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GÖTTINGEN

UNIKASSEL VERSITÄT | ORGANIC AGRICULTURAL SCIENCES

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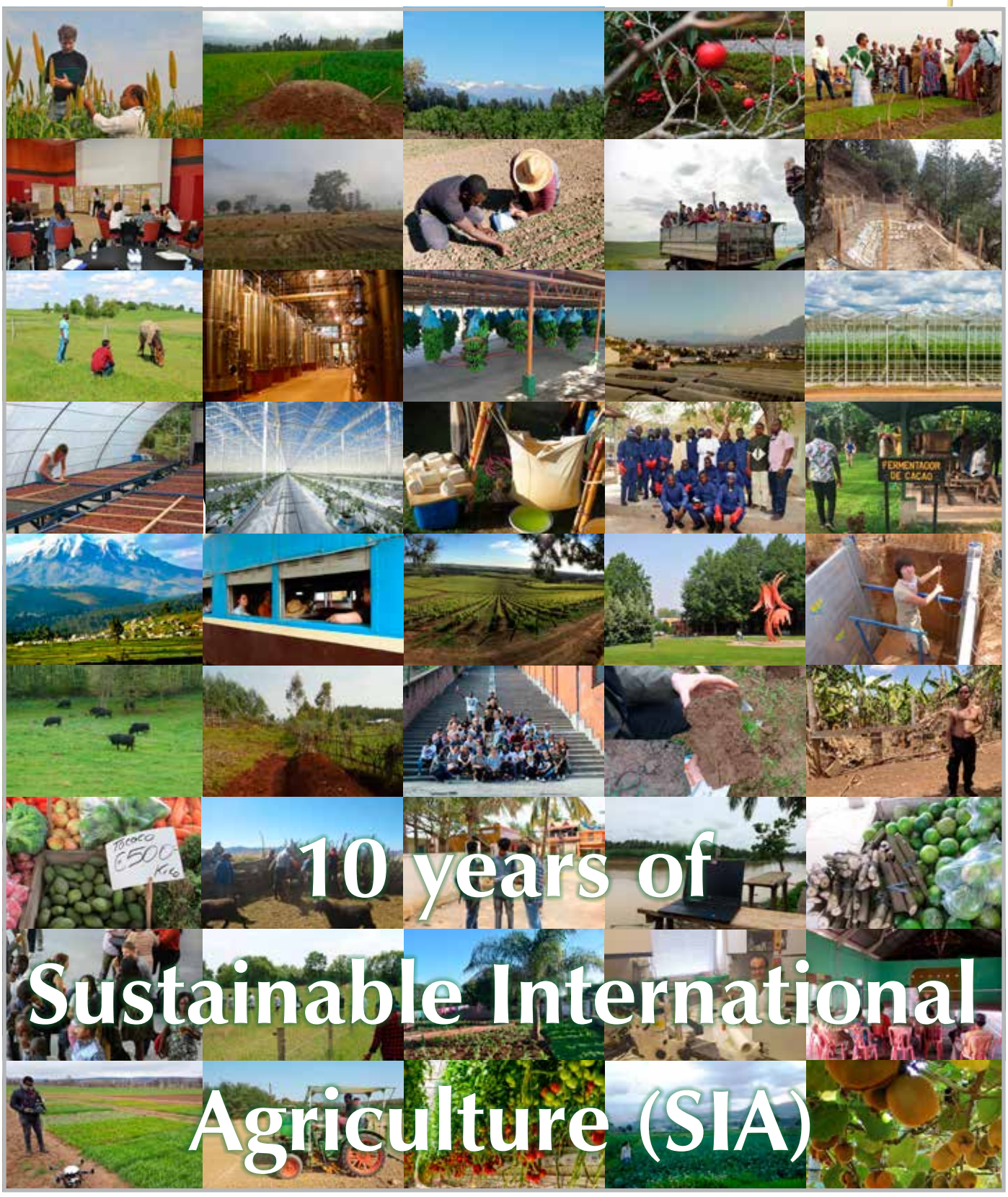
Newsletter der Fakultät für Agrarwissenschaften

Ausgabe 23
Sonderausgabe 10 years of SIA



10 years of Sustainable International Agriculture (SIA)

Dear readers,
10 years "Sustainable International Agriculture" as a joint degree of the Faculty of Agricultural Sciences in Göttingen and the Faculty of Organic Agricultural Sciences in Witzenhausen. On this occasion, we take the opportunity to look back at the beginning of the program, where two degrees from Göttingen and Witzenhausen respectively were merged to one joint degree, and to thank all colleagues and students who have contributed to the success of this degree program.
Each year around 50 students from more than 20 different countries are enrolled in the study program's three different profiles. This large number of international students forms a very special community. The diverse cultural background is a challenge for staff and students at the beginning of each cohort, but most of all it is a resource which contributes to our ongoing international exchange and to the involvement of different perspectives in discussions. This presents a distinct added value for learning, teaching and research.
This special edition of the faculty newsletter gives an overview of how the degree program has developed, what its characteristic features are, and what makes its alumni so successful. The coordinators' articles give an impression of the study program. The international experience of the professors forms the core of the program. The continuous adjustments of the more than 70 modules on offer as well as the development of new modules keep the study up to date. Such thematic variety makes it possible for each of the students to study a curriculum tailored to their interests and career goals.
In their contributions, students and alumni of the program share their individual experiences in Göttingen and Witzenhausen. For each of them it is a unique experience and we learn that studying SIA means travelling. Many SIAs have taken part in the excursions abroad, have organized international internships or conducted the research for their master theses in one of their professors' research projects around the globe. Many SIAs continue with a PhD, some in Göttingen and Witzenhausen, others in other universities in Germany or abroad. The contributions of our alumni show the wide range of employment opportunities. In a number of articles, they give insights into some of the topics that they are engaged in.
We wish SIA, the professors, the staff, the students and alumni all the best for the future!
Best wishes from Göttingen and Witzenhausen

Grete Thinggaard ter Meulen
Academic Advisor of Study Affairs
Faculty of Agricultural Sciences
University of Göttingen

Ute Gilles
International Study Affairs
Faculty of Organic Agricultural Sciences
University of Witzenhausen

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Prof. Dr. Henner Simianer

Dean, Göttingen

For many years, researchers at both the University of Göttingen as well as the University of Kassel have been conducting agricultural research projects all around the world. In diverse geographical settings, they have been searching for innovative solutions for a resource-efficient production of agricultural goods in a site-specific way as a response to the challenges of population growth, globalization and climate change.
It therefore seemed logical to partner up and develop the degree "Sustainable International Agriculture" to prepare students for future professional assignments within the scope of a non-degrading agriculture, which are technically appropriate, economically viable and socially acceptable (FAO, 2004). Shared professorships added strength to the partnership between the two universities.
The diverse international student community of the study program, together with the internationally experienced teachers allows for the integration of intercultural dimensions as well as a global perspective on content and methods in the curricula. This opens up the possibility for broader viewpoints on the very complex topics in the field. Likewise, new colleagues have brought and continue to bring new impulses for the further development of the degree program. Every year new modules are added, and currently our students can choose from more than seventy different modules. This wide range of modules in soil, plant, animal and socio-economic sciences as well as classes addressing methods and soft skills impart qualification for an in-depth analysis, understanding and possible modification of existing farming systems.
This wide scope of the program allows our students to give their degree an individual touch and to graduate as either generalists or specialists. Our students appreciate their professors' international experience and that they have the chance to take part in research worldwide during the preparation of their master theses. Moreover, they cherish the opportunity of learning from the very diverse experiences of their international fellow students and that they have an international network as a base for their professional life at the end of their studies.
We know we are on the right track, when we get feedback on the positions our alumni hold across the globe. The experiment to create a joint degree between two Universities of two different federal states initially was a challenge, but has turned out a great success. I congratulate my colleagues to SIA's 10-year anniversary.

Prof. Dr. Gunter Backes

Dean, Witzenhausen

Back in 2005 when the two respective state ministries and the presidents of our two universities signed the cooperation agreement, we broke new ground. Together with the University of Göttingen, we boldly went where no German university has gone before. In those days, a cooperation in research and teaching between two universities in two different federal states was a complete novelty, but already in 2006, we had our first joint professorship. Three years of planning and development later, partially struggling against high administrative hurdles, we could proudly start our joint study programme "Sustainable International Agriculture" with 50 English-spoken modules in three specialisations offering a broad spectrum of educations from generalist to specialist in those fields. We started with 35 students from 18 countries and today, 10 years later, we can summarise, that SIA became a success story for both universities with stable student numbers and a high satisfaction rate of the students that have access to complementary modules, facilities and services from both universities. We all learned and grew in the working process, dealing with new obstacles every year, and today, not only student networks were initiated by the study programme, but also between the faculties of these two universities, cooperation has been growing and is still increasing. In Witzenhausen, we particularly welcome the highly international quality of this study programme, reflecting and continuing our long history of focus on tropical and international agricultural research. To its 10th anniversary, I would like to congratulate the SIA programme, and express my deepest gratitude to all those that contributed to the success of SIA. For the future, I wish that the successful development of this study programme continues, with many graduates and PhDs enabled by their studies in our faculties to develop sustainable solutions and activities in a global context.

Dr. Uwe Muuss

Director, Göttingen International

Congratulations from
Göttingen International!
The Faculty of Agricultural Sciences was an early pioneer in internationally oriented teaching. Even during the time of the "Vordiplom/Diplom" structure, a master's degree programme was set up in the mid-1980s with a focus on developing nations that was supported by the DAAD in order to create internationally compatible academic structures. In 1991, the "Master of Science in Integrated Agricultural and Forestry Sciences" was established as the first English-language master's programme in Germany. It was subsequently further developed to become the current master's programme "Sustainable and International Agriculture - SIA". SIA is an excellent example of the internationalisation efforts of the University of Göttingen. Students from all over the world enrich the campus with their different professional and intercultural backgrounds and study together with their fellow German students. SIA accounts for a considerable proportion of the current total of 346 international students in the faculty and is one reason why the faculty, with 15 % foreign students, is above the university average.

Göttingen International supports SIA in various ways, starting with International Marketing, where the programme is advertised on DAAD portals or at international trade fairs. The Accommodation Service supports students in their difficult search for accommodation before they begin their studies. Upon arrival, the International Student Office and the Faculty introduce students to life in Göttingen during the introductory week. In addition to an overview of leisure activities, the students receive information about the University and the various activities offered, such as the cultural programmes of the Foyer International, the excursion programme for foreign students, German courses accompanying their studies and much more. These help students find their way around the University and the city of Göttingen.
After enrolment, Göttingen International will continue to support students until they graduate. For example, there are numerous possibilities for those who wish to spend a semester abroad during their studies via faculty and University partnerships. Since 2010 we have been supporting SIA through recruiting and awarding PROMOS scholarships, where SIA is one of the most successful programmes! Under the PROMOS programme, students receive grants for travel expenses and accommodation costs for research stays abroad to collect data for master's theses, study stays and study-related internships. In addition to PROMOS, many students receive scholarships through the EU Erasmus+ mobility programmes Key Actions 103 and 107, which promotes mobility within and outside Europe. The Erasmus+ Key Actions 103 and 107 teams of Göttingen International, together with Faculty advisors, are always happy to provide information and advice on the requirements and funding opportunities. For various reasons, it can become financially difficult at the end of one's studies. And here, too, we try to help. Every year, several emergency or graduation grants are awarded to help in such situations.
Göttingen International is pleased to know that the international students are well looked after in the faculty and endeavours to supplement the excellent supervision offered there with additional measures. Together, this results in a positive mentoring situation for the students, which is also the crucial factor in the successful completion of their studies. This is one of the reasons why many students are happy to get back in touch with their alma mater after graduating, and some stay in contact with the University as cooperation partners in research and teaching. May you pass on to your students, friends and relatives that it is worth coming to Göttingen for SIA!

Dr. Martin Wiehle

Coordinator, Center for International Rural Development,
Faculty 11: Organic Agricultural Sciences, University of Kassel

Welcome address by Tropenzentrum (Center for International Rural Development)
The implementation of the SIA MSc programme has increased the internationalization and networking at the University of Kassel, and particularly at its campus Witzenhausen. With its advisory work for international agricultural research and rural development, the Tropenzentrum at Witzenhausen (University of Kassel) serves as an interface between SIA students and professors and their working groups in Witzenhausen and Kassel. With the Work & Study Program, for example, Tropenzentrum facilitates students' first contact with research topics and tasks of the University's academic teams. More than 60 SIA students have already been financially and technically supported by this program. In addition, members of Tropenzentrum supervise the masters' thesis research and compilation of SIA students and thus contribute to opening up career opportunities for alumni. Through participation of SIA students in the many demand-driven extracurricular training courses offered by Tropenzentrum, students acquire additional soft- and hard-skills and at the same time have the possibility to shape the courses offered.
Tropenzentrum would like to thank the SIA students for the exchange of experience and opportunities. We are looking forward to more years of international profiling and exchange within the SIA degree programme.

Welcome address by the International Center for Development and Decent Work (ICDD)

Transregional and interdisciplinary cooperation at the university locations Kassel and Witzenhausen is a top priority and has been implemented long before the beginning of the SIA MSc program. Nevertheless, since the introduction of the SIA programme in 2009, an important component of global networking and broadcasting has been added for the International Center for Development and Decent Work (ICDD). Such as, for example, the ten SIA students who have received funding for their field research through an ICDD masters' thesis research grant, to collect data in a developing country (mostly their own country of origin) and to complete their masters' thesis. Furthermore, as part of the ICDD Study & Work Program, four SIA students learned to expand their administrative, networking and event planning skills while sustaining, for one year, their livelihood with the respective scholarship. Being a SIA alumnus, it is also possible to receive a three-year DAAD scholarship as an ICDD doctoral scholar:
„I became part of the ICDD through Prof. Dr. Christian Herzig. He is also my main supervisor for my PhD project. As a PhD scholar, what I like most about the ICDD is the extensive North-South and South-South cooperation in academic research. If you are a young scholar who is interested in interacting and sharing research ideas with people from all walks of life, I strongly recommend the ICDD to you".
(Evans Kissi, ICDD PhD scholar)

The integration of SIA students within the ICDD thus offers career opportunities and we look forward to further successful collaboration and learning with dedicated SIA students.

A review on ten years of SIA

Prof. Dr. Eva Schlecht
Chair of Animal Husbandry in the Tropics at University of Göttingen and University of Kassel
Coordinator of the M. Sc. Sustainable International Agriculture till 2017

In 2005, the Hessen State Ministry for Higher Education, Research and the Arts, and the State Ministry for Science and Culture of Lower Saxony, as well as the presidents of the University of Göttingen and the University of Kassel signed a cooperation agreement to confirm the intention of close collaboration in research and teaching between the two universities. At the time, this cooperation agreement was a novelty since German federal states are independent in their research and education policies and strongly uphold this fact. In summer semester 2006, a first joint professorship (Animal Husbandry in the Tropics and Subtropics) was filled by the two universities and in November 2006 the deans of the agricultural faculties in Göttingen and Kassel-Witzenhausen asked a small team of professors of both faculties to develop a joint international and interdisciplinary master's program in agricultural sciences. The team assessed the then-existing master's programs "Tropical and International Agriculture" in Göttingen and "International Ecological Agriculture" in Kassel-Witzenhausen. In July 2007, they concluded that the 40 modules offered in Göttingen and the 30 modules offered in Witzenhausen partly overlapped in contents, but could also close curricular gaps that existed at both locations. A first draft for the joint master's program "Sustainable International Agriculture" was presented to the two faculties in March 2008 and consisted of about 70 different modules across three axes of specialization – "International Agribusiness and Rural Development Economics", "International Organic Agriculture", and "Tropical Agriculture" (renamed "Tropical Agricultural and Agroecosystems Sciences" in January 2014). After several - sometimes controversial yet always stimulating - discussions among the involved lecturers and a quite complex administrative process to clarify various matters (double matriculation in Kassel and Göttingen, allocation of semester fees to the two universities, choice of semester ticket for public transport, and so on), the study and examination order of the joint international master's program Sustainable International Agriculture passed all academic boards at both universities and was signed by both presidents in spring 2009. And so the first cohort of SIA students – 35 persons from 18 countries, took up the study program in winter semester 2009/10.

To start the SIA program in the winter semester is always a challenge; the weather is wet and cold, days are short, outdoor activities are limited and the initial compulsory modules are overloaded with the basics, which can be boring for some and horrifying for others. While today the SIA study advisors and lecturers can answer nonchalantly most of the new students' questions concerning the practical organization of this study program, the concerns of the first cohort were often unexpected by university staff. First there was the problem of commuting between Göttingen and Witzenhausen – which are only connected by an hourly regional train – and the complaints about difficulties in reaching the north campus in Göttingen and the Nordbahnhof train station in Witzenhausen (one student group even decided to hire a taxi from Steinstrasse to Nordbahnhof!). But then, a much bigger problem arose with the statistics class in the first year of SIA when the designated lecturer left the university. Study advisors and SIA speaker were confronted to a very angry crowd of students because the substitute teacher offered the compulsory stats module during the lecture-free time when several students already had planned to study a semester abroad. Surely, a way was found to solve the issue, and today the most vehemently protesting students of that time are all PhD holders from Göttingen and Kassel University. Another issue that still comes up frequently even after 10 years of SIA existence is access to the E-learning platform "Moodle" at Kassel University because student matriculation in Kassel takes a few weeks and is thus not fully completed at the start of the first SIA semester. However, thanks to the availability of the "Open Moodle" platform, lecturers in Witzenhausen now can get around this problem. And that's what is characteristic for the SIA program in general: it may never be perfect, but each administrative, logistic or organizational problem is eventually solved with good will from both sides, including university staff and students. Ultimately, this enhances creativity and problem solving skills of all involved!

With the start of the second semester in springtime, most logistic problems shrink and students start to enjoy life in Göttingen and Witzenhausen. They can explore Lower Saxony, Hamburg, and Bremen with their semester ticket, or join AG Internationales (founded by SIA students with support of SIA study advisors) with its very interesting talks, excursions and parties, or take part in the various SIA methods modules offering lab, computer and outdoor training.

In July 2014, the SIA program received official accreditation as an international MSc program in Germany. Yet, this very positive achievement was bitter-sweet for SIA students and became a major challenge for lecturers when the accreditation board requested to implement one compulsory module for all SIA students. Until then, each of the three axes of specialization had had their own quasi-independent study program under the SIA umbrella. Thus, the compulsory "Sustainability" module was created, addressing the issue of sustainable international agriculture from ecological, economic and social angles and involving five to six lecturers. Of the 50 to 60 students that have to attend this module in their first SIA semester, some are well educated in soil sciences, others in economics, and hardly no-one in several disciplines at the same time. Thus, the challenge for the lecturers to make their contents clear to all and for the students to open their minds to new topics is substantial every year. Success remains mixed.

With 10 years of existence, the SIA program is now well established at the universities of Kassel and Göttingen, and most professors in the two agricultural faculties offer at least one module in this program. Thus, SIA students have the choice between four to five mandatory and six elective modules in addition to their four to five compulsory modules. This is an advantage and disadvantage at the same time. On the one hand, each individual can shape her/his profile even within the three axes of specialization. For instance, students can decide to focus more on soil, plant or animal sciences, to sharpen their skills in GIS and modelling, or to concentrate more on economics and social sciences, and they can even choose modules from other programs and faculties across the two universities. On the other hand, this multitude of choices often results in courses with just two to three participants. Such courses may then be cancelled, or take place and be very demanding on students and lecturers, or evolve into an occasional meeting of lecturers and students.

A further issue is the overlapping of the very popular block courses that normally last for 10 to 21 days and are typically offered in the lecture-free time. Their contents are presented in a condensed way, and often integrate excursions, lab work, or outdoor practical training. However, a student's attitude "I just had to spend two weeks to earn six credits" did of course upset the lecturer offering a blocked module.
Beyond the possibility of creating one's individual academic profile, students have direct contact with the lecturers, for instance during train rides between Witzenhausen and Göttingen or as a positive outcome of the mandatory mentor-mentee relationship between individual lecturers and SIA students. Therefore, the latter have ample opportunities to discuss study problems and aspirations, get student assistant (HiWi) jobs, and identify their preferred supervisor for the master thesis. When professors and post-docs present and discuss the newest methodological approaches and research results in the modules, it familiarizes SIA students with ongoing research projects of – sometimes even joint – teams in Göttingen and Kassel taking place in countries of the global south and east. In this way, many SIA alumni got inspiration for their empirical and/or experimental research topics and became part of interdisciplinary projects for their own master's thesis and often subsequent PhD research.
Last, but by no means least, the interaction during study and spare time with peers from many different countries around the world enhances SIA students' knowledge of other cultures, other countries' agricultural, social, economic and political problems and policies, greatly fosters English (and sometimes also Spanish and French) communication skills, and builds the foundation for lifetime networks at personal and professional levels.

A look into the future of SIA

As reported by Prof. Schlecht in her review (this volume) on 10 years of SIA, this joint international master's program in agricultural sciences is now well established and attracts students all over the world. Over time, SIA has become increasingly interdisciplinary, and that not only refers to teaching but also to the research that offers a wide range of choices to the students, both regionally and topically, for carrying out their MSc thesis work. Examples of the wide range of research projects offering opportunities for thesis work in the tropics range from the evaluation of tradeoffs and synergies in climate change adaptation and mitigation in West Africa, urban agriculture in India, land use transformations in Indonesia to assessment of global change impacts on the multi-functionality of rural landscapes in Southern Africa. The complexity of these research topics is in line with and reflects the necessity to emphasize the role of the various Sustainable Development Goals (SDGs) and their strong interlinkages in agricultural research. This is underlined by the fact that in recent years it has increasingly become evident that agricultural activities and the management of agricultural systems will play a key role in achieving the SDGs, be it Zero hunger, No poverty, Climate action, Clean water and sanitation, or Life on land. Such insights and the societal imperative of achieving the SDGs are associated with a number of challenges for research and teaching that obviously will shape the future orientation of SIA.
The teaching modules offered by SIA have already promoted interdisciplinarity over the years, e.g. by putting strong emphasis on the multitude of agro-ecosystem services and on the need of integrating them in sustainability assessments. However, the dimension of global sustainability challenges requires even greater integrative efforts in the future. For the agricultural sciences, this means a better integration of plant production, animal production, agro-biodiversity protection and agricultural economics. But this also means strengthening linkages to related disciplines (such as hydrology, nature conservation, forestry or spatial planning) and, eventually, to the emerging field of sustainability science. In the future, SIA will continue this process of interdisciplinary integration, also including the newest methodological approaches for integrative research in various modules. This will cover advanced empirical social-ecological as well as agricultural systems modelling approaches across various disciplines and spatiotemporal scales.
Joining ongoing research projects taking place in the Global South, usually with several complementary research groups involved and sometimes even in joint teams (Göttingen and Kassel), familiarizes SIA students with complex research problems, requiring interdisciplinary approaches and transdisciplinary solutions – such as in water-food-nutrition-energy nexus research or when examining potential transformations of currently unsustainable agricultural systems. This type of research has already inspired a number of students to embark on related PhD studies. Two such opportunities of joining multi-disciplinary research groups are currently offered in South Africa and India.

Prof. Dr. Reimund Rötter
SIA Coordinator from 2017-2019
Chair of Tropical Plant Production and Agricultural Systems Modelling
University of Göttingen

Prof. Dr. Reimund Rötter

Prof. Dr. Tobias Plieninger
SIA Coordinator from 2019
Chair of Social-Ecological Interactions in Agricultural Systems
University of Göttingen and University of Kassel/Witzenhausen

Prof. Dr. Tobias Plieninger

BMBF project: South African Limpopo Landscapes network (SALLNet)

Climate-induced risks in southern Africa are expected to become even more prominent in the future than they are already today. This will have tremendous effects on essential ecosystems services (ESs), e.g. production, biodiversity, pollination, and carbon sequestration, provided by the three intertwined land use (LU) types: rangelands, arable lands and orchards. At the same time, strong increases in human populations in the region will put increasing demands on these services that are crucial for supporting local livelihoods. The overarching research question of SALLnet is: "How and to what extent can the functioning and resilience of the multi-functional landscapes in southern Africa be enhanced under possible alternative futures?" To answer this, the Limpopo region was selected as a case study due to its high spatiotemporal climatic variability and diverse land use. Research involves ground-work on the three different land use systems as well as modelling and remote sensing to scale up research results in time and space, and last, but not least, due interaction with key stakeholders during the whole research process to jointly define imaginable futures and evaluate associated options on land use management and supportive policies. The project is composed of eleven research groups from three German and three South African universities and includes a wide range of disciplines, such as grassland science, agronomy, rangeland management, soil science, crop and vegetation modelling, ecology, zoology, remote sensing, rural sociology, agricultural economics and policy research. More information can be obtained from https://www.uni-goettingen.de/en/592566.html

Emerging farmer demonstrating Improved management practices (mulching, drip irrigation, diversification) at Ndengeza, Limpopo Province (Photo: Rötter)

DFG Research Unit: Social-ecological systems in the Indian rural-urban interface

Urbanization is a key driver of global environmental change, and India is one of the world's hotspots of urbanization processes. Besides many other sustainability impacts, urbanization has important effects on farms and farmlands in and around cities – offering both opportunities and threats. Bengaluru is one of India's megacities; known as India's IT capital and once also as the "garden city", Bangalore has experienced an enormous growth of its population and a strong expansion of built-up land over the past decades. Here, researchers from the universities of Kassel and Göttingen investigate together with scientists from various Indian universities and research centres how agricultural systems are changing when rural areas are converted into (peri-) urban areas. Researchers from agricultural economics, crop science, animal science, remote sensing, geography, soil science, and other disciplines investigate urbanization impacts on agricultural production systems, household structures, ecosystem services, and biodiversity. Use of theories and tools from sustainability science helps understand the complexity of and in particular the interactions between these aspects. This project will be performed up to eight years, which makes it possible to study changes over time and offers opportunities for several cohorts of PhD students. A particular feature of this project is that it develops a comprehensive social-ecological systems approach to understanding urbanization impacts on agriculture. The project website can be found at: http://www.uni-kassel.de/fb11agrar/en/sections/home/for2432.html

Around Bangalore (India), farms are increasingly affected by urbanization processes. (Photo: Plieninger)

Potential future researchers (Photo: Rötter)

These two projects demonstrate that there is a worldwide demand for agricultural scientists who are trained in interdisciplinary, sustainability-oriented agricultural and ecological systems thinking – which is exactly what SIA graduates can offer. But also those who strive for careers in agricultural practice or policy will benefit from the integrated view on agriculture and sustainability that will remain a key characteristic of the SIA programme, as also practitioners are increasingly expected to think beyond established sectorial "silos" and understand and manage the sustainability problems of agriculture in an integrated, cross-sectoral way.

The Specialisation in International Agribusiness and Rural Development Economics

Prof. Dr. Stephan von Cramon-Taubadel
Chair of Agricultural Policy
University of Göttingen

Prof. Dr. Stephan von Cramon-Taubadel

The specialisation in *International Agribusiness and Rural Development Economics* (IARD) is older than SIA and dates back to a separate DAAD-funded study program entitled *Master of International Agribusiness* that Göttingen offered for international students – mainly *German Academic Exchange Service* (DAAD) scholarship holders from Latin America – starting in 2001. When the decision was reached to establish an economic specialisation in SIA, we decided to modify MIA and place it under the SIA umbrella, rather than create an additional new study program. In this way we were able to build on the successful experience we had gathered with MIA, but at the same time broaden the program to include courses offered by our colleagues in Witzenhausen. Joining SIA also meant that we could improve supporting services to students, such as counselling and advisory services, and the admissions and examinations offices.

Since MIA was transformed into IARD, DAAD scholarship holders (generally between five and seven each year from our partner Universities – the *Universidad de Talca* in Chile and the *Institut Pertanian Bogor* in Indonesia) have continued to be a key component of each cohort. But IARD in SIA has grown to attract many more students from all over the world. On average just over 12 students have graduated with the IARD specialisation in each of the last 10 years, and roughly one-half of these graduates have been DAAD scholarship holders from Talca and Bogor. Altogether, IARD has accounted for 56% of the 216 graduates from the SIA program, so the economics specialisation has certainly made its contribution to the program as a whole. Of course, while student numbers are important, it goes without saying that quality is even more so. The good news is that over the years we have been blessed with cohort after cohort of interested, demanding, creative and engaged IARD students.

So everything is perfect? Of course not. Our students come from different backgrounds and have a very disparate undergraduate degrees, specialisations and experience. I am sure that many of my fellow lecturers have shared the experience of teaching to a new group of IARD students at the beginning of the semester in October and sensing that some are bored to tears by what I am presenting, while others are wide-eyed with panic. (I suppose that the students find that we lecturers are also a somewhat heterogeneous bunch.) But the study program is broad and offers students many choices, for example between macro- and micro-oriented topics, and between quantitative and qualitative approaches. Experience shows that most IARD students find topical niches that allow them to develop and succeed. It is always gratifying to hear from alumni who have found interesting and challenging jobs, and who report that what they learned in IARD (even the Econometrics ☺) has provided them with the tools and capabilities that they need to make a difference.

I do have one regret. As IARD has grown, I no longer get to know all of the students in a cohort very well. There are too many and, with so many excellent courses and colleagues to choose from in Göttingen and Witzenhausen, the students tend to spread out. (Maybe a few of them are avoiding me? Which brings us back to Econometrics…). Each year several IARD students ask me to supervise their MSc theses, and when that happens it is always fun to work together and find out more about them as individuals.

Looking forward I am very excited about the prospects for the further development of the specialisation in *International Agribusiness and Rural Development Economics*. In recent years both Göttingen and Witzenhausen have hired young, dynamic professors in key areas such as: Social-Ecological Systems, Rural Sociology, Resource Economics, Science Communication, and Nutrition and Agriculture. Over the last 5 years the *Department of Agricultural Economics and Rural Development* in Göttingen has grown from 8 professorships to soon 13. This means that future cohorts in IARD will benefit from new research topics and projects, new courses, and more scope for tailoring their IARD degrees in SIA to their specific interests and needs. So there is every reason to be optimistic and expect that the next 10 years will be even better than the 10 that we are looking back on today.

More details about the specialisation "International Agribusiness and Rural Development Economics" and its modules on page 20.

Als eines der innovativsten Pflanzenzüchtungsunternehmen der Welt legen wir besonderen Wert auf die Eigeninitiative unserer Mitarbeiter.

Zu uns passen authentische Persönlichkeiten, die etwas bewegen wollen. Herausfordernde Aufgaben treiben die Weiterentwicklung Ihrer fachlichen Qualifikation und persönlichen Fähigkeiten voran. Individuelle Fortbildungen und ein hohes Maß an unternehmerischer Freiheit bei der Umsetzung ihrer Ziele begleiten Sie auf Ihrem Weg. Wachsen Sie mit uns und entdecken Sie Ihr Potenzial.

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Prof. Dr. José Diaz Osorio
Speaker of the program on behalf of the University of Talca

Joint Master's Program in International Agribusiness and Rural Development (IARD)

University of Göttingen, Germany and Universidad de Talca, Chile

The Faculties of Agriculture of the Universities of Göttingen and Talca have been cooperating scientifically for many years. In 2002, they introduced the M.Sc. Program in International Agribusiness and Rural Development (IARD) in order to meet the demand for qualified leaders in agriculture and agribusiness. In 2013, a joint Ph.D. in Agricultural Economics was introduced in partnership between both Universities.

The target group is highly qualified students originating from Latin America and Germany who wish to pursue a career in international agribusiness in the private or public sector, in research, or in non-governmental organizations in the agribusiness sector.

The core study program consists of modules covering international agricultural economics, agricultural and rural development policy as well as business administration, management and agribusiness marketing, development economics and rural sociology.

Strong emphasis is placed on acquiring methodological research skills in the fields of econometrics, marketing and social sciences. The program further offers a number of optional modules in agricultural technology, agronomy and animal production. Modules also include seminars, computer-aided exercises, and teamwork to enhance students' presentation, communication and team-building skills. The program also offers excursions to agribusiness enterprises, international trade fairs, and international organizations.

The success of the program is proven by the 117 students who obtained a double degree since the program was introduced in 2002.

Top: Visiting CIEPLAN (Corporación de Investigaciones Económicas para Latinoamérica)

Middle: Campus Talca

Bottom: Excursion to vineyard in Maule Region

IARD-Program with Bogor Agricultural University, Indonesia

Prof. Dr. Suharno
(Speaker of the program on behalf of Bogor Agricultural University)

The Faculty of Agriculture in Göttingen and the IPB have been cooperating in teaching and research since the 1990s. To strengthen especially their academic tie of both they have been engaging in a joint conduct of international master program. The program takes place through developing a common curriculum for the graduate course called *International Agribusiness and Rural Development* (IARD).and a reciprocal student exchange The program speakers are Prof. Dr. Stephan von Cramon-Taubadel, Department of Agricultural Economics and Rural Development (on behalf of the Faculty of Agricultural Sciences, University of Göttingen) and Prof. Dr. Suharno (on behalf of the IPB).
The first and second semesters (coursework) are taken at the IPB from September to July of the following year. Students can take up to seven modules per semester. The third semester (coursework) and the fourth semester (thesis) are taken at the University of Göttingen where students in this program are registered in the study-program Sustainable International Agriculture (SIA) program in Göttingen. Until now 31 students completed the program successfully.
From the perspective of IPB University the IARD program has been contributing to international recognition and reputuation. Through IARD program the statistic of international in-and out bounding of IPB University is significantly increased both in numbers of students and professors. Given this impresive achievement the IARD program is challenged to reach a balanced reciprocity in which incoming students from Indonesia to Göttingen will be ballanced by incoming students from Göttingen to Bogor.

Highlights of the specialisation "International Organic Agriculture"

Prof. Dr. Maria Finckh
Chair of Ecological Plant Protection

Since the 1970's the University of Kassel in Witzenhausen has a focus on tropical and international agriculture. At that time, international students who wanted to study there had to learn German and then studied agriculture at the college level. By the late 1990ies, it was possible to do a BSc in agriculture in most countries, allowing students to study what is relevant in their own countries and international students became increasingly interested in MSc programs and the main scientific language for agriculture had become English. Also, the European Credit Transfer System had become standard. Therefore, the MSc program in International Organic Agriculture was developed at Witzenhausen and started in 2002. It was a big step forward when this program was integrated into the joint degree in Sustainable International Agriculture as the specialization International Organic Agriculture in 2009 and since, this course is taught jointly at the University of Kassel in Witzenhausen and the University of Göttingen. Becoming part of the SIA program considerably increased the course choices for the students and the visibility of the program. Nevertheless, nearly all courses specifically dealing with organic agriculture are taught in Witzenhausen, because this is the Faculty of Organic Agricultural Sciences.

During the ten years that SIA has been taught, the world has changed considerably and so have the students. The most fruitful aspect of the study course is the fact that students come from throughout the world and work together in ever changing groups. There are now organic markets in most of their countries. Thus, students come more and more with detailed ideas what they want to learn and take home from the studies and they bring important new visions and aspects to the teachers and other students.

Practical teaching in the field

It is a challenge to bring together students from different study cultures and equally, the students are severely challenged by the German culture of discussion that also affects the exams. We are asking for discussion everywhere, during presentations and during the exams. So it is fun to look into the faces when I explain that the most important answer in an exam usually is "It depends!" followed by an explanation what are the factors influencing the outcome and perspective taken. Watching students evolving in the discussion culture is the most exciting aspect of all.

One of the most important myths we are trying to destroy is that organic agriculture is low-input and traditional. On the one hand, traditional organic farming is highly context related and depends on the location; on the other hand, traditional farming can also mean high-input farming. Often, traditional farming is misunderstood as the farming done by resource poor farmers that have no choice but to make do with what they have and it is called default-organic. It is important to separate such type of farming from modern organic farming.

Good and productive organic agriculture for high quality products and conservation and enhancement of natural resources is usually initiated by highly educated people with a vision of sustainability with all consequences it entails. It is based on the intensification of ecological processes at all levels, a deeply ingrained desire to take land stewardship for the future and thus carefully use and introduce inputs. This includes potentially new and more diverse plants or the reinstallation and development of often forgotten and almost lost genetic resources. Today, we find successful organic farmers working under all climate and soil conditions and in all countries of the world. We are also aware that not everything that is currently called organic is fully sustainable. In most places it may be better than what high chemical input agriculture delivers. However, if it were that simple, then the whole world would do it. There are still many open questions and research fields that need to be addressed. These include

Soil spade analysis

Crop-livestock integration

questions about the soil management, nutrient cycles, biodiversity enhancement, water conservation, overall productivity, food safety, non-food products, energy inputs, fairness, and income security, among others.

Depending on how the framework is selected, models will show that organic can feed the world or that organic will lead to starvation and reduction of natural resources. Usually, all sides have good and strong arguments. Although all are scientists, emotions, convictions and personal experiences get in the way and we all working in science are not free of these. Therefore, a very important aim is to expose our students to the diversity of views and approaches that can be taken to address a question. We do not want to teach that there is only one right way. Rather the aim is to teach how to use scientific methods to assess the different approaches that are possible and to make informed choices. Most importantly, all need to understand that the path of either / or is an age-old recipe for conflict that this world could never really afford. In the future, however, this will lead to disaster as our real challenges are not local but global by now. We will have to learn and accept that there is a multitude of potential paths to solutions that need to be taken according to where one is. Also not only the solution counts but also the path taken to achieve that solution.

More details about the specialisation "International Organic Agriculture" and its modules on page 20.

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Highlights of the specialisation – "Tropical Agricultural and Agroecosystems Sciences"

Prof. Dr. Andreas Bürkert

Chair of Organic Plant Production and Agroecosystems Research in the Tropics and Subtropics (OPATS), Witzenhausen

Right from the beginning the study focus "Tropical Agriculture" (renamed "Tropical Agricultural and Agroecosystems Sciences" in January 2014) aimed to employ an interdisciplinary approach of science for development. This was and is much appreciated by the MSc students given their personal interests, previous experience and future job opportunities. Of particular interest for students from countries of the Global South seems the well balanced mixture of lectures, student presentations and excursions allowing to exchange agricultural knowledge and experiences across climatic zones.

In 2007 we started a series of bi-annual tropical SIA excursion which deals with specific topics prepared by student seminars and on the ground addressed by a team of 3-4 faculty members. So far seven such interdisciplinary travels of 2-3 weeks were organized to: Oman (2007), Mexico (2009), Kenya (2011), Thailand (2013), Myanmar (2015), Costa Rica (2017) and India (2019). Many excursion participants are particularly excited by the analyses of social-ecological landuse systems which allow them to test their knowledge and prepare for future professional problem solving. Future developments within SIA may allow to make available at least a few scholarships to particularly gifted students in need and the inclusion of elements of digital study such as Webinars and Massive Open Online Courses MOOCs.

More details about the specialisation "Tropical Agricultural and Agroecosystems Science" and its modules on p. 20.

Prof. Dr. Eva Schlecht

The SIA excursions to tropical countries

Since 2007, thus already a few years before launching the SIA program, lecturers from the agricultural and forestry faculties in Kassel/Witzenhausen and Göttingen started to offer joint excursions to tropical countries in order to provide MSc (and some PhD) students with on-spot experience of farming and agro-forestry systems, food value chains, raw material production and issues of nature conservation in the global south. The first two excursions to Oman (2007) and Mexico (2009) were a great success and so it was decided to make these tours an integral part of the SIA program by offering the interdisciplinary elective module "International land use systems research - an interdisciplinary study tour".

The module is offered in March of every second year and after preparative student seminars in Germany that deal with the natural conditions, history, current political and socio-economic situation and the agricultural and forestry sector of the target country, groups of 20 to 26 students plus 3 to 4 university staff and staff from DITSL GmbH Witzenhausen headed off to Kenya (2011), Thailand (2013), Myanmar (2015), Costa Rica (2017) and India (2019). During the two- to three-week field trips, travel conditions are sometimes quite challenging (Fig. 1), but interaction with students and staff at partner universities (Fig. 2) and host institutions in the visited countries are very rewarding, as are the many insights into agriculture (Fig. 3), fisheries (Fig. 4), forestry, food and non-food industry (Fig. 5) and nature conservation programs of the visited country.

Since the study tour is a full-fetched module, students have to write day protocols during the tour and, in the end, pass an exam. At the same time such tours cost substantial amounts of money, and next to the participants' personal contributions, which have to cover about 30% of the total costs, the excursion can always rely on the financial support by the agricultural faculties of Witzenhausen and Göttingen, the forestry faculty of Göttingen, Universitätsbund Göttingen, Promos Uni Kassel, Foundation Fiat Panis Ulm, and DITSL GmbH Witzenhausen. To these main sponsors others do add from time to time.

Even though participant feedback at the end of an excursion was sometimes a bit mixed and sometimes even disappointing for the key organisers, the latter are so far keeping up the offer. The high number of participants - even from the economic faculties in Göttingen and Kassel – who joined the latest excursion to India seems to indicate that even in times of high individual mobility across the globe university study tours are not yet outdated.

Travel with a second-class train from Rangun to the Inle Lake in Myanmar (2015)

Prof. Dr. Eva Schlecht

Village-based dry-fish production near Mawlamyine, Myanmar (2015)

Visit of the vast cacao and coffee collection at CATIE, Turrialba, Costa Rica (2017)

Selina Bruns

SIA Excursion to Costa Rica: Pura Vida!

Every two years, the SIA program offers the most amazing class one could think of: an international study trip. When we started the master degree, we were told that this is one big highlight to look forward to! The older students had been to Myanmar in 2015 and never stopped being thrilled about their experiences. So, in spring 2017 around 20 students from the University of Göttingen and the University of Kassel, including me, joined together with three brave Professors to go on an unforgettable trip to Costa Rica.

After a long flight, we landed in San José, the capital, to start our two week study tour throughout the entire country. In cooperation with the Tecnologico de Costa Rica the organizers had planned visits to a variety of producers, processors and project sights in order to demonstrate the diversity of land. Costa Rica has a rich ecosystem and great diversity. Within only a few hours, you can go from dry forests to cloud forests to rain forests or you can go from swimming in the Atlantic Ocean to swimming in the Pacific Sea.

We started off by visiting an intensive aquaculture company, while getting used to the mosquitos and the tropical sun. As we got more comfortable, we set out to see an intensive tropical fruit production, possessing 7000 ha of oranges, in Oro La Cruz. As we were on the road every day, we usually stopped at different places each night. On day two this was the Dry Forest Research Station Horizontes. It was in the middle of extremely beautiful nature. The researchers there showed us the forest, where we recognized a sign pointing towards the waterfalls. The staff was not able to show us the waterfalls (which were dried out) during the tour, but agreed to get up at 4AM to give us a second tour before we had to leave again. As I though they were joking, I still got up and about 5 students and one guide went for a run in the morning to experience the most amazing sunrise on the edge of a dry waterfall. Quite incredible!

Throughout the next days we visited more mega farms, producing pineapples and bananas. Mega farms are just crazy to observe. You drive for miles and miles and miles and all you see is bananas. The class aimed at a deeper understanding of transforming biodiversity into economic wealth. The monoculture production gave us a great opportunity to discuss our topic with the Professors and among each other. This hands-on experience was more engaging than any theoretical class could ever be. We listened to the arguments from companies, from farmers, from locals, from NGOs, from researchers, from students and from our Professors, which gave us the opportunity to make up our minds and see the pros and cons of different land-use concepts.

In front of banana mega farm

The biggest tree I have ever seen

As the days went on, we visited smallholder farmers, had the opportunity of riding horses and a buffalo, popped in to a crocodile farm, climbed a volcano, and hung out with a sloth in the Cahuita National Park. Towards the end of our trip it was time to put our rain jackets on, as we went on a boat tour through the Tortuguero National Park. It is a ride through purest nature. We slept in little wood houses, right in the middle of the rain forest. For all students, I assume this was the true highlight of the trip.

The study tour was a remarkable experience. I cannot really tell why. I think it was the amazing country and it was the fun group, but most of all the amount of information gained. The hands-on experience, the bundle of different field visits and the in depth explanations of the Professors really made it unique.

SIA – all you need to know

Degree	Master of Science (M.Sc.), Joint Degree of both Universities (Kassel and Göttingen)
Study duration	4 Semester (two semester per year)
Begin of studies	Annually in winter semester
Deadline for application	January 31st for non-EU applicants; June 15th for EU applicants
Admission	Restricted admission; application to the Faculty of Agricultural Sciences, Göttingen
Admission requirements	B. Sc. of at least 3 years duration in agriculture or equivalent study. For further information see: http://www.uni-goettingen.de/sia
Medium of instruction	English

Module structure	
4 compulsory modules (depending on specialisation)	24 ETCS credits
5 Mandatory modules (depending on specialisation)	30 ETCS credits
6 elective modules (free choice, as well from other programmes)	36 ETCS credits
20 weeks master thesis and colloquium	30 ETCS credits
In total: 4 semesters	120 ETCS credits

Contact persons for the M.Sc. Sustainable International Agriculture

Coordinator
Prof. Dr. Tobias Plieninger
Chair of Social-Ecological Interactions in Agricultural Systems

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Main features of the programme

The two-year Master's Programme "Sustainable International Agriculture" (SIA) was established in 2009 as a joint degree between the Faculty of Agricultural Sciences at the University of Göttingen and the Faculty of Organic Agricultural Sciences at the University of Kassel in Witzenhausen.

The study programme is internationally oriented and offers three possibilities for specialization (profiles):

- International Agribusiness and Rural Development Economics
- International Organic Agriculture
- Tropical Agricultural and Agroecosystems Sciences

Due to the close co-operation in the joint degree programme students gain the opportunity to attend modules at both universities. This gives students a wide subject area from molecular biology to sociology. Each of the three areas of specialisation has a core set of modules. Apart from these compulsory modules, the programme allows students to attend mandatory and elective modules, so they can decide individually on a more disciplinary or interdisciplinary study profile. During the course of studies students are enrolled at both universities and have as such the possibility to make use of all facilities, networks and the broad area of co-operations which includes field research in partner institutions and countries.
For more information please see the webpage: http://www.uni-goettingen.de/sia
The SIA programme aims to enable students to contribute to a resource-efficient development of agricultural sites worldwide, to understand global ecosystem relationships in agriculture and to apply social and methodological competencies, quantitative and qualitative research methods in the international context of agribusiness, tropical agriculture and organic agriculture. The students will acquire profound knowledge of bio-physical and socio-economic site conditions and their application in terms of a sustainable securing of site-specific and global food resources.

Fields of occupation

International Organisations and Institutes:

There are many international organisations and institutes which focus on sustainable agriculture and food production, development and food security, be it in "conventional" ways or with a focus on organic agriculture. Many organisations have international projects and co-operations that cross national and international boundaries. The choice is broad! Possible employment areas are:

- Research and development
- Work at international research centres
- Project development & implementation
- Communication & marketing

Universities and Research Centres:
There are many universities and national research centres worldwide with Ph.D. programmes and research projects focussing on agriculture. For those who decide to pursue a career in agricultural sciences, there are also subsequent Ph.D. and post-doctoral programmes offered at the Universities of Göttingen and Kassel/ Witzenhausen.

Non-Governmental Organisations:
There are many NGOs worldwide with projects on sustainable agriculture and food production, development and food security. Some examples of career opportunities with NGOs include:

- Project development & management
- Grassroots and advocacy work
- Work as programme officer
- Development-oriented community research
- Work in agricultural extension

Governments and the Agri-Food Sector: There are a number of opportunities in these sectors, including:

- Governmental and private advisory and extension services
- Consulting companies
- National and international agribusiness companies
- Agricultural administration
- Food safety and certification organisations

From page 53 to 56 SIA Alumni describe how their careers have developed after they finished SIA.

Imprint

Publisher:
Georg-August-Universität Göttingen
Fakultät für Agrarwissenschaften
Der Dekan
Büsgenweg 5,
37077 Göttingen

V. i. S. d. P.:
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Editorial Office:
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Authorship of texts are indicated with every contribution.

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The different specializations of SIA

Specialization in "International Agribusiness and Rural Development Economics"

The profile "International Agribusiness and Rural Development Economics" within the MSc program "Sustainable International Agriculture" trains students to analyse socio-economic interactions between individuals, resources and markets in agriculture using up-to-date quantitative and qualitative methods. Students acquire the tools they need to contribute to the provision of answers to vital questions ranging from the macro-level (e. g. global hunger, the world trade system) to the meso-level (e. g. the structure and performance of national and international food chains; food safety and quality issues) and the micro-level (e. g. the efficiency of agricultural production, participation and poverty at the household level) in agricultural systems.

Modules offered for the profile: "International Agribusiness and Rural Development Economics"

Compulsory modules
The following four compulsory modules must be completed:

World agriculture markets and trade
Socioeconomics of rural development and food security
Sustainable international agriculture: basic principles and approaches
Econometrics I

Mandatory modules
From the following modules five mandatory modules (of which at least one module is on learning work methods with code M) must be completed:

Environmental Economics and Policy
Policy analysis of international agri-environmental schemes
Marketing research
Quantitative research methods in rural development economics
Microeconomic theory and quantitative methods of agricultural production
Evaluation of rural development projects and policies
Organization of food supply chains
Rural sociology
Topics in rural development economics I
Strategic management
Responsible and sustainable food business in global contexts
Economic valuation of ecosystem services in developing countries
Agricultural policy analysis
Scientific writing in Agricultural Economics
Participatory research methods for sustainability
Development Economics I: Macro Issues in Economic Development
Agriculture, environment and development

Elective modules
Additional six elective modules must be completed.

Specialization in "Tropical Agricultural and Agroecosystems Sciences"

The profile "Tropical Agriculture" within the MSc program "Sustainable International Agriculture" aims at qualifying students to become open minded, well trained professionals in sustainable agricultural land use of integrated tropical and subtropical agro-ecosystems. A wide range of modules in soil, plant, animal and socio-economic sciences as well as method-oriented classes confer skills for in-depth analysis, understanding and possible modification of existing farming systems in the wake of need for a resource efficient production of agricultural goods that responds to the challenges of population growth, globalisation and climate change in a site-specific way. A bi-annual two-week excursion to a tropical country (e.g. Oman, Mexico, Kenya, and Thailand), and participation in on-going long-term field research projects of different faculty members allow you to test-apply your skills under real conditions while collecting credits.

Modules offered for the profile: "Tropical Agricultural and Agroecosystems Sciences"

Compulsory modules
The following bridging module (P07) and four compulsory modules must be completed (the bridging module can be replaced by a mandatory module on request in the case of a corresponding preparatory study):

Tropical animal husbandry systems
Applied statistical modelling
Sustainable international agriculture: basic principles and approaches
Soil and plant science
Management of tropical plant production systems

Mandatory modules
From the following modules four mandatory modules (of which at least one module is on learning work methods with Code M) must be completed:

Plant breeding methodology and genetic resources
Ecopedology of the tropics and suptropics
Epidemiology of international and tropical animal infectious diseases
International and tropical food microbiology and hygiene
Livestock reproduction physiology
Aquaculture in the tropics and subtropics
Global aquaculture production, markets and challenges
Livestock nutrition and feed evaluation under (sub)tropical conditions
From conceptualisation to communication: key steps in empirical research
Livestock-based sustainable land use
Socioeconomics of rural development and food security
Exercise on the quality of tropical and subtropical products
GIS and remote sensing in agriculture
Land use, ecosystem services, and human well-being
Project seminar: Social-ecological analysis and management of agricultural landscapes
Ecology and agroecosystems
Plant nutrition in the tropics and subtropics
Organic cropping systems under temperate and (sub)tropical conditions
Pests and diseases of tropical crops
Tropical agro-ecosystem functions
Agrobiodiversity and plant genetic resources in the tropics
Methods and advances in plant protection
Crop modelling for risk management
Nutrient dynamics: long-term experiments and modelling
Experimental techniques in tropical agronomy
Agroforestry Seminar

Elective modules
Additional six modules must be completed

Specialization in "International Organic Agriculture"

The profile "International Organic Agriculture" within the MSc program "Sustainable International Agriculture" offers students the unique possibility to focus entirely on Organic Agriculture. It includes the broad range of topics from soil, crop and animal sciences, as well as environmental, social and economic sciences. You will be asked to: Examine and assess the validity of literature from the natural and social sciences, statistics and other documents. Use state-of-the art statistical techniques to analyse 'hard' and 'soft' data. Apply laboratory methods, technical procedures and qualitative / quantitative approaches of data collection. Interpret and display research data. Apply your skills in the context of international and organic agriculture and agroecosystems' assessment.

Modules offered for the profile: "International Organic Agriculture"

Compulsory modules
The following bridging module (P07) and four compulsory modules comprising 30 C must be successfully completed. The preparatory module can be replaced on request by a mandatory module if corresponding module has been successfully completed.

Organic livestock farming under temperate conditions
Applied statistical modelling
Sustainable international agriculture: basic principles and approaches
Organic cropping systems under temperate and (sub)tropical conditions
Soil and plant science

Mandatory modules
From the following modules four mandatory modules (of which at least one module is on learning work methods with Code M and one economics module with Code E) must be completed:

Biological control and biodiversity
Plant breeding methodology and genetic resources
From conceptualisation to communication: key steps in empirical research
Marketing research
International markets and marketing for organic Products
Socioeconomics of rural development and food security
Evaluation of rural development projects and policies
Rural sociology
Food quality and organic food processing
GIS and remote sensing in agriculture
Land use, ecosystem services, and human well-being
Sustainable diets
Project seminar: Social-ecological analysis and management of agricultural landscapes
Participatory research methods for sustainability
Ecology and agroecosystems
Ecological soil microbiology
Plant nutrition in the tropics and subtropics
Soil and water
Agrobiodiversity and plant genetic resources in the tropics
Methods and advances in plant protection
Crop modelling for risk management
Nutrient dynamics: long-term experiments and modelling
Plant nematology
Livestock nutrition and feed evaluation under (sub) tropical conditions
Agroforestry Seminar

Elective modules
Additional six modules must be completed.

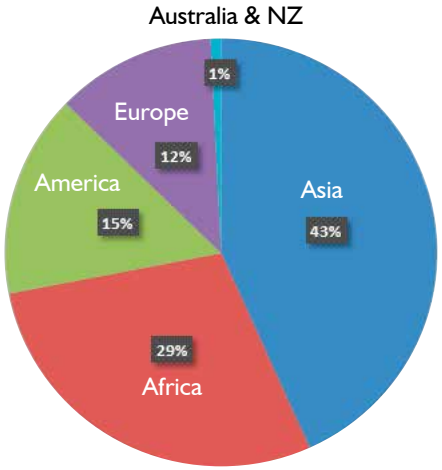
Some figures & numbers from 10 years SIA

The Master's program Sustainable International Agriculture has been training students from all over the world for 10 years. On average, the available 50 places per year were occupied on average by 52% women and 48% men from 20-25 different countries of origin. According to the admission regulations of the degree program, a maximum of 20% of the places can be awarded to students from the European Union, 80% of the places are reserved for non-EU citizens. In the past five years, the vast majority of students came from developing (61%) and newly industrialized countries (23%), with only 16% coming from industrialized countries.

In recent years, the number of applicants has been steadily increasing, reflecting an increasing degree of visibilty of the program. Every year, a large number of candidates eligible for admission results from the field of applicants, which exceeds the available number of places on the course by a multiple.

A considerable number of applicants are specialists and executives from tropical and subtropical countries who are often unable to take advantage of the availability of study places due to the lack of their own funding options, the lack of scholarships and visas refused. Nevertheless the majority of SIA students originate also from these countries. The education and training of these individuals is crucial to build and develop expertise in these countries through mutual dialogue. As practitioners with work experience in the agricultural sector of their home country, these participants also enrich their studies with their contributions and knowledge, promote intercultural learning in dialogue for all students and lecturers, and significantly support the development of new and existing international networks.

Origin of SIA students according to world regions



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	Christian Bischoff Deputy Head of Study Secretariate Kassel

Ute Gilles

The same procedure as every year …?

No! Since 10 years, we are coaching and advising SIA students from the first contact via mail - through the application process and then smoothly guide them through an intensive orientation week into the study program. However, not one cohort is like the other. Every year we meet a diverse group with so many different nationalities and cultural backgrounds. This is sometimes a challenge but even more an enrichment.
The SIA program offers great opportunities to the students with its huge range of cross-disciplinary courses in a multicultural environment. Sometimes the number of modules to choose from are overwhelming so that students feel lost or challenged. Sometimes the learning environment differs tremendously from their undergraduate course. Far away from home and the familiar comfort-zone sometimes problems occur, which at that moment seem huge and difficult. Then it is important to have a good supporting environment, giving guidance and advice as well as providing socializing activities beyond everyday student life to provide distraction, to clear the mind for the essentials and to meet like-minded people.
Our aim is to strengthen the students' ability to meet the challenges and to support and promote their integration into their studies and professional practice.
Students are very open and give important feedback, express their demands and wishes, give us new inputs and perspectives. We try to cater for this. Year after year. BUT. Demands and wishes are different year after year. So, there is never the same procedure as every year. Every year we are very curious. Who is coming? What will we experience together? Where do the students lead us?
THANK YOU for this and stay in touch! Let's continue to build our worldwide network of SIA.

Contact:
Ute Gilles
International Study Affairs
Faculty of Organic Agricultural Sciences
University of Kassel-Witzenhausen

Ute Gilles

Student tutors: working for the international students at Witzenhausen and Göttingen campus

In the last few years, studying abroad has become a progressively popular choice for higher education among international students all over the world. Though, the experience differs for each individual student, there are many common problems that international students face during their initial days. Therefore, it is an attempt by the student tutors at the university campus to help the international students to sail through their initial hurdles after landing in Germany. Both Witzenhausen and Göttingen have student tutors for the program. They focus on solving common problems faced by international students in Germany and thereby offer solutions for handling the problems. The main aim is to make the process of acclimatising to a new environment easier for the new students.
The responsibilities of our tutors extend from helping the students through managing the culture shock to combating with the language barriers at different places such as city registration at the city hall, banks, or even supermarkets. The student tutors provide help with official paperwork and offer campus tours and informative tours around town which aids in socialising among peers along with exploring the region. They organise socialising activities such as excursions, dinner hopping, walks and game competitions. This is to make new students familiar with the new study environment, meet with senior students and get acquainted to the inter cultural campus and the diversity in Germany.

Building global relationships

Brianne Altmann, PhD

Country of Origin: Canada

Completed SIA: 2015

Current Position: Research assistant at the Chair of Animal Product Quality & Coordinator of European Master's in Animal Breeding and Genetics, University of Goettingen

I come from a country that has contemporarily been built on internationalization; therefore, it only seemed logical that I would pursue a program of study with an international focus. Little did I know how international it would be. If there is one thing that I took away from a M. Sc. in International Sustainable Agriculture (SIA), it is my expanded awareness of other countries and their political situations, cultures, and of course climatic and soil conditions; most of which were conveyed by my peers.

The SIA program's winning quality are the students that enroll. With a cohort originating from all but one continent (I'll leave it to the reader to guess which continent was absent), acceptance, empathy, diplomacy, and patience are all well practiced inside the classroom, but more importantly during extracurricular events going into the wee hours of morning after a beverage or two. These skills are the most valuable and for which I am most grateful. My cohort are the people for which I am most thankful.

My goal in coming to study in Germany was to get an outside perspective on global resource-use; one different than that from a country that relies primarily on exporting natural resources. After attaining this goal, my plan was to return to Canada with my expanded horizons, in order to better decipher, understand, and react to dynamic domestic and global situations. However, after my two years in SIA, I had just been given a taste of what the world has to offer; where so many opportunities lie. Europe has largely remained the international hub of travel and trade, and therefore, I chose to stay after completing my degree. From Germany, I have access to East and West Africa, Southeast Asia, South America, the Middle East, and so much more.

As of today, I have visited regions I had, unfortunately, never given a second thought. I had never imagined that in Mali I would encounter a friendliness and thoughtfulness reminiscent of that in my home country. In the steppe and mountains of Mongolia, I found myself home in the back-country, where I camped and played as child. I lived from fried bread and meat, as I did during my stint in the Canadian arctic. The list of the places I have visited still remains quite short, but the list of places I now know I *need* to visit has grown exponentially: Iran, Ghana, Malawi, Malaysia, Chile, Columbia, Kazakhstan … These are places that I do not want to visit because of the beautiful pictures in a brochure, but because of the compassionate stories shared by colleagues who have become dear friends.

I advise all those who wish to further their academic career by enrolling for a M.Sc. in Sustainable International Agriculture – the true values of your degree will be found outside the classroom. You will build global relationships that (with the help of social media and the internet) last for the remainder of your career and beyond.

Studying with a child

Ifunanya Faith Orisekeh

Country of Origin: Nigeria

Started SIA: 2019

Taking on the roles of student and parent at the same time can be overwhelming. A number of times, I struggle to find the balance between my education and caregiving responsibilities.

I had my son in September 2017, at the time when I still had the motivation to further on my studies and build a career. It was a tough decision to make knowing fully well what it entails especially with a child in the picture but I'd say my determination conquered all fears. Fast forward to a year later, I had gotten admission for a master degree. I came into Germany (a totally new environment) with my son and I was totally clueless as to how to begin my journey. It was a very difficult time for me- from trying to find accommodation, register in the city hall, get a bank account, attend the student orientation, and most of all, getting my son into a kindergarten.

The last part was very important to me so that I will be able to attend my lectures without having to carry him around. Sadly, that was not the case at the beginning. Upon arrival, I visited the school day care office several times to request for a space for my son in the kindergarten because I had applied before arrival. I was told every spot was filled and they kept him on the waiting list. I had no choice, I had to take him to class all the time. Half the time, during lectures, I was not paying attention. He wanted all the attention he could get and when he felt uncomfortable, I had to leave the class so that the entire class was not distracted. Needless to say, that was one of the most difficult times for me as a mother, however, I made sure my son was my principal priority amidst every hurdle.

Very importantly, as a student parent, I realized that I had to triple my efforts with that of a single student to achieve the same results. I encouraged myself to put in so much work in my studies while focusing on raising my child. I try to study while he is occupied. I break out the books after I had put him to bed or before he wakes up in the morning. I created a rotating study schedule because my parental duties and other obligations changes from day to day. Most times, I dedicate my time to studying while on campus because I know it might be more difficult to study at home. I made use of the on- campus resources to help me study, manage my time, and even help me complete assignments. My academic adviser was always there for help and advice when I needed it. She is one of the greatest resources available to me.

Above all, I developed confidence in myself. I try not to dwell on negative thoughts, such as worrying that I haven't studied for a long time, or that I shouldn't take so much time away from my family. I constantly remind myself that I am doing this to better myself and that I have the support of my family and the maturity and experience to succeed.

Not a Superhero

Eusun Han

Country of Origin: Republic of Korea

Completed SIA: 2011

Current position:
Postdoctoral research fellow, Department of Plant and Environmental Science, University of Copenhagen

SIA was a harbor for me. It invited me to join and taste the feel of science. It was my gate to a new world, the world of Academia.

According to the Statement of Purpose (SOP) that I submitted for the application to the SIA program in 2009, it seems that I badly wanted to SAVE THE WORLD (Didn't we all, my friends?). The naive-me went on and on saying, "Go Organic!", "Help the people!". At the end of the passionate essay, I stated my after-SIA plan. The young-me was somehow so convinced that he could become a superhero saving the world after the prestigious 2-year program at SIA.

Unfortunately, SIA's curriculum did not include subjects, e.g. "Introduction to the methods to save the world (101)". Instead I learned about science. The 2-year of experience filled me with a lesson how to plan, execute, analyze and communicate science. And, surprisingly, I loved it.

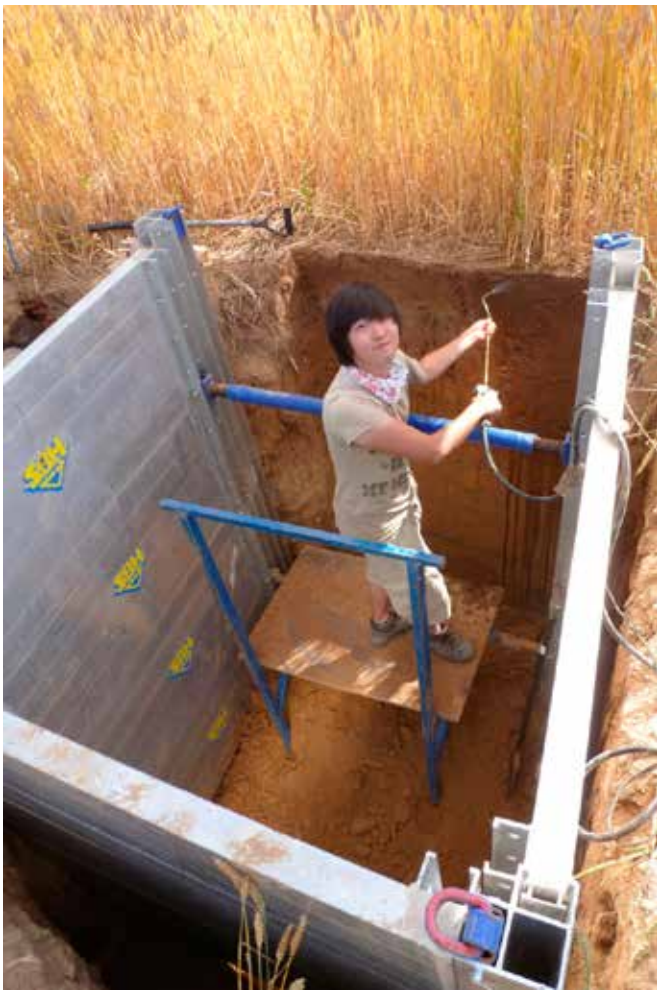
At the end of my SIA-period, I finally came to a conclusion that I can't be a superhero flying around and saving the world. Betraying my promise as stated in my SOP, I dreamed a new dream, a smaller dream. I chose to become a researcher, a scientist. In order to become one, I went through a painful metamorphosis as a PhD student, and thank God, I made it.

And here I am, a hungry, poor and needy postdoc, the form of the life that I never wanted to have. And I still dream to move forward, to be a help of finding meaningful discoveries in the realm of agricultural sciences.

SIA made me down-size my dream. My passion for sustainable agriculture is not as magnificent as before. But it surely is more tangible and real now.

SIA time: Measuring fresh weight of animal fodder in Western Rwanda in 2010 to investigate on the livestock resource availability.

Postdoc time: I have developed a root method to investigate nutrient uptake in the subsoil. The round-shaped tubes were inserted up to 5 m of soil depth for the purpose. Prior to the experiment in 2017, I am pumping out the underground water at our study site in Taastrup, Denmark.



PhD time in Bonn: Measurement of root growth of winter wheat using the profile wall method at the study site in Rheinbach in 2013. I am jet-spraying in order to remove the 5 mm thickness of the soil surface to reveal the crop roots onto the soil profile.

My remarkable journey to SIA

Albert Nsengumuremyi

Country of Origin: Ruanda

Started SIA: 2019

"Commencing my Studies at University of Göttingen and specifically in SIA is a dream come true, leave alone representing incoming students who might have had a journey like mine, this will be more meaningful and fulfilling to me".

Coming from a war tone Country and surviving one of the worst horrors of the 20th century that made me a partial orphan, I was left with nothing substantial for survival in the aftermath of the 1994 Rwandan genocide. My family sought Refuge in Kenya and at an early age, I became passionate about my studies, excelling both in class & sports though with a year of dropping out due to lack of school fees. I was later lucky to be granted a scholarship from Great Lakes & Faraja Organizations that helped needy children in Nairobi/Kenya.

After High school, I yearned to be the first one of my family to pursue University education, with my previous scholarship bodies not funding university studies. I decided to solicit for funds from my extended family which I had just recently discovered about helping me enroll for my degree at Kenya Methodist University.

After joining campus, I pursued a Bachelor of Science degree in Agriculture inspired by the need to improve food supply and distribution to the poor communities. At University I joined the Soccer team that competed in a local league. A team that fostered community involvement, it really grew my teamwork as well as building on my leadership skills. As a player achieving goals always rejuvenated and motivated me, this energy granted us promotion yearly up to the Super League.

In the early days of 2013, I was elected as the President of the Students Union at Kenya Methodist University for a yearly term. This opportunity gave me vast knowledge and growth in my interpersonal skills since I oversaw a diverse group in a cabinet of thirty elected Associates. We provided services to over fifteen thousand students through planning, organizing and executing events. This we did successfully that year attaining an Honor from the University Management. Our Soccer coach, together with the Dean of Students then referred my case to the Kenya Methodist University Developmental Association (KeMUDA) that awarded me a an Excellence Study Scholarship.

Upon my graduation I got attached to the University Recruitment office as a Marketing and student recruitment officer. I have had mentorship and teaching opportunities at my former workplace that kept growing me, driving me to seek more knowledge and expertise abroad.

My drive has always been, to contribute in the Engineering of reliable Sustainable models and policies in Agriculture. With an objective of ensuring a food secure society while having equity in distribution of food resources. A society that meets its needs and of its future generations. A Masters in Sustainable International Agriculture seemed the preferred program for me, I first applied as I was completing my Undergraduate Degree in 2015 without Success as I had not inscribed my motivation and did not know how to compose a complete application. After my two-year work experience at my former University in Kenya, my zeal and persistence to be part of this transformative program grew and pushed me to apply again, this time with immediate success.

SIA gives me a chance to access the world-class research centers that I have never had before as I strived through studies in my life. Being guided by the internationally experienced Professors at Uni-Gottingen besides the multicultural environment gives me an opportunity to be propelled into an Agricultural research career that is destined to touch my community, and why not further my research topics in a Doctoral Program maybe. This is an ideal program and it has effects beyond me, but rather on a global scale.

Different perspectives

Ann-Kathrin Lichtner

Country of Origin: Germany

Completed SIA: 2016

Current Position: Works for GIZ (Deutsche Gesellschaft fuer Internationale Zusammenarbeit GmbH) in Ethiopia

My interest in agriculture came hand in hand with my interest in tropical and subtropical agroecosystems. Before I started my Bachelor in Agriculture sciences in Göttingen, I did part of my agricultural internship in Nigeria and therefore aligned my studies towards continuing my masters with a focus on tropical and subtropical agriculture. It was satisfying to find such a master program in Göttingen. Since I enjoyed living and studying in Göttingen I was happy to have been accepted to the SIA program. The first thing I appreciate about the program is its wide range of courses from different specifications one can choose from - rural development, business, soil biology, crop production etc. Since one can also choose from other study programs from two universities, one can really select according to one's interest and preference and is able to look beyond one's own nose (or one's specification). This still helps me in my job today since my tasks vary from Monitoring and Evaluation to workshop management right through to giving technical backstopping about soil related processes. I liked that the different focus of the two universities allowed me to see things from different perspectives, hear various opinions and therefore was given the room to explore my own stance. Listening to and understanding various stakeholders is crucial when working in international cooperation.

Secondly, I appreciated and still profit from the multicultural study community which, together with the opportunity to include an exchange semester and the master thesis research to be conducted abroad, allowed me to widen my horizon and enriched the "classroom and greenhouse theory" with experiences from all over the world. The family, personal and warm study environment allowed me to explore topics and subjects beyond the "script of the course".

The experiences of the time studying in the SIA program gave me the technical and intercultural background and the self-esteem to pursue a career outside of Germany. After an internship at the GIZ-SEWOH project "Integrated Soil Fertility Management" in Ethiopia I got a chance to continue as Junior Advisor and now as a Project Advisor. In the project, we follow a participatory approach to engage farmers in the rehabilitation of their land through the adoption of soil fertility enhancing technologies while supporting favorable political frameworks. One of my responsibilities is the Monitoring and Evaluation of the project and using the figures that we collect with our partners on the ground to help to design and adjust project activities. Furthermore, together with colleagues we design and give trainings as well as produce extension material. By far the most rewarding task is being in the field with farmers and extension workers to discuss progress and to see on the ground, what works well and what ideas are there to further learn and adjust technologies and extension approaches to the local conditions. I am very grateful to work within the topic that has always been my pet issue during my study time. While I love my work as well as living abroad I still enjoy coming back to Göttingen and remembering the "good old" study days.

Demonstration on farmer's field, front only lime than lime and green manure and than control

Improved compost preperation in the field

Farmer's demonstration field, right side ISFM and lime, left side farmer practise

Why to study modelling?

William Nelson

Country of Origin: England

Completed SIA: 2015

Current position: PhD candidate at the chair of Tropical Plant Production and Agricultural Systems Modelling (TROPGAS), University of Göttingen

One of the most rewarding courses for me as part of the SIA programme was the module dd. This takes place every year in the SIA programme, but the excursion travels bi-annually through a tropical country. For me, this was Thailand, which we travelled through for two weeks. Mornings would start very early and by 10 o'clock we had usually arrived at our first agricultural system, then a brief lunch stop, and on the next system. From crocodile farms, to organic shrimp co-operatives and water buffalo! This exposure is unique, as is spending two weeks with the researchers and guides of the excursion, who have years of experience working in such countries and systems.

About half way through the excursion we were walking through a rubber plantation and I had just avoided walking through a large spider web, which had a pretty menacing looking spider in the middle of it. I was talking with one of our mentors about what to specialise in, which was going to be my niche? I wanted something that was dynamic and would give me a lot of options once done with my studies and when looking for useful work - this is when I came across modelling.

The trip to Thailand was in February, and on returning to Germany I registered for the summer semester course in Crop Modelling for Risk Management, offered by the Tropical Plant Production and Agricultural Systems Modelling (TROPAGS) working group in Göttingen. That was quite a few years ago, and now I've just finished my PhD in the TROPAGS working group investigating intercropping and using the crop simulation model (CSM) APSIM – I even taught the course last year as part of an integrated e-learning module. What inspired me to continue with crop modelling from the course I took that summer semester, was the combination of empirical data use (field-based studies) and computer modelling, upon which the course is heavily based. This synergy really encourages model users to approach resource use-related scientific questions from a systems perspective. While this can be quite overwhelming to begin with, as there are so many complex interactions to consider, users develop a thorough understanding of many parts of the system in question, from management decisions, to soil, climate, and plant physiology.

My interest in this area of research has taught me a great deal and has taken me all over the world, and it continues to do so. What started as basic intrigue has led to me working with field trials in India, Germany, Niger, South Africa, taking crop model courses in Niger, giving such courses here in Germany as part of an e-learning initiative between TROPAGS and South African partners, and ultimately to my post-doc position for the next three years. This post-doc role will take me to South Africa to collect empirical data for ecological land use modelling, looking at how different land uses interact with one another, as well as the more in-depth modelling of the individual systems themselves.

Of course, CSM is just a method with which agricultural systems can be investigated. The way they make you think and the insight this can offer is, in my experience at least, not as common in other related disciplines. Crop simulation modelling can be practical in the field-work required to test and improve the models, and theoretical in the design of model calibration and validation, and creative in the simulation scenarios experimented with. Making the decision to follow this path has certainly opened doors knowledge and work-wise for me, and so I'm very grateful for the advice and conversation I had back in that Thai rubber plantation, as well as avoiding that spider.

Physiological measurements (pearl millet leaf number), ICIRSAT-India, (Photo: Karina Schell)

Linda Steinhübel

Country of Origin: Germany

Completed SIA: 2016

Current Position: PhD candidate in the DFG Research Group FOR 2432 "Social-ecological systems in the Indian rural-urban interface: functions, scales, and dynamics of transition" Project C05 "Patterns and determinants of nutrition and food insecurity"

The crew – enumerators became good friends.

March 2016, with a Master degree in "Sustainable International Agriculture" and still not feeling done with learning. I was not yet sure, what exactly I wanted to do but I knew "something with development". During the last three years I studied agricultural and development economics from a variety of angles and met students from every corner of the globe – all with never putting a foot outside the western world myself. So, what did I really know? I decided it was not enough and that there was more for me to learn, specifically on location. My chance came with the start of the new Indo-German project "Social-ecological systems in the Indian rural-urban interface: functions, scales, and dynamics of transition" funded by the German Research Foundation. The project aims at understanding the multiple consequences of urbanization on ecosystems and society in and around Bangalore, a megacity in Southern India (for information see https://www.uni-kassel.de/fb11agrar/en/sections/home/for2432.html). Several PhD positions opened up in the Department of Agricultural Economics and Rural Development and I got the one at the chair of Prof. von Cramon-Taubadel. Our particular subproject is interested in the effects of urbanization on agricultural commercialization and intensification, and eventually on the nutritional status of smallholders. To analyze these interactions, we needed data. The plan was a survey of 1200 farm households along the rural-urban gradient of Bangalore.

A few months of questionnaire preparation later and together with some other PhD students employed in the project I landed in Bangalore in October 2016 – full of ideas, ambition, and largely unrealistic expectations. We moved into an apartment, three rooms for eight people plus four- to six-legged uninvited subtenants. After a couple of weeks of constant noise (traffic, temple bells, street dogs, etc.), frustrating visa regulations, limited success in enumerator training and questionnaire pretesting, and basically zero privacy, I was only one more catastrophe away from sending the termination letter I had already drafted to perfection in my head. "Something with development" looked so much more romantic in theory than in practice. However, for no yet identified reasons the day came and things fell into place. I guess there is some truth to the saying "Everything is possible in India". The survey found its rhythm and we gained in speed, enumerators became friends, and when I left Bangalore in March 2017, I left a place that felt like home – in the best possible meaning of the word.

Back in Germany the "scientific" part of the PhD started and the new agenda was set on data preparation, analysis, and paper writing. To large parts also because of the great liberty I received from my supervisor, I was able to work on three quite different but all the more interesting papers. In the first paper, we were able to identify the importance of secondary towns (smaller towns in the periphery of large cities such as Bangalore) and income diversification on farmers' decisions to intensify their agricultural production. In another paper, we analyzed farmers' decisions to adopt borewells. The Bangalore area is prone to droughts, especially with advancing climate change. Thus, learning about potential coping mechanisms applied by farmers can help in future policy making balancing smallholder well-being and environmental depletion. In my current paper, I collaborate with ecologists and we investigate how agricultural intensification in terms of chemical fertilizer and pesticide use affect wild pollinator communities, which are essential for the common fruit and vegetable production in the Bangalore area.

If everything goes according to plan, I will finish my PhD this year. What I will do afterwards? I do not know yet. However, if there is one thing that the PhD taught me, there is always more to learn, in the academic sense and simply about myself.

Getting organized and finding households for the survey.

The last mile problem: Why do some individuals escape poverty while others appear to be stuck? A behavioral economics approach

Understanding the unique psychology of the poor has emerged as a promising approach to tackle the so called *last mile problem*. The last mile **refers to the last stretch between having a plan to solve an issue and actually solving the issue**. For example, when it comes to combating rural poverty through increasing farm income, then the last mile is the gap between having a plan on how to increase farm efficiency, e.g. through precise pesticides usage, and making farmers actually use these pesticides (Schilbach et al., 2016; Banerjee & Duflo, 2011).

Smallholder farmers in the larger Mekong region appear to have different levels of efficiency on their farms. These differences are crucial, as they distinguish the very poor from the moderately poor and thus those potentially trapped in the vicious cycle of poverty from those who have escaped it. Most interestingly, therefore, is to ask: *What determines the difference in technical efficiency?*

For our research, we visited 309 smallholder farmers in rural Cambodia in 2018 for our final data collection. We conducted extensive interviews and seven behavioral experiments on e.g. risk attitudes, cognitive capacity, and mindset.

For our analysis we will be using a standard Stochastic Frontier Analysis, which will help us understand each unit's performance. Afterwards, in aiming to explain the differences, not only sociodemographic -, but also behavioral variables will be used.

As suggested by literature (Manevska-Tasevska & Hansson, 2011; Nuthall, 2000; Wilson et al.,2000; Rougoor et al.,1997) psychological explanations for the differences in efficiency levels have rarely been considered. Using a novel approach of including *bandwidth* (Mani et al., 2013) as an explanatory factor for differences in inefficiency holds great potential.

Kahneman & Tversky (1984) and a great body of literature point toward a two-system model of the brain. As our cognitive function is a limited resource (*bandwidth*), when people are mentally taxed, they are less likely to engage in system 2 processes (Shafir & Mullainathan, 2013). Thus, when individuals worry due to severe scarcity of e.g. financial resources, there is less bandwidth available to them for judgment or decision making (Mani et al., 2013).

If bandwidth is a determinant factor, then policies that aim to improve efficiency but demand cognitive capacity resources, as suggested by Manevska-Tasevka & Hansson (2011), might not support all farmers equally. In fact, ignoring the importance of bandwidth when developing policy implications might cause leaving the very poor behind, while merely supporting those with less limited cognitive resources.

Selina J. K. Bruns

Country of origin: Germany

Completed SIA: 2018

Current position: PhD candidate at the Chair of Farm Management, University of Göttingen

Smallholder farmer in Vietnam

Internationalization and diversification strategies of companies from emerging economies: the case of fresh fruit export companies from Chile

The food and agricultural value chains have experienced constant changes throughout the last decades having important organizational and economic implications that have shaped global markets. Among these changes, a rapid globalization and the increasingly openness of international trade have pushed firms to intensify their participation in international markets as an alternative to exploit new market opportunities. These changes have exposed firms to higher levels of internationalization, forcing them to adapt and develop strategies to be able to cope with a higher complexity of modern value chains. In this regard, firms follow different internationalization strategies and paths which at the same time may affect differently firm performance depending on the diversification strategies implemented. Therefore, the analysis of these subjects has become an important research trend in the international business literature over the last decades. However, despite a great body of studies, some research gaps still remain unaddressed.

First, despite the importance of the emerging countries in the global economy, there is a lack of scientific literature examining internationalization and diversification strategies of export firms from Latin American countries, particularly in the agricultural sector. Second, there is a scarcity of studies of the internationalization strategies and paths deeply analyzing their dynamic nature over time. Third, the empirical studies analyzing the geographic diversification-performance relationship have not disentangled the effects of diversification within and across different geographic regions in the case of export firms. And forth, there is a lack of studies examining the influence of the distance on export market selection considering different distance dimensions.

Therefore, my dissertation consists of three essays contributing to fill these research gaps. The first essay develops and apply a conceptual framework to classify and examine the internationalization strategies of firms, paying special attention to their dynamic over time. We employed this framework to classified 233 firms from the Chilean fresh fruit export sector over a seven-year time period (2009-2015). We find that most of the firms are transregionally or globally oriented, while the home regionally oriented firms show the lower frequency. Additionally, results indicate that most firms include one additional market per year (linear internationalization path) but mainly export to more distant markets from very early stages of the firm (born-global firms).

The second essay explores the effect of geographical and product diversification on firms' export performance. To do so, we individually examine the effect of geographic diversification within (intra) and across (inter) geographic regions on firms' export performance. Additionally, we examine the effect of product diversification on export performance and finally we examine the role of product diversification as moderator on the geographic (intra and inter) diversification-performance relationships. The analysis is based on panel data using 279 firms over a six-year time period (2010-2015). Our results show that the relationship of both intra- and inter-geographic diversification have an inverted U-shape, where moderate levels of diversification have positive effects on export performance, but higher levels or diversification become counterproductive. Results also show that product diversification has a positive effect on export performance and a negative moderating effect on the relationship between inter-regional diversification and export performance.

The third essay examines the influence of the managers' perceived distance on export market selection and also examines the strategies implemented by managers to cope with the psychic distance. To do so, we employ the cultural, administrative, geographic and economic (CAGE) distance multi-dimensional framework and analyze the effect of each distance dimensions. This qualitative research is based on 30 in-depth interviews with managers of export companies of fresh fruits in Chile. Our finding show that the perceived psychic distance has an influence on export market selection, especially the economic and administrative distance dimensions, while the cultural dimension resulted to be the less significant. We also identify the most important factors driving the influence of each of the psychic distance dimensions as well as the strategies implemented by the managers to cope with these factors.

Luis Vinicio Losilla Solano, PhD.

Country of Origin: Costa Rica

Completed SIA: 2012 (Double Degree program with Talca/Chile)

Current position: Full professorship and researcher at the Department of Agricultural Economics and Agribusiness, Universidad de Costa Rica, San José Costa Rica

Based on the findings of the three essays, we draw important conclusions: Internationalization strategies and paths need to be analyzed longitudinally over time to really understand the dynamics of these processes. The use of a more inclusive framework permits to capture with more precision the strategies that have been implemented by firms. We show that the diversification strategies may enhance export performance when individually implemented; however, firms need to find their optimum levels of diversification to avoid counterproductive results. Furthermore, despite the strategies implemented by firms' managers to cope with the perceived distance, our results confirm that it still influences the international market selection, and thus, affects the way that businesses internationalize.

Technical and Environmental Efficiency in Grapevine Production in Mendoza, Argentina

While producing more with less has seemed to be right direction, the resilience capacity of agroecosystems calls for responsible exploitation of natural resources. Agricultural systems in semi-arid areas present a good example of the challenges of sustainable development, where the climatic conditions are suitable for the high-value crops with relatively low water needs. Grapevine production fits into this scenario providing the main input for the high-value product wine.

As the Argentinean grapevine production systems have gained global visibility, the wine industry has been revitalized with a greater focus on enological quality, technology adoption, and export orientation. However, small and medium size producers face scale limitations, financial constraints, and uneven access to quality irrigation water. There is a concern that vineyards fall short on their potential and that they are not optimizing their resources.

In the past, the economic tools designed for the agricultural sector aimed to sustain a level of profits by influencing the market conditions rather than improving farm level efficiency.

This dissertation departs from previous empirical applications by shedding light on the efficiency determinants of grapevine production and simultaneously accounting for agroecosystem characteristics and plot level information including irrigated water volumes in Mendoza, Argentina.

First chapter reviews the institutional settings of the water-energy nexus following a tripod framework, where policy effectiveness is discussed in light of the water-energy policies. Although the majority of policy tools were demand-oriented during the last 25 years, they have not provided consistent economic incentives for agricultural producers to consider environmental degradation of groundwater resources.

Second chapter assess the Technical Efficiency (TE) through the Stochastic Frontier Analysis (SFA) utilizing a unique dataset of 647 plots that includes, soil characterization, water volumes, and dummy variables for technology adoption and enological practices.

To further enhance better understanding of the vineyards' performance, the analysis divided the sample in two subgroups: viticulturists and wine growers. The former commercializes their output with wineries; while the latter elaborates their own wine.

The stochastic analysis is performed allowing for external and managerial variables to affect the economic performance in relation with their benchmark. Although the mean technical efficiency of both subgroups is similar, their technology-set and market orientation are significantly different.

Accounting for effects in the ecosystem and employing directional distance functions, the last chapter of the dissertation assesses the environmental efficiency of grapevine producers. The research considers that farmers jointly produce a desired output (grapevines) and an undesired output (saline hazard), both are dependent on the farmers' location as well as their production systems and practices.

Each plot has an irrigation need that varies according to the agroecosystem and crop management, the results confirm that irrigation beyond a certain threshold does not improve performance.

General conclusions of the dissertation call for greater involvement in the decision process of the sector specific policies while jointly fostering accountability of policy-makers on their decisions.

Vineyards that rely on groundwater for irrigation perform relatively well considering their limitations, governmental support should focus on strengthening managerial practices and technology adoption that will minimize their losses against environmental threats.

The technical advice from agricultural extensionists is a desirable contribution to improve technical-environmental efficiency performance.

Moreover, significant technical and environmental performance could be achieved if joint programs of technology adoption and extension services are fostered. The funding for these programs could come from gradual reassignments of the annual budget for subsidizing energy. To envisage greater development of the industry, the edition of a new joint strategic development plan would realign efforts towards quality while ensuring economic earnings for producers.

http://hdl.handle.net/11858/00-1735-0000-002E-E52F-6

Félix Sebastián Riera, PhD.

Country of Origin: Argentina

Completed SIA: 2012 (Doubel Degree Program with Talca/Chile)

Current position: working remotely with a personal project of precision agriculture in arid areas of Argentina and assessing the productivity gaps in water use for grapevine production in Argentina, Chile and Bolivia

Water quality analysis during fieldwork. I collected 420 water samples for agricultural irrigation in Luján de Cuyo. This area has a rising potential of enological characteristics but the competition for water resources among sectors had implications on the resource quality

Encouraging rainforest preservation by smallholder farmers: ex-ante policy evaluation

Arieska Wening Sarwosri

Country of Origin: Indonesia

Completed SIA: 2015

Current Position:
PhD candidate at the Chair of Farm Management, University of Göttingen

There is a large variance of products which contain palm oil in our daily life. Some of them explicitly state the usage of palm oil, but many of the products do not precisely mentioned that the products contain palm oil as it appears under many names. Palm oil is used mainly for food and cosmetic industries as well as to produce biodiesel. In the food industry, the main purpose is to improve the structure of the products and as cooking oil. For example, bread, chocolate, cookies, ice cream, margarine, and pizza. The production cost of palm oil is lower compared to other vegetable oil and hence, in the last several decades, the demands increased in a great number. In response, the producer countries increase their production. This benefits the producer countries in term of export revenue and improvement of the livelihood of smallholder producers. The palm oil production increases smallholders' income, and thus mitigates rural poverty. However, the high global demand has accelerated the rainforest conversion to oil palm plantations in the producer countries. As oil palm can only be cultivated as a monoculture, many big scale companies as well as smallholders clear the rainforest to establish the plantations. The conversion of rainforest into oil palm plantations not only poses a threat to the environment, but also threatens the livelihood of indigenous tribes who live inside the forest.

To encourage sustainable agriculture and as response to the growing concern of consumers about rainforest loss, sustainable palm oil (SPO) certifications were established. The principles and criteria of the certification encourage the producers to produce in a sustainable farming system such as maintain long term production and income without neglecting the sustainability of forest and biodiversity. Many big scale companies are certified, and hence, they have to implement the principles of the SPO certifications within their palm oil production process. Otherwise, they cannot sell their products to the markets with high concern of sustainability such as Europe.
However, the participation of smallholders in the certification remains low while their contribution to the overall palm oil production is high. In Indonesia, the biggest palm oil producer worldwide, 40% of the production is done by smallholder farmers. Our research investigates several possible policies to be implemented in order to encourage participation in the certification programs. We investigate three policies including price premium, the provision of environmental information and the effect of group norms on the participation in certification scheme. To investigate the effect of the policies, we utilized a social dilemma experiment. Using the experiment, the impact of the policies can be examined ex-ante. Our research took place in Jambi Province, Indonesia, which is one example of an area where a substantial amount of rainforest is converted to oil palm plantations. This research involves 636 smallholders in Indonesia; these smallholders cultivate oil palm, rubber, or both crops. Rubber is the main cash crop in Jambi, but we involved them in our experiment because many rubber smallholders also cultivate oil palm as the second crop and a significant number of plantations were converted from rubber into oil palm plantations. Thus, rubbers smallholders potentially become oil palm farmers in the future.

Group of smallholders do the experiment in badminton hall.

Our office when we are in Village Teluk Pandak, Jambi.

Price transmission and market integration in Latin America

In 2015, I was granted a scholarship by the German Academic Exchange Service (abbreviated DAAD in German) to study the joint master's degree program "Sustainable International Agribusiness" with the specialization in "International Agribusiness and Rural Development". As part of this academic experience, I did an internship in 2016 at the Livestock Information, Sector Analysis and Policy Branch (AGAL) of the Food and Agriculture Organization of the United Nations (FAO) in Rome, which specializes in livestock sector analyses.

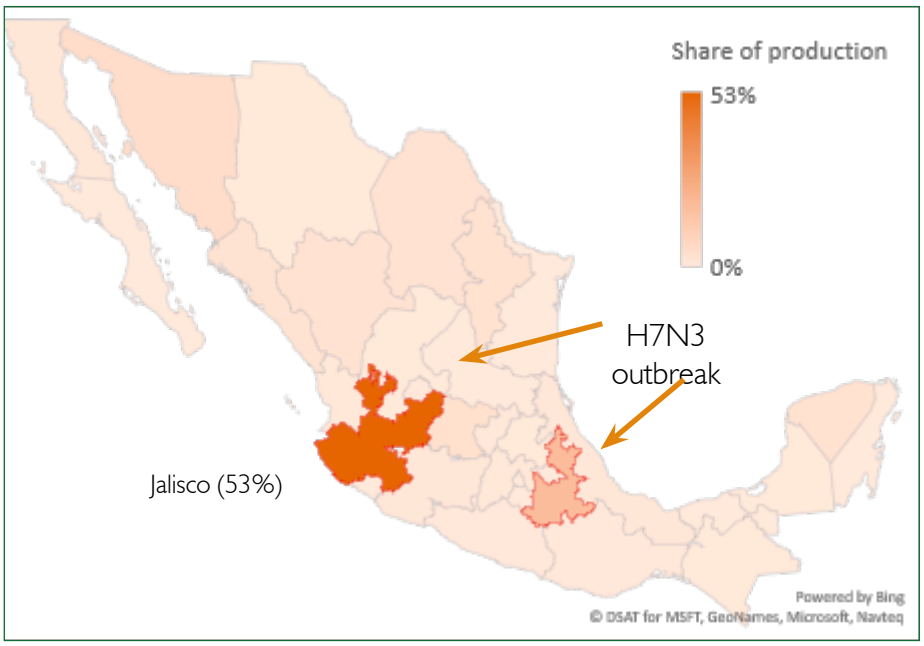
During this internship, I analyzed the level of price transmission and market integration in various Latin American livestock markets. Price signals provide information related to the market conditions, thus driving economic decision-making and resource allocation. Markets are said to be integrated if a pass-through of prices exists across geographically separated markets (spatial price transmission) or along supply chains (vertical price transmission). This pass-through is characterized by the magnitude, speed, nature, and direction at which prices are transmitted from one market (or link in the supply chain) to another.

Furthermore, the extent to which prices are transmitted determines the degree of market efficiency. In agricultural markets, however, the presence of various factors such as transfer costs, market power, or trade policies might dampen the level of price transmission. As a result, price signals will not be fully passed on from one point to another, with potential implications for food security and welfare distribution.

In a joint effort between the University of Göttingen and FAO, I developed my master's thesis using the above theoretical background to grasp the indirect consequences of animal disease outbreaks on food markets. Therefore, I considered the case of the 2012 Avian Influenza outbreak in Mexico and its impact on price dynamics along the egg supply chain.

Mexico leads egg production in Latin America and ranks as the fifth largest producer in the world. However, Mexican egg production is concentrated in two states -Jalisco and Puebla-. In June 2012, the country suffered from three outbreaks of Highly Pathogenic Avian Influenza Virus (H7N3) in Jalisco. Consequently, more than 20 million birds were slaughtered and disposed, which provoked a shortage of egg supply and culminated in an abrupt increase of real egg prices. Despite the rapid restoration of the egg supply, egg prices remained high.

With the application of cointegrating techniques, I analyzed how prices at wholesale and retail levels responded unevenly to the supply shock caused by the H7N3 outbreak. Additionally, the results showed that the equilibrium (or long-run) relationship between prices at these two links was disrupted thereafter. These price dynamics led to increased wholesale-retail marketing margins favoring retailers, which is consistent with market power at downstream stages of the supply chain.



Contribution to Mexican egg production by State in 2015.
Source: Author with data from INEGI, 2016

Carlos Barrantes

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Completed SIA: 2017

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Considering that eggs are the most accessible and affordable animal protein in Mexico, such rise in the price of this staple can be worrisome. Increased retail prices for eggs may not only reduce households' access to this food but also curtail their capacity to purchase other more expensive animal proteins. Since animal proteins are the main source of micronutrients, a reduction in households' access to these items may pose a risk for food security, particularly in regions with low-income levels and high poverty rates.

After graduating from the SIA master's program, my ongoing interest in these topics inspired me to continue with the Ph.D. program "Agricultural Economics" at the University of Göttingen. Currently, I am exploring the role that different aspects of industrial organization play on price transmission and market integration in Latin America. The aim of my research is to provide theoretical and empirical inputs to address policy issues regarding food security, welfare distribution, competition, and trade.

Kiwi production in Chile

Sustainability of smallholder supplied high value chains

Dr. Cristina Maria Romero Granja

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Completed SIA: 2011

Current position:
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An increase in international demand for high-quality food, together with globalization, have shifted transactions from spot markets to vertical coordination, opening new business opportunities for small-scale farmers in developing countries. NGOs and government agencies often support small-scale farmers in developing countries to link to global markets; however, overcoming the initial constraints to gaining access may not be enough to maintain a long-term marketing relationship and thus sustained welfare increases. Arrangements involving smallholders regularly lose suppliers or collapse over time due to unsustainable marketing relationships. It is not uncommon, that farmers are exposed to contract breach, including hold-ups from the buyer, such as delayed payments and product rejection, which affect the relational capital throughout the supply chain.

To date, only few empirical studies have focused on the sustainability of export value chains supplied by smallholders, given the difficulty of accessing reliable transaction data and recording farmers' relational capital in rural areas of developing countries. Under the scope of the Research Training Group GlobalFood (RTG 1666), we analyzed transactions and relational capital of small-scale farmers in Ecuador supplying the high-value broccoli export chain. We focused on the effects of contract breach, including payment delays and product rejections, on farmers' decision to exit the supply chain and on their levels of trust. Understanding these relationships in more detail helped us to derive policy recommendations on how to support the inclusion of small-scale farmers in high value export chains. Field work was conducted in the Andean region of Ecuador, where we interviewed about 400 randomly selected farmers. The survey data was then merged with detailed records from the collection center, containing information on broccoli transactions over an eleven-year period. Additionally, we conducted a trust framed field experiment with a sub-sample of 180 farmers in order to quantify the effect of opportunistic behavior on their relational capital.

During the early 2000s, Ecuador advanced to the 6th largest exporting country of broccoli and cauliflower in the world, with one third of the total area planted on small farms. Around 2002, small-scale farmers were linked to an exporting firm through a collection center established by a producers' organization. A fixed price and the quality, quantity and payment conditions were specified in a contract signed by both parties. The harvested broccoli was assembled in the collection center and sent to the firm, where it was processed and shipped to other countries. Farmers got access to credit, inputs, and technical information in exchange for growing broccoli on their land and delivering it to the firm, who deducted the cost of the provided services from the payments to farmers. Twelve years later, a large percentage of the suppliers had partially or completely abandoned the scheme. By 2010, the country's export volumes had decreased by fifty percent, even though broccoli prices in the international market were relatively stable.

The first paper "Dynamics of smallholder participation in horticultural export chains: evidence from Ecuador" studies the influence of hold-ups experienced by farmers (i.e. payment delays and product rejections) on farmers' decisions to enter and exit the export supply chain. In the analysis, we control for heterogeneous effects after the bankruptcy of the major processing firm – a negative external shock experienced by the sector. The results reveal that payment delays and, to an even larger extent, product rejections have a negative influence on the amount of broccoli delivered and significantly increase the likelihood that farm-

View of the Cajabamba area, where broccoli smallholders are located, Chimborazo Province, Ecuador.

Indigenous broccoli farmers during a session of the trust framed field experiment in the Gatazo Hospital commune. Chimborazo Province, Ecuador.

Cristina Romero at a broccoli plot in the Gatazo commune, Chimborazo Province, Ecuador. (Photo: Patricia Cruz)

ers drop out of the chain. Heterogeneous effects are found for poorer and female-headed households, who tend to remain longer as suppliers in the export chain after the negative external shock, and thus seem to be trapped more easily in less profitable market arrangements.
The second part of the research was published in the paper "Opportunistic Behavior and Trust: Experimental Results from Broccoli Farmers in Ecuador". Results from the trust experiment show that generalized trust among the farmers in our sample is extremely low, which is possibly related to the harsh conditions they have experienced over the years in the export chain. Furthermore, if farmers receive a signal of opportunistic behavior, in the form of a delayed payment, their trust, which is already low, does not further deteriorate. However, a positive signal sent prior to the trust game significantly increases trust levels among farmers.
Based on the results of these studies, we conclude that attention should not only focus on facilitating farmers' access to global supply chains, but also on making these relationships beneficial for both farmers and buyers in the long term. Assistance is needed to improve the bargaining skills of farmers' groups and to conduct legal actions when they are affected by opportunistic behavior of downstream actors. If buyers aim at establishing sustainable marketing relations with their suppliers, they need to send strong positive signals to build trust and encourage cooperation.

The studies have been published as the following journal articles:

Romero, C., M. Wollni (2018): Dynamics of smallholder participation in horticultural export chains – evidence from Ecuador. Agricultural Economics 49(2), 225-235

Romero, C., M. Wollni (2019): Opportunistic behaviour and trust: Experimental results from broccoli farmers in Ecuador. Journal of Agricultural Economics, 70(1): 62-80

Ecophysiological modelling of macadamia trees in the Limpopo Province, South Africa

South Africa is the largest producer and exporter of macadamia nuts in the world, with a constantly growing industry. However, despite the key role that macadamia plays for the country's economy, there is only limited literature describing the physiology of this crop. Furthermore, tools to enhance the learning and understanding of agro-ecosystem interactions, such as ecophysiological models, are not available for macadamia, unlike for other (sub)tropical perennials like oil palm, coffee or coconut. Therefore, the overall goal of my research is to increase understanding about and gain new insights on the processes determining the interactions of genotype, environment and management (G x E x M) in macadamia orchards and to apply and extrapolate this knowledge to explore the effects of climate change and management interventions in the Limpopo region. To this end I will first conduct field experiments and monitor a number of ecophysiological variables in macadamia orchards selected along an altitude gradient in the Limpopo Province. Secondly, I will develop, on that basis, a first-ever process-based (ecophysiological) macadamia growth simulation model and evaluate it with existing and newly generated data sets. The resultant model will allow for upscaling of results from field experimentation across the whole region.

Smallholder homegarden in the village of Mafarana (Limpopo Province, South Africa)

Thomas Bringhenti

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Furthermore, the effects of climate change and management interventions on the system's productivity and related ecosystem services can be explored and quantified. My research is being conducted in the framework of the *South African Limpopo Landscapes Network (SALLnet)* joint research project, funded by the *Federal Ministry of Education and Research (BMBF)* and involving the cooperation of a number of German and South African partner universities.

Changing Nature of Sustainability Initiatives in Global Agricultural Value Chains

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Factors such as information, communication and technology advancement, privatization and liberalization of markets explain the emergence and expansion of global agricultural value chains (GAVCs) (Baldwin, 2016). The impacts for participating in GAVCs includes interdependency and interconnectedness of economies, market access, utilization of network technology, specialization and productivity growth (Cattaneo et al., 2010). Promoting sustainable GAVCs may benefit millions of people particularly from the Global South. In this regard, a number of sustainability initiatives from different actors through various governance structures are increasing. In this article, we highlight the changing characteristics of these initiatives and their ability to address sustainability challenges along the GAVCs.

First, we notice a shift from a broad focus to a specific one. Currently, most of the present initiatives center on key issues e.g. deforestation, human rights, gender inequality and child labor. Such specific focus improves our understanding and enhances effective and efficient formulation of policies to tackle the menace.

Second, producers and the community are currently regarded as active actors. Past initiatives treated producers and the community as initiative takers. However, collaboration with farmers and the community in designing and implementing sustainability initiatives is increasing. Such multi-stakeholder approach improves legitimacy, consequently leading to both improvement in participation and quality of compliance (Schouten & Glasbergen, 2012).

Third, there is a shift in orientation of sustainability initiatives from farm to sector and landscape (Nelson & Phillips, 2018). Sectoral and landscape consideration enables a comprehensive coordination to foster forest restoration and integration of anthropogenic features of land reforms. This approach captures a holistic participation of numerous actors in sustainable initiatives.

Fourth, we observe a new paradigm shift of focus on prices and income in contrast to previous focus on productivity and yield only. In addition to productivity growth, a number of present initiatives include alternative livelihood programs that improve the entrepreneurial skills of Global South actors. Through this, they are able to diversify livelihood strategies particularly during lean and off seasons.

Finally, we realize that present initiatives are not only interested in the number of actors participating and adopting in quantitative terms, but also interested in compliance, the qualitative dimension. Through monitoring, auditing and support with assurance, present sustainability initiatives helps to improve the behavior of actors along the GAVCs.

Sustainability initiatives in GAVCs have evolved over time. The direction of change in characteristics is promising and inclusive. Such paradigm shift shows a journey towards achieving sustainability in numerous food supply chains such as coffee, palm oil, cocoa, horticulture, tea, wine and many others. We encourage all actors at different levels of the GAVCs to consider characteristics of initiatives that promote inclusive economic, social and environmental growth while ensuring partnership and peace in such governance systems.

Crop modelling and experimentation to improve climate change impact assessments of barley

Mercy Appiah

Country of Origin: Germany

Completed SIA: 2018

Current position: PhD candidate at the chair of Tropical Plant Production and Agricultural Systems Modelling, University of Göttingen

The core of my research is assessing the effect of global climate change on the agricultural production of one of the most important cereal crops – barley. It is mainly used for malting, brewing, animal feed production and other uses in human consumption. As shown exhaustively, climate change, caused by elevated greenhouse gas emissions, principally CO_2-emissions, will lead to increases in the mean and the variability of global surface temperatures. Additionally weather extremes like heat and drought are expected to occur more frequently. Against this background the special interest of this thesis lies in the interaction of heat*drought*elevated CO_2. Besides an in-depth analysis of currently available climate change scenarios and the impact of changing environmental conditions on barley and the utilization of crop growth models for ex- ante evaluations of climate change impacts, further experiments will be conducted to increase the understanding of physiological responses of barley to heat*drought*elevated CO_2.

Climatic conditions and fruit diversity of guava affect its nutritional composition: a case study of Kenyan guava accessions

Despite some efforts seen in the production of tropical fruits, such as mangoes and avocados, the opportunities to grow, consume, and export more fruits from tropical regions remain under-exploited compared to those in temperate regions. For instance, the supply of fruits and vegetables in lower-income countries fall short by 58% on average based on nutritional recommendations. Consequently, low-quality nutritionally unbalanced diets are common in these regions, leading to high risks of nutrient deficiencies. Research to improve fruit production, therefore, offers tremendous opportunities for raising the incomes of small-scale farming families in these regions while also improving their nutritional status.

Guava (*Psidium guajava* L.) is an important tropical fruit tree grown mainly for its edible fruits, which are eaten raw or made into purée (pulp), jam, jelly, paste, juice, syrup, and chutney, among other products. The guava tree is cultivated in orchards and in home gardens in many tropical countries. In Kenya, for example, the guava tree exists in all regions of the country and mainly grows unattended. Despite the lack of attention to guava tree husbandry, guava fruit production in Kenya has recently seen an increase.

In general, recent studies have reported an appreciable amount of antioxidant phytochemicals, including ascorbic acid, carotenoids, flavonoid compounds, and polyphenols in the guava fruit, which are essential dietary components. Moreover, the fruits contain substantial amounts of minerals such as potassium, phosphorus, and calcium, which could significantly contribute to meet a person's daily dietary requirements. However the diversity of agroecological conditions under which guava grows and existence of different guava accessions cause variations in its nutrient composition. With our study, the variability of Kenyan guava growing under different agroecological conditions is investigated for the first time. We determine the nutrient composition of 128 guava accessions collected from four agroecologically diverse regions of Kenya. These fruits were morphologically characterized at the World Agroforestry Centre in Nairobi, Kenya and nutritional analyses determined. Further nutritional analyses were performed in the Division Quality of Plant Products, University of Göttingen, Germany. The nutrient composition data was correlated with the climatic variables in the regions of collection and also with the fruit flesh colour and fruit weight- and size-based traits.

In conclusion, the ascorbic acid content positively correlates with annual precipitation. The total soluble solids (TSS) content which contribute to the fruit flavour positively correlated with temperature, and was found to be higher in white-fleshed fruits (n = 26) compared to red-fleshed ones (n = 102). White-fleshed fruits showed lower pulp weights and contained more seeds. Red-fleshed fruits had a higher content of phenolic compounds than the white-fleshed types, while the white-fleshed fruits contained more TSS, protein, and some minerals.

The relationship between climatic data and fruit traits such as ascorbic acid and TSS could aid in the choice of guava production regions with climatic conditions that enhance these chemical components. The flesh colour of fruits provides the information necessary for the selection of fruits for various purposes—for example, sweeter white-fleshed fruits with a higher mineral content could be preferred for fresh consumption, while larger, less sweet fruits with a lower mineral content could be preferred for industrial processing.

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Country of Origin: Kenya

Completed PhD: 2018

Current Position: Lecturer, Department of Seed, Crop & Horticultural Sciences, University of Eldoret, Kenya

Guava tree.

Original source of the article:

PhD thesis by Chiveu C. Josiah: Assessment of genetic and nutritional diversity, and salinity tolerance of Kenyan guava (Psidium guajava L.): an underutilized naturalized fruit species. University of Göttingen, 2018

Guava fruit flesh colours.

Testing multi-functional cool-season cover crop species under semi-arid conditions in Limpopo (South Africa)

Sala Alanda Lamega

Country of Origin: Togo

Completed SIA: 2017

Current position: PhD candidate at the Chair of Grasland Science, University of Göttingen

In agricultural systems, a wide range of cover crop species have been selected and grown over the past decades. Cover crops are generally grown between two main cash crops to improve production efficiency by decreasing nutrient losses thereby increasing the agronomic and environmental benefits. In the scientific literature leguminous and non-leguminous cover crop species have been adopted for their 'catch crop' and 'green manuring' functions – preventing soil erosion and N leaching, providing mineral N for the subsequent cash crop, and increasing the soil carbon pool through the incorporation of the plant residues. However, contrasting results have been reported on the efficiency with respect to yield formation of subsequent crops, i.e. some studies showed positive other negative impacts, suggesting that site-specific conditions are relevant. Indeed, these agro-ecological benefits depend on the selected species, management and specific site with the respective soil conditions. A major management option for adaptation is found in the species selection and the sowing date, which determines the available time of the remaining growing season. With a frequent occurrence of climate uncertainties on a global scale and restricted land availability, there is an urgent need to understand the complex interactions between the environment – soil – management continuum. As extreme weather events are projected for the Limpopo region in South Africa, adverse impacts on livestock and crop production are forecasted. Consequently, the work package within the SALLnet project (South African Limpopo Landscape Network) is investigating temporal and spatial factors associated with livestock feed deficit.

The present project firstly evaluates livestock feed deficits across smallholders and emerging farmers using agro-ecological zones in Limpopo. This evaluation consists of on-farm data on:

- Feed base systems and strategies coping with climate uncertainties (is there any differences in the feed base and or the strategies with respect to the agro-ecological zones?)
- Period of livestock feed deficit (regular feed shortages in the winter/fall periods? Any differences across the agro-ecological zones?)
- Forage, soil and faecal samples to assess soil nutrient status and forage resources Isotopic (^{15}N and ^{13}C) signature analyses (on cattle hair to investigate the extent of grazing period and feed)

A number of studies promoted the incorporation of cover crop species into the prevailing mixed crop-livestock systems across smallholder farmers in Southern Africa. However, the focus was given to tropical species resulting in a low level of adoption across farmers. Therefore, the present study investigates winter cover crop species, commonly used in temperate regions, grown in field trials of the Limpopo region with the main goal to bridge the winter fallow period by extending the grazing season and to provide a reliable forage basis during the winter season. Therefore field experiments will be initiated in 2019 in a second step. These field experiments will be implemented at two sites in Limpopo (Polokwane and Thohoyandu) with winter hardy and non-winter hardy species of the leguminous, brassica and poacea family.

Top: Sala A. Lamega and Dirk Koops recording emergence and count of rapeseedlings.

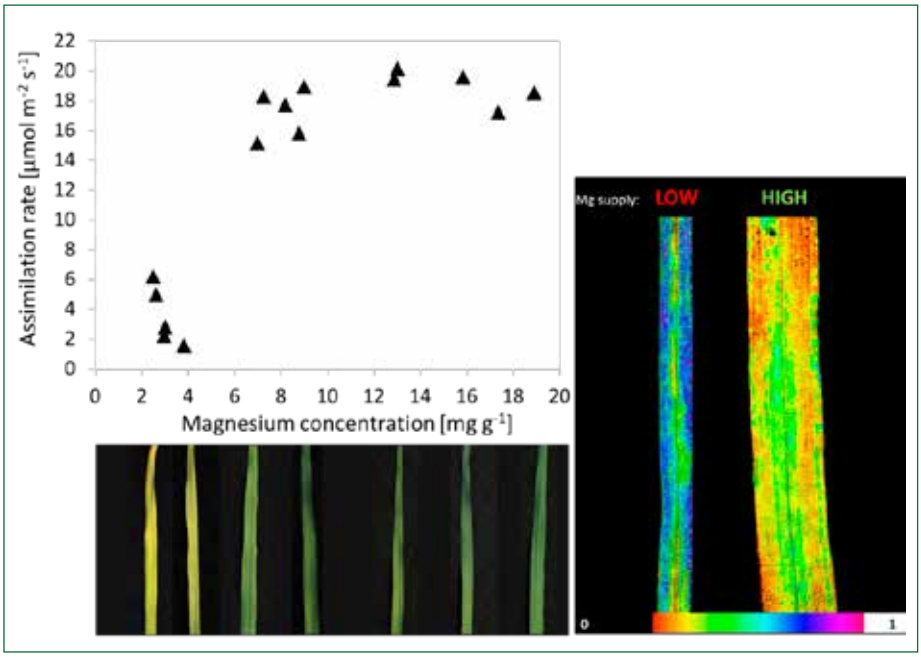
Bottom: Sala A. Lamega planting in Deppoldhausen using a sowing tractor.

Eight (8) winter/summer CC species mainly vetches (Vicia villosa L. and Vicia sativa L.), clovers (*Trifolium incarnatum* L. and *Trifolium alexandrium* L.), winter and summer rapeseeds (*Brassica napus* L.) and grasses (*Secale cereale* L., *Lolium multiflorum* Gaud.) were selected for the experiment with additional fallow plots. Results based on the field experiment will then be used to set up the Agricultural Production Systems sImulator (APSIM) to quantify the potential of the introduction of cover crops under expected climatic conditions in Limpopo. The APSIM model will be calibrated and tested against the data collected on-farm and the field experiment during the first two steps. Prior to this, a field trial with several important cool season cover crop species was set up in August 2018 in Germany to derive model parameters for the cover crop species of interest.

Sala A. Lamega operating a drone for plant height, Leaf area index, soil temperature and vegetation indices.

Plant research on photoprotective mechanisms and magnesium nutrition at IAPN

The nutrient magnesium is essential for plants and plays a dominant role in photosynthesis and photosynthesis related processes. Photosynthesis takes place in the chloroplasts, where 35% of the magnesium in cells is allocated. This high percentage illustrates the dependence of photosynthetic processes on the presence of magnesium. For instance, the enzyme Rubisco which is responsible for fixation of atmospheric CO_2, is activated by magnesium. Moreover, the leaf pigment chlorophyll, which absorbs light energy, requires magnesium for its molecular structure. If magnesium concentrations within the plant become deficient, photosynthetic performance is decreased and only a small portion of light energy is converted to biochemical energy (see figure). Hence, excessive energy is formed which in turn produces reactive oxygen species. Reactive oxygen species are toxic to the plant and can cause damage to DNA, proteins, cell walls etc. if they occur in too high concentrations. To protect itself from damage, the plant uses the so called "photoprotective mechanisms". Hereby, part of the excessive energy is converted into harmless heat, a process known as "non-photochemical quenching" (NPQ). The proportion of energy used in photosynthetic processes and the proportion of energy converted into heat can be determined by chlorophyll fluorescence where the leaf is illuminated with light of a certain wavelength. While part of the light is absorbed by the leaf pigments, a small portion of light, approximately 1-2%, is remitted in a longer wavelength and can be detected as fluorescence. This methodology allows indication on the photochemical efficiency of the plant. Our results show that plants which suffer magnesium deficiency reduce the photochemical efficiency and dependent on the severity of deficiency, increase the dissipation of energy as heat.



Left: Decreasing leaf magnesium concentrations lead to reduced assimilation rates and reduction of chlorophyll concentration as visible by yellowing of leaves.
Right: Due to reduced assimilation capacity, light energy is in excess to what can be used in photosynthesis and can damage the plant. To protect leaves from damage, the excess light energy is converted to thermal energy, which is assessed as non-photochemical quenching (NPQ). The leaf on the left suffers Mg deficiency and has higher NPQ, indicated by more blue and purple colours. The false colour scale at the bottom depicts values from 0 to 1.

Jun.-Prof. Dr. Merle Tränkner

Country of Origin: Germany

Completed SIA: 2012

Current Position:
Junior professorship at the Institute of Applied Plant Nutrition (IAPN), University of Göttingen

Recent publication on the topic:
Tränkner, M.; Tavakol, E. & Jákli, B. (2018): Functioning of potassium and magnesium in photosynthesis, photosynthate translocation and photoprotection. Physiol. Plantarum, 163, 414-431.

SIA-Projects

Project of the Volkswagenstiftung: Livelihood Management, Reforms and Processes of Structural Change

"I'm Sheko, a vintage cow, and with my super-adapted genes I help Ethiopian cattle farmers to face global challenges".
Within the Livelihood Program funded by Volkswagen Foundation Hanover, Dr. Simret Weldenegodguad and her team are investigating the willingness of Ethiopian livestock keepers to preserve the well-adapted Sheko cattle as a pure local breed so as to benefit of its high disease tolerance.

Chair of Animal Husbandry in the Tropics and Subtropics
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Social-ecological dynamics, ecosystem services uses, and governance of green infrastructure in urbanizing environments

More and more people live in cities worldwide, and the growth of "megacities" is particularly rapid in Asia. A network of green infrastructure (composed of urban parks, street trees and other semi-natural habitats) can help mitigate the negative sustainability impacts of urbanisation. The research unit "Social-Ecological Systems in the Indian Rural-Urban Interface" includes a project that analyses the spatial-temporal dynamics, multiple uses, and future development options of green infrastructure. Experiences from the Indian megacity Bengaluru – known as the "Garden City" – can be used to derive strategies for green infrastructure planning and management in the metropolises of the Global South.

Social-Ecological Interactions in Agricultural Systems
Prof. Dr. Tobias Plieninger
plieninger@uni-goettingen.de
https://www.uni-goettingen.de/de/573702.html

Agriculture-Nutrition Linkages in Africa

Hunger, malnutrition, and low dietary quality are still widespread problems in Africa. Many of the people affected are smallholder farmers. Against this background, we analyze how smallholder agriculture could be further developed to become more nutrition-sensitive. Data from various countries show that an increase in farm production diversity has positive effects on dietary diversity, especially when farm households are mainly oriented towards subsistence production. However, better market access and market functioning have much stronger positive effects on smallholder nutrition, implying that that improvements of road and market infrastructure should have high policy priority.

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Impact of pasture quality, climate and health on dairy cows' pasture behavior

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At the end of the forth SIA semester, I was lucky to get the chance to conduct my Master thesis' research within the framework of the Sino-Mongolian-German project Watercope. Mongolian as well as Chinese pastoralists are dependent on the natural resources of the steppe of the Altay-Dzungarian regions in and around the district of Bulgan Soum. As population grows, the political reorganisation still hampers economic development, the pressure on the environment increases and extreme weathers have devastating effects on the their herds, herders of the Sino-Mongolian border area face tremendous problems endangering their possibility to sustain their unique traditional knowledge and livelihoods. Thus the transborder project aimed at aimed at developing, comparing and test-implementing technologies to better cope with the effects of climate change on scarce agro-ecological resources in the vulnerable steppe and semi-desert ecosystems of the Altay Mountains and the Dzungarian Desert Basin.

Despite the fact that livestock movement in the research area in general had been studied already, the cattle management and above all dairy farming practise at the research sites of the Watercope project in Western Mongolia had not been looked at more deeply at that time. Generally, small ruminants make up for the largest number in the Mongolian pastoralists' herds. They are multi-purpose livestock species and are of high monetary value; cashmere goats in particular, as the hair of the goats is much easier to transport to traders and generating far more household income. Nonetheless, cattle are kept among many herding households in the study area and although they are not herded, cattle management as well as the processing of milk frames the herders' daily routine because days start and end with the milking of the cows. The milk production mainly serves households self-sufficiency hardly income and is therefore often. I experienced this many times when herders looked at the pictures of the animals I had taken. They were most excited about horses and goats whereas they were often puzzled why I had taken so many photos of cows. However, with all the dairy products consumed on a daily base dairy management contributes largely to the food security of Mongolian herders thus it was important to raise awareness for its importance as a part of the backbone of the Mongolian herders' nutrition and nutrition.

Thankfully, I stayed with one herder family one month during summer pasture at the Altay mountains around Tsunkhul Lake 2,450 m.a.s.l. and one month during autumn pasture in the vicinity of Bulgan. I stayed in a tent next to one family's ger and their hospitality made me feel like I was part of their family. That's why I was also able to learn a lot about their customs and seasonal activities such as different ways of "white food processing", felt making and sea buckthorn picking and processing besides studying dairy cow behaviour and conducting semi-structured interviews about cattle management, dairy production and processing. In total 29 herders shared their individual management and production practises with me of which were 24 Mongolian and 5 Kazakh herders. Additionally, 5 households agreed to be observed during the morning and evening milking process for 3 consecutive days to record the duration of the whole milking process, duration and

Small ruminants' vaccination against Foot and Mouth disease during autumn pasture in a wooden corral.

number of the single milking and calf suckling intervals as well as the herd's milk yield. During the same days, to study the cattle move- and management, I followed and observed the behaviour of six cattle of each of the 5 households and recorded their tracks by with GPS data loggers.

The main findings were that there were specific dairy cow management strategies such as that cows were pushed to certain grazing areas in between 6:00 a.m. and 6:00 p.m. where cows were milked. The different families had distinct areas where their cattle herds were grazing which overlapped but were not the same. They differed in highest distance to the ger and distance walked by the cattle, i.e. the bigger the herd, the longer the daily track. Moreover, the amount of dairy production was closely linked to the household's structure. The more children were present, the more the family relied on dairy products. For instance, during the summer pasture when more children stayed with their parents because of school holidays more milk products were directly consumed. However, during autumn pasture, when herders had less help during milking still the same amount of milk was extracted per cow and day and the duration of milking stayed the same. Concerning cattle movement and management there were differences between summer and autumn pasture. For example, around Tsunkhul Lake the herds walked longer distances due to insufficient fodder supply and as milking started one hour later at autumn pasture, cattle had one hour less for grazing and other activities. Generally, the cattle's age had an effect on resting and walking time as well as the duration of milking intervals.

On the one hand, during the interviews herders claimed to have a too small number of cows which they would need to cover the individual household's needs. On the other hand, often not even all of the herds' lactating cows were milked there seemed to be a lack of labour rather than dairy cows. In addition to that, there seemed to be no proper breeding programme to improve individual cows' milk yield. A recognition, of rural cattle management and dairy production in Mongolia and the people involved in it would be a first step to improve especially

Cheese making in the Altay region. Fresh cheese/curd (left) that was dried in the fresh air and curd that was left hanging in a linen bag to de-whey.

Mongolian female pastoralists' livelihoods. In a nutshell, the SIA program was truly by the research. Despite all the hick-ups of conducting research in remote areas with little electricity and language barriers truly learnt a lot for my following academic and private life and I can recommend it to all of the following SIA students to conduct their master thesis research abroad to connect the SIA theory with SIA practise.

Responses of Boer goats to saline drinking water

In many tropical coastal regions, sea level rises due to global climate changes. Accordingly, salinization of ground water and soil is an increasing worldwide phenomenon, thus creating new threats for farm animal production. Our study investigated the capacity of goats to differentiate saline water in a free choice system. In this study, 12 non-pregnant Boer goats were kept in individual pens under controlled stable conditions for 4 weeks. Animals had access to cut hay and water *ad libitum*. In the control phase (1 week), only fresh water was supplied in five identical buckets for each pen. During the subsequent treatment phases (3 weeks), fresh water and four different concentrations (0.75, 1.0, 1.25, and 1.5% NaCl) of saline water were offered simultaneously in a free choice system. The positions of the salted water were changed daily at random. Individual water intake, feed and mineral supplement intake were recorded daily, while body weight and body condition score were measured weekly. Total water intake, dry matter intake and total sodium intake were significantly ($P<0.001$) higher when the choice between saline water drinking water was offered. The total sodium intake of the goats ranged between 0.37–0.55 g/kg $BW^{0.75}$ per day, being 8 to 11 fold higher than the daily requirements of sodium for body maintenance. Young goats avoided saline water intake more strictly than older animals. All goats showed a significant preference for fresh water (0% salt) over saline water in the choice situation. At the first offering of the simultaneous choice situation (week 2), animals did not differentiate between salt concentrations of 0.75% and 1.0%. However, in the further course of the experiment (week 3 and 4), animals distinguished saline water concentrations more distinctly and avoided concentrations of 1% to 1.5%. The results suggest that goats are able to differentiate between saline water concentrations and to balance their sodium intake through water by self-selection in a free choice system.

Rukhsana Amin Runa

Country of Origin: Bangladesh

Completed PhD: 2018

Current Position:
Assistant Professor, Department of Surgery and Obstetrics, Bangladesh Agricultural University

Functional and genomic characterisation of the hatchability in Naked Neck chicken

My project involves research into the Naked Neck gene in chickens, which, as the name suggests, causes a lack of feather growth in the neck, along with reduced feathering in the body. Due to the lack of feathering, birds with these genes have a greater tolerance to warmer climates, along with improved production and reproductive performance, which is of interest within tropical countries and also with raising climate temperatures. We are interested in the hatching rate of chickens with this gene, as there is a reduction in the hatching rate seen with the occurrence of this gene, however the reason for this reduced hatching rate is unknown. Our goal is to look into reduction in the hatching rate through differential temperatures during hatching, along with molecular and genetic testing in the hope of finding the cause, or hopefully reducing the number of late embryonic deaths that occur, leading to the reduced hatching rate. In working on this project, I am privileged to be able to work with animals, in a laboratory, and also learn a lot about computer programming to analyse the genetic data we will receive. Along with the work on my project, I have so far been able to also give lectures, improving my teaching abilities, and take part on some excursions and conferences, for example the DGfZ Conference which was held in Bonn in September 2018. I am looking forward to working further on my PhD, and am not exactly certain as to in which direction I will head in once I am finished, but am looking forward to finding out.

Annelise Havill

Country of Origin: New Zealand

Completed SIA: 2017

Current position: PhD candidate at the Chair of Functional Breeding, University of Göttingen

Make good use of your time

This was supposed to be a 2-year adventure. Get on a plane, fly across the ocean, leave family & friends behind, and move to a new continent with two suitcases. My plan was to stay for the SIA program and move back right after. Little did I know that my career would take root and gradually blossom here in charming little Göttingen.

Due to my father's career, my family and I had the chance to move to Africa and live in the city of Bamako, Mali for three years. It changed my life forever. I knew right away that I wanted to come back and work in West Africa and I kept this in mind when I had to choose a bachelor's degree. When I heard about the SIA program in Germany, I was halfway done with my bachelor's, but I already knew this is what I was going to do next.

In 2014 I was accepted into the "International Agribusiness and Rural Development Economics" specialization. In one of the introductory classes of SIA, one professor caught my attention when I realized most of her research takes place in West Africa and focuses on animal sciences. No need to tell you how fast I jumped out of my chair to talk to her after class! Long story short, she introduced me to her work within Urban FoodPlus (UFP), a multidisciplinary research project intended to enhance food security in West African cities. Subsequently, I completed both my master's degree and doctoral degree field work with UFP, where I had the occasion to learn how to work with local institutions, lead a team of assistants, organize the various logistics, manage a budget, design questionnaires, carry out data collection, and much more. This professor and this research project were the stepping stones to my academic career.

The workload during the SIA program was much lighter than what I was used to in North America and at first I was disappointed; I thought this was a reflection of the courses' quality. However, with time I realized that this free time enabled me to carve a more refined profile for myself based on my interests. I had time to travel abroad, to participate in international conferences and workshops, to go on educational excursions, to be part of a student group that organized all kinds of activities, to establish relationships with professors and renowned scientists, to work for the university, and to improve my skills of choice. None of this would have been possible had I been swamped by homework, papers, presentations, and readings. I was given the time and conditions to become the scientist and professional I wanted to become.

Now I am midway into a PhD on a topic that I love, working in countries that I love even more. This is all thanks to the freedom of the SIA master and the opportunities offered at the university. Nonetheless, one must jump on the occasions when they present themselves. If I could give one tip to current and future master students, it is to make good use of that time. Don't be afraid to try new things, meet more people, and go for what you want. Start your network, approach professors, ask questions, and establish yourself! This will be more valuable to your future than anything else.

Jennifer Provost

Country of Origin: Canada (Québec)

Completed SIA: 2016

Current Position: PhD candidate at the Chair of Animal Husbandry in the Tropics and Subtropics, University of Göttingen

Guillermo Garnica

Country of Origin: Mexico

Completed SIA: 2018

Current position: Conducting family projects and since 2016 general director and coordinator of the project SuLaTi in the area of Agroecology.

SuLaTi is working in a collective way with various actors on an international, national and local level to develop and implement an extensive plan of sustainable land management in Tianguistengo.

http://www.agroecol.mx/en/director.php

Make Chocolate Fair – a student initiative

The internationalisation of the Faculty of Agricultural Sciences created spaces for discussion and promoted the understanding of world challenges from different perspectives. This was the case of the event, Make Chocolate Fair in summer time 2014. Students from Ghana, Indonesia and Mexico of the Master Sustainable International Agriculture gathered together andpresented the actual situation of the cacao production in each country.

This event was hosted by the khg (the Catholic Student Community) and organized by the ONG Mexikofreunde in Göttingen e.V. as part of the European campaign "Make Chocolate Fair" to raise awareness about the injustice in the global cocoa industry. In doing so, the three student groups contacted local producers of cocoa in their respective countries to present their production conditions during the event besides the general national situation. Additionally to the bad working conditions and child labor in Africa and the unsustainable practices in Indonesia that the low cocoa prices boost, the cultural erosion of ancient practices of cacao cultivation and consumption in Mexico was a new interesting perspective. The event included also food exhibition of the three countries, music from Latin America and a drumming group. The money raised during the event was sent to the three cocoa producers in each country.

For further information please visit our website **www.tropentag.de** or contact us per Email **info@tropentag.de**

Tropentag conference

Tropentag is an international annual conference on research in tropical and subtropical agriculture and rural development. It is jointly organised by the universities of Berlin, Bonn, Göttingen, Hohenheim, Kassel, ZALF e.V. (all Germany), Ghent University (Belgium), Czech University of Life Sciences Prague (Czech Republic), BOKU Vienna (Austria), and the Council for Tropical and Subtropical Research (ATSAF e.V.) in cooperation with the GIZ Advisory Service on Agricultural Research for Development (BEAF).

Tropentag conference is interdisciplinary, science-based and development-oriented. It addresses issues of agriculture, agro-/forestry, fisheries, and overarching topics of natural resources management, environmental and economic sustainability, food security and nutrition in the context of rural development and poverty alleviation worldwide. The conference brings together students, junior and senior scientists, development practitioners, and experts from international research and funding organisations. Every year, at alternating venues, around 700 participants from more than 60 different countries attend this conference to exchange (research) information, meet colleagues, discuss current questions, and identify partners for future cooperation. Young scientists have the opportunity to make contact with funding organisations, international research organisations as well as with like-minded persons from different countries, and -SIA- students can get a first flavour of a conference atmosphere, present findings of their master thesis in a poster session (and probably win a poster prize), or get engaged as a student reporter.

Brianne Altmann

On behalf of AG Internationales

AG-Internationales was started in 2013, to correspond with the already well-established student "AGs" in the Faculty of Agriculture; although the Ag-Interationales offers all of its content and events in English with a strong focus on international-exchange. Its aim is to provide a meeting point for all students, international and German, who have a passion for agriculture while focusing on closing the gap between academia and practice.

AG-Internationales meets its mandate via multiple avenues. First, the group is completely student established and lead with a priority on flexibility and consensus. Students studying at the Faculty of Agriculture come from diverse backgrounds developed through diverse experiences and Ag-Internationales appreciates this wealth of experience by allowing students to have input, plan events, invite speakers, and choose meeting formats that best suit them. Then, through their events AG-Internationales reaches a broader audience and provides a platform for exchange on current topics related to international agriculture. Finally, AG-Interationales is sometimes the one avenue that international students have to get the domestic (German) perspective on agriculture from an academic and non-academic standpoint. These aspects are all crucial for international students studying at the faculty, as many remain in Germany after the completion of their studies. Complementarily, German students participating in AG-Internationales develop experience working in an international setting, while remaining at home.

AG-Internationales is proud of its semester-based programming. Its students have managed to book top public speakers to discuss international policy, social justice issues, and current industrial production practices. Anne Jacobs-Schleithoff (Deputy Head of the Division for USA, Canada, Mexico, Federal Ministry for Economic Affairs and Energy), Joakim Demmer (director and producer of Dead Donkeys fear no Hyenas), and representatives from Kalisalz (K+S) have all been well-received guests by students - just to name a few. In addition, Ag-Internationales has arranged numerous day excursions to visit local agricultural and food production businesses, such as KWS Saat (Einbeck), Nordzucker AG (Nordstemmen), and Fleischwaren Wulff GmbH (Göttingen).

Last but not least – annually, AG-Internationales plans a summer excursion, where students intensively interact over 3- to 4-days with everyday German/European agriculture. On these excursions, students visit organic and conventional agricultural organizations representing all parts of the value chain. Every excursion focuses on a specific region, and therefore, the unique and specialized production circumstances that have developed over time. Past excursions have included: the wine-making Rhineland region, Berlin-Brandenburg, Frankonia-Allgaeu (Bavaria), Hamburg-Schleswig-Holstein, and the Netherlands-Belgium-German triangle between Venlo, Brussels and Liége province, and the Eifel-Region. Students come back with a broader understanding of agriculture as it is practiced in Europe, as well as with new contacts and stronger friendships.

AG-Internationales summer excursion 2015 touring the fields at Familie May, Landwirtschaftlicher Betrieb (Junkerhausen, Germany).

AG-Internationales has proved itself to be instrumental in complementing students' studies at the Faculty of Agriculture. Whether it has been international students looking for more programming in English or German students looking to build their international competencies, AG-Internationales is where it all comes together.

AG-Internationales day excursion to KWS Saat (Einback, Germany) in November 2014 to learn about the production of seed and potential career opportunities.

AG-Internationales summer excursion 2018 hiking to the alpacas, Kasteel Nieuwenhoven (Sint-Truiden, Belgium).

AG-Internationales summer excursion 2018 getting acquainted with the landscape and livestock (Malmedy, Belgium-Eifel Region, Germany).

AG-Internationales summer excursion 2018 learning about innovative low-water solutions for leafy vegetables at Urban Ponics (Venlo, the Netherlands).

AG-Internationales summer excursion 2018 learning about the establishment of an rural cooperative-housing project from founder Jeanne Hoogenboom, Kasteel Nieuwenhoven (Sint-Truiden, Belgium).

AG-Internationales summer excursion 2018 touring the experimental fields at Bi-Pa - Biological Products for Agriculture (Londerzeel, Belgium).

AG-Internationales summer excursion 2018 group picture (Liége, Belgium).

Selina Bruns

Summer School in Kyoto

In fall 2016 all SIA students had the unique opportunity to apply for a fully funded trip to Japan for an international winter school offered by Kyoto University: The Kyoto Graduate Seminar 2016. I had never been to Japan while always being fascinated by it. Therefore, this adventure seemed just right for me – and I applied. Luckily, I got the spot and together with two classmates, one from Mexico and one from Iran, I found myself in December 2016 on a Lufthansa flight to Osaka.

To my astonishment it turned out that Japan is even more beautiful than I have imagined it to be. The Japanese people are very kind, welcoming, and humble. The campus is full of beautiful trees; the city is packed with breathtaking temples, surrounded by ravishing landscape.

The winter school made things even more interesting. It was designed as an international and interdisciplinary program for graduate students. The Kyoto Graduate Seminar was carefully arranged by the Graduate School of Economics, the Graduate School of Letters and the Graduate School of Agriculture. For one full week, we covered a wide range of subjects regarding the possibility and challenges of the realization of sustainability, global collaboration and inclusion. Presentations were given by academic experts from Kyoto University as well as from international universities.

Though all participants were foreigners to Japan, the majority of students came from Southeast Asia. This caused typical class discussions e. g. on environmental consciousness, corporate responsibility, market power or land rights to take totally different turns. It made me realize that in such discussions Europeans tend to focus on the individual, the liberty of the individual and Democracy, while Asians are able to see a beauty in collectiveness. My classmates brightened my horizon by challenging me to think differently, to consider solutions that put the community first.

As a class we also visited different sights around town such as the Kinkakuji (Golden Pavilion) and the impressive Kiyomizu-dera Temple, with over 1200 years of history. Most vividly I remember the beauty of the botanical garden, which presented a place of extraordinary beauty and calmness to me.

One morning we hopped on a bus to visit a local farmers market a bit outside of the city. The Professor explained that there is a trend in Kyoto to start a farm around town, which more and more young people seem to find attractive. The products from the semi-rural areas are highly sought-after from gourmet restaurants and rich private customers, so the farmers can charge a high price for their organic products. These smallholder farmers are very different from the stereotype: They are quite wealthy, not forced to farm but are farmers by choice, not farmers for generations rather entrepreneurs that wish to escape the noise of the city to live balance with nature. Thus, also the market is rather unusual. It is a hip place to hang out and buy organic meat, fish, fruits and vegetables, with pictures of the farmers and a short profile of them in front of their products.

I believe it is the strong international network that makes the SIA program so interesting and authentic. We do not just learn in the classroom, but have a wide range of opportunities to learn in the field, from international Professors and students. This is what made my SIA experience truly unique.

SIA students at Kyoto Graduate Seminar 2016

Nature Kyoto

Description of farmers at farmers market

Sufyan Rasheed

Country of Origin: Pakistani

Completed SIA: 2017

Current Position:
Project Specialist, BASF, Germany

I started the SIA program in October 2013 with a focus on International Agribusiness and Development Economics and I finished my degree in October 2017. Obviously, it took me double the time to earn my degree than the two years that are anticipated in the program regulations. The reason for this delay is simple. I had to work to finance my studies. Though stressful at the time and often frustrating, particularly the fact that my part-time job required me to speak German would payoff later.

Coming from Pakistan I am accustomed to struggle but as I finished my degree and got a job at BASF, a well-known internationally operating company, for the first time I had the feeling of stability and relief. The day I got the interview call was a true milestone in my life. Currently, I am working in a startup group which focuses on the development of potential future businesses. I am a project manager and my task is to identify business potential in various sectors including agriculture and agricultural engineering. That means preparing feasibility reports, defining projects and supervise their successful execution.

How did I get there? From my experience even though working in an international group, a certain level of German language is definitely helpful. It allows you to quickly integrate in your group and you can communicate with you colleagues without causing unpleasant and awkward moments. If people are hesitant to come to you because you only speak English, it will decrease your chances of growth in the company. German is a difficult language, I know! Here are some tips that worked very well for me: When I worked part time during my studies, I had to leave the comfort zone of Pakistani or international (English-speaking) friends and I was forced to speak German. I also tried to make as many German friends as possible and I started to watch German TV. Finally, I invested in some language courses to get grammar and pronunciation right (at least to a certain degree).

I got my job after doing a five months internship and I think, this is probably the smoothest way to find permanent employment. I would recommend starting as early as possible to look for internships maybe already after the 2nd semester. To some extent I was lucky as I just started applying after I graduated. However, the pressure then is much higher and the 18 months of the job-search visa can go by quickly. Some tips for the internship or job application and the interviews: Prepare your CV (especially for international students) for cooperate standards. Your home country might have other customs in terms of how to format and what to write in a CV. If you are unsure ask German students or use the career service of the university. When you get an interview, try to speak in German. Even if you have to switch to English later, it will increase your selection chances and makes a good impression. Finding a master thesis in a company is also a way to get to know a company and to position yourself for later employment.

Ruth Schulte-Sutrum

Country of Origin: Germany

Started SIA: 2017

After I finished my Bachelor in International Development, I decided to continue with the SIA Master - Agricultural Economics and Rural Development. In September 2018, after two semesters in Göttingen, I started a 6-months internship with GIZ, Gesellschaft für Internationale Zusammenarbeit, at the Market Oriented Agricultural Programme North West (MOAP NW) in Ghana. I was working closely with AFC, Agriculture and Finance Consultants, as they implement part of the project components for GIZ.

During this internship, I learned a great deal about the work in the world of development projects and the work dynamics on the ground. I worked with the vegetable market women in Wa, the regional capital of the Upper West Region of Ghana. Our task was to assist the market women to improve their businesses. My colleagues and I did this by supporting the market women to form an association, as well as linking them to vegetable producers within the regions. In addition, I assisted the assessment and development of possible small-scale storage facilities, as well as organizing a meeting between market women and several stakeholders at the border regarding their hindrances of importing vegetables from Burkina Faso.

Another area I worked on was the production and marketing of organically produced vegetables. In collaboration with a local NGO, Center of Indigenous Knowledge and Organizational Development (CIKOD), we facilitated an organic vegetable training and supported three women groups, who dedicated themselves to organic dry season gardening. They were facing challenges of limited water availability and the tedious labor of manual irrigation.

Something I learned in this internship is that to be critical and to have doubts is a very healthy and necessary mindset for change. Though, as a German in Ghana, there is a fine line between behaving culturally appropriate and appearing like a know-it-all. Doubts and criticism can result in discussions and advise that moves the addressed issue forward, as opposed to agreeing that the constraints in this society are so limiting that there is no hope for change.

As I prepare to go back to my studies, I am currently applying for a semester in France with the Erasmus+ Programme. The statistics might show that most SIA students do not complete the programme within the given 2 years. Though, I believe that the experiences students make alongside their studies are enriching experiences for their life and future career opportunities.

A foot in the door – an internship at GIZ

Adeniyi Kazeem Adegoke

Country of Origin: Nigeria

Completed SIA: 2016

Current position: Country coordinator/Value Chain Advisor for Competitive African Rice Initiative (CARI) programme in Nigeria, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

After completing the program - M.Sc. in SIA (profile in International Agribusiness and Rural Development Economics), my journey as a professional and a career in agricultural development started. It was a major transition, graduating from University of Göttingen and entering the "real world." Right after I completed SIA program, I retuned back to my home country (Nigeria). I didn't just return but began an internship programme with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH – German development cooperation working in Abuja, Nigeria. I was working in one of GIZ agricultural value chain development project – Pro-poor Growth and Promotion of Employment in Nigeria (SEDIN), was responsible to provide support to technical team, the value chain development unit of the project in carrying out their duties related to the provision of capacity development and extension/ advisory services to beneficiaries/value chain actors in all aspects.

I completed my internship with GIZ within a 3 months period. I must say that this never ended there because I was hired as an Agribusiness development consultant by AFC Consultant International working on behalf of GIZ in the same project that I intend. This was possible because of their satisfaction with my work, which I hold it on to the technical knowledge and skills that I learnt from SIA master program and was reflected in my work. For the last three year, I have been working with GIZ in Nigeria and I am currently working in one of its project on rice value chain development – Competitive African Rice Initiative (CARI) as a Country coordinator and Value chain advisor.

Presentation on rice working from in Nigeria at the Multi-Actor Partnership Meeting at Kigali Convention Centre.

Taking break from my last job before SIA master degree was a great step and worth more at the end. Besides the enriching classroom knowledge that I acquire from SIA program that have made me to be more successful in my career today. SIA program also helped me in getting adjusted to other people's culture and that as kept me working in a diverse and multicultural environment. My experience as an international student has been incredibly stimulating and rewarding as well. All this gives me a healthier sense of self-esteem and a feeling of great accomplishment.

SIA program was a perfect fit for me because it is unique, enriching, challenging, rewarding and success is celebrated.

Facilitating access to finance workshop among rice value chain actors and banks in Northern, Nigeria.

Working to promote sustainable agriculture through Spray Service Providers (SSPs) concept in the rice producing regions in Nigeria. To promote safe use of pesticides and personal protective equipment to reduce health risk for small scale farmers through SSPs.

Looking beyond the horizon

Kofi Barnes

Country of Origin: Ghana

Current SIA Student

Internship: Market Intelligence Analyst, BIOMIN holding GmbH

One of the most misguided notions of conventional wisdom is depicting that the SIA program is not suited for working in regular companies but rather in research, development agencies, NGOs or in academia. This narrative unfortunately, is echoed by a lot of present and past SIA students. This often prevents SIA students like myself from exploring options outside academia or research.

My name is Kofi Barnes, I am in my fourth (4th) semester of the SIA program studying International Agribusiness and Rural Development Economics. I am also currently interning as a Market Intelligence Analyst at BIOMIN Holding GmbH in Austria.

BIOMIN is a leader in animal nutrition and health, which develops and produces feed additives, premixes and services for the improvement of animal performance, in an economically viable way. BIOMIN products cover solutions for mycotoxin risk management, holistic approaches towards promoting growth naturally as well as specific solutions that address dietary requirements for swine, poultry, dairy and beef cattle as well as aquaculture.

I first encountered BIOMIN when I attended last year's Praxisbörse at the north campus. When I met the representatives from BIOMIN, they gave me such a warm welcome and told me a great deal about the company. I told them what I was studying and what kind of opportunities I was looking for. From our conversation, it was apparent that interning as a Product Manager would be fitting for my skills and course of study. As such, I was asked to bring my CV the following day as they will be returning to the central campus for day two (2) of Praxisbörse.

I submitted my CV and two weeks later, I had a skype interview with the company and received the good news the following day. I was elated, as I had spent majority of my time in the summer semester looking for an internship.

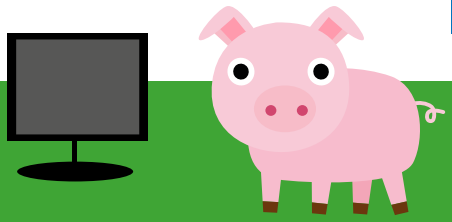
I was initially employed as a Product Manager Intern for four (4) months. Through this experience, I had the opportunity to attend countless basic and advanced trainings. I also had the opportunity of giving basic product training to new staff members. These were very useful as they made practical things I had learnt in the university. I also had the opportunity to travel and attend conferences abroad with the company.

After the end of my four (4) months contract, the company decided to extend my internship and offered to change my role to intern as a Market Intelligence Analyst. Here I am able to apply the knowledge I have gained form SIA courses such as World Agricultural Markets and Trade, Quantitative Research Methods, Econometrics, Agricultural Price Theory etc.

I also have the opportunity to use the data I collect for my master thesis. This is perfect for me as the results of my master thesis will actually be useful for the company. Moreover, being paid to write your thesis? Who doesn't like?

The working environment at BIOMIN is definitely the best working environment I have worked in. My colleagues and bosses are always eager and more than willing to help and explain things to me. I have learned so much working in both Product Management and Market Intelligence. The skills I have acquired so far at BIOMIN and still acquire will definitely spur me on to achieving my long-term professional goals.

The SIA program offers varied opportunity to work in various organizations. I entreat my fellow SIA colleagues who may not be interested in working in research or acquiring a PhD immediately to explore options with Agricultural companies. This offers a different perspective on how the knowledge we acquire from the SIA program can be applied.



www.AgrarDebatten.blog

Kommentare aus der Wissenschaft

The blog „AgrarDebatten" from the Faculty of Agricultural Sciences, University of Göttingen, is a newly developed forum and platform to share news from the comprehensive pool of agricultural topics. Established as well as young researchers are given the chance promptly to give scientific comments emerging topics. The blog is meant to provide space for a rich discussion of agricultural production based on the critical, and sometimes controversial, questions stemming from society at large. In this way, scientific knowledge is made accessible in various formats.

Faculty of Agricultural Sciences
Contact: marketing-agrar@gwdg.de

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All about cocoa

Dr. Elsa Hegmann

Country of Origin: Germany

Completed SIA: 2012

Current Position: Deputy Head of Cocoa and Research and Project Manager at Tres Equis – Finca de Cacao, Costa Rica at: Rausch GmbH, Berlin (www.rausch.de)

During a four-month internship at CATIE in Costa Rica, which I completed as part of my bachelor's degree in agricultural sciences at the University of Hohenheim, I became fully aware of the importance of preserving biodiversity and the challenges and potentials associated with growing tropical crops today. What fascinated me most was the work in the world's second largest cocoa collection (IC3) held at CATIE and the understanding that an incredible amount of knowledge, effort and dedication is required to obtain the raw material for chocolates. Since then, cocoa has been a central part of my career and personal life.
Shortly after my return from Costa Rica, I started looking for a Master's programme that promised interesting content, strong relation to current topics and at the same time was internationally oriented.
Thus, the decision for the newly established Joint degree Master Sustainable International Agriculture of the University of Göttingen and the University of Kassel-Witzenhausen was made quickly and a few months later I sat in the introductory sessions together with students from all over the world. We were the 1st year of SIA.
After one and a half enriching years in Göttingen, I returned to Costa Rica for my Master thesis' studies on different fermentation- and drying strategies for six new cocoa varieties (Theobroma cacao L.) selected at CATIE. Since 2007, these high-yielding and disease resistant cocoa clones are cultivated by cocoa farmers throughout Central-America, however, detailed information on the individual quality properties was lacking. The Master thesis was supervised by Prof. Ploeger of the Department of Organic Food Quality and Food Culture at the University of Kassel and Prof. Lieberei of the Department of Crop Biology at Biozentrum Klein Flottbek of the University of Hamburg.
Prof. Lieberei, internationally known for his extensive research on Theobroma cacao L., offered me a doctoral position to study in more detail the main components involved in aroma formation of the six CATIE-varieties and to identify which post-harvest treatment can be advised to farmers to exploit the full quality potential of these fine flavour cocoas.
Thus, between 2012 and 2015 I spent all harvest seasons in Costa Rica carrying out monoclonal fermentation studies, followed by several months of fruit pulp analytics and chemical quality analyses at the University of Hamburg. The family business Rausch GmbH, located in Berlin, supported the financing of my doctoral thesis and offered me a position in their Cocoa department.
Since its establishment in 1918, the Rausch company is dedicated to the production of high quality chocolates exclusively made out fine flavour cocoa from different origins. We source cocoa directly from the farmers and avoid middlemen. Hence, during the last 7 years I have been working closely together with our partner cooperatives/farmers to ensure the aroma quality and quantity of their raw cocoa beans. Together with my colleague Dr. Christina Rohsius, I visit them several times a year to check the quality and to carry out in-field trainings (participatory approaches), especially on post-harvest management. In addition, I manage the company's own Fine Cocoa Estate in Tres Equis, Costa Rica, since May 2018. The aim here is to reforest old pastures by means of diverse and environmentally friendly agro-forestry systems, while at the same time ensure the production of high quality cocoa beans for our chocolates.
The project includes the cooperation with national and foreign research institutes to support young scientists in their careers related to sustainable agriculture.

PhD Research in Costa Rica; turning cocoa bean samples during drying.

Post harvest-training at a cooperative of Nacional-Cocoa producers in Ecuador selecting banana leaves for fermentation.

A story of an adventure

Ehsan Ebrahimi

Country of Origin: Iran

Completed SIA: 2013

Current Position:
I am currently writing a proposal for having a post-doc position at the Department of Soil Sciences, University of Kassel

In April 2011, when I came to Witzenhausen as an Erasmus exchange student, I couldn't imagine that my next six years of life will be involved in this town.
The SIA program celebrates its 10th anniversary, and while I'm just a little older, I've spent my best years with this program. My name is Ehsan Ebrahimi from Iran and I joined SIA program as Erasmus exchange student from Norwegian University of Life Sciences. After a while, the attraction of the courses, offered by the University of Göttingen and Kassel made me become a full-time student after I finished my master at 2012. During these years I managed to finish my PhD with one of the best professors in my field Prof. Peter von Fragstein at the University of Kassel. Besides studying, I experienced a multicultural environment by living in Witzenhausen and Göttingen. My university experiences thus far have been so amazing. Witzenhausen is a very welcoming place, and from the first day, I felt at home here. I have made many new friends from different backgrounds.
The depth and detail of what we have learned was far beyond my expectations. The best thing about SIA program is the flexibility to study what most interests you, with options from organic agriculture to agribusiness. This great deal of flexibility offers in module selection, allowing you to keep your options open at first, but specialize as you gradually discover the areas in which you are most interested. In this program I was able to choose from a wide range of course options. This meant that I've enjoyed my studies all the way through as I've been constantly learning about things that are truly of interest to me. Studying agriculture at the University of Göttingen and Kassel is very different to the agricultures a student becomes accustomed to in their BSc. Studies. Despite the course being challenging, there is still ample time to join some of the many societies and sports activities offered, which personally have given me many amazing memories and have greatly enhanced my university experience!
In some ways, choosing to study organic agriculture was a bit of a gamble. However, on reflection, when looking back at it after seven years, I can honestly say it is one of the best decisions I have made. Now, I try to expand my experiences as post-doctoral scientist at faculty of Agriculture in Witzenausen, where I turned to a person who I am now.
In the five years, I studied at this university, I succeeded in successfully completing my PhD project. In this project, I tried to apply new types of compost to the vegetable production. This effort was ultimately successful and its results were published in the form of scientific articles. However, what made my work important was an innovative method of vermicompost application. This method, which we called theUnderroot method, reduced the consumption of inputs by as much as 37 percent without causing a significant change in production.

Introduction week for Erasmus Students (2011)

Career Service

Preparing international and German students for the specific requirements of the global job market is a main objective of the central Career Service. Especially students from international degree programmes, such as SIA, gain multiple benefits by participating in Career Service offers for a successful career path planning. The international career counseling supports them with different offers right from the beginning of their studies:

- Advisory Service and CV-Check in English and German language
- Identifying competencies, interests, values especially for international needs
- Defining professional and personal goals
- Developing research strategies for the global job market
- Career events with an international focus
- Certificate-Programme "Building International Careers"

Students from the Faculty of Agricultural Sciences form the third largest group of perceived advisory services or career events of the Career Service. In particular, international students of SIA are very engaged within the Certificate Programme "Building International Careers": Here, both German and international students are getting prepared for a career worldwide and qualify in culturally heterogeneous "success teams" for a global career entry. Two SIA-students of the last cohort reported, that they gained useful insights on how to convince with their skillset and on how to build an individual international profile.

A circuitous career route around the world

I joined the Sustainable International Agriculture MSc. program (SIA) in 2009 with funding from the Partridge Foundation's Trans Atlantic Partnership in Sustainable Food Systems. I was lucky enough to be the first of the College of the Atlantic (COA) alumni to join the SIA program. After graduating from COA and before starting at SIA I spent several years at sea as an environmental educator on traditional tall-ships. This led me, rather circuitously, to an organic farm in the south of France and to a job with the International Federation of Organic Agricultural Movements (IFOAM) in Bonn, Germany. It was my good fortune to share an office there with Dr. Hervé Bouagnimbeck, a Witzenhausen graduate, who recommended SIA for the strong focus on smallholder farming systems in the tropics and sub-tropics.

It turns out to have been good advice. SIA was a great experience for me. The mixture of theory and hand's-on classes with Prof. Dr. Eva Schlecht and Prof. Dr. Buerket in Germany, Kenya and in the Czech Republic provided me with a good foundation in the processes and approaches of agricultural and ethnobiological sciences. My work with Dr. Christian Hülsebusch and Prof. Dr. Brigitte Kaufmann at the German Institute for Tropical and Subtropical Agriculture (DITSL) and the Journal of Agriculture and Rural Development in the Tropics and Subtropics (JARTS) offered training in scientific methods and writing techniques. My time in the SIA program gave me a solid foundation for international research on issues related to agricultural development and ethnobiology.

I finished the SIA MSc. program as part of the first class of graduates in 2011. The thesis was the basis for a Human Ecology paper on ethnobotany and conservation in the North Atlantic (Whitney, Gebauer, and Anderson 2012) the loss of native species and habitats is also taking place in "cold spots" with low bio (Kassam 2008. After SIA I followed a rather circuitous route around the world and back to Germany. I continued to pursue links between ethnobotany and conservation in other regions through a series of ethnobotany studies with indigenous communities in Southeast Asia. Years later I came back to Germany to do my PhD on homegardens in the southwest of Uganda under the supervision of Prof. Dr. Oliver Hensel. Currently I am working as a postdoctoral researcher with Prof. Dr. Eike Luedeling at the University of Bonn's Horticulture Institute (INRES) and as a Guest Researcher at the Center for Development Research (ZEF).

Whitney, Cory W., J. Gebauer, and M. Anderson, 2012, A Survey of Wild Collection and Cultivation of Indigenous Species in Iceland. Human Ecology 40(5): 781–787.

Dr. Cory W. Whitney

Country of Origin: United States

Completed SIA: 2011

Current Position: Postdoctoral Researcher at the University of Bonn's Horticulture Institute (INRES) with Prof. Dr. Eike Luedeling

Talking with an elder of the Hmong community during ethnobiology fieldwork in Northern Laos. (Photo: Pham Van Dung)

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Follow YOUR Career Path!

PostDoc in Uruguay

Kathrin Grahmann

Country of Origin: Germany

Completed SIA: 2012

Current position: PostDoc at National Research Institute of Agriculture in Uruguay

Straight after finishing the SIA program in 2012, I started a Junior Research position at the International Centre of Maize and Wheat Improvement (CIMMYT) to develop my PhD project which I started in 2013. I conducted my PhD with Prof. Andreas Bürkert from the Department of Organic Plant Production and Agroecosystems Research in the Tropics and Subtropics in Witzenhausen, University of Kassel which was financed by the Studienstiftung des deutschen Volkes, DAAD and GIZ. During my PhD, I spend most of the time at CIMMYT´s experimental station in Ciudad Obregón, Mexico at the sustainable intensification program (SIP) and strengthened my interest in the understanding of soil-plant interactions in sustainable cropping systems. Therefore, I focused the last years on reduced and zero-till management practices where the importance of long-term experiments is outstanding.

After finishing my PhD, I took my maternity leave and started a new job position, a postdoctoral fellowship, in 2018 at the National Agricultural research Institute in Uruguay. My PostDoc deals with the development of research in nutrient and fertility management for sustainable intensification in agroecostystems. I am mainly focusing on the analysis of soil quality data coming from long-term experiments and the future design of agricultural production systems. One emphasis is done on the statistical analysis of long-term data. Long-term experiments in agricultural science are essential to observe cumulative treatment effects and to assess the importance of soil processes for sustainable production systems. Another priority of mine is the evaluation of long-term erosion under totally covered soil determining total, fixed and volatile solids in eroded water samples taken from surface runoff plots under no-till. I am working on the project "Design of agricultural production systems" being responsible for a field trial with no-genetically modified soybeans. These are rotated with cover crops aiming to gradually reduce pesticides and mineral fertilizer input and to incorporate agro-ecological elements that lead to a more environmental-friendly cropping system less prone to climatic risks without compromising the economical importance of soybean crops in this region.

The master program SIA, where I have chosen the specialization "International Organic Agriculture" enabled me to get a broad knowledge of sustainable international practices around the world. I was able to acquire skills in intercultural integration and mobility, robust academic work ethics, profound knowledge in my specific field of interest. This master course gave me the inspiration for my future research career and prepared me for the investigation in gaps of knowledge in sustainable use of agricultural landscapes. I keep in touch with many of my former fellow students, various of them being close friends up to now. SIA was the best choice for me and I am really thankful to the universities of Göttingen and Kassel to provide this diverse, high-quality, challenging and inspiring Master program.

Happy birthday SIA and lets go for another 10 years of happy and pleased students around the world.

Azadeh Farajpour Javazmi

Country of Origin: Iran

Completed SIA: 2018

Current Position: Scientific associate at the Research Institute for Application-oriented Knowledge Processing (Forschungsinstitut für anwendungsorientierte Wissensverarbeitung, FAW/n), Germany

Alliance for Development and Climate

Climate protection is a question of survival for humanity, as we know it today. The limits of Earth's capacity are being reached faster and faster. The extreme and sudden changes of climate patterns adversely affect the world. Many studies have shown that the volume of anthropogenic greenhouse gas emissions (GHG), e. g. CO_2 influences this issue in a strongly negative way. The industrialized countries have been the primary emitters of GHG emissions for a long time and are consequently held responsible for climate change, though China is by now the greatest emitter. Yet the main victims are the people in developing countries: 100 million people in coastal and drought areas are at risk due to heat and rising sea levels. Since their livelihood is threatened, up to 140 million people could be displaced from their homes due to climate change by 2050, according to World Bank. At the same time, 600 million people in Africa still have no access to electricity.

To this extend, climate change is closely linked to development policy and programs. What is needed is therefore a robust implementation of the UN Sustainable Development Agenda 2030 that is compatible with climate protection. Economic growth for development must be organized to be climate-neutral or even climate-positive. In fact, climate protection measures are particularly more effective in developing and emerging countries than in industrialized countries. However, there is hardly a chance to implement the SDGs by 2030 (at best by 2050). Also, the present politics will not lead to a climate-neutral economic growth in developing countries.

The partner countries in the Global South require extensive support but the developed countries are not able and not willing to finance the process. Therefore, along with development cooperation programs such as the Marshall Plan with Africa launched by Germany's Federal Ministry for Economic Cooperation and Development (BMZ), influential partners in politics and state, economy and business as well as society and NGOs need be won to provide the necessary resources, in particular financially. In other words, significant voluntary contributions of non-state actors are needed to effectively complement government efforts. Privately-funded, high-quality GHG emissions compensation projects can effectively support partner countries in climate protection and their development (through extensive ecological, social and economic co-benefits). They are a crucial element with which climate change will be mitigated and development can simultaneously be achieved.

With these consideration in mind, the BMZ launched the Alliance for Development and Climate in autumn 2018. The aim of the alliance is to promote development and simultaneous climate protection. It seeks to shift public attention on international development and climate protection efforts. In addition, it is an institutionalized platform for non-governmental engagement, in particular for the private sector. The members voluntarily compensate CO_2 emissions in high-quality projects in developing countries, e.g. afforestation, reforestation and humus formation in agriculture. One example is projects on preservation of mangroves. Mangroves bind up to 5 times more CO_2 than other forests and protect the neighboring lands against flooding. Sadly enough, one third of mangroves worldwide are already destroyed. These projects generate jobs and source of income for those looking after the mangroves. These kinds of projects inherently yield enormous social and economic co-benefits, thereby enabling prosperity for many people. Looking ahead, the members of the alliance can hopefully contribute to a better future.

Azadeh Farajpour Javazmi

Marshall Plan with Africa

Africa is probably the greatest challenge for a global sustainable future. Population in Africa will double until 2050 and might grow by a factor 4 until 2100. "Many of the global challenges we are facing today can only be tackled by joining forces with strong African partners. Africa offers unique opportunities; the continent has huge potential but may also create huge problems. Roughly half of the world's 20 fastest growing economies are in Africa. Still, all these countries are relatively poor and African's share of global GDP is shrinking, while its share in population is increasing. By 2035, Africa will have the largest potential workforce in the world. This is where the global markets, customers and employees of the future are emerging."[1]

The challenges for reaching the Sustainable Development Goals of the UN (SDGs) are big and it is getting more and more difficult to implement the SDGs until 2030. By 2070, the bulk of the world's population growth is predicted to take place in Africa. From 2.4 additional billion people projected between 2015 and 2050, 1.3 billion will be added in Africa. On the other hand, Africa is among the continents that are adversely affected by climate change. Climate change already forces many Africans to leave their settlements and homes and find their ways to Europe. In short, there is a great need for a stronger engagement and cooperation between developed and developing countries. The current cooperation is based on trade, finance and double taxation agreements. Still, large-scale investments in developing countries, especially in the African continent, are needed. For this purpose, the Federal Ministry of Economic Cooperation and Development of Germany launched the *Marshall Plan with Africa* in 2017 based on results of an analysis by the Club of Rome and the Senate of Economy. [1]

The Marshall Plan is based on three pillars. The first pillar is aiming at economic activity, trade and employment. In East and Southern Africa, more than 60% of the population is under the age of 30. More than 50% of this young population is unemployed and over 50 million of the young Africans are in precarious employment. To give this youth a future, the continent needs at least 20 million new jobs each year. The focus of the second pillar is peace, security and stability while the third pillar is democracy, rule of law and human rights. One of the necessary conditions and keys for development and economic growth is peace and security as the chances for investment in an area with conflicts are low.

To reach these goals, the Marshall Plan has selected priorities. The plan supports educational/training projects concerning population growth, improvement social systems and infrastructure as well as transport infrastructure, generating local forms of renewable energy, supports entrepreneurial activities and simplify the process of obtaining microcredits for the locals, provides long-distance energy transport and invests in methanol production as a liquid to store energy.

In the area of irrigation and agriculture, it is planned to desalinate seawater and groundwater to supply locals with drinking water as well as water for irrigation. Moreover, large-scale humus formation (for CO_2 sequestration) and higher agricultural productivity as well as reducing pre- and post-harvest loss are on the agenda of the Marshall Plan. Furthermore, enormous afforestation on degraded soils in the tropics with the purposes of timber production and CO_2 removal from the atmosphere is planned. In addition, promoting sustainable tourism on the agenda of the Marshall Plan is a new form of value creation. It promotes intercultural exchange and cooperation. In the area of education, investment and improvement of education of women and girls, training opportunities aimed at crafts, promotion of dual programs, strengthening universities and colleges, increasing student exchange, and study programs are set as necessary on the implementation plan. In general, the Marshall Plan is an ambitious pathway to strengthen cooperation between Europe and Africa and to empower Africans achieve a higher standard of living while simultaneously protecting the environment.

1 Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ) (2017): Afrika und Europa – Neue Partnerschaft für Entwicklung, Frieden und Zukunft. Eckpunkte für einen Marshall-Plan mit Afrika. Berlin, Januar 2017.

Social-ecological impacts of urbanization in the agricultural systems of villages surrounding Kathmandu, Nepal

Urbanization is described as the process of increasing share of the total population lives in urban agglomerations. The share of global urban population is growing unprecedentedly and is estimated to reach 68%, respectively 7.2 Billion people by 2050. This increase entails the proportional increase in demand for food, water, housing, and other related resources in urban areas. Therefore, urbanization tends to drive multiple commercial activities such as agriculture and housing business.

Despite the contribution of agriculture to the national economy (approximately one-third of the national economy), agriculture in Nepal is mainly practiced for subsistence. Among the most commonly farmed crops are cereals such as corn, rice, wheat and, driven by the more recent demand, also vegetables.

Urbanization in Nepal mainly takes place in few big urban settlements like Kathmandu, Pokhara, and Biratnagar. Significant rise in urban population, and economic intensification have thus induced land use changes in those towns. Kathmandu is the capital and biggest city of Nepal. Most of the public services and facilities are centralized in Kathmandu, which generates a considerable attraction for Nepalese all over the country aiming to improve their economic situation and quality of life. The migration into the city has urged the city to expand to the surrounding villages where it led to social and ecological impacts on agricultural systems.

Since the population density has increased, the land demand for settlements and other services has increased and so did the land price. This has driven land use change from agriculture to settlement and other built-up environment. More built-up environment leads to more concrete cover. Therefore, soil porosity, soil infiltration and water holding capacity are reduced by an increased soil compaction and soil sealing. Such changes in soil properties can amplify flash floods, soil erosion, and loss of soil fertility during short heavy rain. Further, the soil erosion and the disposal of household and industrial wastes to the water bodies have polluted water. Consequently, water quality is degraded and available water for drinking and irrigation has become scarcer than before. In addition to soil and water, agricultural biodiversity has also been displaced from the urban areas as a result of replacement of the vegetation cover by the built-up environment. Based on the information above, we can conclude that urbanization has mostly negative ecological impacts on agricultural systems in the villages surrounding Kathmandu.

In addition to the ecological outcomes, the population rise due to urbanization brings diverse social issues to the villages surrounding Kathmandu. The demand for basics such as food, education, health and transportation services increased. It has also become easier to offer these services on a larger scale and at lower costs. However, due to the shrinking cropland surface, cereals are often imported to the villages to ensure food availability. In sub- and peri-urban areas, cropping of (off-season) vegetables (mostly in plastic tunnels, see the photo) instead of cereals is in vogue. Fragmented land and higher value of vegetables in the local market have motivated farmers to this shift. In the past, people relied on subsistence farming and the ones who did not often had to minimize daily food consumption during the lean season. At present, people rely more on imported and instant food than on local and home-cooked food.

In the fields of education and health, more schools and clinics can be seen as positive effects of urbanization. Finally, urbanization has attracted the construction of more roads as more vehicles are operated in the local routes. The improved infrastructure is perceived positively by the farming communities of the villages.

Since most people abandoned farming, traditional activities such as singing, dancing and eating together during crop cultivation and harvest have also been eroded. However, due to globalization, people in the villages have now access to global media and international communication. This exposition to the international zeitgeist generated a notion where foreign culture is often considered superior to traditional and local cultures. Thus, the traditional and local cultures are threatened due to urbanization. Although, education levels and access to health facilities for people from farming communities have increased, their sedentary lifestyles give more space to non-communicable and chronic diseases. Therefore, we can conclude that the social impacts of urbanization, especially related to health and culture, are often mixed.

Altogether, we find that urbanization is a requirement for economic development and quality of life. However, we should carefully maintain and conserve ecological and cultural aspects of agricultural systems to ensure a holistic development.

Pramila Thapa

Country of Origin: Nepal

Completed SIA: 2016

Current Position: PhD candidate at the Chair of Social-Ecological Interactions in Agricultural Systems", Kassel University

Urbanization and off-season vegetable farming in plastic tunnel in Dahachowk, Chandragiri Municipality-1, Kathmandu. In this picture, we see many concrete buildings, plastic tunnels, and few green patches of wheat field as an outcome of unorganized urbanization. There is no regulation on where and how much settlement area and where farming area should be. As a result, settlement area encroaches farm land. Settlement areas increases because of in migration to Kathmandu from other parts of Nepal. Since the demand for vegetables also grows with the inmigration, intensive vegetable farming –eg. off-season vegetable farming in plastic tunnel—is heavily in practice.)

Climate Smart Agriculture: An approach for sustainable food security in Nepal

Gyanendra Dhakal

Country of Origin: Nepal

Completed SIA: 2014

Current position: Lecturer-Soil Science at the Himalayan College of Agricultural Sciences & Technology (HICAST)

In Nepal, the overwhelming majority of the poor live in rural areas and rely on subsistence agriculture. They face acute challenges in food security, hunger and rural poverty. With the rapid increase in population growth and urbanization and an increase in the demand for food has come in turn, alarming threats to our natural resources, including; soils, water and biodiversity in the rural areas of Nepal.

Climate and agriculture are strongly interrelated universal processes and thus variations in climate have strong influences on agricultural activities. The food security challenge is intensified by agriculture's extreme vulnerability to climate change. Climate change's negative impacts are already being felt, in the form of reduced yields and more frequent extreme weather events, affecting crops and livestock alike. It is also disrupting; food availability, access to food and food quality along with seasonal variations in temperature with more warming in the winters than in the summers. Increases in temperature lead to increases in variability in the summer monsoon precipitation which results in a reduction of field yields of important crops while encouraging the development of weeds and pests. It has the potential to threaten the average farmer in the rural areas of Nepal to experience a crop deficiency for one year out of every four years. Climate change also has the effect of creating an additional increase in prices for the main agricultural food crops such as; rice, wheat, maize and millet.

In summary, the impacts of climate change variations on agriculture are; effects on crop yields on which dairy and other livestock production depends; overall variation in outcome including prices, production, and consumption; and the change in per capita calorie consumption. To this end substantial investments in adaptation are required to maintain current yields and to achieve the required production increases.

To cope with the alarming effects of climate change and to ensure the sustainable development of marginalized communities in the rural parts of Nepal we need to adopt a new approach such as; Climate-smart-agriculture (CSA). CSA, is an approach to food security in a changing climate through sustainable increases in productivity, helping communities to enhance adaptation strategies to climate change and contributing to climate change mitigation by adopting appropriate practices in both the short and the long-run.

CSA is a way by which we can improve the scientific supervision and investment settings needed to attain sustainable agricultural progress, to ensure better food availability under the impact of climate change. Its play vital role in achievement of sustainable goals contributes to the achievement of sustainable goals by integrating its three core pillars: i) Sustainably increasing agricultural productivity and incomes; ii) adapting and building resilience to climate change; iii) reducing and/or removing greenhouse gases emissions, where possible. In Nepal, research and development of CSA technologies and practices together with capacity building of major stakeholders including farmers has received special attention. The worst issues of climate change could be controlled by successful adaptation strategies, which would probably be less than the cost of impacts that would occur without adjustments.

Strategies for CSA such as; efficient resource management, training in the technical knowledge needed by farmers, integrated renewable energy technologies for farming systems, the role of institution for CSA implementation and improvement, resource conserving technologies, crop genetic modification, land use management, variations in cropping seasons, crop relocations, the integration of modeling and forecasting, efficient pest management, crop modelling and GIS mapping, are introduced in rural area, which are under research and improvement based on locality. Among them; efficient resource management, capacity building of stakeholders, conservation agriculture, land use management and variation in cropping seasons are in practice and the response so far looks like it will play a vital role in coping with climate change and the food security problems of rural Nepal.

Organic market in Dang District

In conclusion, for the effective implementation of these strategies, multi-stakeholder mechanisms at National, District and Field levels are needed. This will actively engage those involved in; planning, implementation and monitoring activities, equal inclusion of women and equal inclusion of the poor and disadvantaged communities. This in turn will ensure the fair and equitable distribution of benefits whilst building on existing CSA practices such as the Climate Smart Village (CSV) and the Climate Adopted Village (CAV). It will utilize the value chain approach as a key strategy to promote products generated from efficient and standardized CSA practice.

Plastic Pond under construction for rain water havesting

Farming system in Nepal - aninal dung source of nutrient getting lost from field due to over exposure and evaporation

Pheromone trap for insect and pest

Neglected and underutilized crop species (NUS)

Far off the beaten path of mainstream agriculture lays a wide field of promising crops whose full potential still remains to be unrevealed: neglected and underutilized crop species (NUS). The term generally applies to plant species that are unable to benefit from the advances in technology and science due to a variety of agronomic, socio-economic and cultural reasons. The increasing trend towards homogeneity in diets and lifestyle threatens the persistence of NUS and impedes further realization of their potential. Since they hardly fit in the concept of standardised food items produced by large-scale agriculture, NUS are not very likely to be found in the shelves of supermarkets. Local farmer´s markets on the other hand create chances for small-scale farmers to sell their specialty products through direct marketing. There, producers can offer even small quantities of crops in accordance to the individual tastes and preferences of their customers. Thereby farmer´s markets may play an important role in the diversification of diets and preservation of agrobiodiversity.

Accordingly, the objective of my internship with Bioversity International was to conduct a case study on the farmers' market in Turrialba, Costa Rica. Research activities included the identification of the present NUS and the assessment of the market´s role in their promotion. Semi-structured interviews with market vendors and visitors were conducted on eight consecutive market days between August and September 2016. The final study aimed to identify obstacles in the marketability of NUS on the part of producers as well as consumers.

During the time of the investigation there were 119 distinct stands at the market, most of which offered a variety of fresh vegetable and fruit produce. The majority (89%) of vendors were small-farmers that sold their own produce while only 11% of the vendors stated to be intermediaries.

Among the total number of crops produced and sold by the vendors, 45 plant species were categorized as neglected and underutilized. The vegetable chayote (*Sechium edule)* was the most commonly offered crop among the NUS. Other common NUS were the tuber crop malanga (*Xanthosoma sagittifolium*), cas (*Psidium friedrichsthalium*) and culantro coyote (*Eryngium foetidum*). Furthermore, the presence of NUS at the farms was not a rarity but rather common. Most of the producers had at least one or two different NUS at their farm and some of them even specialized on their cultivation. Most of those NUS cultivated and/or sold by the vendors were fruits (51%) and medicinal plants (18%).

Some of the NUS were widely found on vendor´s farms but only a small number of them sold their harvest. Branches of the mozote tree (*Triunfetta ssp.*) are traditionally used to make a refreshing beverage and were commonly found on the farms but only a few vendors sold the twigs. The vendors mentioned low prices, low demand and short shelf-life of fruits as the main marketability obstacles of NUS.

On the side of the market visitors, there were big differences in popularity among the NUS. Only a few consumers stated to know neglected crops such as cocona (*Solanum sessiliflorum*) and flor itabo (*Yucca guatemalensis*). Accordingly, they blamed the lack of knowledge concerning preparation and use of those NUS for their low willingness to buy those products. Other NUS were better known but equally neglected by the consumers due to their undesired crop characteristics. This applied for example to tacaco (*Sechium tacaco*), an endemic Costa Rican vegetable, which consumers hesitated to buy due to its bitter taste and long cooking time.

The main finding was that the current sale of NUS at the farmers´ market in Turrialba is below its potential due to various obstacles on the supply and demand side.

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Furthermore, the results point toward the need for a differentiated view on all NUS. Since the reasons for neglect were diverse and differed among crop species, there probably is no one-size-fits-all strategy for NUS promotion. In order to strengthen the sale of NUS at the market, general information about crops and their use is needed. Thereby, the direct contact between municipal government, producers and consumers as a feature of traditional markets may prove to be an advantage

Share of different food categories of the 45 NUS cultivated on vendors´ farms or sold at the farmers´ market

The Role of Protected Cropping in a Sustainable Global Food Production System

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By the year 2050, the world's population will expected to reach 9.1 billion, up from 7.5 billion which indicates around 34 percent higher than today (FAO, 2009). Therefore, the upcoming challenge is the continuous enhancement of food production to be able to feed the growing world population while using efficient resources and having less impact on environment. According to the "How to feed the World 2050" report of the Food and Agriculture Organization, growers comprehensively must increase food production 70 percent compared to current levels in order to meet the needs of a larger population. Consequently, the greater priority has to be given to modernization of farming practices, as well as research and development in agriculture to achieve the yield and productivity. The set of technological options should be as broad as possible, ranging from new plant varieties adapted to changing conditions, farming systems with improved water and labour-saving technologies, reduction of losses and waste and natural resource management.

Protected Cropping is a technology-based method to not only provide protection, but also uphold optimum growing conditions through the development of plants. The production commonly takes place within an enclosed growing structure such as polyhouse or plastic house, or glasshouse (Albright and Langhans, 1996). Plants are often grown in a hydroponics system, also referred to as soilless culture. This is a method of cultivating crops in any growing medium which are different to soil and can include pure water culture such as rock wool, coconut fibre, vermiculite etc. Therefore, protected cropping links the high technology glasshouse with a soilless growing system (NSW Department of Primary Industry, 2007).

According to Hickman (2016) the total projected world greenhouse production area is approximately 473,466 hectares (around 90% area is covered with plastic houses and only 10% with glasshouses). Countries including China, Spain, South Korea, Japan and Turkey are the major players which have a combined cumulative greenhouse covered area totalling 96% of total greenhouse coverage. A wide range of agricultural crops can be grown in the controlled protected environment. However, experience has demonstrated that protected cropping is worthwhile only for high-value horticultural crops. Worldwide production in controlled environments has been focused on tomato, capsicum, cucumbers, eggplant, herbs, lettuce and other leafy greens, including some types of cut flowers (Hadley, 2017).

The initial investment and operating costs for controlled environment agriculture is very high. Therefore commercial glasshouse production is capital intensive compared to conventional field production. On the other hand, the higher volume of produces transform to high returns on investment. Table 1 shows the comparison of potential yields that can be obtained for selected crops in a glasshouse atmosphere to yields that are achieved in open fields. The increase in yield that can be achieved in the controlled environment ranges from 250% for capsicums to 800% for lettuce (Smith, 2011). Moreover, the other advantages of growing crops in a protected atmosphere include control over almost all aspects of the growing environment allowing for better quality produce and lower input costs. The key resources used in protected cropping are water, light, energy, labour and nutrients. Research indicates that the high value horticulture crops produced in glasshouses are much more resource efficient than in field production.

Therefore, I believe that the rising tendency in the protected cropping industry towards construction of commercial, technologically complex, high-yielding and resource-efficient glasshouses may offer possibilities for meeting future demand for vegetables and other products in a comparatively sustainable way.

Hydroponics Tomato Production in Controlled Environment (Photo: Costa Group)

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Agribusiness	Crop sciences	Animal sciences	Ressource management	Economics and agricultural social sciences

Start: Winter semester

Ecosystem management

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Start: Winter semester

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The subjects are natural scientific basics, physiology, breeding, husbandry, feeding, use and hygiene of horses as well as business economics of horse farming.

Restricted admissions
Start: Winter semester

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