student statistics for winter semester 2008/09

	TOTAL	Germany		Central and South America		Africa		Asia	
	No.	No.	%	No.	%	No.	%	No.	%
Faculty of Agricultural Sciences (M.Sc., Dipl., B.Sc.)	2011	1589	79	35	2	84	4	156	8
Agricultural Sciences, M.Sc.	342	177	52	14	4	45	13	69	20
Specialization: Agricultural Economics (AgEcon), M.Sc.	89	20	22	3	3	28	31	25	28
Agricultural Sciences in the Tropics and Subtropics (AgriTropics), M.Sc.	57	14	25	8	14	17	30	17	30
Environmental Protection and Agricultural Food Production (EnviroFood), M.Sc.	52	9	17	3	6	5	10	24	46
Organic Food Chain Management (OrganicFood), M.Sc.	52	15	29	1	2	8	15	19	37
<i>International M.Sc. Programs (with development country reference)</i>	<i>250</i>	<i>58</i>	<i>23</i>	<i>15</i>	<i>6</i>	<i>58</i>	<i>23</i>	<i>85</i>	<i>34</i>
Ph.D. (enrolled at Fac. A)	540	231	43	14	3	25	5	67	12
Faculty of Natural Sciences (M.Sc., Dipl., B.Sc.)	1248	1164	93	6	0	10	1	23	2
Faculty of Business, Economics, and Social Sciences (M.Sc., Dipl., B.Sc.)	3899	3452	89	4	0	3	0	30	1
TOTAL	7158	6205	87	45	1	97	1	209	3

Table A2: Selected ongoing and past research programs/projects of UHOH with relevance to development issues and a total budget of above 100 tsd. Euro

Program/Project Name	Donor	Duration	Total Budget UHOH in tsd. €	No. of Students from UHOH		Cooperation Partners in Developing Countries	
				MSc	PhD	Higher Education Institutions	Research Centers and Governmental Agencies
Sustainable Land Use and Rural Development in Mountainous Regions of Southeast Asia (Uplands Program) - Special Research Program (SFB) 564	German Research Foundation (DFG) - Federal Ministry of Economic Cooperation and Development (BMZ)	2000 - 2009	12,385	70 (4)	32 (40)	Thailand: Chiang Mai University, Kasetsart University, Mae Jo University, Silpakorn University; Vietnam: Hanoi Agriculture University, Thai Nguyen University of Agriculture and Forestry	Vietnam: National Institute of Animal Husbandry (NIAH)
Adapted Farming in West Africa - SFB 308	DFG - BMZ	1985 - 1999	17,113	80	55	Niger: University of Niamey	Benin: Direction de la Recherche Agronomique; Mali: Institute de la Recherche Agronomique (INRAN), Research Station for Animal Husbandry (SERZ); ICRISAT; IICA; ILCA
Living Landscapes China (LILAC)	BMBF	2007 - 2010	1,220	2 (1)	(6)	China: Chinese Academy of Science (CAS), China Agricultural University (CAU), Nanjing Agricultural University (NAU), Yunnan Agricultural University (YAU), Yunnan Academy of Social Sciences (YASS)	China: Center for Biodiversity and Indigenous Knowledge (CBIK), Nabanhe National Nature Reserve (NNNR), TianZi Biodiversity Research and Development Centre
Fuel and Livestock Feed for Future	BMBF	2007 - 2009	1,030	2 (3)	(4)	China: Zhejiang University, Sichuan Agricultural University, Nanjing Agricultural University, Chinese Academy of Agricultural Sciences	
Smallholder agroforestry options for degraded soils: Tree establishment in cropped fields (SAFODS)	EU-INCO	2002 - 2006	198	1	1	Philippines: University of the Philippines Los Baños (UPLB); Indonesia: Brawijaya University, Lampung University	Indonesia: ICRAF
Trees, Resilience and Livelihood Recovery in the Tsunami-affected Coastal Zone	EU – ASIA PRO ECO II B Post-Tsunami PROGRAMME	2006 - 2009	150	4	(1)		Indonesia: Indonesian Research Institute for Estate Crops, Indonesian Soil Research Institute (ISRI), ICRAF

Trees in multi-Use Landscapes in South-East Asia (TUL-SEA): A negotiation support toolbox for Integrated Natural Resource Management	BEAF (BMZ/GTZ)	2007 - 2010	120		(1)	Indonesia: Brawijaya University; Vietnam: Thai Nguyen University of Agriculture and Forestry (TUAF); Philippines: (MOSCAT)	Indonesia: Indonesian Conservation Community (KKI WARSI), Indonesian Coffee Cocoa Research Institute (ICCRI), ICRAF; Philippines: Bukidnon Environment and Natural Resources Office (BENRO), Misamis Oriental State College of Agriculture and Technology
RISOCAS	BMZ	2008 - 2011	1,010	(1)	(3)		Benin: Africa Rice Center (WARDA), Mali: Institute for Rural Economy (IER), Madagascar: National Center for Applied Research for Rural Development (FOFIFA)
Fostering rural development and environmental sustainability through integrated soil and water conservation systems in the uplands of Northern Vietnam	EnBW Rainforst Foundation	2007 - 2012	220		(1)	Vietnam: Hanoi Agricultural University	Vietnam: National Agricultural Extension Centre (NAEC) of the Ministry of Agriculture and Rural Development (MARD)
Mobilizing regional diversity for creating new potentials for pearl millet and sorghum farmers in West and Central Africa	BMZ/GTZ	2006 - 2009	324	2 (1)	(1)		Nigeria: Lake Chad Research Institute (LCRI), Institute of Agricultural Research (IAR), Niger: Institut National de Recherches Agronomiques du Niger (INRAN), Burkina Faso: Institut National de l'Environnement et Recherche Agricole (INERA), Mali: Institut d'Economie Rurale (IER), Senegal: Institut Sénégalais de Recherche Agricole (ISRA); ICRISAT
Sustainable conservation and utilization of genetic resources of two underutilized crops – finger millet and foxtail millet – to enhance productivity, nutrition and income in Africa and Asia	BMZ/GTZ	2008 - 2010	269	(1)		India: University of Agricultural Sciences, Rajendra Agriculture University, Acharya N G Ranga Agricultural University	ICRISAT, National Agricultural Research Organization, Uganda; Kenya Agricultural Research Institute; Department of Research and Development, Tanzania;
Integrative Governance and Modelling	CGIAR Challenge Program on Water & Food Robert-Bosch-Stiftung	2004 - 2008	300	2 (2)	1 (1)	Ghana: University of Legon, Institute for Statistical, Social and Economic Research (ISSER), Chile: Universidad de Talca	Chile: Instituto de Investigaciones Agropecuarias, Ghana: Water Resources Institute

List A3: Selected publications in peer-reviewed journals (2005-2009)

The number of articles with relevance to development issues in peer-reviewed journals equals 481 in total.

- ADHIKARINAYAKE, T.B., PALIPANE, K.B., MÜLLER, J. 2006. Quality change and mass loss of paddy during airtight storage in a ferro-cement bin in Sri Lanka. *J Stored Prod Res* 42, 377-390.
- AHLHEIM, M., FRÖR, O., SINPHURMSUKSKUL, N. 2006. Economic valuation of environmental benefits in developing and emerging countries: theoretical considerations and practical evidence from Thailand and the Philippines. *Q J Int Agr* 45, 397-419.
- AKINRINDE, E.A., IROH, L., OBIGBESAN, G.O., HILGER, T., ROMHELD, V., NEUMANN, G. 2007. Influence of phosphorus supply on two cowpea varieties grown on an acidic Alumi-Haplic-Acrisol. *Arch Acker Pfl Boden* 53, 33-38.
- AREGA, D.A., ZELLER, M. 2005. A comparison of production and distance function approaches to technical efficiency measurement: With applications to adopters of improved cereal technology in Eastern Ethiopia. *Agr Econ Rev* 6, 5-17.
- AREGA, D.A., ZELLER, M., SCHWARZE, S., NURYARTONO, N. 2005. The extent and determinants of production efficiency of farmers in the rainforest margins in Central Sulawesi, Indonesia: Implications for land use and support services. *Q J Int Agr* 44, 335-353.
- BECKER, K., MAKAR, H.P.S. 2008. *Jatropha curcas*: A potential source for tomorrow's oil and biodiesel. *Lipid Technol* 20, 104-107.
- BECU, N., NEEF, A., SCHREINEMACHERS, P., SANGKAPITUX, C. 2008. Participatory modeling to support collective decision-making: Potential and limits of stakeholder involvement. *Land Use Policy* 25, 498-509.
- BERARDINI, N., KNÖDLER, M., SCHIEBER, A., CARLE, R. 2005. Utilization of mango peels as a source of pectin and polyphenolics. *Innov Food Sci Emerg* 6, 443-453.
- BIESALSKI, H.K., TINZ, J. 2008. Nutritargeting. *Adv Food Nutr Res* 54, 179-217
- BREUSING, N., GRUNE, T. 2008. Regulation of proteasome-mediated protein degradation during oxidative stress and aging. *Biol Chem* 389, 203-209.
- BRUECK, H. 2008. Effects of nitrogen supply on water-use efficiency of higher plants. *J Plant Nutr Soil Sci* 171, 210-219.
- BUCHENRIEDER, G. 2005. Non-farm rural employment – review of issues, evidence and policies. *Q J Int Agr* 44, 5-18.
- BURGER, H., SCHLOEN, M., SCHMIDT, W., GEIGER, H.H. 2008. Quantitative genetic studies on breeding maize for adaptation to organic farming. *Euphytica* 163, 501-510.
- CAHANER, A., AJUH, J., SIEGMUND-SCHULTZE, M., AZOULAY, Y., DRUYAN, S., VALLE ZÁRATE, A. 2008. Effects of the genetically reduced feather coverage in naked neck and featherless broilers on their performance under hot conditions. *Poultry Sci* 87, 2517-2527.
- DIMASSI, O., NEIDHART, S., CARLE, R., MERTZ, L., MIGLIORE, G., MANÉ-BIELFELDT, A., VALLE ZÁRATE, A. 2005. Cheese production potential of milk of Dahlem Cashmere goats from a rheological point of view. *Small Ruminant Res* 57, 31-36.
- DUNG, N.V., VIEN, T.D., LAM, N.T., TUONG, T.M., CADISCH, G. 2008. Analysis of the sustainability within the composite swidden agroecosystem in northern Vietnam. 1. Partial nutrient balances and recovery times of upland fields. *Agr Ecosyst Environ* 128, 37-51.
- ERKOSSA, T., STAHR, K., GAISER, T. 2005. Effect of different methods of land preparation on runoff, soil and nutrient losses from a Vertisol in the Ethiopian highlands. *Soil Use Manage* 21, 253-259.
- EULER, D., MARTIN, K., CHAMSAI, L., WEHNER, R., SAUERBORN, J. 2006. Ground cover vegetation of lichi orchards in relation to land use intensity in mountainous northern Thailand. *Int J Botany* 2, 117-124.
- FALKE, K.C., SUŠI, Z., HACKAUF, B., KORZUN, V., SCHONDELMAIER, J., WILDE, P., WEHLING, P., WORTMANN, H., MANK, R., ROUPPE VAN DER VOORT, J., MAURER, H.P., MIEDANER, T., GEIGER, H.H. 2008. Establishment of introgression libraries in hybrid rye (*Secale cereale* L.) from an Iranian primitive accession as a new tool for rye breeding and genomics. *Theor. Appl. Genet.* 117, 641-652.
- FERENJE, B.T., HEIDHUES, F. 2007. Fall in technical efficiency of small farm households in the post reform period of Ethiopia. *Q J Int Agr* 46, 241-261.
- FERENJE, B.T., HEIDHUES, F. 2007. Study of total factor productivity of tef in Ethiopia: application of a growth decomposition approach. *Q J Int Agr* 46, 119-144.
- FEUGANG, J.M., KONARSKI, P., ZOU, D., STINTZING, F.C., ZOU, C. 2006. Nutritional and medicinal use of cactus pear (*Opuntia* spp.) cladodes and fruits. *Front Biosc* 11, 2574-2589.
- FRANCIS, G., EDINGER, R., BECKER, K. 2005. A concept for simultaneous wasteland reclamation, fuel production, and socio-economic development in degraded areas in India. Need, potential and perspectives of *Jatropha* plantations. *Nat Resour Forum* 29, 12-24.
- FREI, M., BECKER, K. 2005. Integrated rice-fish culture: Coupled production saves resources. *Nat Resour Forum* 29, 135-143.
- GAO, Y.G., GIESE, M., LIN, S., SATTELMACHER, B., ZHAO, Y., BRUECK, H. 2008. Belowground net primary productivity and biomass allocation of a grassland in Inner Mongolia as affected by grazing. *Plant Soil* 307, 41-50.

- GERMER, J., SAUERBORN, J. 2008. Estimation of the impact of oil palm plantation establishment on greenhouse gas balance. *Environm Dev Sustain* 10, 697-716.
- GORDILLO, G.A., GEIGER, H.H. 2008. Alternative recurrent selection strategies using doubled haploid lines in hybrid maize breeding. *Crop Sci* 48, 911-922.
- GORDILLO, G.A., GEIGER, H.H. 2008. MBP (Version 1.0): A software package to optimize maize breeding procedures based on doubled haploid lines. *J Heredity* 99, 227-231.
- GRENZ, J., SAUERBORN, J. 2007. The potential of organic agriculture to contribute to sustainable crop production and food security in Sub-Saharan Africa. *J Agr Rur Dev Trop* 89, 50-84.
- GRENZ, J., SAUERBORN, J. 2007. Mapping the potential geographical range of the parasitic weed *Orobanche crenata*. *Agr Ecosyst Environ* 122, 275-281.
- GUARTE, R.C., POTT, I., MÜHLBAUER, W. 2005. Influence of drying parameters on beta-carotene retention in mango leather. *Fruits* 60, 255-265.
- HEGELE, M., NAPHRUM, D., MANOCHAI, P., SRUAMSIRI, P., BANGERTH, F. 2006. Control of flower induction in tropical/subtropical fruit trees by phytohormones at the example of longan and mango. *Acta Horticulturae* 727, 217-226.
- HEROLD, P., SNELL, H., TAWFIK, E.S. 2007. Growth, carcass and meat quality parameters of purebred and crossbred goat kids in extensive pasture. *Arch Tierzucht* 50, 186-196.
- IRUNGU, C., ZELLER, M., MBURU, J. 2005. Assessing NGOs' Targeting performance and characteristics of households participating in child development programmes in rural eastern Kenya. *J Agr Rural Dev Trop* 106, 119-129.
- ISENGARD, H.-D., KLING, R., REH, C.T. 2006. Proposal of a new reference method to determine the water content of dried dairy products. *Food Chem* 96, 418-422.
- JANJAI, S., LAMLERT, N., MAHAYOTHEE, B., BALA, B.K., HAEWSUNGCHARERN, M., NAGLE, M., LEIS, H., MÜLLER, J. 2008. Finite element simulation of drying of longan fruit. *Dry Technol* 26, 666-674.
- KAHI, A.K., WASIKE, C.B., REWE, T.O. 2006. Beef production in arid and semi-arid lands: Constraints and prospects for research and development. *Outlook Agr* 35, 217-225.
- KEIL, A., ZELLER, M., FRANZEL, S. 2005. Improved tree fallows in smallholder maize production in Zambia: Do initial testers adopt the technology? *Agroforest Syst* 64, 225-236.
- KEIL, A., ZELLER, M., WIDA, A., SANIM, B., BIRNER, R. 2008. What determines farmers' resilience towards ENSO-related drought? An empirical assessment in Central Sulawesi, Indonesia. *Climatic Change* 86, 291-307.
- KUGLER, F., STINTZING, F.C., CARLE, R. 2007. Evaluation of the antioxidant capacity of betalainic fruits and vegetables. *J Appl Bot Food Qual* 81, 69-76.
- LANGENBERGER, G., PRIGGE, V., MARTIN, K., BELONIAS, B., SAUERBORN, J. In press. Ethnobotanical knowledge of Philippine lowland farmers and its application in agroforestry. *Agroforest Syst*, DOI 10.1007/s10457-008-9189-3.
- LEGESSE, G., ABEBE, G., SIEGMUND-SCHULTZE, M., VALLE-ZÁRATE, A. 2008. Small ruminant production in two mixed-farming systems of southern Ethiopia: Status and prospects for improvement. *Exp Agr* 44, 399-412.
- LEMKE, S., HEUMANN, N., BELLOWS, A.C. In press. Gender and sustainable livelihoods: Case study of South African farm workers. *Int J Innov Sustain Dev*, Special Issue on Gender and Sustainable Development.
- LEMKE, U., VALLE-ZÁRATE, A. 2008. Dynamics and developmental trends of smallholder pig production systems in North Vietnam. *Agr Syst* 96, 207-223.
- MAERTENS, M., ZELLER, M., BIRNER, R. 2006. Sustainable agricultural intensification in forest frontier areas. *Agr Econ* 34, 1-10.
- MAMUN, S.M., FOCKEN, U., BECKER, K. 2007. Comparison of metabolic rates and feed nutrient digestibility in conventional, genetically improved (GIFT) and genetically male (GMNT) Nile tilapia, *Oreochromis niloticus* (L.). *Comp Biochem Physiol* 148, 214-222.
- MARTINEZ-HERRERA, J., SIDDHURAJU, P., FRANCIS, G., DAVILA-ORTIZ, G., BECKER, K. 2006. Chemical composition, toxic/antimetabolic constituents and effects of different treatments on their levels, in four provenances of *Jatropha curcas* L. from Mexico. *Food Chem* 96, 80-89.
- MATUSCHKE, I., MISHRA, R.R., QAIM, M. 2007. Adoption and Impact of Hybrid Wheat in India. *World Dev* 35, 1422-1435.
- MOELLER, C., PALA, M., MANSCHADI, A.M., MEINKE, H., SAUERBORN, J. 2007. Assessing the sustainability of wheat-based cropping systems using APSIM: model parameterisation and evaluation. *Aust J Agr Res* 58, 75-86.
- MOSSHAMMER, M.R., STINTZING, F.C., CARLE, R. 2006. Evaluation of different methods for the production of juice concentrates and fruit powders from cactus pear. *Innov Food Sci Emerg* 7, 275-287.
- NEEF, A., ELSTNER, P., SANGKAPITUX, C., CHAMSAI, L., BOLLEN, A., KITCHAICHAROEN, J. 2005. Diversity of water management systems in Hmong and Thai communities in Mae Sa watershed, northern Thailand. *Mt Res Dev* 25, 20-24.
- NEEF, A., HEIDHUES, F., STAHR, K., SRUAMSIRI, P. 2006. Participatory and integrated research in mountainous regions of Thailand and Vietnam: Approaches and lessons learned. *J Mt Sci* 3, 305-324.
- NIKOLIC, N., SCHULTZE-KRAFT, R., NIKOLIC, M., BÖCKER, R., HOLZ, I. 2008. Land Degradation on Barren Hills: A Case Study in Northeast Vietnam. *Environ Manage* 42, 19-36.

- OEHME, M., FREI, M., RAZZAK, A., DEWAN, S., BECKER, K. 2007. Studies on nutrient cycling under different nitrogen inputs in integrated rice-fish culture in Bangladesh. *Nut Cycl Agroecosys* 79, 181-191.
- PANSAK, W., DERCON, G., HILGER, T.H., KONGKAEW, T., CADISCH, G. 2007. ¹³C isotopic discrimination: a starting point for new insights in competition for nitrogen and water under contour hedgerow systems in tropical mountainous regions. *Plant Soil* 298, 175-189.
- PARZIES, H.K., FOSUNG NKE, C., ABDEL-GHANI, A.H., GEIGER, H.H. 2008. Outcrossing rate of barley genotypes with different floral characteristics in drought-stressed environments in Jordan. *Plant Breeding* 127, 536-538.
- QAIM, M. 2005. Agricultural biotechnology adoption in developing countries. *Am J Agr Econ* 87, 1317-1324.
- QAIM, M., MATUSCHKE, I. 2005. Impacts of genetically modified crops in developing countries: A survey. *Q J Int Agr* 44, 207-227.
- QAIM, M., STEIN, A.J., MEENAKSHI, J.V. 2007. Economics of Biofortification. *Agr Econ* 37, 119-133.
- RICHTER, H., FOCKEN, U., BECKER, K. 2008. A first test of a new modelling approach to estimate food consumption in particle-feeding fish. *J Appl Ichthyol*, 24, 38-43.
- RISCHKOWSKY, B., SIEGMUND-SCHULTZE, M., BEDNARZ, K., KILLANGA, S. 2006. Urban sheep keeping in West Africa: Can socio-economic household profiles explain management and productivity? *Hum Ecol* 34, 785-807.
- ROWE, E.C., VAN NOORDWIJK, M., SUPRAYOGO, D., CADISCH, G. 2005. Nitrogen use efficiency of monocrop and hedgerow intercropping in the humid tropics. *Plant Soil* 268, 61-74.
- SAKONNAKHON, S.P.N., CADISCH, G., TOOMSAN, B., VITYAKON, P., LIMPINUNTANA, V., JOGLOY, S., PATANOTHAI, A. 2006. Weeds - friend or foe? The role of weed composition on stover nutrient recycling efficiency. *Field Crops Res* 97, 238-247.
- SAUER, J., YILMA, T. 2007. Consistent evidence on the efficiency of maize production in southwest Ethiopia. *Q J Int Agr* 46, 23-48.
- SCHERBAUM, V., SHAPIRO, O., PURWESTRI, R.C., INAYATI, D.A., NOVIANTY, D., STÜTZ, W., YUSRAN, Y., MÜLLER, T., WIRAWAN, N.N., SURYANTAN, J., BLOEM, M., PANGARIBUAN, R.V., QAIM, M., GRUNE, T., HOFFMANN, V., BELLOWS, A.C., BIESALSKI, H.K. In press. Locally produced Ready-to-Use Therapeutic Food (RUT) piloting in moderately and mildly wasted children in Nias Island, Indonesia. *Sight and Life Magazine* 1, 29-37.
- SCHIEBER, A. 2007. Mango (*Mangifera indica* L.), a 'functional fruit'? *Fruit Processing* 17, 149-152.
- SCHLECHT, E., HIERNAUX, P., KADAOURE, I., HÜLSEBUSCH, C., MAHLER, F. 2006. A spatio-temporal analysis of forage availability, grazing and excretion behaviour of cattle, sheep and goats in Western Niger. *Agr Ecosyst Environ* 113, 226-242.
- SCHREINEMACHERS, P., BERGER, T. 2006. Land-Use Decisions in Developing Countries and their Representation in Multi-Agent Systems. *J Land Use Sci* 1, 29-44.
- SCHULER, U., CHOOCHAROEN, C., ELSTNER, P., NEEF, A., STAHR, K., ZAREI, M., HERRMANN, L. 2006. Soil mapping for land-use planning in a karst area of N Thailand with due consideration of local knowledge. *J Plant Nutr Soil Sci* 169, 444-452.
- SCHULTE, M.J., MARTIN, K., SAUERBORN, J. 2007. Biology and control of the fruit borer, *Conopomorpha sinensis* Bradley on litchi (*Litchi chinensis* Sonn.) in northern Thailand. *Insect Sci* 14, 525-529.
- SCHWEIGGERT, U., HOFMANN, S., REICHEL, M., SCHIEBER, A., CARLE, R. 2008. Enzyme-assisted liquefaction of ginger rhizomes (*Zingiber officinale* Rosc.) for the production of spray-dried and pasty-like ginger condiments. *J Food Eng* 84, 28-38.
- SIMTOWE, F., MDUMA, J., PHIRI, A., THOMAS, A., ZELLER, M. 2006. Can risk aversion towards fertilizer explain part of the non-adoption puzzle for hybrid maize? Empirical evidence from Malawi. *J Appl Sci* 6, 1490-1498.
- SPREER, W., NAGLE, M., NEIDHART, S., CARLE, R., ONGPRASERT, S., MÜLLER, J. 2007. Effect of regulated deficit irrigation and partial rootzone drying on the quality of mango fruits (*Mangifera indica*, L., cv. 'Chok Anan'). *Agr Water Manage* 88, 173-180.
- STEIN, A.J., NESTEL, P., MEENAKSHI, J.V., QAIM, M., SACHDEV, H.P.S., BHUTTA, Z.A. 2007. Plant Breeding to Control Zinc Deficiency in India: How Cost-Effective is Biofortification? *Public Health Nutr* 10, 492-501.
- STEIN, A.J., QAIM, M. 2007. The Human and Economic Cost of Hidden Hunger. *Food Nutr Bull* 28, 125-134.
- SZINICZ, G., MARTIN, K., SAUERBORN, J. 2005. Abundance of selected insect species in vegetable crops of a Philippine upland area. *Agr Ecosyst Environ* 111, 104-110.
- THIPPAYARUGS, S., TOOMSAN, B., VITYAKON, P., LIMPINUNTANA, V., PATANOTHAI, A., CADISCH, G. 2008. Interactions in decomposition and N mineralization between tropical legume residue components. *Agroforest Syst* 72, 137-148.
- WALKER, A.P., VAN NOORDWIJK, M., CADISCH, G. 2008. Modelling of planted legume fallows in Western Kenya using WaNuLCAS. (II) Productivity and sustainability of management strategies subject to biophysical variation. *Agroforest Syst* 74, 143-154.
- WARBURTON, M.L., REIF, J.C., FRISCH, M., BOHN, M., BEDOYA, C., XIA, X.C., CROSSA, J., FRANCO, J., HOISINGTON, D., PIXLEY, K., TABA, S., MELCHINGER, A.E. 2008. Genetic diversity in CIMMYT non temperate Maize germplasm: Landraces, open pollinated varieties, and inbred lines. *Crop Sci* 48, 617-624.

- WOLLNI, M., ZELLER, M. 2007. Do farmers benefit from participating in specialty markets and cooperatives? The case of coffee marketing in Costa Rica. *Agr Econ* 37, 243–248.
- XIA, X.C., REIF, J.C., MELCHINGER, A.E., FRISCH, M., HOISINGTON, D.A., WARBURTON, M.L. 2005. Genetic diversity among CIMMYT maize inbred lines investigated with SSR markers: II. Subtropical, tropical mid-altitude and highland maize inbred lines and their relationships with elite U.S. and European maize. *Crop Sci* 45, 2573-2582.
- YILMA, T., BERG, E., BERGER, T. 2008. The agricultural technology-market linkage under liberalisation in Ghana: Evidence from micro data. *J Afr Econ* 17, 62-84.
- ZELLER, M., SHARMA, M., HENRY, C., LAPENU, C. 2006. An operational method for assessing the poverty outreach performance of development policies and projects: Results of Case Studies in Africa, Asia and Latin America. *World Dev* 34, 446-464.
- ZELLER, M. 2006. A comparative review of major types of rural microfinance institutions in developing countries. *Agr Financ Rev* 2006, 195-213.
- ZELLER, M., SHARMA, M., HENRY, C.J., LAPENU, C. 2006. An operational method to assess the poverty outreach performance of development policies and projects: Results of Case Studies in Africa, Asia and Latin America. *World Dev* 34, 446-464.
- ZILBERMAN, D., AMEDEN, H., QAIM, M. 2007. The Impact of Agricultural Biotechnology on Yields, Risks, and Biodiversity in Low-Income Countries. *J Dev Stud* 43, 63-78.

Table A4: Formalized cooperation agreements for FSC

Letters of Intent from the following institutions are attached.

Higher Education Institutions in Africa, Asia, and Latin America
Sokoine University of Agriculture, Tanzania
Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), Uganda
Kasetsart University, Thailand
Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), Philippines
Centro Agrónomo Tropical de Investigación y Enseñanza (CATIE), Costa Rica
Universidad de Costa Rica, Costa Rica
Centers of the Consultative Group on International Agricultural Research
International Food Policy Research Institute (IFPRI), USA
International Institute of Tropical Agriculture (IITA), Nigeria
International Livestock Research Institute (ILRI), Kenya
International Rice Research Institute (IRRI), Philippines
World Agroforestry Centre (ICRAF), Kenya
Centro Internacional de Agricultura Tropical (CIAT), Colombia
International Crops Research Institute for the Semi-arid Tropics (ICRISAT), India
Governmental and Non-governmental Organizations and Donors in Germany
Brot für die Welt, Stuttgart
Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), Eschborn
Deutsche Welthungerhilfe, Bonn
FIAN International, Heidelberg
KfW Bankengruppe, Frankfurt am Main
Vater und Sohn Eiselen-Stiftung, Ulm

Table A5: FSC Members

Professors marked in italics joined the working group that developed the presented concept.

Department	Code	Division	Professor	
<i>Faculty of Agricultural Sciences</i>				
Soil Science and Land Evaluation	310	A	Soil Science Petrology	Stahr
		B	Soil Biology	Kandeler
		D	Biogeophysics	Streck
Landscape and Plant Ecology	320	A	Landscape Ecology and Vegetation Science	Böcker
		B	Plant Ecology and Ecotoxicology	Fangmeier
Plant Nutrition	330	C	Fertilization with Soil Chemistry	Müller T.
Crop Production and Grassland Research	340	D	Co-ordination for Organic Farming and Consumer Protection	Zikeli
Plant Breeding, Seed Science and Population Genetics	350	A	Plant Breeding	Melchinger
		C	Plant Breeding and Biotechnology	Weber
		D	Seed Science and Seed Technology	Kruse
Phytomedicine	360	B	Weed Science	Gerhards
		C	Applied Entomology	Zebitz
Special Crop Cultivation and Crop Physiology	370	D	<i>Fruit Science</i>	<i>Wünsche</i>
Plant Production and Agroecology in the Tropics and Subtropics	380	A	<i>Plant Production in the Tropics and Subtropics</i>	<i>Cadisch</i>
		B	Plant production and Agroecology in the Tropics and Subtropics	Sauerborn
		C	Crop Waterstress Management in the Tropics and Subtropics	Asch
Farm Management	410	A	Production Theory and Resource Economics	Dabbert
		C	Computer Applications and Business Management in Agriculture	Doluschitz
Agricultural Policy and Agricultural Markets	420	A	<i>Agricultural and Food Policy</i>	<i>Grethe</i>
		B	Agricultural Markets and Marketing	Becker
Social Sciences in Agriculture	430	A	Agricultural Communication and Extension	Hoffmann
		B	<i>Gender and Food</i>	<i>Bellows</i>
		C	Rural Sociology with Gender Studies	Kromka
Agricultural Engineering	440	B	Livestock Systems Engineering	Jungbluth
		D	Process Engineering in Plant Production	Köller
		E	<i>Agricultural Engineering in the Tropics and Subtropics</i>	<i>Müller J.</i>
Animal Nutrition	450	A	Animal Nutrition	Rodehutschord
Environmental and Animal Hygiene and Veterinary Medicine (with Animal Clinic)	460	A	Anatomy and Physiology of Domestic Animals	Amselgruber
		B	Environmental and Animal Health	Böhm
Animal Husbandry and Animal Breeding	470	A	Animal Husbandry and Regulation Physiology	N.N.
		B	Farm Animal Ethology and Poultry Production	Bessei
Animal Production in the Tropics and Subtropics	480	A	Animal Husbandry and Breeding in the Tropics and Subtropics	Valle Zárate
		B	Aquaculture-Systems and Animal Nutrition in the Tropics and Subtropics	Becker

Agricultural Economics and Social Sciences in the Tropics and Subtropics	490	A	<i>Rural Development Theory and Policy</i>	<i>Zeller</i>
		B	<i>International Agricultural Trade and Food Security</i>	<i>N.N.</i>
		C	Farming and Rural Systems in the Tropics and Subtropics	Doppler
		D	Land Use Economics in the Tropics and Subtropics	Berger
<i>Faculty of Natural Science</i>				
Biological Chemistry and Nutrition	140	A	<i>Biological Chemistry and Nutrition</i>	<i>Biesalski</i>
		C	Biochemistry and Nutrition	Graeve
		F	<i>Biological Chemistry and Nutrition Biofunctionality and Food Safety</i>	<i>Grune</i>
Food Science and Biotechnology	150	B	Biotechnology	Fischer
		C	Food Process Engineering	Kottke
		D	Plant Foodstuff Technology	Carle
		H	Food Analysis	Isengaard
Botany	210	A	General Botany	Küppers
Zoology	220	B	Parasitology	Mackenstedt
Physiology	230	A	Physiology	Breer
		B	Membrane Physiology	Hanke
Plant Physiology and Biotechnology	260	A	Plant Physiology and Biotechnology	Schaller
<i>Faculty of Business, Economics, and Social Sciences</i>				
Economics	520	F	<i>Economics, esp. Environmental Economics and Regulatory Policy</i>	<i>Ahlheim</i>
Social Sciences	540	D	Sociology	Buß
Household and Consumer Economics	530	A	Household and Consumer Economics	Sousa-Poza

Table A6: Project objectives and expected achievements by end of DAAD funding (June 2014)

Objectives		Expected Achievements (Serving as Project Success Indicators)
1	<i>Capacity strengthening in food security education and research</i>	
a	Implementation of excellent PhD teaching and research programs at UHOH in collaboration with HEIs from Sub-Saharan Africa, South and Southeast Asia, and Latin America	Establishment of a Young Excellence School (YES) in Hohenheim: 4 summer schools, 24 short courses, 24 methodological seminars/workshops
b	Review and improvement of curricula of selected MSc and PhD programs at partner HEIs in developing countries	Southeast Asia: Establishment of joint PhD program in "Food Security and Agricultural Development" at Kasetsart University (Thailand) with regional outreach to Southeast Asia and in cooperation with HEIs in the region; East Africa: Support to curriculum development and training for regional MSc program in Agricultural Economics under an already funded partnership program with DAAD but enhanced through FSC activities, focusing on support to the regionalization of the program; support to implementation and improvement of regional PhD program in "Soil and Water Management", administered by the Regional University Forum for Capacity Building in Agriculture (RUFORUM) and established by Sokoine University (Tanzania); All regions: 24 short courses and 24 regional workshops/seminars at partner HEIs in Sub-Saharan Africa, South and Southeast Asia, and Latin America
2	<i>Human capital formation and knowledge generation and transfer</i>	
a	Education and training of graduate and postgraduate development experts and scientists specialized in food security	Training of 3 professors (by FSC visiting professorships), 15 assistant professors (by South-North and South-South visiting lectureships) and 27 PhD students (by YES and Sandwich DAAD scholarships) from developing countries; Education and training of 24 PhD students (by YES and Excellence DAAD scholarships) and 80 MSc students (by existing MSc programs and Eiselen scholarships) from developing countries; Training of 5 assistant professors (by North-South DAAD visiting lectureships) and 9 PhD students (by YES and Sandwich DAAD scholarships) from developed countries; Education and training of 30 MSc students (by existing MSc programs and Eiselen scholarships) from developed countries
b	Generation and dissemination of policy-relevant knowledge through applied, demand-driven research by scientists and students in partnership with national and international development organizations and research institutes	Publication of 100 peer-reviewed papers, 60 dissertations (33 at UHOH, 27 at partner HEIs), and 110 MSc theses; Dissemination of technical, institutional, and policy findings to decision makers in international and governmental organizations in Germany and developing countries via policy briefs, public hearings, discussion papers, workshops, contributions to international conferences, and multi-stakeholder working group participations related to global challenges of food security, poverty, and hunger
c	Involvement of students at UHOH and partner HEIs in consultancy studies on request of national and international donor institutions, development organizations, and research institutes	Enhanced knowledge transfer to primary target group in close collaboration with contracting partner organizations and FSC partner institutions on site
3	<i>Creation of scientific synergies and institutional strengthening of HEIs through multi-stakeholder networking in food security research, teaching, and policy outreach</i>	
a	Pooling of UHOH's food security related activities under the umbrella of a competence center	Establishment of FSC incorporating all UHOH divisions with reference to food security

	b	Interlinking and coordination of own and partner HEIs' activities within and across regions	Operationalizing regional coordination offices; Implementation of 5 FSC annual planning and monitoring workshops (with participation of development organizations and practitioners, 5 advisory board meetings, and 10 semi-annual management committee meetings; Establishment of web domain
	c	Formation of national and international partnerships between HEIs and development organizations and establishment of an international, open multi-stakeholder platform for cooperation	Establishment of FSC network and formalization of cooperations by bilateral Letter of Intents and concrete cooperation agreements between UHOH and partner institutions; Expansion of FSC network by up to 15 additional HEIs in developing countries and a minimum of 3 German or international development organizations by formalized cooperations
	d	Strengthening and expanding North-South cooperations between UHOH and partner HEIs in developing countries	Exchange of scientific staff: 3 professors (1-2 years) and 5 assistant professors (short-time) from partner HEIs to UHOH; 5 assistant professors (short-time) from UHOH to partner HEIs; Exchange of graduate students for education, training, and research: 18 PhD students (short-time) from partner HEIs to UHOH and 9 PhD students (short-time) from UHOH to developing countries; Provision of DAAD funds for 24 PhD students from developing countries for education at UHOH and research in developing countries, and for 80 MSc students from developing countries (based in Hohenheim) and 30 MSc students from industrialized countries for research in developing countries
	e	Strengthening and expanding South-South cooperations among partner HEIs in developing countries	Exchange of scientific staff across regions: 10 assistant professors (short-time) of African, Asian, Latin American partner HEIs to partner HEIs in foreign regions; Exchange of graduate students across regions: 9 PhD students (short-time) of African, Asian, Latin American partner HEIs to partner HEIs in foreign regions Support to staff of HEIs for publications, for attendance of conference (especially those strengthening South-South relationships), and building institutional linkages between HEIs in the South
	f	Enhancing the capacity of partner HEI's to acquire research funds	Increase of third-party funding through synergies and improved attractiveness
4 Establishment of a Think Tank in Germany for food security related development policy			
	a	Provision of own and partner institutions' scientific and practical expertise to national and international development organizations	Policy briefs, newsletters by email to stakeholders and alumni of FSC, public hearing, discussion papers, and workshops upon request of contracting partner organizations and stakeholders
	b	Acting as a contact and knowledge broker between national and international stakeholders and FSC network members with and across regions	Implementation of intermediary service by FSC management staff for North-South, South-North, South-South, and North-North contact sharing and knowledge transfer
5 Enhancement of public, civic and private sector action against food insecurity through advocacy and sharing of scientific knowledge			
	a	Implementation of national and international information and communication platform	Establishment of web-domain in English and German with description of FSC engagement, online discussion paper series, newsletters (open source for partner HEIs), blogs, press briefings and conferences
	b	Advocacy and public awareness building	Establishment of 4 international conferences in Hohenheim and at partner HEIs (in rotation) and public lecture series in Hohenheim with 100 lectures
	c	Acquisition of third-party funds for extending activities and continuation of engagement	Acquisition of third-party funds for awarding 9 Sandwich and 2 Excellence scholarships to PhD students (in addition to those named above), conference, seminar/workshop, and research support

Box A7a: Profiles of Strategic Partner Institutions in Africa

Regional Universities Forum for Capacity Building in Agriculture (RUFORUM)

The Regional Universities Forum for Capacity Building in Agriculture is an initiative by a consortium of 25 universities in East, Central and Southern Africa (12 members and 13 associates) to develop and strengthen human resource capacity for inter-disciplinary problem-solving. It achieves its goal through grants programs to support research and to address rural (agricultural) development issues, especially community and smallholder farmer needs.

RUFORUM's mission is to foster innovativeness and adaptive capacity of universities engaged in agricultural and rural development to develop and sustain high quality in training, innovative and impact oriented research and collaboration. RUFORUM sees a vibrant agricultural sector linked to African universities which can produce high-performing graduates and high-quality research responsive to the demands of Africa's farmers for innovations and able to generate sustainable livelihoods and national economic development, research, and collaboration. RUFORUM seeks to make universities more responsive to emerging challenges in the region and to respond to those challenges in a national and regional development paradigm.

RUFORUM is collaborating in networks such as New Partnership for Africa's Development (NEPAD), Forum for Agricultural Research in Africa (FARA), Common Market for Eastern and Southern Africa (COMESA), African Network for Agricultural and Forestry Education (ANAFE), Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN).

RUFORUM supports a wide range of Regional MSc and PhD Programs, among others a PhD in Food Science and Nutrition.

Sokoine University of Agriculture (SUA)

Founded in 1984, Sokoine University of Agriculture is one of the leading higher learning institutions in Tanzania. The mission of the university is to offer Bachelor, Master and PhD degree programs in Agriculture, Forestry, Natural Resource and Veterinary Science.

Food Security ranks high amongst the important facets and manifestations of poverty, and it is thus a key element of the poverty alleviation strategy and hence research and training. At SUA, the food security theme, is conceived in a broad sense, and it consists of measures to address policies, strategies, technologies, governance and organizational aspects that aim at ensuring adequacy of food supply in terms of quantity and quality, stable and sustainable supply of the same over time and also accessibility to food by all who need it.

The undergraduate and post graduate degree programs, as well as the research and outreach activities undertaken by SUA are heavily inclined towards addressing various facets of food security. From the 16 Postgraduate Programs the MSc in Food Science, the MSc in Human Nutrition and the M.A. in Rural Development are explicitly focusing on FSC relevant themes. There are also short courses that are tailor-made for food security, and two SADC (Southern African Development Community) Regional Training Modules.

The University collaborates with regional and international universities, promoting research and training activities that have direct and indirect implications for food security such as in the SADC Food Security Program and the African Economic Research Consortium (AERC).

Box A7b: Profiles of Strategic Partner Institutions in Asia

Kasetsart University (KU)

Kasetsart University (KU) founded in 1943 is the first university in Thailand which offers courses in the field of agricultural science. Kasetsart is one of the two leading Universities of Agriculture in Thailand. It aims to produce qualified graduates to serve the need of Thai society and global community. One of the missions is to strengthen the core body of knowledge and field of expertise for the excellence in tropical agriculture.

The University offers a wide range of MSc and PhD programs in environmental, agricultural and food sciences. The offered MSc in Food Safety, Food Engineering, Biotechnology, Food Science, Food Industry Technology, Fisheries, Agricultural economics, Tropical Agriculture and Agricultural Research and Development are specifically focusing on food security.

Various bodies within the KU focus on different aspects of food security. The Institute of Food Research and Product Development (IFRPD) undertakes, as its main activity, food research and development from agricultural resources to increase quality and quantity foods compatible with the rising demand of the local people and food industrial development in the country. Moreover, centers of excellence in rice science, oil palm, sugarcane and agricultural biotechnology are also working toward the improvement of agricultural production for global food security.

Kasetsart University network of partnership covers both national and international levels. It is a founding member of Council of Agricultural Faculties of Thailand which foresees the future of Thai agricultural education and research. With its close working relationship with Bank for Agriculture and Agricultural Cooperatives of Thailand, KU also has significant impact on and reach out to Thai farmers' well-being. International collaboration such as with AVRDC allows KU to share its valuable resources and knowledge with the world.

Kasetsart University has students from all over Asia (Laos, Cambodia, Myanmar, Malaysia, Indonesia, Vietnam, Philippines, Singapore, China, Bhutan, Sri Lanka, Pakistan, Bangladesh, Nepal, India, and Mongolia) and thus plays an important role in regional capacity development. Collaborative research projects on main food crops, food science and technology are ongoing.

In collaboration with many regional and international universities and research and development institutes, Kasetsart University supports education and research activities to improve both knowledge and human resource capacity to ensure sustainable development on food security

Kasetsart University maintains more than 200 institutional agreements with other institutes of higher education worldwide.

Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA)

The Southeast Asian Regional Center for Graduate Study and Research in Agriculture founded in 1965 is one of the 15 regional centers of excellence of the Southeast Asian Ministers of Education Organization (SEAMEO). SEARCA is mandated to strengthen institutional capacities in agricultural and rural development in Southeast Asia through graduate education, short-term training, research, and knowledge exchange. It serves the eleven SEAMEO member countries in Southeast Asia, namely Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Vietnam and Timor-Leste. It also implements projects for its associate member countries Australia, Canada, France, Germany, New Zealand, Norway, the Netherlands and Spain.

Southeast Asia faces multiple challenges of rural poverty and food insecurity, rising energy and food prices, growth of agro-fuels production, biosafety and biotechnology, and the emergence of new value chains and the increasing integration of traditional ones amidst globalization and global policy shifts on one hand, and dwindling resources, biodiversity management, and changing climate on the other. SEARCA sees that efforts in agricultural competitiveness and natural resources management are the key to addressing the problems of food insecurity and poverty in Southern Asia. Its people are Southeast Asia's most potent force for progress. Hence, agricultural human resource development has been SEARCA's primary goal since its establishment.

SEARCA's Graduate Study Program will continue to develop a strong cadre of agricultural professionals in the region through more MSc and PhD scholarships, sandwich programs and student exchange programs.

Box A7c: Profiles of Strategic Partner Institutions in Latin America

Universidad de Costa Rica (UCR)

The University of Costa Rica created in 1940 promotes through teaching and research transformations of the social sphere in order to contribute to an integral development of society, so as to obtain general well-being of the population, in the context of freedom, independence and justice. The University counts for 50% of the scientific publications by all Costa Rican research institutes and universities. UCR offers more than 130 MSc and PhD programs. A Master Program in Food Science and another one in Human Nutrition are explicitly focusing on food security. Other programs with relevance to food security are the MSc in Agrobusiness and Management, in Agricultural Sciences and Natural Resources, and a PhD in Systems of Sustainable Tropical Agricultural Production.

The UCR is founding member of the International Association of Universities (IAU) and has signed more than 340 cooperation agreements with universities across the globe. UCR is member of all major higher-education networks of Latin America. Of special relevance in the present context is the active membership of UCR in the Higher Education Council of Central America (CSUCA) and the Higher Education Development Center (CINDA). UCR created and coordinates the Research Network on Food and Nutritional Security and Safety (REISAN), which encompasses members of all Central American countries.

Centro Agronómico Tropical de Investigación y Enseñanza (CATIE)

During its 35 years of existence, the Tropical Agricultural Research and Higher Education Center (CATIE) has become the leading Knowledge Center for Sustainable Agriculture and Natural Resource Management in Latin America and the Caribbean. CATIE has two great strengths: a) its close cooperation with national, regional and international institutions and organizations, both public and private, non-governmental and academic, in its member countries (Mexico, Dominican Republic, Guatemala, Honduras, El Salvador, Belize, Nicaragua, Costa Rica, Panama, Venezuela, Colombia, Bolivia and Paraguay), affiliated members and other countries; and b) the quality of the services it provides, based on the effective integration of its three basic activities: research, education and outreach, all of which focus on sustainable human development and natural resource conservation.

CATIE forms leaders capable of solving problems in a complex and changing world, implements projects that contribute to agricultural development and conservation of natural resources and contributes to public policy at municipal, national and international levels through scientific knowledge.

CATIE offers 3 PhD Programs, including two joint degrees (Idaho, UWB) and 6 MSc programs including ecological agriculture/agroforestry and a Master of International Agribusiness Management (jointly with INCAE Business School).

CATIE works in strategic alliances with more than 200 public and private partners.

Table A8: Selectable study modules in the YES PhD program

Modules of the curricula at the Faculty of Agriculture in 2008	Professor
PhD Level	
Methods of Scientific Working	Cadisch
Modeling Techniques in Land-Use and Rural Development Economics	Berger
MSc Level	
Advanced Environmental and Animal Hygiene - Laboratory Work	Böhm
Advanced Environmental and Animal Hygiene - Project	Böhm
Advanced Policy Analysis Modeling	Grethe
Advanced Soil Biology	Kandeler
Agricultural and Food Policy	N.N.
Agricultural Production and Residues	Jungbluth
Air Pollution and Air Pollution Control	Fangmeier
Animal Health Management in the Tropics and Subtropics	Valle Zárate
Applied Econometrics	Doppler
Biodiversity, Plant and Animal Genetic Resources	Sauerborn
Bioinformatics	Piepho
Breeding Methodology	Melchinger
Conservation Agriculture	Claupein
Crop - Environment Interactions	Wünsche
Crop Physiology	Claupein
Crop Production Affecting the Hydrological Cycle	Asch
Crop Production Systems	Cadisch
Crop Protection in Organic Farming	Zebitz
Development of Agriculture in Transition Economies	Bahrs
Development Policies and Economic Strategies	Zeller
Ecology and Agroecosystems	Sauerborn
Ecology of Insects	Zebitz
Economic Modeling and Policy Simulation	Berger
Ecophysiology of Crops in the Tropics and Subtropics	Asch
Ecotoxicology and Environmental Analytics	Fangmeier
Entomological Methodology	Zebitz
Entomology	Zebitz
Environmental and Resource Economics	Dabbert
Environmental Management	Doluschitz
Environmental Microbiology, Parasitology and Microbial Ecology	Böhm
Environmental Policy and Legislation	Grethe
Environmental Pollution and Soil Organisms	Kandeler
Environmental Science Project	Streck
Ethnic, Cultural and Social Aspects of Watershed Development	Zeller
Exercises in Plant Nutrition	Müller
Farm Level Modeling	Berger
Farming and Rural Systems Development	Doppler
Farming Systems Research	Doppler
Fertilization and Applied Soil Chemistry in the Tropics and Subtropics	Müller
Field Course in Site Ecology (Meteorology, Soil Ecology, Vegetation Ecology) with Seminar	Böcker
Food and Nutrition Security	N.N.
Food Rights: Security, Sovereignty, and Public Health	Bellows
Food Safety and Drinking Water Quality Related to Zoonoses in the Tropics and Subtropics	Böhm
Food Safety and Quality Chains	Schöne
Food Technology and Residues	Kottke
Forest Resources and Management	Kammesheidt
Gender and Food Studies	Bellows
Genetic Resources and Animal Husbandry Systems in the Tropics and Subtropics	Valle Zárate
Global Change Issues	Fangmeier
Information Technologies and Expert Systems in Plant Protection	Gerhards
Inland Water Ecosystems	Tremp

Integrated Agricultural Production Systems	Cadisch
Integrated Watershed Modeling	Cadisch
Integration of Aquaculture in Agricultural Farming Systems	Becker
Intensive Aquaculture Systems	Becker
Interdisciplinary Advanced Soil Science Project	Stahr
Interdisciplinary Case Study	Asch
Interdisciplinary Study Project, Scientific Methodologies for Integrated Research	Stahr
International Food and Agricultural Trade	N.N.
International Nutrition	Bellows
Knowledge and Innovation Management	Hoffmann
Land Use Economics	Berger
Livestock Breeding Programs - Planning Procedures and International Case Studies	Valle Zárate
Livestock Production Systems and Development	Valle Zárate
Major Pedological Field Trip	Stahr
Mapping Course: Soils and Vegetation	Stahr
Markets and Marketing of Organic Food	Becker
Matter Cycling in Agroecosystems	Streck
Methods of Scientific Working (for Crop Sciences)	Schmid
Microeconomics of the Food Chain	Becker
Molecular Aspects of Plant Protection	Gerhards
Organic Farming in the Tropics and Subtropics	Zikeli
Organic Food Chain Project	Zikeli
Organic Food Systems and Concepts	Zikeli
Organic Livestock Farming	Valle Zárate
Organic Plant Production	Claupein
Organizational Development	Hoffmann
Physiological and Ecological Aspects of Animal Nutrition in the Tropics	Becker
Phytopathology	N.N.
Planning of Breeding Programs	Melchinger
Plant and Post Harvest Protection in the Tropics and Subtropics	Zebitz
Plant Breeding and Seed Science in the Tropics and Subtropics	Melchinger
Plant Nutrition and Soil Chemistry in the Tropics and Subtropics	Müller
Plant Quality	N.N.
Plant Symbioses for Nutrient Acquisition	Neumann
Population and Quantitative Genetics	Schmid
Postharvest Technology and Food Quality	Müller
Poverty and Development Strategies	Zeller
Precision Farming	Köller
Problems and Perspectives of Organic Farming	Zikeli
Processing and Marketing of High Value Food Products	Müller
Processing and Quality of Organic Food	Zikeli
Project Evaluation Methods	Doppler
Project in Soil Sciences	Kandeler
Promotion of Livestock in Tropical Environments	Valle Zárate
Qualitative Research Methods in Rural Development Studies	Zeller
Quantitative Methods in Biosciences	Piepho
Quantitative Methods in Economics	Doppler
Remote Sensing	Wulfmeyer
Renewable Energy for Rural Areas	Müller
Renewable Energy Sources for Mountainous Regions	Müller
Rural Communication and Extension	Hoffmann
Rural Development Policies and Institutions	Zeller
Seed Research	Kruse
Selection Theory	Melchinger
Signaling in Plants under Stress	Asch
Social Conditions of Organic and Sustainable Agriculture	Bellows
Socio-economics of Organic Farming	Dabbert
Soil Fertility and Fertilization in Organic Farming	Müller

Soil Genesis Classification and Geography	Stahr
Soil Water and Forest Resources	Stahr
Spatial Data Analysis with GIS	Streck
Sustainable Livestock Production Systems	Valle Zárate
Sustainable Production of High Value Crops	Wünsche
Tropical Soils and Land Evaluation	Stahr
Waste Management and Waste Techniques	Thomanetz
Water and Soil as Resources	Müller
Watershed Ecology and Agroecosystems	Sauerborn

Box A9: Summer school in Hohenheim in 2010

Summer School: Assessment and Treatment of Disease-related Malnutrition

Organizers: H.K. Biesalski and T. Grune

Background:

Malnutrition has forever been a major problem for developing countries. The elimination of hunger from the world is one of the major tasks of mankind also included in the MDG. In most of these goals the elimination of hunger is given as the major goal. However, more recently many developing countries (as well as developed countries) face another even more complex problem: malnutrition in micronutrients, essential amino acids or lipids. Malnutrition in either of these compounds is leading to severe failure in development during childhood, to increased spreading of infectious disease, including viral and parasite infections, and to metabolic diseases. Since the micronutrient are not interchangeable in their metabolic function and, therefore, each of the micronutrients has to be provided in an adequate amount, a new understanding of nutritional habits, food processing and crop raising has to be developed. Since about 40 nutritional food components are established to be essential, it is important to underline the individual requirements of nutritional supplementation with these components and their effects on health in special risk groups. Since this task is inherently more complex, then the pure nutrition with an adequate amount of calories, regardless of the source, we believe that such a summer school will make a great impact on the understanding of future developmental goals.

Aim:

The aim of this summer school will be the development of an understanding of the complex interaction between malnutrition in essential food components, health effects and reasons for such malnutrition. The School will enable participants to understand the basic roles of important micronutrients in the metabolism, their distribution and most importantly basic principles of the involvement of these micronutrients in disease development. Basic principles in the assessment of risk groups for malnutrition will also be thought.

Teaching plan and structure of the school:

The school will be organized during the summer on a three week basis, given the usual 180 hours workload for 6 credit points. At the end of the school a multiple choice based examination will be performed. Therefore, this school can be also used by the students to get credit points for their regular studies.

We aim for a maximum of 30 students in the school. A wide spectrum of teachers from the University of Hohenheim and from other institutions will be invited to perform the teaching.

The teaching programme will be divided into six major parts. These include:

Basics: especially for students having no biological, medical or nutritional background (e.g. students of agriculture etc.) the basic principles of human metabolism and physiology will be given.

Nutritional education: the basics of nutrient-metabolism interaction in the human body will be included here and together with details of digestion and absorption, as well as the role of malabsorption in the development of diseases

Essential food components: essential food components, their prevalence in various foods (here the world wide distribution of different crops will be taken into account) will be taught. Food component stability during processing and storage as well as variations in dependence of soil etc. will be also included into the teaching programme here

Malnutrition in connection with disease: the input of malnutrition n disease prevalence, severity and outcome, as well as malnutrition as a consequence of disease will be looked at in this part of the school. Infectious diseases, viral infections, parasite infections, cachexia and protein-energy-malnutrition will be central points in this part of the school.

Malnutrition of underprivileged groups: here the nutritional situation of special groups with regard to gender, age and family size will part of the teaching programme.

Assessment and treatment of malnutrition: basic principles of malnutrition assessment applicable to a wide range of the population will be demonstrated together with effective treatment strategies applicable in underprivileged countries will be demonstrated.