

The background of the cover is a photograph of a group of people standing in a field of bright yellow flowers, possibly rapeseed. The people are dressed in casual to semi-formal attire, including hats and collared shirts. They appear to be engaged in a discussion or a field visit. The sky is bright and clear.

Agri4D

CONFERENCE PROCEEDINGS

AGRICULTURE FOR FOOD SECURITY POST 2015 – THE ROLE OF SCIENCE

AGRICULTURAL RESEARCH FOR DEVELOPMENT CONFERENCE 2015

**23- 24 September 2015
Undervisningshuset, Almas allé 10
SLU Campus Ultuna
Uppsala
Sweden**

ABOUT

Millennium Development goals are set to expire in 2015 and the new set of goals is in the final stage of negotiations. At this time the discussion about the role of science in agricultural development and food security is highly relevant.

A lot has changed since the year 2000 when the first MDGs were formulated. Experts are now advocating for a paradigm shift that would bring the North and the South together, defining attainable objectives for an equal and a productive partnership, based on mutual interdependence. Food security based on sustainable agriculture can provide common grounds for such partnership. Implementation of the SDGs will not only require substantial political efforts, but will also need rigorous scientific advice. Agriculture for Development Conference 2015 will explore the role of science for agriculture and food security post 2015.



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Day 1

Opening remarks by Anders Malmer, SLU Global and Madeleine Fogde, SIANI.

Rapporteur: Eskil Mattsson, University of Gothenburg

An introduction to the theme and a warm welcome to the fifth agricultural research conference was given by **Anders Malmer, Director of SLU Global**. Anders stressed that not only researchers but also other actors who are important for information exchange were attending the conference. Anders mentioned that the conference is now biannual and welcomed everyone to a refurbished SLU campus, with a more compact feel that will hopefully stimulate more multidisciplinary interaction and activity. SIANI has been an important network organization in the planning of the event, especially in the sense that it has facilitated increased policy-related participation and interaction. Anders mentioned the recent visit to SLU by the Chair of the African Union Commission. This should be seen as a sign of interest in the activities undertaken by SLU and by the Swedish resource base in the field from the African horizon as well as from the Swedish Ministry of Foreign Affairs.

Madeleine Fogde, SIANI welcomed everyone and noted that this conference is an important platform for interaction, especially on the topic of food security and nutrition for all. Madeleine mentioned that the theme and timing of the conference were perfect since the post-2015 agenda and the sustainable development goals (SDGs) would be agreed in New York City that week. In addition, the large number of refugees coming to Europe and Sweden from conflict areas is partly due to drought and spiraling food prices. The SDGs highlight these issues. Madeleine mentioned that feeding a growing population will be a challenge that is more complex than just sustaining production. Eradicating poverty by 2030 is possible and by accomplishing that we can reach other SDGs as well. Madeleine concluded the introduction by noting that a key question that will hopefully be answered during the conference is: *How can our research contribute to food security in the nexus of the SDGs?*

Keynote speeches

“Contested Visions, Big Challenges and the Role of Science Evidence” by John McDermott, Director, Agriculture for Nutrition and Health CGIAR/IFPRI

John McDermott began by presenting a pessimist vs. optimist view, which means that things should be easier in the future than in the past. John emphasized that there are a lot of contested visions of how the world will look. There will be dramatic changes in population in low- and middle-income countries by 2050 due to factors such as urbanization and rising incomes. Such growth patterns will pose great challenges and will affect food production, prices and hunger. To avoid price volatility people must remain calm, as was seen for example during the earlier food price hike in 2007–2008.

John showed how the future will affect different continents with respect to food prices and production. There are very different pictures between world regions. For example, Africa has many regional production challenges and opportunities. In many areas in Africa, farmland is being fragmented while in other areas sustainable de-intensification is required. In addition, there is underinvestment in irrigation; hence it will be interesting to see how things develop in many African countries. In the future, the quality of diets will be central. There is a need for stronger policies in this area.

Overall, is science a trend setter for how things are going to look? How does this fit with what is going to happen in New York, with the adoption of the SDGs? Compared to the Millennium Development Goals

(MDGs), the post-2015 agenda includes all countries and the goals and indicators are much broader. An important question will be how science can influence the agenda through innovations and new processes. Many challenges remain: one is how to access data. John asked: how can food innovation be captured in the future? This will require a mixture of interventions, country ownership and leadership. There is also a need to use different instruments to scale-up nutrition policies.

The questions following John's presentation focused on how to link up consumption patterns and the role of inclusive markets. Another person asked how science can be involved in delivering the SDG indicators while another question discussed the role of public research in meeting food security issues. On SDG indicators, John answered that there is too much focus on indicators. An approach focused on the theory of change and 'how to issues' would be better going forward. John also mentioned that public research has a role to play in terms of supporting economic analyses.

“Livestock’s place within planetary boundaries” by Christel Cederberg, Department of Energy and Environment, Chalmers

As an introduction, **Christel Cederberg** began presenting the role of the Planetary Boundaries framework in relation to a historical view of changes in milk and egg production. As consumption patterns change due to increases in welfare, people eat more protein and meat. Cereal consumption will increase by 50% by 2050, according to FAO. How can we measure how people will eat in the future? And will developing countries reproduce the development paths of developed countries?

Christel showed that world food production contributes to about 25% of global greenhouse gas (GHG) emissions and accounts for 35% of global land use, which causes losses of biodiversity and the extensive spread of chemicals. In addition, global food production is the dominant impact on the nitrogen and phosphorous cycle. Livestock and soils are the largest sources of GHG emissions from the agricultural sector as nitrous oxide and methane are more potent GHGs than carbon dioxide.

Christel mentioned that she was often asked the question: 'What is the problem with cattle and their methane emissions? – This is such a natural process'. Christel explained, however, that due to a large increase in global cattle population over recent centuries, GHG emissions resulting from ruminant feed digestion are now a major problem. According to global estimates of GHG emissions by species in the livestock sector, 65% come from cattle and 80% from all ruminants.

Christel further explained the relationship between GHG emissions and intensity in dairy systems, where higher output per cow generally yields lower GHG emissions. In Sweden, milk yields per cow have increased constantly over the past 100 years due to better management, knowledge, genetics and feed quality. In Western Europe methane emissions are relatively low, due to large-scale dairy production with high levels of efficiency. Methane emissions in Latin America are higher due to low levels of dairy production and lower efficiency in animal management.

Christel compared degraded pasture with highly productive pasture in Brazil. Poorer feed quality in the degraded pastures yields larger methane emissions. Highly productive pasture with soy on the other hand is more integrated with better management.

Christel talked further about the role of improving feed resources for cattle, which can also improve food security, limit GHGs and save land and forest. Of the distribution of global food production today, 55% of the pork and 70–75% of the chicken are produced on industrial farms where more than 90% of the feed come from outside the farm. This trend is expected to increase. The majority of beef production is on mixed farm systems where the fodder supply comes from on-farm sources to a relatively large extent.

Christel showed a map of pig distribution in the world. The concentration per square kilometre is highest in China, the European Union and parts of United States, and a majority of the fodder for this production comes from the Amazon. Christel mentioned that there is a surplus of phosphorus in products. Hence, there is a need for better nutrient cycling with less use of fertilizers. As a result of intensive livestock farming, there are high nitrogen levels in world water systems, which results in leaching.

Christel ended her presentation by stressing the need for more research on how we are going to develop systems analyses for improving nutrient cycling.

Parallel Sessions

Post green revolution possibilities and challenges ahead

in South and South-East Asia

Session leaders: Ewa Wredle, SLU; Eskil Mattsson, Chalmers University

Rapporteur: Lovisa Neikter

Eskil Mattsson, University of Gothenburg emphasized the role of tropical home gardens in providing food security and nutrition in Sri Lanka. Tropical home gardens offer the possibility of generating a wide variety of both environmental and socio-economic benefits, although economic and legal constraints, land scarcity and insufficient support from development programmes hinder further development and scaling-up. Eskil mentioned that land-use planners need to take this into account, since home garden practices are promoted by the government as sustainable land-use systems.

Gunilla Ström, SLU talked about a study on urban and peri-urban livestock in the peri-urban areas of Phnom Penh, Cambodia. The study found that keeping livestock provides an important extra income among the peri-urban households, but household practices applied by the farmers pose serious risks of zoonotic transmission; and interventions are needed to develop sustainable urban livestock systems with special regard to manure and waste management.

Johan Dicksved, SLU presented a study on calf performance in small-scale dairy production in Southern Vietnam. The aim of the project is to identify routines in commercial dairy calf management that can be improved in order to reach sustainable dairy production of both female and male calves. First, a survey was carried out in Dong Nai Province of the management of 40 randomly selected small-scale farms, using interviews and field observations. Second, two management systems (restricted suckling versus artificial rearing) were studied, comparing calf growth, IgG absorption and the development of gastrointestinal microbiota in both female and male calves.

Johanna Lindahl, SLU talked about three projects carried out in collaboration with the International Livestock Research Institute on aspects related to the white revolution in India. Johanna explained that FAO projections for 2030 stress that demand for meat will increase by 3.7% due to a growing middle class and globalization. One study focused on training programmes to promote knowledge and hygiene among producers and traders, where the objective was to evaluate the improvements in knowledge. Unregulated use of antibiotics results in antibiotic residues in milk, since there is no testing and no control. Johanna concluded that dairy is very important in India but in spite of large efforts, productivity is suboptimal.

Dil B. Khatri, SLU spoke about Nepal's established community forestry programme and related issues of food security. Food security is a challenge and associated with deep-rooted social inequality. Dil mentioned that mainstream forestry science influences the forest management agenda and that community forestry in Nepal provides limited space for forest-food security. Despite devolution of power, forest users have limited mechanisms to challenge the techno-bureaucratic power that restricts forest-food security linkages.

In the ensuing discussion several topics were raised, such as the role of climate change impacts on infrastructure and distribution networks of food, and the role of interdisciplinary and multi-disciplinary research. Differences between intensifying animal production in the EU compared to South Asia were also discussed.

Transforming subsistence farming into commercial enterprises: The changing face of eastern and southern African agriculture

Session leaders: Ivar Virgin, SEI and Matthew Fielding, SIANI.

Rapporteur: Maria Göthberg, Focali

Catherine Komugisha Tindiwensi, a PhD student and lecturer at the Makerere University Business School, argued that it is a mistake to put all farmers with relatively small farms and resources into one group. Her research shows that farmers with relatively small farms have very different ambitions for their land. Some are happy maintaining subsistence farming, while entrepreneurial farmers want to sell their products to local, regional and international markets: “We need to distinguish between these two categories of farmers; otherwise we risk having misguided policies.”

Once we understand that different smallholder farmers have different ambitions we can go on to ask the question: how can we assist entrepreneurial farmers in building commercial businesses? And similarly: how can we support those farmers who want to remain at subsistence level?

The most straightforward way to implement change-oriented projects in agriculture is through training farmers at the farm and within local communities, which is done by NGOs or via government extension services. **Ngolia Kimanzu**, who is a community development adviser for the Water, Sanitation, Hygiene and Food Security Programme at the Salvation Army, shared experiences from his work with agricultural extension services in Malawi and Kenya: “Even though in some countries trust in governments can be low, many governments are positive about being the agents of change. Ideally, extension services should be provided by many actors, but if NGOs and the private sector show no interest in doing so, then governments need to take responsibility.”

In turn, training farmers on up-to-date production strategies can improve agricultural efficiency. **Ylva Ran**, Research Associate at Stockholm Environment Institute (SEI), talked about ways to assess the environmental impacts of livestock production in Tanzania. Livestock production systems are commonly associated with a number of environmental impacts, such as soil erosion, greenhouse gas emissions, and water use and biodiversity threats. A key challenge facing African smallholders is livestock feeding inefficiencies resulting in poor productivity and high emissions of GHGs. Ex-ante assessments of potential environmental impact are required to ensure increased small-holder efficiency as well as reduced environmental impact. Ran noted that: “Reducing environmental impact from livestock production systems is complex and African farmers and other actors in the livestock value chain need support, training and increased knowledge to identify potential areas of concern in the near future as well as from a long-term perspective.”

Becoming a commercial farmer requires a number of preconditions: technical equipment, knowledge, financing capital, human capital and access to markets. **Mats Stading**, from the Technical research institute SP, works advising companies on how to connect and adapt to international markets. Stading emphasized that improving farmers’ access to markets requires the active presence of private and public sector actors.

Another crucial factor in creating better market opportunities for small-scale farmers in the region is agro-processing and the development of value chains. Adding value to farm produce is key to making agriculture profitable, as the example of the prices for 1 kilo of potatoes vs 1 kilo of potato chips illustrates well. Encouragingly enough, the African agro-processing sector is showing signs of growth and expansion, demonstrated not least by the growing brewery sector in the region.

‘There is a mutual interest – from both an African and a European perspective – in having new grains and new products on the European market’, according to Stading. ‘It is true that commercialization of traditional African crops, such as millet, teff and sorghum, can drive up prices in local markets, where these products are traded and consumed. There is no clear solution to this, the best strategy is to have “slow” development so both markets and producers can adapt to shifting demand’.

Access to markets and improved agricultural techniques are beneficial, but are not sustainable if farmers do not have secure long-term access to land. A number of case studies presented by **Laura Saxer**, **Lasse Krantz** and **Emmanuel Muyombano** from the University of Gothenburg, **Atenchong Talleh Nkoboul** from the University of Hohenheim and **Atakilte Beyene** from the Nordic Africa Institute illustrated land tenure reforms in Kenya, Tanzania, Rwanda and Mozambique, and their effect on local farmers. Land tenure issues are hard to avoid in future food scenarios, particularly in regard to large-scale land investments which, judging by the evidence from the case studies, have an impact on local food production. Well-tailored and customized tenure rights systems can facilitate local food security and open

up possibilities for the commercialization of agriculture. Vague and messy tenure rights systems that lack a long-term perspective on agricultural development can lead to stagnation and decay.

The ensuing discussion focused on whether we should aim for more sustainable subsistence farming or commercial farming. It was noted that smallholders should not be treated as a homogenous group, but rather as a highly diverse group with different goals, ideas and ambitions. Hence, there is a need to differentiate between those who strive to be commercial and those who strive to remain subsistence farmers.

The role of new grains was also discussed. For example, how can we avoid African traditional grains becoming popular in new global markets and as a result becoming too expensive for the poor in the producing market? There are no good answers to this, but with gradual development both markets can adapt.

The role of future farming was also highlighted. Who will farm in the future? The profession is in great need of recruiting a new generation of farmers to secure future food production. Most young people become farmers by inheriting land and the profession from their families.

However, heavy work and high risk in combination with rapid urbanization and an unattractive image of farming push young people away from the agricultural sector. This is to some degree a lifestyle choice – communication and culture in the global era spur dreams of a future in the city. But it is also about failing to make farming a more profitable, secure and attractive career. It is key to incentivize young farmers so they choose a career in farming instead of investing their skills in other professions.

West Side Story: Threats and opportunities for livelihoods in West Africa?

Session leaders: Per Knutsson, GU; Madelene Ostwald, GU; Ulrik Illstedt, SLU

Rapporteur: Karolin Andersson

Gun Eriksson Skoog, Nordic Africa Institute spoke about developments in the Liberian post-war cocoa market. Have recent developments benefitted smallholders? Has it become more inclusive? Have the institutions changed? And how have they contributed to the inclusiveness of the cocoa market? The study found that the cocoa market has become more inclusive over the years, but not completely inclusive. In addition, structural changes have altered power relationships within the cocoa market, which has led to higher prices being paid to farmers, which in turn strengthens price incentives.

Jenny Friman, University of Gothenburg illustrated governance of the agroforestry system, linkages between regulations, use and users of agroforestry in Burkina Faso and how discourses on the Burkina Faso agroforestry system relate to regulation, use and producing subjectivities. The challenges in managing agroforestry systems are related to technology, policy, norms, values and power structures. Deborah Goffner, CNRS Research Unit talked about the *Balanites aegyptiaca* tree, which is an underutilized, indigenous African fruit species with the potential to improve livelihoods. To date, this indigenous fruit tree has been chosen as a reforestation candidate by many countries since it is a very useful, robust tree much used for food (fruit but also leaves), but also much used for commerce. Can this tree contribute more than an environmental goal by promoting social and economic benefits in the Sahel? A value chain analysis found that women play the principal role throughout the current market chain and that the diversity of products means immense potential for added value for all the fruit parts.

Lowe Börjeson, Stockholm University spoke about the re-greening trend in the Sahel. Through a multi-method study in one area, using remote sensing, tree inventories and interviews, it was shown that tree density has clearly increased since the 1980s. This change was associated with a shift in species composition to more tolerant tree species. Lowe proposed that these landscape changes need to be understood in relation to land management. The findings also have implications for policies relating rural livelihoods to climate change adaptation, ecosystem services provisioning and biodiversity conservation.

Hanna Sinare, Stockholm Resilience Centre talked about a study focused on landscape units, ecotopes, and the ecosystem services provided in six villages in northern Burkina Faso. The ecotopes identified in the field were fields, shrub land, fallow, homestead, depression, forest and bare soil. Hanna's work showed that research on landscape-scale effects and the distribution of ecosystem services is lacking, while these aspects are central to understanding the effects on livelihoods.

Martin Karlson, Linköping University presented his work on the use of satellite remote sensing to map different tree cover attributes in West African Sahel. Different methods have been tested. WorldView-2 and Landsat data were used and verified with data from field assessments. Object based image analysis was used to detect individual trees and the Random Forest model was used to detect predictor variables to use from the satellite image. The suggested method gave good results for detecting trees, but smaller trees were harder to detect than bigger ones. The Sudano-Sahelian zone is a complicated environment for remote sensing due to its patchy landscape. Further uses of remote sensing data and its contribution to research could include soil carbon sequestration potentials and how species distribution is affected by roads and other landscape factors.

Aida Bargaés Tobella, SLU talked about a study on West African agroforestry parkland in relation to the current paradigm in forest hydrology that predicts that more trees on land lead to less water resource. Through measurements of soil infiltrability, water drainage, tree transpiration, degree of preferential flow and tree water uptake, Aida showed that an intermediate tree cover maximizes groundwater recharge. This optimum tree cover theory provides new perspectives for research and policy on the hydrological impacts of trees in the landscape. An important next step will be to see if the same process occurs in other parts of the world.

As a general starting point for the discussion, session leaders asked whether we as researchers do our best for sustainable livelihoods? Is it in relation to the external factors or the internal factors? Is it the link between them? Where are the bottlenecks?

The answers to these questions suggested that it is a combination of both. For example is the lack of statistics in the data a big constraint? The results presented during this session can also be used by policymakers, but it is important to know the local context for each case.

Another person highlighted that it is important to understand the link between village and local landscapes, and how they are changed in relation to local needs but also the wider political environment. There is a need to do more of these linkages, and get a better understanding of this.

A third person raised the importance of trees in providing a core resilience part in the context of change and conflicts. Some trees have lived through that change.

Discussions continued on the role of livelihood and livelihood landscapes. There are many opportunities and ways to improve livelihoods. In what way is that enough to talk about? Are we talking about the relevant things here? To what degree do people want to have livelihoods and to what extent do they want to have careers?

A follow-up session on this topic at the next conference should examine the push factor. What are the trends for leaving rural areas both in developed and developing countries? What are we looking at in the future? Who is staying on in the countryside and what will they do?

Challenges and opportunities for reducing inequalities and protecting ecosystems in Latin America and the Caribbean

Session leaders: **Torsten Krause, Lund University; Kristina Marquardt, SLU; Margarita Cuadra, SLU**

Rapporteur: Indre Giedraityte

Örjan Bartholdson, SLU spoke about how the bureaucracy that regulates land tenure, agriculture and community-based forest management affects the way people act in the Brazilian Amazon.

Kristina Marquardt, SLU highlighted a study that investigated how small-scale Kechwa-Lamista farmers in the Peruvian Amazon experience land pressure, agricultural intensification and commercialization, deforestation and restricted access to the forest, and market access.

Josefin Egerlind, SLU talked about how the struggle of Alto Huaja, a Kechwa-Lamista community in the Peruvian Amazon, to get a collective land title is being influenced by different external actors and their views and models on how indigenous territories should be governed.

Torsten Krause, Lund University talked about the role of the native tree *Ilex Guayusa* in traditional agroforestry systems in the Ecuadorian Amazon region and its potential to augment farmers' incomes, increase the diversity of agroforestry systems in the region and buffer against pests of conventional cash crops.

Margarita Cuadra, SLU highlighted the complexities of the co-management of natural resources between the government and local communities in the case of Zapatera National Park in Nicaragua.

Cristian Alarcon, SLU talked about the reproduction of inequalities and environmental degradation in South America and contemporary agrarian questions. Cristian argued that social class is very much a topic of agro-economic policy and research, especially in the Latin American context.

Leticia Pizull, JTI spoke about the role of biobeds, a Swedish construction that is intended to retain and biologically degrade pesticides. Inadequate management of pesticides leads to soil and water source contamination. Biobeds are increasingly common in many countries, particularly in parts of Europe (Sweden and France) and in some Latin American countries. Biobeds are advantageous in many ways: they are relatively cheap, use mostly local materials, are easy to maintain and reduce the risk of soil contamination.

The ensuing discussion focused on issues such as how governance of ecosystem services combined with livelihoods in the same system can achieve, for example, food security. Moreover, the audience and the presenters debated the question of how dilemmas in conservation and production in protected areas can be confronted. Finally, the discussion focused on the role of science itself and how science can interact with stakeholders to be more relevant to stakeholders and have a larger impact.

DAY 2 Thematic sessions

Sustainable intensification in agriculture

Session leader: Ulf Magnusson, SLU

Rapporteur: Eskil Mattsson, University of Gothenburg

Per Hillbur, Malmö University talked about research-to-development platforms and their role in informing various stakeholders in agricultural development and in promoting technological, social and institutional change. The aim for the future is to involve the private sector, governments and NGOs in creating incentives locally while showcasing and bringing results to a larger audience, which is a big challenge. Ensuing questions dealt with the role of science-driven vs demand-driven processes and the role of the private sector in leveraging incomes.

Cecilia Sundberg, SLU spoke about the role of biochar as an opportunity to create win-wins along value chains, to improve soil productivity, crop yields, energy efficiency and health. Pot trials had shown increased yields where biochar was applied, although effects varied with soil type while cook stove tests showed reductions in the fuel required to cook meals along with less PM and CO emissions. Questions focused on scaling-up opportunities, food taste and the role of cultural traditions vs biochar management

Cecilia Lalander, SLU talked about the concept of converting organic waste to animal feed protein through fly larvae composting and vermicomposting in Uganda. Large waste reductions are possible for both methods of up to 75% and 70 %, respectively, on a dry matter basis and with waste to biomass conversion rates of more than 10% for both methods. Questions following the presentation focused on scaling-up possibilities, the role of inorganic waste, and human constraints and attitudes in handling the composts.

Ulf Magnusson, SLU spoke about a cross-sectoral study of reproductive performance, husbandry factors and production traits in dairy farms in two different Ugandan regions. In Kampala, milk production and calving rates were higher than in rural Gulu, and Kampala farmers were also more often male, commercialized and more experienced. Hence, gender, degree of commercialization and productivity varied with degree of development while improved reproductive management can make better use of natural resources and yield higher income for the farmer.

Rodomiro Ortiz, SLU on behalf of 15 co-authors talked about cross-bred bananas. Cross-breeding of East African highland cooking and juicing bananas in the 1990s has resulted in 27 secondary triploid hybrids today with high host plant resistance to pests, edible yields and high breeding gains.

Ksenia Gerasimova, University of Cambridge highlighted the role of GM crops in providing food security for smallholder farmers in South Africa and East Africa. Ksenia explained that scientists and state authorities experience lobbying from both proponents and opponents of GM technologies in Africa, and that opponents often have strong links to European NGOs. Both sides target smallholder farmers, where proponents argue that GM crops can enhance farmers' ability to feed their families while farmer-based NGOs claim that GM seeds are only an alternative for commercial farmers.

Linus Karlsson, SLU spoke about the new concept of Climate Smart Agriculture (CSA), which was launched by FAO in 2010 to provide triple wins and synergy between food security, mitigation and adaptation. Until now, no one has really studied how it will look on the ground. CSA is an umbrella term. Hence the narrative is new, but not the problems, actors or solutions. Linus explained that companies have started to call their products climate smart to fit the narrative. A counter narrative could be that CSA is a concept that fits with green washing and a prolongation of the green revolution. Furthermore, the space created by CSA has been

filled by different actors. There will be important questions to answer about how the concept is used and who by, and what the consequences will be for the future.

The discussion that followed focused to a large extent on whether science is political. It was agreed that science is political and that the data we present reflect relative agendas. Furthermore, one must be aware of which narrative to focus on. Other contributions emphasized that we must be aware of all the implications of our results, while at the same time believing that we can make a difference. It was stressed that all human beings are political animals. As scientists, we want to be objective and curiosity should be a driver, but there

Empowering women and youth in agriculture

Session leaders and rapporteurs: Agnes Andersson Djurfeldt, Lund University; Jim Sumberg, Institute of Development Studies (IDS), University of Sussex, UK.

Cecilia Fåhraeus, Uppsala University gave an overview of empowerment outcomes for women engaged in agriculture. It involved a problematization of the discourse of female entrepreneurship prevalent within development policies geared towards agricultural livelihood practices. One person from the audience argued that the discourse seems to result in a watering down of both concepts: entrepreneurship and empowerment. Does the emphasis on empowerment through entrepreneurship reflect the influence of the neoliberal project? To make headway it will be important to continue to take a critical approach to the terminology. Another comment highlighted that the focus on individual entrepreneurship undermines the idea that there is an important collective / social aspect to empowerment. Another person commented that empowerment is a fuzzy and therefore problematic concept – it is used in very different ways. It might be worth thinking about how agency fits into the story. Or perhaps there are other concepts that would help break down and describe elements of empowerment. It is important to develop a contextual understanding of lived whole lives. Livelihoods is also a messy concept and term – perhaps thinking in terms of lived lives might be helpful. A final question asked how to manage men's responses to changes in women's lives when these changes challenge social structures.

Martina Angela Caretta, Stockholm University spoke about the negotiation of gender relations as a result of engagement in group enterprises. Based on two cases in East Africa, Martina contended that communities of practice can help explain negotiations that shape local gender contracts. Martina also presented reflections on how Kenyan and Tanzanian women triggered reciprocal learning by challenging each other to improve their group routines and practices to further their proactive role in local agricultural communities. A follow-up question wondered more about who these women were. For example, what does she know about their lineage and family members? This information should be an important part of the analysis. For example, are the group members related? The response was that they are generally not related. A second question highlighted the role of hydro-patriarchy: are things changing in terms of women getting access to water? Another person in the audience asked whether the merry-go-round groups were spontaneous and what the initiative in organizing these groups looks like? A final comment addressed the language of contract and negotiation, which is very formal and business-oriented. Would it be worth thinking about how contracts are performed'?

Lisa Westholm, University of Gothenburg gave a presentation on the potential impacts of the REDD+ programme on gender and social relations in Burkina Faso. One person asked what happens if women become seriously interested in NTFPs? REDD+ assumes once a 'women's product', always a women's product. But what if NTFPs become economically attractive, won't men take them over? Another person asked what the incentives are for men to stop cutting down? trees. Lisa responded that in principle cutting is part of the management plan, and over time the plan is to reduce cutting. The hope is that they will be able to make more money from the wood that is sold, so a reduction in the quantity won't matter so much. A third person commented that the whole theory of REDD+ remains unproven. Is there really evidence to support the narrative that men capture women's activities when they become profitable? Lisa responded that there

is a problem of enhancing the public profile of women's activities – does this just draw the attention of men and make them more of a target? Finally, one person mentioned that it is fashionable to talk of agency but we all need to be careful. Too much focus on agency shifts attention away from structure. The notion of context needs to be unpacked: context hides marble-like structures.

Jenny Friman, University of Gothenburg discussed issues of how and by whom rights and access to agriculture land are gained and maintained and why this matters for how land is used, based on semi-structured interviews in Burkina Faso. One person asked how local people cut live trees? Jenny responded that cutting live trees is illegal but, as dead wood is scarce, live trees are indeed being cut. On the other hand, fruit trees on other people's land are not cut. Another person commented that there is a lot that could be added to this from the perspective of property rights theory – both in terms of trees and land – and understanding processes such as allocation, borrowing, renting, and so on. A third person asked whether women make good money from cutting wood? Jenny responded that little money is made from the activity. They much prefer beer making as an income generating activity.

In a study from rural Malawi, **Ellen Hillbom, Lund University** asked to what extent access to dambo (farm plots on marshlands) and dimba lands (gardens along rivers and streams) influences smallholders' increase in number and diversification of crop production, and whether institutional structures hinder women's access and control over these agricultural resources. One person thought it would be interesting to study aspects of ownership of land tied to patri- versus matrilineal ownership. The secondary rather than primary use of land for food crops is also relevant – produce from dimba land is sold rather than consumed. The aspect of seasonality and off-season sales is also important, since wetlands can be cultivated in the dry season. The issue of mechanized pumps was raised, and the level of irrigation technology. Are mechanized pumps available? Ellen said that these are very basic irrigation systems, occasionally treadle pumps are used, but watering is mostly based on watering cans.

Göran Djurfeldt, Lund University spoke about a new study in which he had modelled agrarian structural transformation and processes of change – crop intensification, diversification of crop patterns and diversification out of agriculture into non-farm activities – in six countries of sub-Saharan Africa. The gender aspects of the processes based on comparisons between female- and male-headed households had been studied in detail. One person asked how the variability between years in terms of yields had been dealt with in the data? Could this mask important differences? Göran responded that we have data for three years and can calculate the three-year average. This had not been done in this case because the data set encompasses a large number of sites in many countries and because, since there has not been a drought or a similar event, there is no systematic bias in the data and individual differences are cancelled out. Another person thought the geographical dimensions were interesting – where does intensification take place, taking account of the importance of markets, alongside agro-ecological aspects? Another commented on the small differences in intensification by gender of head of household – is there a continued misrepresentation of the female-headed household and how do we address this?

Christine Okali, Independent Research Professional questioned gender analyses of development that depart from categorical comparisons of women and men with, in this case, rural, especially agricultural development conceptualized as starting from an assumed male subject, and men being the norm against which women, 'the deviant gender', are measured. One person highlighted that while there may be a need to collect more and different types of data, there also is a need to make much better use of existing quantitative data. A middle ground – combining different types of data, quantitative as well as more qualitative – is necessary to understand social change.

Improving access to markets and developing value chains

Session leader: Kostas Karantininis, SLU

Rapporteur: Ekaterina Bessonova, SIANI

Kostas Karantininis, SLU presented a study on the willingness to pay for organic food in Africa. A lot of production in Africa is already organic but not certified, and certification like chemical inputs is expensive. Certification is a business, and many retailers also have their own certification systems. Certification might be the reason that hinders the development of the industry. Different buyers require different certification, and when you change a climate you might have high transaction costs. Some certifiers use this as power over producers. There is big potential, but there are problems unique to each of the countries.

Jens Rommel, Leibniz Center for Agricultural Landscape Research presented an analysis of the price effect of cooperatives in the non-varietal wine market in Mendoza, Argentina. It was found that cooperatives pay lower prices than investor-oriented firms at the individual level, but no positive effects were found of cooperatives strengthening regional prices [for their products???] within a department

Luca Di Corato, SLU presented a dynamic stochastic programming model that reflected the typical bargaining situation concerning large land deals in Africa. The model showed that commodity price volatility increases the value of the land development option but slows down the land development process. Luca also applied the model to a cotton project in Ethiopia. Luca answered questions on whether the legal frameworks of countries affect the negotiation processes; and whether the model could be applied to all countries or is case-specific.

Kostas Karantininis, SLU showed that production and marketing of high-value products such as vegetables on the Kenyan domestic organic market was impeded by transaction costs and limited credit facilities. Leah suggested that there is a need to improve market coordination, market information and communications, and to locate organic outlets closer to producing areas.

Mulguleta Watabaji, Ghent University talked about a framework linking value chain governance and value chain integration using quantitative and qualitative data from four malt barley-growing districts in Ethiopia. The study found that the use of contracts with farmers' cooperatives has positively influenced value-chain integration and that trust has a positive influence on value chain integration.

Keynote Speeches

“Family farming and Innovation” by Kostas Stamoulis, FAO

Kostas started by highlighting that family farm innovation is key to food security and sustainable development. Kostas showed the distribution of farms worldwide: there are more than 570 million farms, about 47 per cent of which are in upper middle-income countries and 36 per cent in lower middle-income countries. Most farms are located in Asia (35 %), particularly in China (24%).

Globally, more than 90% of all farms are family farms. There are many definitions of what constitutes a family farm. There are more than 500 different types of family farm, which operate about 75% of all farmland. However, large farms cover most of the world's farmland, while farms are becoming smaller in low- and middle-income countries. Overall, family farms are diverse and family farm households have many sources of income. Crop and livestock production dominates followed by non-farm incomes. Smaller farms have higher yields than large farms, but they have lower labour productivity.

Kostas highlighted that sources of growth depend on research and innovation. So, we need a research agenda

that corresponds to diversity beyond yield enhancing technologies, with several entry points to rural poverty reduction. Kostas mentioned that different family farms have different needs. Large family farms are for example similar to large business ventures.

Small or medium-sized farms have the potential to become commercial if innovation is promoted by research. What else is needed for subsistence smallholders with little or no potential for commercial production? We need to work on labour productivity, and find the right pathways where innovations can play a role. Kostas went on to say that innovation means doing things better, using knowledge. Agricultural innovation systems include all institutions and individuals that enable farmers to innovate.

We need a new green revolution with high-yielding varieties. For this to happen, agricultural research and development is crucial, but this takes place in only a few countries, mostly in high-income countries. Many countries need to invest more in agricultural research and development, and make it more effective. In addition, among dimensions of sustainability, there is a need to look more at the social aspects of low-income countries.

International cooperation can make research efforts more effective, where farmer-led innovation and formal research can complement each other. Inclusive and participatory research can meet the needs of family farms in particular. Agricultural extension is also a priority area through extension and rural advisory services for family farms.

After the presentation, the moderator reiterated Kostas' statement that we need to involve family farms in research on family farming. How do you do that in practice?

Kostas replied that before this event he was at a discussion on farmer field schools. Farmers take the time to attend these if they can see the results. Part of these strategies involves taking new knowledge into account. On the question of whether new technologies can help to transform family farming, Kostas replied that no single technology will transform agriculture. Scaling-up is a challenge. We must ask ourselves what the incentives are for farmers to adopt new technologies.

“Agroforestry steps to sustainable development, from science of discovery to delivery” by Margaret Kroma, ICRAF

Margaret started by mentioning the ICRAF science week 2015, where participants took stock of the future and discussed the role of agroforestry in sustainable development. Given that the SDGs must now be implemented, it is timely and pertinent to discuss the role of the post-2015 agenda. What more is there to do? What is the role for science?

On the state of food insecurity in the world in 2015, global hunger has continued to decline. This is most pronounced in developing countries despite significant population growth: 72 developing countries have met the 2015 Millennium Development Goal of halving poverty. The objectives of sustainable development are to deliver improved human well-being, ensure equitable economic development, provide climate resilient pathways, satisfy the essential needs of the poorest and address the limitations imposed on the environment's ability to meet future needs. The SDGs are based on three fundamental principles: transformation, universality and integration.

Using the SDGs and their challenges and opportunities, Margaret asked the audience a number of questions. What is the future we want or the future we fear? What kind of science do we need? And is it time for a broader science that links to the SDGs? We spent a whole week in Indonesia discussing whether our agroforestry research is still relevant. We concluded that it is a challenge for us, but an opportunity for science.

Margaret continued to talk about the different benefits and services that agroforestry systems provide where agroforestry is all about interactions between trees, crops, livestock, households and system intensification. Agroforestry is about choosing the right tree for the right place; and trees for products (e.g. medicine, income) and trees to provide services (e.g. fertility, erosion control, biodiversity). Agroforestry is not only

about technology, but also about local institutions, tenure, governance and informing policies. These are very important aspects and agroforestry can be a tool to fulfil many of the SDGs, especially SDG 17. Driving delivery and impacts will require more aggressive social science engagement.

In the following discussion the moderator asked whether agroforestry can really make a difference. There are people who remain to be convinced: so what are the barriers to reaching out with the knowledge?

Margaret responded that agroforestry is a relatively new science that provides a new way of looking at knowledge. The key barrier is the difficulty in communicating the essence of complexities and boundaries. In addition, the policies influencing agroforestry are in turn influenced by knowledge and tools. Agroforestry science must move beyond high-impact journals. On the question of whether the SDGs can help agroforestry move forward, Margaret mentioned that they present a huge opportunity that challenges the boundaries of science. It is not only about technology, but also social equality across boundaries.

The audience raised two questions on the issue of ensuring diversity in agroforestry systems and how to convince farmers to make profits in agroforestry when trees take years to grow.

On diversity, Margaret stressed that the agro-ecological context has to be accounted for since the systems are not uniform due to ecological, social and economic differences at the local, regional and national levels. Hence there is a need for a portfolio of options that fit different contexts. To ensure profits in the short term and long term you have to address the progression of crops within the system where agricultural crops come first and trees will come later to assist income and increase yields.

“Is agriculture the sweet spot for youth employment in Africa?” by Jim Sumberg, Institute of Development Studies (IDS), University of Sussex, UK

Jim said that in the past few years it has been more common to hear from African politicians, academia and media that the lack of employment opportunities for young Africans is prohibiting development. This proposition was also strengthened during the Arab Spring.

There are many ways in which we can justify interest in young people’s employment, such as from a human rights perspective in which everyone has the right to work. There are other ways to approach this, for example, self-actualization – everyone has the right to be the one they want to be – or from the point of view of food security, economic growth or security. Who are going to be the farmers in the future? This is a highly interesting and politicized issue that has strong links to sub-Saharan Africa. Jim explored the proposition and argumentation that the agricultural sector has an opportunity to provide reasonable quality and attractive jobs in agriculture. Are there any research ideas coming out of this?

The first part of the argument is that the African Population is growing, which means that millions of people are joining the jobs market. As many young people live in rural areas there is a continued importance for the agricultural sector. On the other hand have we seen unprecedented levels of economic growth and urbanization in sub-Saharan Africa without any increase in employment. Hence, urbanization has been decoupled from jobs. This has created interesting dynamics. One problem today is that many young people end up in the informal sector, which is not a strategy for well-being since these jobs are often poorly paid, seasonal and dangerous.

The second part of the argument is that there is a tremendous demand for more food. Africa has unused resources of land and water and is often considered the future bread basket of the globe. Jim continued by saying that we have to ask ourselves: why is there a concern that young people are moving away from agriculture? What kind of explanations do we find for this in the literature?

First, there are many issues related to structural change, such as problems with institutions and problems with access to technology, which result in low productivity and profitability, and this is not specific to young people. There are also problems with land markets, they are not flexible and people cannot get access to land, and

as a result they lose interest. A second argument is that it is more about the young people themselves. There are not many role models left in farming so people move out in pursuit of other expectations and aspirations. A third argument is that it is not a problem of structure and aspirations – the young people just do not know. Education can provide the means to change mindsets. For each argument there is a set of interventions. With structural change for example we invest in technology, markets and institutions and in changing mindsets. This is basically the world agricultural development agenda for the past 40 years.

Jim continued to reflect on these arguments: a lot of the discourse is framed generally about young people and agriculture. To be honest, young people are very diverse and we have to break down the discussion. What do we mean by young people? When this is defined, you can start discussing why people are not involved in agriculture. There is a need for systematic and nuanced analyses of the diversity of young people; this is much more than disaggregated data by age.

Young people also need good jobs that are transformational, not only decent jobs. There is a gap between that imagined future and the future that is imbedded in current agricultural policies. Therefore, there is a need to decrease that gap by increasing the imagination and aspirations of policymakers. In a final point about policy coherence, Jim highlighted the need to expand on the idea of policy coherence. People who are most effected by such polices must also be involved in these polices.

In the discussion, issues of agricultural transformation and new agricultural technologies were raised. Jim mentioned that the transformation that will take place in sub-Saharan Africa will be more capital intensive and less labor intensive. Jim also mentioned that new agricultural technologies are a driver and what many young farmers really want is to get away from the manual and make agriculture modern.

Panel discussion

Panelists

Madelene Ostwald, Linköping University

John McDermott, IFPRI

Jim Sundberg, Institute of Development Studies, IDS

Kostas Stamoulis, FAO

Margaret Kroma, World Agroforestry Centre, ICRAF

Ola Möller, Sida

Moderator: Johan Kuylenstierna, SEI

Rapporteur: Eskil Mattsson, University of Gothenburg

Johan started by asking the panel for their reflections on the conference in terms of the research aspects.

Madelene mentioned that she had attended all five Agri4d conferences. She had experienced an evolution in which the themes discussed had become paired. She mentioned for example issues of 'intensification vs utilization', 'north vs south', 'short term vs long term' and 'production vs consumption'. Madelene thought this was a new and interesting way of systematizing themes. The talk about narratives and stories is also new and helps us to embrace complexity, but it also tells us that scientists are working in a political context.

Ola Möller mentioned that he had been very impressed by several inspirational presentations at the conference. All the presentations had strong linkages with Sida's policy of supporting research that is of high relevance to its partners in terms of addressing poverty and sustainable development. Ola further challenged the researchers to support practitioners, innovators and entrepreneurs to scale-up results to further reduce poverty and support sustainable development. Without scaling up we cannot say that we have contributed,

Ola stressed. This is not a silver bullet, but taking innovations further is important. Responding to a question on whether researchers are the entrepreneurs, Ola replied that many researchers are entrepreneurs in being. Bringing research to the market or institutions is key, the potential is very much there and we have to find ways to do it.

John McDermott continued to give his reflections from a scientific point of view. What are the governmental, societal and scientific approaches to youth employment? This is an interesting point that needs much further attention. How science is viewed has changed in many ways. Scientists were the experts, but that is no longer the case. We provide evidence but there is other knowledge as well. We need to tighten up the evidence and make sure our research is replicable. Also, as data will play a critical role in the future as a tool for resolving complex problems, 'statistics are going to turn heads'.

Johan asked Margaret about her reflections on the conference in relation to the SDGs.

Margaret stressed that at a similar conference a few years ago, a majority of the discussion would have focused on technology. Now it is more about the context. The role of science will be to bridge the domain between research and where the action takes place. It is interesting to see an emerging agenda in which narratives play an important part. Margaret also highlighted that communication is an important tool for scientists to master. This is not comfortable for scientists but much-needed to inform policymakers about the risks and trade-offs of results. Margaret emphasized that we also tend to focus too much on technology that informs innovation. We need to further recognize tenure issues, governance and recognition. What are the spaces and opportunities for engagement?

Kostas Stamoulis mentioned that it is important to see scientific input as a continuous process. Looking at old research questions in new frameworks is interesting and can bring about new ideas and solutions.

Jim Sundberg highlighted that scaling up takes place through new framings and discourses. His plea would be that investors see upscaling as a broad process. The core role of research is to understand politics and that can really drive change forward. Jim concluded that new frameworks and narratives about fundamental problems are really important.

The conversation moved on to the topic of development assistance and the role of research. The moderator asked Ola whether there is a risk that aid projects tend to become too narrow-minded and lose what is important because of the focus on how they are evaluated.

Ola responded that the important thing as a donor is strategic development and not about supporting a small technical tool. In this regard, it is important for research to contribute and influence policy change. We must demonstrate concrete results to our political decision makers. It is difficult to assess and demonstrate that support to specific processes has really happened and yielded results. Here we need assistance from researchers.

Madelene responded that there is too much demand on researchers to be expert in different fields and be communicators and entrepreneurs. It is not a scientific task to do all these things. We have a hard time handling our own discipline. Madelene concluded: Please guide us or give us contacts or let us work together but do not give us all the tasks.

The discussion moved on with audience members on topics such as the linkages between research and policy, long-term vs. short-term scales, the role of structural change in agriculture and the role of research in assisting development in sub-Saharan Africa. Other questions from the audience included the role of future extension services in agriculture and how producer price fluctuations affect the interest in working in agriculture.

On research-policy links, John McDermott responded that compiling different research topics and putting them together is a real art that necessitates taking long-term and short-term challenges into account.

Madelene clarified her earlier statement by saying that science should definitely influence policy through the right means. We have to acknowledge also that researchers are highly diverse and heterogenic as a group.

The moderator concluded the panel discussion by challenging the panel by giving them 15 seconds to provide a title or a specific subject that should be addressed at the next conference.

John suggested framing the discussion around specific themes and suggestions for transformative solutions around those themes.

20 Ola suggested a focus on interlinkages between different communities and how to act and work together.

Madelene suggested talking more about what agriculture in a developing country context would look like without science.

Jim's challenge for the next conference was to discuss the role of different kinds of data and what evidence is needed. Could big data be used to solve these problems?

Costas suggested inviting people who had presented at earlier conferences to talk about what they had learned from the projects they presented.

Margaret thought that an interesting topic to talk about would be 'research in development'.

Closing remarks

In the closing remarks **Anders Malmer, SLU** and **Madeleine Fogde, SIANI** thanked all the participants and organizers. Anders reminded all the participants to keep up the good work they are doing in the field. He emphasized the role of multidisciplinary and interdisciplinary, and stressed that you cannot go multidisciplinary without being secure in your own discipline.

Madeleine concluded that agriculture has many links to many of the sustainable development goals and we must all continue to work to embrace the SDG agenda on a daily basis. Madeleine also mentioned that an agricultural conference targeting youth is planned for 2016.

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