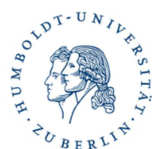




Programme and Book of Abstracts

Farming systems facing global challenges: Capacities and strategies

11th European IFSA Symposium
1-4 April 2014 in Berlin, Germany

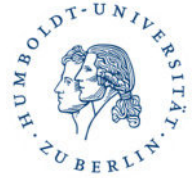




EUROPE GROUP

IFSA

INTERNATIONAL
FARMING
SYSTEMS
ASSOCIATION



Leibniz-Zentrum für
Agrarlandschaftsforschung
(ZALF) e.V.

11th European IFSA Symposium
1-4 April 2014 in Berlin, Germany

Farming systems facing global challenges: Capacities and strategies

Programme and Book of abstracts

Heike Schobert, Maja-Catrin Riecher, Holger Fischer, Thomas Aenis, Andrea Knierim (Eds.)

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About the 11th European IFSA Symposium

Farming systems facing global challenges: Capacities and strategies

Farming systems have to face challenges that originate in changes of global dimension in both the bio-physical and the societal sphere:

- Climate change leads to increasing weather uncertainty and raising average temperatures, thus impacting agro-ecosystems and water supplies;
- Food safety concerns are spreading in Europe while in other regions food security remains a challenge;
- Changing consumption patterns and unequal purchasing power contribute to the unsustainable use of natural resources in many countries.

These changes have manifold implications and raise questions with regard to agricultural land use: How do farmers and horticulturists cope with such challenges? What and how shall learning take place, which (human) skills need to be developed? What capacities do farming systems have to innovate, to adapt? Which strategies are promising to support the transition of farming systems at a regional level? What societal institutions and social transformation will support these transitions? And what can farming systems research contribute to address these challenges?

All of these questions call for multi-level, multi-actor approaches. With its 11th Symposium the European Group of the International Farming Systems Association (IFSA Europe) seeks answers that deal with these challenges in an integrative, interconnected way on field and farm level, on regional or landscape level or even at a larger scale. Throughout the symposium, opportunities will be offered to discuss how capacities can be strengthened and what strategies seem promising to address various global challenges.

The Symposium is jointly organized by the Humboldt-Universität zu Berlin and the Leibniz Centre for Agricultural Landscape Research (ZALF), Müncheberg, in the frame of the Innovation Network of Climate Change Adaptation Brandenburg Berlin (INKA BB).



Programme

Tuesday 1st April:

INKA BB - Action and Research for Climate Change Adaptation in Land Use

16:00 - 18:00 Senatssaal

Wednesday 2nd April:

Opening plenary

09:00 - 10:30 Auditorium Maximum

Workshop sessions 1 - 3

11:00 - 17:00 Seminar Building (DOR 24) – seminar rooms

Global IFSA Forum 1 - 2

13:30 - 17:00 Seminar Building (DOR 24) – Fritz-Reuter Hall

IFSA Board meeting

17:00 - 18:00 Seminar Building (DOR 24) – Fritz-Reuter Hall

Gala Dinner

20:00 Clärchens Ballhaus

Thursday 3rd April:

Field trips to Berlin and Brandenburg

Meeting point: Seminar building (DOR 24)

Friday 4th April:

Workshop sessions 4 - 5

9:00 - 12:30 Seminar Building (DOR 24) – seminar rooms

Closing plenary and synopsis

13:30 - 15:00 Auditorium Maximum



Tuesday 1st April:
**INKA BB – Action and Research for Climate Change Adaptation
in Land Use**

Main Building, Senatssaal

- 15:00 Registration to IFSA open
- 16:00 Welcome to the IFSA community
Thomas Aenis, *Humboldt-Universität zu Berlin, Germany*
Frank Ellmer, *Humboldt-Universität zu Berlin, Albrecht-Daniel-Thaer Institute of Agricultural and Horticultural Sciences (temp. Director), Germany*
Hubert Wiggering, *Leibniz Centre for Agricultural Landscape Research (Director), Germany*
- Introduction
Richard Bawden, *Prof Emeritus at the University of Western Sydney, Australia*
- 16:15 INKA BB –
What we planned and what we learned – perspectives from three points of views:
Action Research: Andrea Knierim, *Leibniz Centre for Agricultural Landscape Research, University of Hohenheim, Germany*
Agricultural land use: Wolfgang Scherfke, *The German Farmers' Association, Germany*
Water management: Stefan Kaden, *DHI WASY, Germany*
- 16:45 INKA BB – An evaluative dialogue between a farmer and a scientist
Martin Suer, *Beerfelder Hof (Naturland farm), Germany*
Johann Bachinger, *Leibniz Centre for Agricultural Landscape Research, Germany*
- 17:10 Exchanges with the plenary – facilitated discussion Richard Bawden
- 18:00 Get together with food and drinks –
pictures and products from INKA BB



Wednesday 2nd April: Opening plenary and workshop session

Opening plenary (Auditorium Maximum)

- 09:00 - 10:30 Welcome to IFSA 2014
Jan-Hendrik Olbertz, *Humboldt-Universität zu Berlin, Germany (President)*
- The Arc of History
Janice Jiggings, *Wageningen University & Research Centre, The Netherlands*
- The converging insecurities of food, water, energy and climate, and their implications for 21st Century farming systems
Andrew Campbell, *Charles Darwin University, Australia*

Workshop sessions (Seminar Building - DOR 24)

- 10:30 - 11:00 *Coffee break*
- 11:00 - 12:30 Workshop session 1
- 12:30 - 13:30 *Lunch (Canteen)*
- 13:30 - 15:00 Workshop session 2
Global IFSA Forum 1
Patrick Dugan, *CRP Agricultural Aquatic Systems (Director), WorldFish (Scientific director)*
Richard Bawden, *Prof Emeritus at the University of Western Sydney, Australia*
- 15:00 - 15:30 *Coffee break*
- 15:30 - 17:00 Workshop session 3
Global IFSA Forum 2
Ray Ison, *Open University, UK & Monash University, Australia*
Nadarajah Sriskandarajah, *SLU, Uppsala, Sweden*
Hatem Belhouchette, Jacques Wery or Christian Gary, *UMR System, Montpellier, France*
- 17:00 - 18:00 IFSA Board meeting
- 20:00 *Gala Dinner (Clärchens Ballhaus)*

Friday 4th April: Workshop sessions and closing plenary

Workshop sessions (Seminar Building - DOR 24)

- 09:00 - 10:30 Workshop session 4
- 10:30 - 11:00 *Coffee break*
- 11:00 - 12:30 Workshop session 5
- 12:30 - 13:30 *Lunch (Canteen)*

Closing plenary and synopsis (Auditorium Maximum)

- 13:30 - 15:00
- Highlights from the workshops
 - Results from the Global IFSA Forum and the “future of IFSA” discussion
 - Summary on the Symposium and
 - Outlook on IFSA 2016
- 15:00 *Farewell*



Conference venue

The 11th IFSA Symposium is situated right in the centre of Berlin, on one of three campuses of the Humboldt-Universität zu Berlin. The central campus is home to the Arts and Humanities, Law, Economics and Business Studies as well as Theology.

The **conference** takes place in two buildings: the **Main Building** and the **Seminar Building - DOR 24** (Dorotheenstraße 24), also known as “Hegel-Building”.

There are several ways to reach that part of the campus:

- **By foot:** walk from the train station “Friedrichstraße” (10 min.)
- **By tram (streetcar):** take the line 12 or M1 from “Friedrichstraße” to the stop “Universitätsstraße”
- **By bus:** right in front of the main building is the stop “Staatsoper” of the bus lines: 100, 200 and TXL (to/from Airport Tegel)



The Main Building is the representative seat of the university on the avenue “Unter den Linden” (street address Unter den Linden 6). As an integral part of Berlin's city centre, it draws many visitors every year. Originally the building was constructed as the Palais of Prince Heinrich but was donated to the newly founded university in 1809/10.

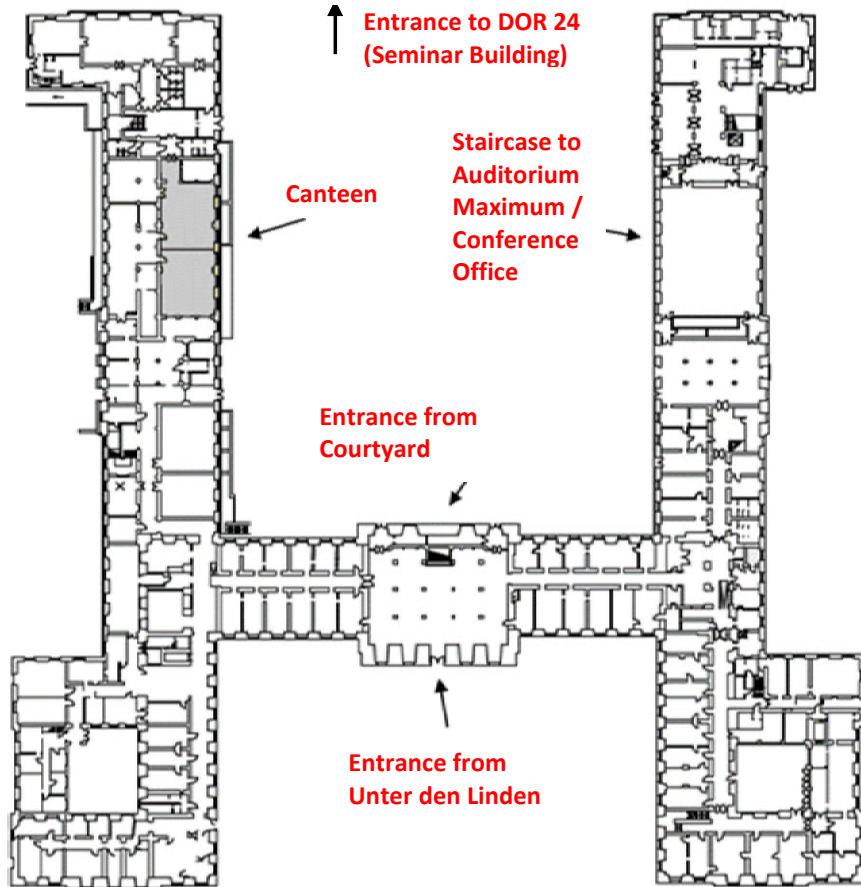
The building has **two entrances**, one main entrance via Unter den Linden, the other via the courtyard from Dorotheenstraße. The conference participants will find here:

- **Ground floor:** - Canteen
- **First floor:** - Conference Office
- “Senatssaal” and “Auditorium Maximum” for the welcome and farewell events

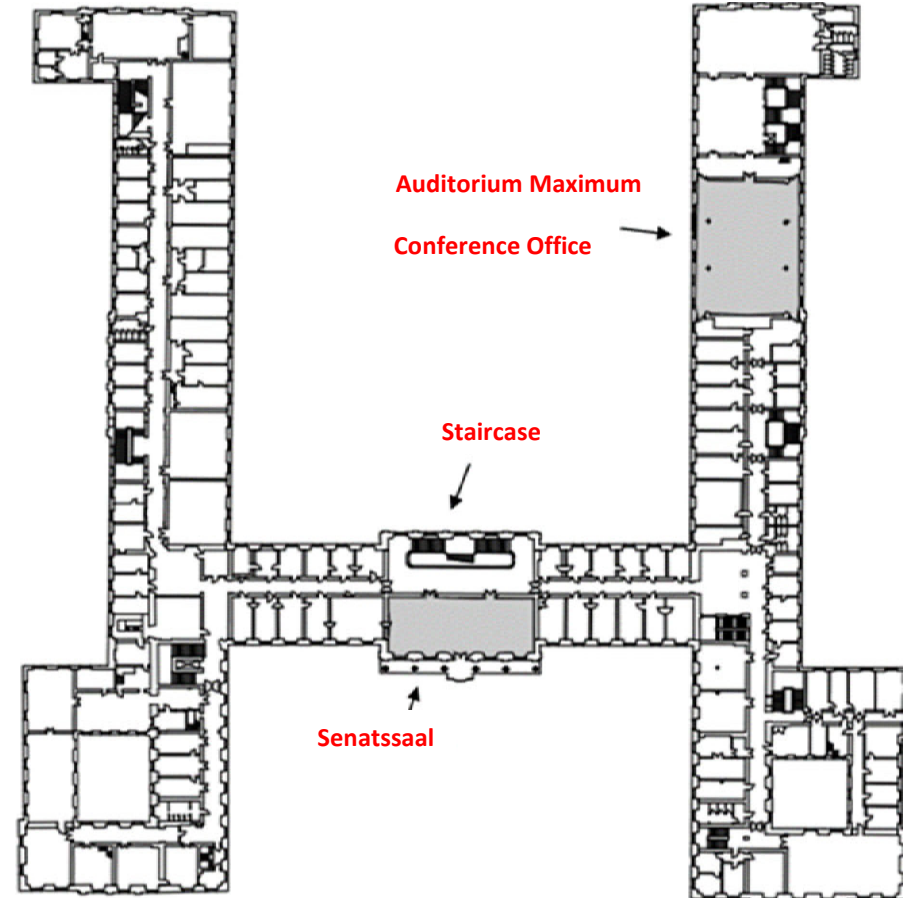
You find the **Conference Office** opposite of the Auditorium Maximum. Here you can **register, receive your conference documents and obtain any information around this year's IFSA. You also find help if you experience any difficulties.** The conference office opens each day (Tuesday-Friday) 30 minutes before the symposium activities start and closes 30 minutes afterwards.

Main Building (Unter den Linden 6)

Ground floor



First floor



Main Building 1st floor	Auditorium Maximum	Senatssaal
Tuesday, April 1st	16.00-18.00	INKA BB
Wednesday, April 2nd	09.00-10.30	Opening plenary
Friday, April 4th	13.30-15.00	Closing plenary

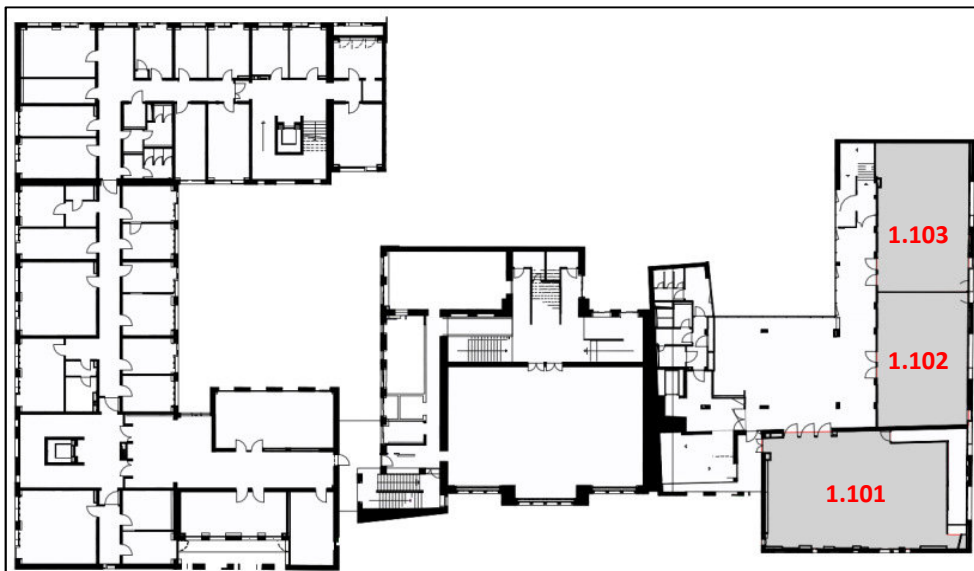




The Seminar Building - DOR 24 is situated at the "Hegelplatz", between the main building and the railway tracks (street address Dorotheenstraße 24). The building was reopened after a fundamental restoration in 2006. An eye-catcher is the Fritz-Reuter-Hall, named after Professor Fritz Reuter. He widely contributed to the field of musical education and facilitated the new concert hall including an organ after the Second World War.

All workshop sessions take place in the seminar building, including the Global IFSA Forum and the IFSA Board Meeting.

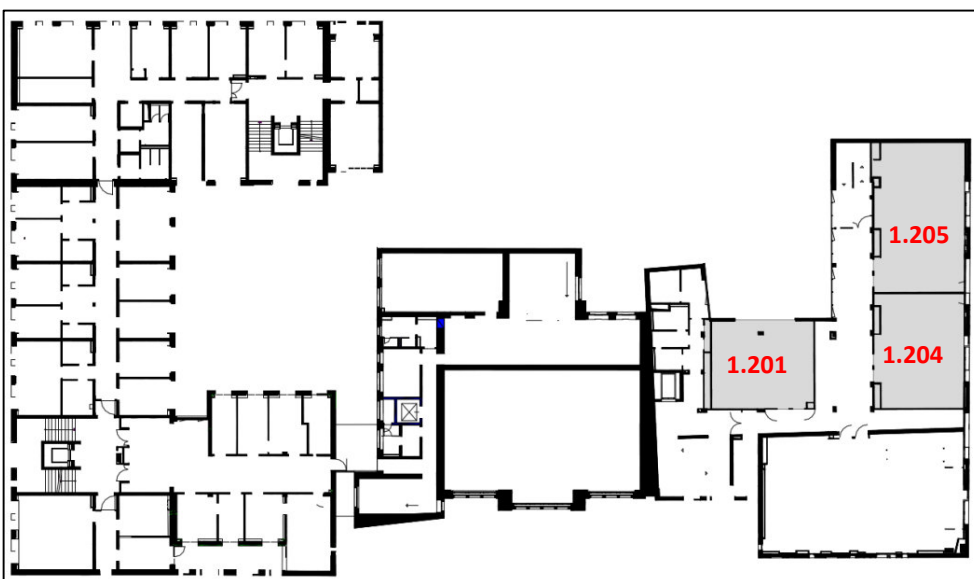
- 1st floor: lecture hall 1.101, seminar rooms 1.102 and 1.103
- 2nd floor: seminar rooms 1.201, 1.204 and 1.205
- 3rd floor: Fritz-Reuter Hall
- 4th floor: seminar rooms 1.401, 1.402, 1.403, 1.404 and 1.405
- 5th floor: seminar rooms 1.501, 1.503, 1.504, 1.505 and 1.506



DOR 24
1th Floor

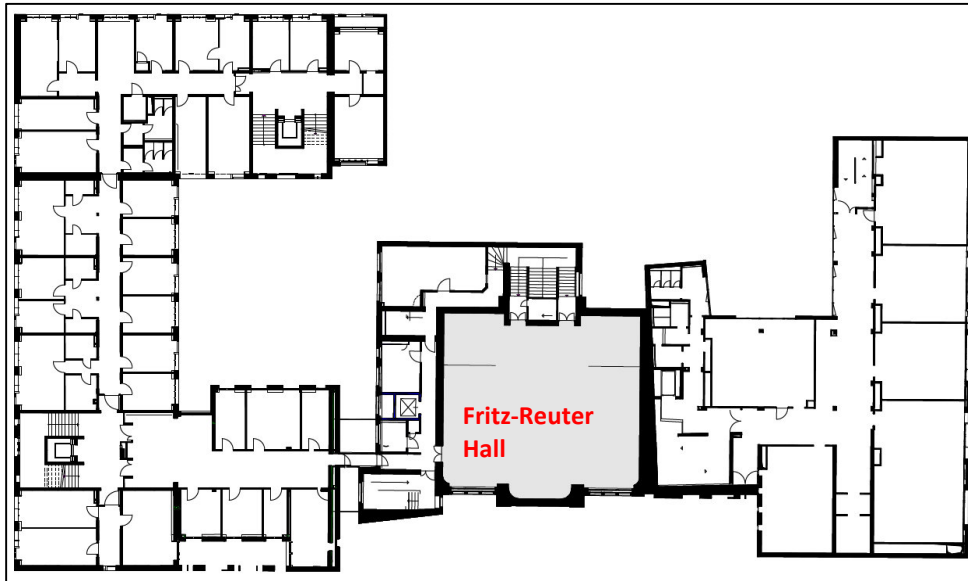
lecture hall
1.101

seminar rooms
1.102
1.103



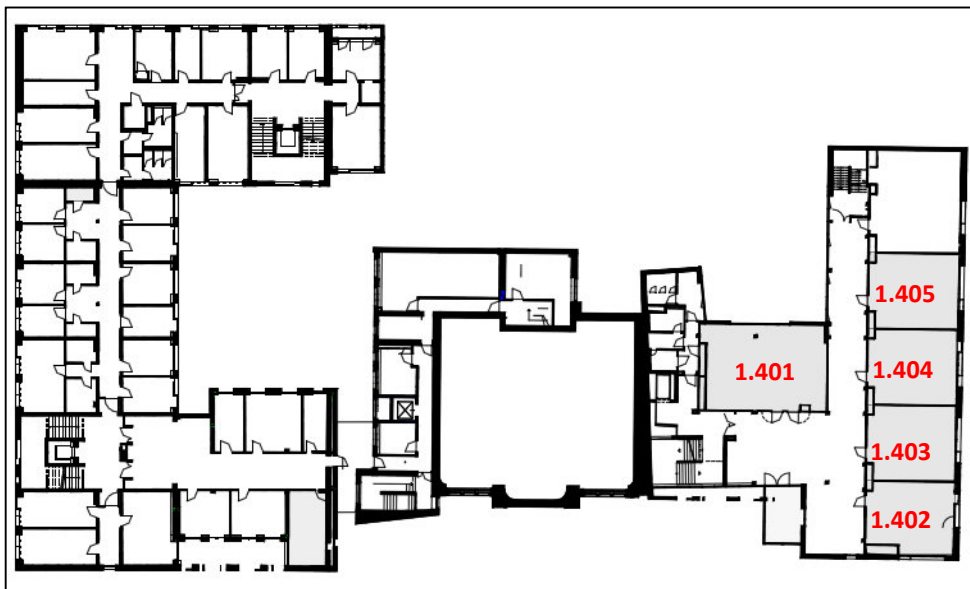
DOR 24
2th Floor

seminar rooms
1.201
1.204
1.205



DOR 24
3th Floor

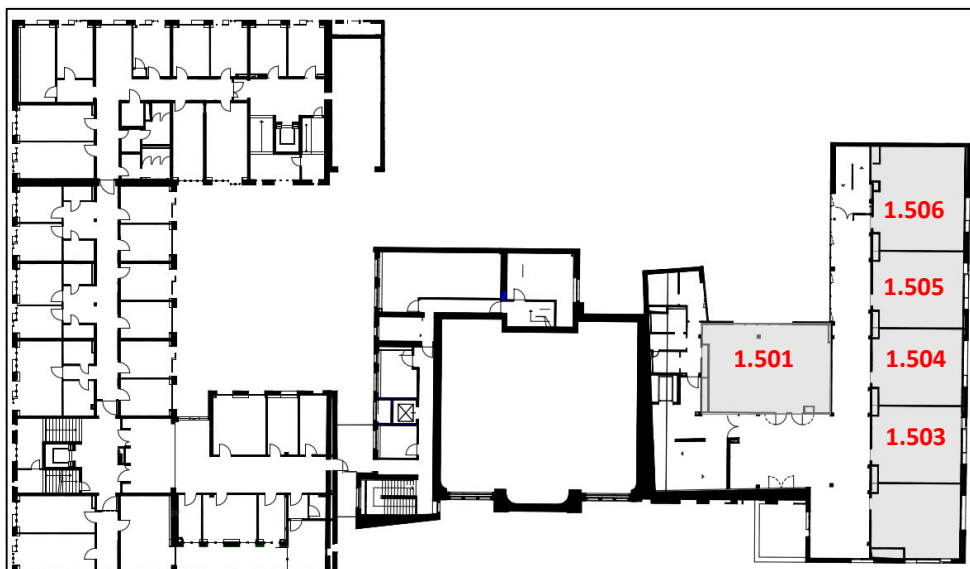
Fritz-Reuter Hall



DOR 24
4th Floor

seminar rooms

- 1.401
- 1.402
- 1.403
- 1.404
- 1.405



DOR 24
5th Floor

seminar rooms

- 1.501
- 1.503
- 1.504
- 1.505
- 1.506



Overview of workshop locations in the seminar building

Overview of workshop locations in the seminar building
 Wednesday, April 2nd

	1 st floor			2 nd floor			4 th floor				5 th floor			3 rd floor			
	1.101	1.102	1.103	1.201	1.204	1.205	1.401	1.402	1.403	1.404	1.405	1.501	1.503	1.504	1.505	1.506	Fritz-Reuter Hall
11.00-12.30		WS2.5	WS1.3	WS2.6	WS2.11	WS1.8	WS2.4	WS1.9	WS2.7	WS1.5	WS2.1	WS1.7	WS2.9	WS3.3	WS2.2	WS2.8	
13.30-15.00		WS1.2	WS1.3	WS2.6	WS2.11	WS1.8	WS2.4	WS1.9	WS2.7	WS1.5	WS2.1	WS1.7	WS3.1	WS3.3	WS2.2	WS2.8	Global IFSA I
15.30-17.00		WS1.2	WS1.3	WS2.6	WS2.11	WS1.8	WS2.4		WS2.7		WS2.1	WS1.7		WS3.3	WS2.2	WS2.8	Global IFSA II
17.00-18.00																	IFSA Board

Friday, April 4th

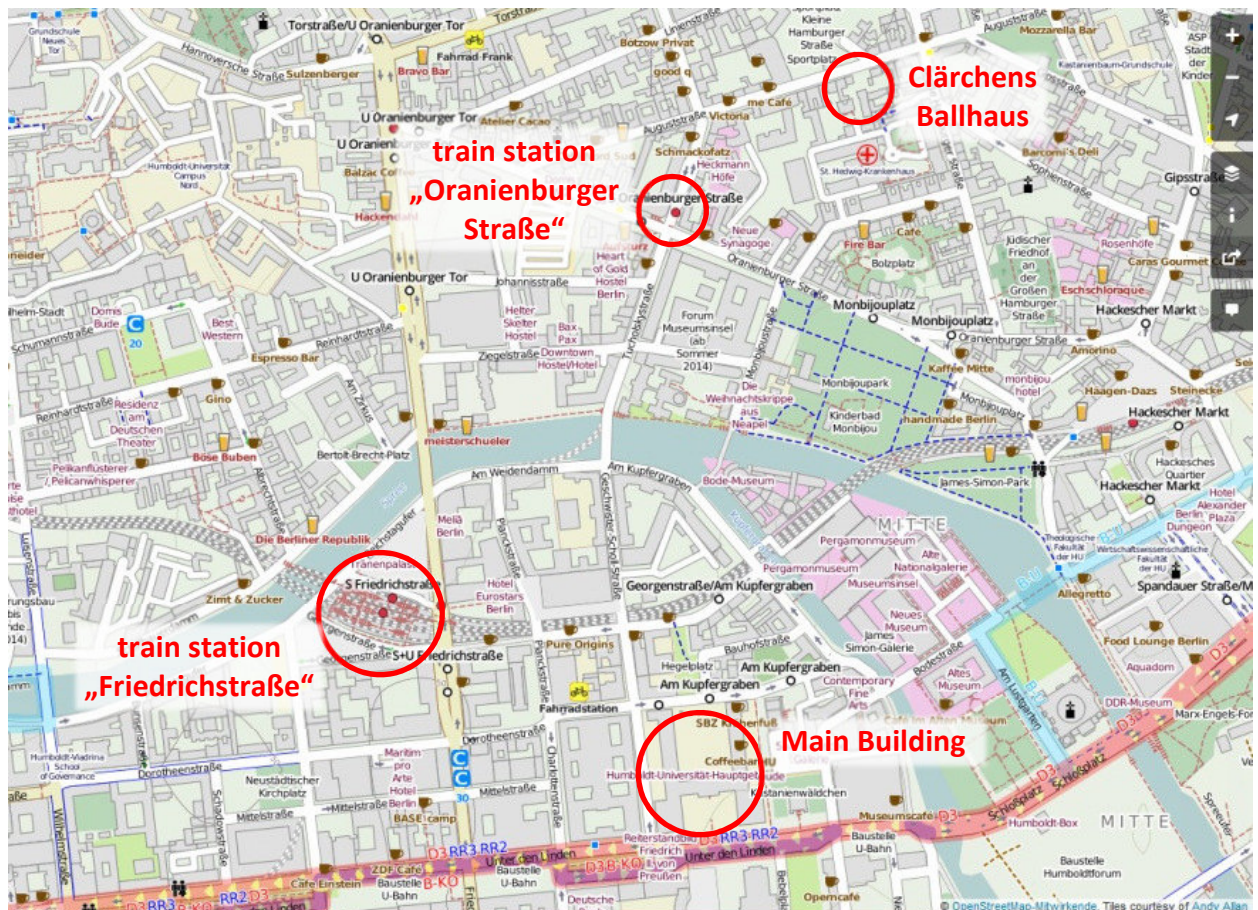
	1 st floor			2 nd floor			4 th floor				5 th floor			3 rd floor			
	1.101	1.102	1.103	1.201	1.204	1.205	1.401	1.402	1.403	1.404	1.405	1.501	1.503	1.504	1.505	1.506	Hall
09.00-10.30		WS1.2	WS1.3	WS2.6	WS2.11	WS1.8	WS2.4	WS3.2	WS1.6	WS1.1	WS1.4	WS1.7					
11.00-12.30		WS1.2	WS1.3		WS2.11	WS1.8	WS2.4	WS3.2	WS1.6	WS1.1	WS1.4	WS1.7					



„Clärchens Ballhaus“ is the location of this year's **gala dinner** on Wednesday evening (street address Auguststraße 24). The best way to reach Clärchens Ballhaus is by foot from the train station “Oranienburger Straße” (S1, S2, S25). The walk should take you about 7 min.

Since 1913 people have been celebrating at Clärchens Ballhaus (Engl.: ballroom). In 2005 the Spiegelsaal (Engl.: mirrored ballroom) was opened for the public for the first time since WWII: It is reserved for parties, concerts, literary soirées and special events, such as the gala dinner of the 11th IFSA Symposium. The mirrored ballroom is characterised by its original preserved condition, since the owners left most of the interior untouched.

Clärchens Ballhaus, Auguststraße 24





Abstracts



Opening Plenary: Farming systems facing global challenges: Capacities and strategies

Keynote: The Arc of History

[Janice Jiggins](#)

Wageningen University & Research Centre, The Netherlands, janice.jiggins@inter.nl.net

In 1994 the participants to the IFSA conference held in Montpellier, organised together with our French colleagues, suggested that we pay more attention to the informal and formal institutions in which farming systems are embedded, and to how they constrain innovation or are transformed (by design or otherwise) to support systemic innovation. Twenty years' on, certain institutional forces have become dominant in forcing the pace of change – notably, regional trade treaties, intellectual property rights, the extreme concentration of control over commodity trade, commercial seed development and sales, agro-chemicals, processing and food product retailing. Production, and farmers' interests, have become a small and relatively powerless part of the value chain. It is said that these trends are the 'inevitable' consequence of competitive markets - as if markets and the rules within which they function, were not also institutions created by conscious or casual decisions. It is said also that these institutional developments are necessary to feed an expanding global population, that is increasingly urbanised, and to satisfy increased consumer demand for meat and dairy products. However, they are forcing farming system development along a trajectory that calls into question the sustainability of soils, water availability and quality, agro-biodiversity, and reliance on carbon energy and phosphorous – and hence also the sustainability of food provisioning. Business as usual calls into question also the survival of broad-based knowledge, capacity and skills in farming and food systems. Is this a sensible, resilient pathway? Climate change throws into the mix a number of wild cards. Mitigation already seems a lost cause. Less well recognised is that since it is impossible to determine the parameter values of change, in time frames and location-specificity that are useful for farm decision-making, adaptation – that implies planned responses to known parameters of change – also seems an insufficient response. What has and can the IFSA movement offer to guide, in societal terms, rapid systemic transition toward resilient farming and food systems?

In this address I review and assess a number of emergent lessons from IFSA's experience over the last decades, that might offer some comfort and hope in meeting these challenges.

Keynote: The converging insecurities of food, water, energy and climate, and their implications for 21st Century farming systems

[Andrew Campbell](#)¹

Charles Darwin University in Darwin, Australia

Rural landscapes and natural resources are becoming increasingly contested. The era of easily extracted fossil fuels is coming to a close. Inherent climate variability, exacerbated by underlying climate change, is increasing pressure on water resources. Climatic extremes are more frequent and intense, stressing farming systems and food security. Energy prices are reflected in the cost of transport and nutrients, particularly agrichemicals and fertilisers. Population growth and changing demographic and consumption patterns see increasing demand for food, but the traditional means of increasing food production through expanding and intensifying the footprint of agriculture is increasingly squeezed by land, water, energy, nutrient and carbon constraints. In rich industrialised countries, the general public and consumers are also concerned about biodiversity conservation, landscape

¹ **Professor Andrew Campbell** is the Director of the [Research Institute for the Environment and Livelihoods](#) and Head of the School of Environment at Charles Darwin University in Darwin, Australia. With training in forestry, rural sociology and knowledge systems from the University of Melbourne and Wageningen Agricultural University in The Netherlands, his research interests span the interactions between climate, water, energy, food systems and biodiversity, and the interface between knowledge, science and policy.

Andrew Campbell was previously Managing Director of [Triple Helix Consulting](#), Chief Executive of [Land & Water Australia](#) and a senior executive in the Australian Government Environment portfolio. He was instrumental in the development of Landcare, as Australia's first National Landcare Facilitator. He chairs the board of the [Terrestrial Ecosystem Research Network](#), is a Visiting Fellow at the [Fenner School](#) at the Australian National University, a Commissioner of the IUCN World Commission on Protected Areas, and a Fellow of the Australian Institute for Company Directors. Andrew Campbell still maintains an involvement in his family farm (forestry, grain crops and sheep) in south-eastern Australia, where his family have been farming since the 1860s.



amenity, water quality, animal welfare, GMOs, public health and safety, and fair trade. These concerns are reflected in policy, planning and governance systems for rural landscapes and natural resources to varying degrees in different countries.

Against this backdrop, the task of developing sustainable and resilient farming systems that meet societal needs in volatile climates is formidable. Rich economies like Europe, North America and Australia should set high-level strategic objectives for our agricultural and natural resource management systems. For example: to double food availability for consumption; to double water and energy productivity; to become a net producer rather than consumer of energy; and to become carbon-neutral — by say 2030. Each of these goals is technically ambitious. Pursuing them in parallel represents a daunting integration task for both science and policy. Doing so, while respecting broader objectives around biodiversity, landscape amenity and social cohesion, will be a searching test for traditional approaches to research investment and management, for the interface between science and policy, and for knowledge management and science communication.

This presentation will explore how such objectives might be achieved, and their implications for research and extension, from research investment through to broader industry, stakeholder and community engagement.

**Workshop 1.1: Actor-driven or instrument-driven: does it make a difference?**Convenors: **Jesús Rosales Carreón, Fleur Marchand** and **Lies Debruyne****Theme 1: Innovation, knowledge exchange and learning****Workshop 1.1: Actor-driven or instrument-driven: does it make a difference?**Convenors: **Jesús Rosales Carreón**, Copernicus Institute of Sustainable Development, Utrecht University, The Netherlands**Fleur Marchand, Lies Debruyne**, Social Sciences Unit, Institute for Agricultural and Fisheries Research (ILVO), Belgium

To overthrow barriers that impede transitions towards a sustainable agriculture, to increase the development or adoption of new systems, establishing linkages between stakeholders seems to be valuable. Furthermore, experiences with monitoring and evaluating various processes are very diverse. In this workshop, we will consider the role of instruments and the role of actors in knowledge exchange and learning processes towards sustainable farming.

Different perspectives on animal health and implications for communication between stakeholdersSusanne Hoischen-Taubner¹, Alexandra Bielecke², Albert Sundrum¹¹ Faculty of Organic Agricultural Sciences, University of Kassel, Germany, ² Schulz von Thun Institute of Communication, Hamburg, Germany, susanne.hoischen@uni-kassel.de

Despite numerous efforts of various professional groups, the level of production diseases in livestock production remains on an unsatisfying high level. Barriers in the process of knowledge transfer in connection with the improvement of the animal health status have been the topic of a study taking different stakeholder perspectives into account. Using instruments of communication science, the perspectives of farmers, agricultural and veterinarian advisors as well as animal scientists were brought together and discussed in workshops. The process revealed the following barriers in the transfer of knowledge: diverging comprehension of animal health, complexity behind multifactorial production diseases, reluctance to assume responsibility, and role conflicts. We conclude that the current communication structure between stakeholders is highly self-referential and not appropriate to enable a target-oriented transfer of knowledge aiming to reduce prevalence rates of multifactorial production diseases on the farm level. Hence, an impulse from "outside" is required to irritate the deadlocked situation and provide new orientation.

Keywords: *Knowledge transfer, stakeholder analysis, self-referential judgments, reflection, conflicting areas***Farmers' rationality in soil management: which factors influence implementation of sustainable management practices in soil conservation? – A case study in Germany and Austria**M. Werner¹, HH. Steinmann¹, N. Schlatter², H. Spiegel², E. Wauters³, G. Ruyschaert³¹ Georg August University Goettingen, Germany, ² Austrian Agency for Health and Food Safety (AGES), Austria, ³ Institute for Agricultural and Fisheries Research (ILVO), Belgium, mwerner6@gwdg.de

Sustainability in farming practices is of increasing importance in research and society. There has been extensive research on best management practices to mitigate soil degradation. However, invariably the success of practices proposed by scientists and technicians rely on farmers to implement them, ultimately the farmers' actions will determine the soil quality status.

This paper aims to contribute to the provision of insights into farmers' perception of soil and of soil management. Based on this understanding it aims to identify barriers and drivers to adoption of sustainable soil management beyond mere technical aspects. Finally the paper explores the role of soil management in overall farm management by reconstructing the rationality of farmers' decision making in crop rotation and weed management. The study is based on a qualitative approach using open and semi-structured in-depth on farm interviews.

Insights into farmers' decision making in combination with barriers/drivers for implementation of sustainable soil management practices can contribute to a better understanding of what is needed to foster better farm compatibility and thus adoption of these practices.



Workshop 1.1: Actor-driven or instrument-driven: does it make a difference?

Convenors: **Jesús Rosales Carreón, Fleur Marchand and Lies Debruyne**

The research leading to these results has received funding from the European Community's Seventh Framework Program under grant agreement No. 289782 (Catch-C)

Keywords: *farmers rationality, soil perception, soil management, soil conservation*

Using games to support multi-stakeholder decision-making for sustainable development of livestock production

E.M. de Olde^{1,2,3}, I.J.M. de Boer²

¹ Department of Engineering, Aarhus University, Denmark, ² Animal Production Systems group, Wageningen University, The Netherlands, ³ Land Use Planning group, Wageningen University and Research Centre, The Netherlands, evelindeolde@gmail.com

Decision-making for sustainable development of agricultural regions is challenged by the complexity of the livestock system and the involvement of multiple actors. To support the decision-making process, model-based games could improve the understanding of possible consequences of decisions at hand. This study analysed the opportunities to use model-based games in order to support the decision-making process in the Peelhorst region, an area with a high livestock density in the south of the Netherlands.

Stakeholders were interviewed to identify key issues in the decision-making process. This yielded two types of issues: 1) issues related to the sustainability of the livestock system; such as public health and odour and 2) process related issues, i.e. issues related to governance or stakeholder interaction, such as trust and awareness. For each issue a literature review was made and possible indicators and models were identified. For half of the issues clear indicators or models were found, whereas for the other half no clear indicator could be defined and additional research is needed. Tackling issues related to governance requires discussions or workshops with relevant stakeholders. Model-based games could feed into these discussions to encourage knowledge exchange and support decision-making.

Keywords: *games, decision-making, livestock production, spatial planning, participation*

Development and evaluation of an on-demand sustainability tool in Flanders

Coteur Ine¹, Marchand Fleur^{1,2}, Debruyne Lies¹, Bijttebier Jo¹, Triste Laure¹, Lauwers Ludwig^{1,3}

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Facing increasing sustainability demands from society, the regional farmers' organization Boerenbond recently decided to act in a pro-active way towards various demanding parties (consumers, retailers,...). As the sustainable development of an industry finds its origin in the strategies at farm level, the farmers' organization asked to develop an on-demand scan tool for the assessment of sustainable development at farm level. The tool aims at increasing the insights on the sustainability of multiple farm aspects. Through this first goal, a second objective is to support the learning process of the farmer. However, several authors (Weaver and Rotmans 2006, Reed 2008, Bell et al. 2012, Pülzl et al. 2012, Triste et al., in press) identify that the research and development process leading to the tool has an important influence on the success of the outcome. The aim of this paper is to describe and evaluate the set-up of a participatory development process for three different industries (fruit production, greenhouse cultivation and arable farming). How this development process is conceived is based on the results of the lessons learnt on the development process of the MOTIFS tool (Triste *et al.*, in press). The process, context and outcome of the process is studied, with a focus on the outcome (on-demand scan tool). For example, what kind of tool did this process generate and does the tool meet the initial objectives of the project? The evaluation is based on the contextual model of Burgess and Chilvers (2006) and a framework to evaluate participatory research by Blackstock *et al.* (2007). Criteria such as leadership, ownership, social learning and transparency will guide the evaluation. A multiple data collection method (document analysis, interviews) is applied and data are analysed based on the selected criteria and the lessons learnt from previous studies. What lessons were successfully implemented during this development process and which barriers still remain an issue? These insights will also help us to revise the original participatory process and should improve the processes of three other industries (dairy farming, pig farming and horticulture) set up in the future.

Keywords: *sustainability assessment; participatory tool development process, evaluation*



Workshop 1.1: Actor-driven or instrument-driven: does it make a difference?Convenors: **Jesús Rosales Carreón, Fleur Marchand and Lies Debruyne****Next Generation Decision Support Systems for Farmers: Sustainable Agriculture through Sustainable IT**Jessica Lindblom¹, Christina Lundström², [Magnus Ljung](#)³¹Interaction Lab, University of Skövde, Sweden, ²Department of Soil and Environment, Swedish University of Agricultural Sciences, Sweden, ³Extension Office, Swedish University of Agricultural Sciences, Sweden, Magnus.Ljung@slu.se

The core of many changes towards a more sustainable agriculture is the individual decision-maker. The decisions of each farmer have impacts on sustainability and are made in a complex world of contradictory interests and values. Agricultural decision support systems (AgriDSS) will be a major contributor in the realization of a viable farm economy with less negative environmental impact, but it must not only provide current and relevant information. Current DSSs available to farmers, advisors, experts, and policy makers are not used to their full potential. One reason is that they fail to capture the actual needs of the farmers and to understand their decision-making in practice. They are not adapted to the high complexity characterizing sustainable land use decision-making. Among farmers the acceptance of these systems are low, partly because existing DSS are based on what scientists and system developers consider as necessary. As a result, new linkages and better understanding between different stakeholders in agriculture has to be improved. The user-centred design (UCD) approach can answer the core of the identified problems of most DSSs, because it put the farmers' experience in focus and involve them early and continuously in the design process.

In this paper we discuss next generation's AgriDSS which are useful and useable for farmers and other stakeholders. By introducing theories from UCD, illustrated by the Swedish case of implementing Precision Agriculture, we show what is needed to make new technologies contribute to resilient farms and farming systems. We argue that there is a dual link between environmental sustainability and information systems (IS) addressing both *sustainability through design* – how IS can be used to promote more sustainable behaviours, and *sustainability in design* – how sustainability can be the governing principle of the design of the information systems themselves.

Consequently, the next generation's AgriDSS must simultaneously enable stakeholders to get access to the best knowledge available, and at the same time involve them in the process of developing the user interface design. To use existing and future information efficiently, participatory approaches are therefore crucial and need to be a part of transition towards sustainable agriculture.

Keywords: *farmer's decision-making, farmer participation, decision support system, sustainable land use, sustainable IT*

Linkage processes between niche and regime: an analysis of Learning and Innovation Networks for Sustainable Agriculture across Europe[J. Ingram](#), N. Curry, J. Kirwan, D. Maye and K. KubinakovaCountryside & Community Research Institute, University of Gloucestershire, UK, jingram@glos.ac.uk

This paper aims to reveal, and contribute to an understanding of, the linkage processes that connect innovation networks in sustainable agriculture to elements of the mainstream agricultural regime. It draws on findings from analysis of 17 Learning and Innovation Networks for Sustainable Agriculture (LINSAs) analysed within the EU research project SOLINSA (Support of Learning and Innovation Networks for Sustainable Agriculture). The LINSAs examined represent networks of actors engaged in: agricultural food production, alternative food marketing, urban food systems, care farming and farm energy production. The notion of compatibility and linkage at the macro level structures provides a framework in which to examine the linkage processes that enable LINSAs (as niche projects) to adapt and the regime to accommodate them. Five modes of interaction are distinguished based on the level of LINSAs compatibility with the regime; these are labelled: *Compatible; Complementary; Emergent; Divergent; and Oppositional*. The study reveals the dynamic and complex nature of both the LINSAs and the regime entities and their interactions and the range of linkage processes that enable LINSAs to adapt and the regime to accommodate them. In conclusion, although the challenges of transition to a more sustainable agriculture are often articulated at a macro level, this study shows that at a sub-niche or project level multiple linkage processes are operating which can help to bring about a transition to sustainability.

Keywords: *innovation, learning, sustainable agriculture, networks, niche, regime, linkage processes, LINSAs*



Workshop 1.1: Actor-driven or instrument-driven: does it make a difference?

Convenors: **Jesús Rosales Carreón, Fleur Marchand and Lies Debruyne**

Approaching initiatives stimulating sustainable farming as characteristics of learning practices

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Sustainable development can be described as ‘wicked problem’ without fixed end goals or templates to achieve it. Suggestions to start challenging our existing practice, resulted in a number of initiatives to stimulate farmers to increase the sustainability of their farming practices. These initiatives are very diverse with respect to the actors involved, the tools used, the setting in which it takes place, etc. The contestable, normatively and revolutionary concept of sustainability calls for learning as an essential element of projects and practices that seek to contribute to a sustainable development. Although before mentioned initiatives for sustainable farming claim to spur farmers towards a more sustainable farming practice, insights on how and if these initiatives influence the sustainable development of farming practices are lacking. Therefore we try to find out the kind of learning that is necessary to achieve a sustainable development of farming practices through literature on Education for Sustainable Development (ESD) and educational practices. Based on a framework of Lankester, we ordered a non-limitative list of characteristics of educational processes mentioned in literature in categories ‘who learns’, ‘why is learned’, ‘how is learned’, ‘what is learned’. These characteristics will be used to analyse four cases where farmers are stimulated to increase the sustainability of their farm. Two of these initiatives are located in The Netherlands (‘Veldleeuwerik’ and ‘Koeien en kansen’) and two are located in Belgium (‘Beloftevol Boeren’ and ‘Boerenbond duurzaamheidsproject’). Based on this analysis, we derive recommendations on how the educational dynamic within these practices can be further stimulated and farmers learn to deal with sustainability as a wicked problem.

Keywords: *sustainable farming practices, learning practices, learning dynamics, literature review*



Workshop 1.2: Evaluation of policy schemes supporting innovation and advisory services: new concepts, methodologies and case studies

Convenors: **Susanne von Münchhausen, Anna M. Häring, Henrike Rieken, Kristin Davis, Pierre Labarthe, Andrea Knierim, Michael Kügler, Sabine O'Hara**

Workshop 1.2: Evaluation of policy schemes supporting innovation and advisory services: new concepts, methodologies and case studies

Convenors: **Pierre Labarthe**, INRA SAD, France
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The production of knowledge and the support to innovation are projected to become key priorities of agricultural and rural policies. Nevertheless, the huge diversity of policy conception and implementation indicates the need for evaluation and analyses which aim at identifying the policy that best fits in the particular context. The workshop will also allow for North-South exchange about cases, concepts and methodologies.

'Failing' to implement FAS under diverse extension contexts: a comparative account of Greece and Cyprus

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The setting-up of Farming Advisory System(s) is an important element of the 2003 European Union Common Agricultural Policy reform. FAS (i.e. advisory activity) has been introduced through Reg. 1782/2003 primarily, but not exclusively, aiming at helping farmers with cross-compliance, i.e. the maintenance of farms in good agricultural and environmental conditions (GAEC). The current paper aims at critically examining the implementation of FAS in Greece and Cyprus. The two countries have different extension systems which have decisively affected the implementation of FAS. Greece is a characteristic case of the demise of extension while in Cyprus the 'traditional' extension service is, despite shortcoming, still well-functioning. In both cases the setting up and implementation of FAS seems to have failed - at least as far as the numbers of farmers participating in the scheme is concerned. The exploration of the reasons for such a 'failure' is thus undertaken.

Keywords: *extension systems, FAS, Greece Cyprus*

Advisory services in the United Kingdom: exploring 'fit for purpose' criteria

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The concept of Agricultural Knowledge and Information System (AKIS) offers a multi-actor perspective designed to deal with the complexity and the diversity of information sources and channels in rural areas. Advisory services are a subsystem of AKIS that are meant to provide farmers with relevant knowledge and networks around innovation, as well as adjustments to policy and markets in agriculture. It is contested whether a fragmented AKIS and associated advisory services is problematic and policies should strive to enhance its integration and coherence, not least because the multiplicity of service providers is confusing to farmers and land managers. Other authors argue that with the diversity of farmers' practices and information needs, an array of providers that operate simultaneously is needed to address these needs while a uniform national approach is neither useful nor necessary. The current UK AKIS and the advisory sub-system are characterised by a diverse advisory community and fragmentation. This paper takes the discussion beyond fragmentation to investigate whether the UK advisory system are 'fit for purpose'. We explore the characteristics of advisory services by means of identifying criteria for well-functioning services and investigating to what extent they are currently met. Data were collected in an online survey of 80 agricultural advisory organisations across the UK. Findings show that most criteria are met but a number of client groups are not targeted by advisory services and some organisations use only a narrow range of advisory methods.

Keywords: *advisory services, extension, agriculture, AKIS*



Workshop 1.2: Evaluation of policy schemes supporting innovation and advisory services: new concepts, methodologies and case studies

Convenors: **Susanne von Münchhausen, Anna M. Häring, Henrike Rieken, Kristin Davis, Pierre Labarthe, Andrea Knierim, Michael Kügler, Sabine O'Hara**

Evaluating a Co-innovation Policy Initiative in New Zealand

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This paper describes a methodology to evaluate the process and impact of applying a “co-innovation” approach in the New Zealand Agricultural Innovation System. This is a participative and interactive approach to fostering effective innovation across sectors and stakeholders. The project involves four projects each providing an “innovation network” in different industry sectors which interact with a targeted national “Community of Practice” operating across organisations from industry, research and government in three primary sectors. This requires evaluation instruments capturing data at both process and impact levels and feeding emerging findings to project participants to guide on-going action. The project is in its first year and initial data is already providing insights into the notion of co-learning and its impact on participants and the innovation system. This paper details the evaluation approach being used and the initial results obtained.

Keywords: *Agricultural Innovation System, Co-Innovation, Evaluation, New Zealand, Participative RD&E, Policy*

Advisory Services in System of Agricultural Knowledge and Information in Poland

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The main goal of paper is analysis and evaluation of Polish advisory system and the process of its restructuring and role in Agricultural Knowledge and Information System. The base materials for analysis are: data of survey, done among 16 Provincial Advisory Centres in 2012-2013, results of earlier research and discussion panel of 16 ODRs' directors done by authors. The first part contains the historical overview of the development of the agricultural advisory system in Poland, its organizational structure as well as the structure of AKIS. The second part describes the financing mechanisms and funding schemes to cover advisory work and the last part presenting AKIS stakeholders in Poland.

Paper is prepared under the UE Project „Prospects for farmers' support: Advisory services in European AKIS” (PRO AKIS – FP7-KBBE-2012.1.4.-07).

Keywords: *agricultural advisory, type of organization, structure of management, financing schemes, AKIS stakeholders*

Systemic problems hampering innovation in the New Zealand Agricultural Innovation System

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This study identifies systemic problems in the New Zealand Agricultural Innovation System (AIS) that affect the ability of participants in the agricultural sectors to co-develop technologies. We integrate structural, functional and dynamic streams of innovation system enquiry, gathering data through 30 semi-structured interviews with individuals in Government, industry and research. Interviews explored perceptions of the influence of actors, interactions, institutions, infrastructure, and market structure on the effectiveness of AIS functions. Examples of systemic problems were: (i) a lack of facilitative and transformational leadership and systemic intermediaries to support the formation of strategic innovation agendas in vertically and horizontally fragmented industries, (ii) a culture of hunting for funding within research organisations hindering sustained involvement of researchers in innovation, (iii) a large number of actors in the R&D component of the AIS competing for public resources to pursue uncoordinated innovation agendas, and (iv) a lack of institutional support for actor interactions and roles that support interactions, such as innovation platforms and innovation brokers.

The existing New Zealand AIS limits innovation to a linear process; restricting opportunities for innovation to occur and fostering competition amongst organisations that collectively have much to contribute to innovation in the agricultural sectors through constructive collaboration and roles in all facets of the innovation process. These findings indicate an urgent need to create a policy and legislative framework, built on a systemic understanding of innovation, that more pro-actively stimulates and fosters co-innovation. Such a framework would feature



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elements of innovation brokering organisations and multi-actor platforms for innovation agenda setting and prioritisation, in which all actors in the value chain and innovation support system jointly articulate the innovation agenda.

Keywords: *Agricultural Innovation System, co-innovation, systemic innovation policy framework, systemic instruments, interviews, New Zealand*

Farm Innovation through Rural Development Programmes 2014-2020: an evaluation model of the EIP

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The European Rural Development Policy (RDP) 2014-2020 calls for building bridges between the research and the entrepreneurial worlds, through mainstreaming existing tacit knowledge and developing innovations to firms. In this view, the implementation of an "interactive model" for innovation is a focal point of the concept of the European Innovation Partnership (EIP) which will be implemented through the operational groups (OGs). These latter will be acting entities applying for co-operation projects for innovation through involving different relevant actors, such as farmers, scientists, advisors, enterprises and others.

The novelty of the OGs action calls for the setting up of an adequate monitoring and evaluation strategy to be carried out by the evaluators of the RDPs 2014-2020 in view of capturing the interactive innovation model being applied by the OGs, through a qualitative and quantitative assessment of their implementation and performances as well as of their capacity to foster knowledge transfer and innovation across the rural systems. Accordingly, this study proposes an evaluation strategy which, by taking steps from the conceptual background outlined by Cristiano and Proietti and the European Evaluation Network for Rural Development, places great emphasis on exploring the OGs, the innovation brokerage and the farmers actions (behaviours, practices and capacities) as well as analysing farmer-system related determinants of innovation (policy, supply chains and advisory systems). The evaluation strategy is established upon a set of dimensions, questions and respective criteria and proposes an overall participatory approach to be implemented by the use of a mix of methods and a vary of tools, which permit to capture the complexity of the interactive innovation, through investigating on a vary of relevant fields and perspective levels.

Keywords: *evaluation, operational group, knowledge brokerage, interactive innovation, RDP, EIP.*

Advisory services within national AKIS – concepts and empirical evidence from selected EU member states

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Recently, Agricultural Knowledge and Innovation Systems (AKIS) have gained considerable attention in scientific and political fora in the EU. AKIS is considered as a key concept to identify, analyse and assess the various actors as well as their communication and interaction performances for innovation processes in the agricultural sector. Through qualitative expert interviews and with the help of an institutional mapping the appraisal of the national AKIS and especially the role(s) and functions of advisory services as one major actor within these systems have been investigated in selected EU member states (BG, DE, F, IRL, PT and UK). We will present the varied national conceptions of AKIS and compare them qualitatively with regard to the institutional settings, and their overall policy frameworks and coordinating structures. Specific attention will be given to agricultural advisory services and their integration within the respective national or country-wise AKIS. Conclusions are drawn with regard to the practiced conceptual and the methodological approach towards AKIS.

Keywords: *AKIS appraisal, Europe, AKIS diagram, advisory service providers*



Workshop 1.2: Evaluation of policy schemes supporting innovation and advisory services: new concepts, methodologies and case studies

Convenors: **Susanne von Münchhausen, Anna M. Häring, Henrike Rieken, Kristin Davis, Pierre Labarthe, Andrea Knierim, Michael Kügler, Sabine O'Hara**

Analysis of the Role of an Innovation Broker Appointed by an Environmental Innovation Partnership in the Cotton Industry, Queensland, Australia

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Outcomes from contemporary Agricultural Innovation Systems (AIS) can be viewed as the product of interacting plural, multi-level and often short term, concomitant initiatives. The new language of Environmental Innovation Partnerships (EIP), Organisational Groups (OG) and Innovation Brokers (IB) appears to engage with this perspective. Reflecting on our 2007 Australian case, members of an AIS developed what could now be considered to be an EIP. Their objective was to support accelerated adoption of better irrigation practices within an Australian cotton catchment. One of the members of the partnership was operating an Agri-Environmental Scheme (AES) that was seeking to monetarily incentivise the on-farm implementation of environmentally-sensitised irrigation practices. The members pooled their resources, and appointed a short term IB to facilitate the use of the financial incentives by local irrigators and their agronomic advisors to purchase knowledge based on their self-identified irrigation knowledge needs. The IB was to also facilitate better linkages between all relevant initiatives in relation to irrigation, water, cotton and the catchment. The hypothesis was that new or modified OGs would emerge, driven by the knowledge needs of the participants, and that practice change would ensue. Members of the EIP also reasoned that if these OGs could be sustained post-project that a legacy of on-going systemic change could be achieved. Our research shows that the EIP was successful in terms of exceeding short term objectives. However, the EIP was not successful in terms of generating a post-project legacy, by new or altered OGs that could drive further practice changes in the AIS. An analysis of these results allows us to consider innovation processes supported by AESs, EIPs, multi-level OGs and IBs within short time frames. It also allows us to explore the implications for evaluation of such initiatives.

Keywords: *Agricultural Innovation System, Innovation Broker, Organisational Groupings, Agri-Environmental Incentives, Evaluation, Cotton Farming Systems, Australia*

Linking Innovation and Research in Agricultural Knowledge and Innovation Systems

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Innovation is high on the agenda, in view of the deep economic crisis and the challenges of feeding 9 billion people in 2050 in a more sustainable way. For an effective and efficient response the Agricultural Knowledge and Innovation Systems (AKIS) needs to innovate itself and adopt new ways of working. This paper reports on work carried out by the EU's SCAR to implement the European Union's (EU) European Innovation Partnership (EIP) 'Agricultural Productivity and Sustainability' in relation to Horizon2020.

National and regional governments can stimulate innovation by implementing the EIP through multi-actor operational groups that work in a participatory way. This is to be translated in an instrument portfolio that consists of incentives for research, development and innovation as well as the stimulation of knowledge exchange, adoption of innovation and technical application in the production process. The support of facilitators and innovation brokers is of core relevance for AKIS as well as the establishment of operational groups.

Special attention is needed to incentivize research to be responsive to the needs of innovation processes. Our recommendations suggest that at least for some of the Horizon2020 project calls or national funded research better incentives could be installed to link innovation and research.

Multi-actor innovation might benefit from modern ICT support. There is a great potential for using existing social software tools and platforms for communication, interaction, knowledge sharing, preservation of information and as such stimulate multi-actor innovation.

The difference between innovation and research means that governments have more instruments than research to promote innovation. Extension and education, fiscal measures, credit guarantees, innovative procurement, inducements like prizes and other incentives can help too. There is an important European dimension to innovation and innovation policy.

Keywords: *EIP, innovation policy*



Workshop 1.2: Evaluation of policy schemes supporting innovation and advisory services: new concepts, methodologies and case studies

Convenors: **Susanne von Münchhausen, Anna M. Häring, Henrike Rieken, Kristin Davis, Pierre Labarthe, Andrea Knierim, Michael Kügler, Sabine O'Hara**

Systemic evaluation of management advice for family farms approaches in Africa: the increasing role played by Producers' Organizations

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In Africa exists a plurality of forms of advisory services provided by several actors. In this context experiments in MAFF (Management Advice for Family Farms) conducted with French support for nearly two decades in many Francophone African countries have sought to promote comprehensive advice to farms, one that is based on learning methods. Questions now arise on how to increase the number of producers with access to advisory services (AS) and how to improve institutional and financial sustainability of advisory mechanisms.

To address such questions we carried out a systemic evaluation of existing AS in order to identify the constraints and perspectives to scale them up and/or out and to improve the sustainability. We used four main criteria: (i) modalities of mechanism of governance, (ii) MAFF funding modalities, (iii) modalities for capacity and skill building for advisers and other actors, and (iv) modalities to adapt advisory services to regional or national situations. Internal assessments based on this analytical framework were carried out by various MAFF systems in 8 countries. A workshop was organized in 2013 in Benin with the actors involved in the internal assessment to help draw out lessons.

The results show the diversity of internal governance mechanisms of MAFF. There are evidences of the strong role played by POs in the direct implementation of advisory services in many countries. However, a lack of connection between MAFF and other services of the PO limit the capacity of PO to efficiently meet the needs of its members. Funding mechanisms are still fragile. The contributions from farmers and their POs continue to remain limited. Many difficulties are due to a lack of well-trained advisors related to poor national specific training programmes. For many MAFF systems farmer extension worker are the future but only under certain conditions. Changes in methods are observed in order address the question of scaling out.

From the “best fit” to the “big fuss”: the lost opportunities of the Italian advisory services

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The regionalization of the public Italian advisory services responds to the extreme differentiation of the local farming systems, institutional arrangements, market opportunities, and many other contextual factors. In Italy, each Region has its institutional framework on agriculture advisory services, developing 21 different Agricultural Knowledge and Innovation System that rarely interact with each other.

The possibility to design an agricultural advisory system on local basis could be an important prerequisite in devising a system that fit the specific needs and situations, according to the theoretical framework that support a shift from a “best practice” or “one-size-fits-all” to a “best fit” approach in the reform of public advisory services (Birner, 2006).

However, the decentralization of Italian advisory system produces a great variety of regional public systems with different quantity and quality of service delivery, poor coordination, duplication of efforts by key players, limited funding, penalizing the farming systems in some Regions. The recent measures to cut public extension system have further compromised the quality of services offered while new challenging scenarios demand an even more complex knowledge needs.

The main aim of this paper is to analyse the effects of decentralization and of current disinvestment in the Italian public extension services, while the knowledge needs of small and medium-sized farms (by international standards, the farms managed in Italy are very small and thus rarely competitive on the global markets), the emphasis on public goods provided by agriculture and the dominant narrative of rural development require more support from advisory services.

The study is carried out within the EU FP7 Project Prospects for Farmers Support: Advisory Services in European AKIS (PRO AKIS).

Keywords: *agricultural advisory service, Agricultural Knowledge and Innovation System*



Workshop 1.3: Innovation Platforms as Drivers of Institutional Change

Convenors: **Janice Jiggins, Ray Ison, Niels Röling**

Workshop 1.3: Innovation Platforms as Drivers of Institutional Change

Convenors: **Janice Jiggins**, Knowledge, Technology & Innovation group (CPT section), Wageningen University, The Netherlands
Ray Ison, The Open University, UK/Monash University, Australia
Niels Röling, COS-SIS Programme, Wageningen University, The Netherlands; University of Ghana, Ghana; University of Abomey-Calavy, Benin; Institute of Economic Research, Mali.

Participants at the 1994 (Montpellier) FSRE conference recommended that more attention be paid to the institutional aspects of purposeful systemic change. This workshop focuses on the role of Innovation Platforms in removing or by-passing the institutions that constrain multi-level innovation, and creating or strengthening institutions that support farming system transformations.

Assessment of farmer participation in on-farm adaptive research in South-western State, Nigeria

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ABSTRACT This paper addresses farmers' participation in On-Farm Adaptive Research (OFAR) in South-western Nigeria. The concept of OFAR entails full participation of farmers in the research process, direct contact between researchers and farmers and intensive investigation of farmers' situations to strengthen Research-Extension-Farmers Linkage. Farmers' level of participation is critical in creating room for consideration of local ethics, culture, environmental and socio-economic characteristics to enhance successful and accepted programmes. This study sought to assess farmers' level of participation based on four major phases of OFAR process: diagnostic survey phase, research phase, field test phase and demonstration phase. A multi-stage sampling technique was employed to collect cross sectional data from 350 farmers in South-western Nigeria. Farmers were favourably disposed to participation and inadequate input, capital, access to information; time and non-availability of market were major constraints against participation in OFAR. The implications of these findings for both research professionals and farmers are discussed.

Keywords: *Keywords: Participation, OFAR, Extension, Linkage, Research*

Developing an Innovation Agenda for Water Productivity: the case of an innovation platform in research

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Research in innovation studies suggests that appropriate starting conditions are required if alignment of research to practice and policy is to be enabled. To achieve this alignment, a scoping exercise is required and must involve those people and institutions who have an interest or stake in the research. This paper describes such a scoping exercise to develop an Innovation Agenda for Regional Water Productivity in Australia through a new research initiative at the University of Melbourne. This Agenda was developed through a two-stage engagement project in which opportunities and constraints for innovation in regional water productivity were identified and discussed with key stakeholders without pre-empting research or development questions. Firstly, we conducted an online survey of water sector stakeholders using a Delphi process. Then the findings of this survey were considered and augmented in discussions with key experts in a stakeholder workshop. We suggest that together these engagement activities represent a platform for innovation in which novel thinking was generated in conversations involving researchers, key water sector institutions and communities. In aiming to progress innovation in water productivity, we also suggest that organizations such as the University of Melbourne and its partners, need to invest in such platforms as a pre-requisite to creating practice and policy change through research.

Keywords: *water productivity; research; innovation; stakeholder engagement*



Workshop 1.3: Innovation Platforms as Drivers of Institutional ChangeConvenors: **Janice Jiggins, Ray Ison, Niels Röling****Using co-innovation to stimulate change in the New Zealand agricultural sector**

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A recently implemented research and development program, called Co-learning and Co-innovation to Achieve Impact in New Zealand's Biological Industries, aims to stimulate change in the New Zealand agricultural sector, which is an important contributor to the New Zealand economy mainly through exports. The program is attempting to implement agricultural innovation systems principles in 4 Innovation Platforms (IPs), evaluate the processes and outcomes, and influence the national innovation system to enable putting the principles of agricultural innovation systems into practice. Three streams of work are used; an academic stream that translates between theory and practice, an application stream responsible for implementing co-innovation principles in 4 IPs and a stream responsible for "scaling up" i.e. influencing and stimulating change at the innovation system level. Each of the streams has a leader, forming the core research team that meets regularly and co-ordinates activities between the three streams. An experienced international science advisor and international collaborations ensure research quality, rigor and depth. Reflexive monitors in the innovation studies and leadership team ensure that co-innovation principles are applied and that adaptive management occurs. A reflexive monitor is a person who challenges and influences presumptions, current practices, and the underlying institutions, either in the design of a project or in its management, and who keeps reminding participants of the ambitions for system innovation. The use of reflective practice in the program ensures that AIS principles are consistently used at all levels. The paper describes how the program, which uses an Agricultural Innovation Systems (AIS) approach (colloquially called "co-innovation") and 4 Innovation Platforms, was implemented and highlights the lessons learned during the first 14 months of the program against a backdrop of AIS theory, principles and practices.

Keywords: *Agricultural Innovation System, Innovation Platform, Co-Innovation, Lessons, New Zealand, Implementation.*

Two steps forward and one step back: Progress towards innovation platforms for Agricultural Workforce development in Australia

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Agricultural workforce development is an emerging domain for multi-stakeholder, multi-level, systemic innovation, particularly in Australia. Associated with increasing farm size and production in response to post-drought climatic conditions and low levels of unemployment from the mining boom, the challenges in attracting, retaining and developing a workforce is emerging as an important area of policy interest and practical concern for farming systems. This paper reports on empirical research into the issues of workforce development within the Australian dairy and cotton sectors with particular emphasis on the institutional arrangements that are supporting or hindering farming systems transformation related to workforce issues. Both sectors have prioritized workforce issues as areas of national significance and have embarked on different combinations of initiatives including the development of national workforce strategies, conducting research and development, advocating for policy changes, building advisory capacity and trialling new governance arrangements to span national and regional scales. Emerging findings suggest that national initiatives and community-level projects working together as platforms for innovation to address workforce concerns are necessary for creating wide impetus for change. Further, 'champions for change' at both national and local levels are important for providing the 'case' for innovation and working together. However, issues with sustaining these platforms have been identified. National initiatives, local projects and the presence of champions are highly contingent on particular policy settings, sources of funding and are open to the uncertainties associated with stakeholder 'representation'. This means that the assemblage of the right people, at the right time and in the right place/scale can rarely be sustained and is ultimately not conducive to systemic change and innovation. We describe participatory research methodologies that have informed and facilitated the formation of different types of innovation platforms to progress the agricultural workforce issues of the cotton and dairy sectors, however without a single institution (e.g. government) or collective agreement between key institutions (e.g. government, industry, education) to take on



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the mantle of providing the environment for agricultural workforce innovation platforms to flourish, the establishment of such platforms as a response to the current challenges remains precarious.

Keywords: *agricultural workforce; social learning; workforce development systems*

The fair-milk “Fairebel”: a multi-level innovation

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The case on which the study focuses is the Belgian fair-trade milk « Fairebel » which had been created by dairy farmers few months after the 2009 milk crisis. This innovation is overseen by the program “Fair Milk” set up by the European Milk Board (EMB), a European organisation of dairy farmers, which has established 5 fair-trade milks in European countries (Austria, Netherlands, Belgium, Luxembourg and France). At the Belgian level, the case study of the “Fairebel” project shows how the dairy system is locked in. In such an irreversible system, the developers of “Fairebel” have to use cunning and make some contradictions (or even incoherences) to build their idea of a fair-trade milk and make it be commercialized in the concrete world of products. Also, the “Fairebel” project tries to increase the market power of dairy farmers and by-passes entirely the dairy industry in Belgium which had refused to support the project. For example, the developers of “Fairebel” stock up on the spot market and the production of the “Fairebel” milk boxes is made by the Luxembourgish dairy Luxlait. At first glance, the “Fairebel” project is more a greening than a radical transition of the system: it uses devices of the main system to try to change some bad consequences (the remuneration of dairy farmers) without pushing to a structural transition. At the European level of the EMB to which “Fairebel” is participating, the transition of the system is radicalized by changing the character and the structure of the regime itself (e.g. CAP) : reversal of the actors’ power, re-appropriation of the means of production by the farmers, modification of the economic and trade rules of the dairy products (e.g. monitoring agency). Taken together, these two levels of this fair-milk innovation strengthen each other and the transition which is inspired by “Fairebel” is more radical than at the Belgian level considered alone.

Keywords: *Fair-trade, innovation, transition, multi-level, milk, dairy industry, Belgium*

Learning systems, innovation and ‘the wrong kind of weather’

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Extremes of wet and dry weather experienced in the UK in the past few years have raised many questions and issues about traditional water managing and farming practices. Farm infrastructure and traditional machinery have been found limiting in addressing some of the issues that have arisen, such as increases in flooding, diffuse pollution and inability to access land to carry out basic farming operations. This paper considers some of the reactions to these issues from those who are tasked with trying to address them both in the short and long term. These include those who suggest that it is not the weather that is at issue but how we deal with it, with our legacy systems of technologies and institutions. The paper is written from the viewpoint of considering what kinds of social infrastructure can support learning to make improvements in such situations at a range of different levels. It also reviews the nature of some of the learning that has taken place and discusses implications for future learning system design. Examples are drawn from two research contexts, one an on-going European project that concerns water governance and climate adaptation and the other a community of researchers working on the development of a new generation of agricultural machines they claim to be more appropriate to extremes in weather. Theories of social learning systems, including communities of practice will inform this contribution.

Keywords: *Learning systems, climate change, water, agriculture, innovation, communities of practice.*

Change of practices: institutional conditions and local actions

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While earlier policy failed to increase rice production in Benin, the current policy programmes seem more effective. Rice production has increased. The outcomes with regard to changes in farmers’ practices however, are



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rather diverse. In our contribution, which builds on the PhD-study of the second author, we will discuss how the new generation of policy programmes has provided the institutional conditions to change farmers' practices of rice production and water management in inland valleys in Benin. Among the relevant outcomes of the programme interventions are the change from ineffective collective canal cleaning to effective individual canal cleaning in one area, the use of pumps in upland areas in another and farmers who changed from growing vegetables or maize alone to growing rice and vegetables in the third. The programmes seem to effectively address the major institutional barriers for more effective water management and rice production by providing subsidy for seeds, credits for fertiliser and a market outlet. The programmes allowed the farmers to deal with problems of inequitable land allocation and discriminatory participation in canal cleaning. To understand the contribution of the policy interventions to the changes of farmers' practices better, the chain of events was analysed meticulously with a timeline, by triangulating interviews and informal conversations with field observations. The study shows how the policy interventions interacted with farmers' local actions and local rules. The different outcomes of generic policy are explained by the diversity regarding the importance of rice for farmers' livelihood, local conflict management and diverse physical conditions like the availability of upland area and flooding. PM Although we will not address the role of an innovation platform, we do think that we can contribute to the discussion in this session because the study shows another way of dealing with institutional barriers to change.

Keywords: *Innovation barriers, institutional conditions, rice production, water management, local actions, policy*

The articulation of discourses in innovation networks: who overlooks?Maarten CrivitsInstitute for agricultural and fisheries research (ILVO) - Department Social Sciences, maarten.crivits@ilvo.vlaanderen.be

Innovation is rarely considered a point of contention. It invariably seems to denote some type of intrinsically desired newness most ordinarily associated with effective commercialization of a new technology, idea or organizational form. However, once considering innovation as something happening within a network or 'system' of interdependent actors, it becomes clear that different interpretations and appropriations of innovation are co-evolving in a competitive framework. Although we fully acknowledge the importance of collective learning processes as a basis to overcome barriers for innovation we nevertheless wish to caution for an approach that insufficiently conceptualizes the role of power. Innovation is not solely comprised of the mutual generation of knowledge but also connected to processes of interest articulation as they are performed by the different participants and social groups. In this process a heterogeneous group of actors is involved in aspects concerning power-play, inclusion, exclusion, contestation and conflict (Nahuis, 2007). This consideration reveals a political dimension of innovation and warrants a questioning of the underlying mechanisms of accountability. To gain insight in how more inclusive innovation processes can be built we evaluate how farmer's interests can be articulated and how innovation networks be held accountable to ensure fair representation of farmers. Based on political theory we propose a framework anchored in deliberative democratic theory, an approach which attributes significant transformative power to deliberation in decision making. We elaborate an approach based on the concept of discursive representation, in which representation is related to a procedure guaranteeing a maximum of relevant discourses to be included within decision processes of networks. We substantiate our approach by drawing on a case-study of an innovation network in Flemish Agriculture in which leading stakeholders debated and convened a vision and coalition building trajectory on sustainability in the food system. Using a discourse analysis we reveal competing interpretations of innovation and stipulate their outcome in the collective decision process. We particularly assess how farmer's interests in innovation processes are articulated both by farmers or those claiming to represent them. We end the paper on a practical note by formulating a set of recommendations on how the deliberation of discourses can be worked out more transparently in emerging innovation networks, with a special emphasis on the role of 'the mediator' in this process.

Keywords: *Innovation, political processes, governance networks, representation, farmer perspective, discourses*



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Agricultural Domains as Arenas of Convergence: Moving up from Field and Farm
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Site selection for agricultural R&D is commonly based on agro-ecological conditions, e.g., climate, soils, ecosystems and the farming systems they support. Sites need to represent them for the R&D to be relevant and widely applicable. Site selection seldom anticipates the concerted action of the actors who can make agricultural innovation happen. It tends not take into account the networks of policy makers, professionals, technicians, traders, consumers, financial organizations, farmers, and others who, through their interaction and decision and rule making, positively or negatively determine the outcomes of agriculture, including innovation, externalization of costs, consumption, productivity and distribution of value added. Based on 10 years of action research in Benin, Ghana and Mali, we have learned the importance of agricultural domains as arenas of participation, negotiation, concerted action, innovation, policymaking, institutional development and institutionalization. Agricultural domains are not the same as industries, (cash) crops, irrigation schemes, or agro-ecological zones. We define a domain as a (potential) system of interest of actors who have a stake in some area of agricultural production, marketing and consumption, and share an interest in its performance. This shared interest (with dimensions such as productivity, equity, competitiveness and sustainability) creates a potential for concerted action and institutional development based on concrete interaction among (representatives of) stakeholders on various platforms. Our research in West Africa has worked in nine different domains. They differed considerably in the extent to which they could be considered as ('soft') systems of interest, e.g., in the extent to which actors shared an interest in their performance (or sometimes sacrificed it for short-time gain), or shared an understanding of the mechanisms operating in the domain. The paper will:

- Compare these domains in terms of some major characteristics;
- Analyse factors that facilitate or inhibit innovation;
- Describe some of the scoping, diagnostic and other exploratory systems research, as well as the participatory experimentation, that become vital once domains are embraced as arenas for innovation and development.

Keywords: *interaction, institutions, innovation, systems of interest, West Africa' system analysis*

Programmes, projects and learning inquiries: institutional mediation of innovation in research for development
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There is now widespread interest in how Innovation Platforms (IPs) can mediate innovation processes concerned with research for development (R4D). Too often IP's are viewed as a bolt on extension to the technology delivery pipeline, with little attention to issues of institutional change and any notion of IPs being part of a process of (i) stimulating learning for innovation and (ii) transforming the context so that the gains made from learning can be institutionalised. In this paper we critically examine an attempt at institutional innovation via the creation of a 'learning project' which came to sit alongside 23 R4D projects set within an overall African Food Security Initiative (AFSI) program operating in East and West Africa. Institutional constraints and opportunities are explored including how the overall approach could have been reframed as an organisational innovation platform designing, managing and evaluating IPs at different systemic levels of governance i.e., in the collaborative program with CORAF and BECA; in the constituent projects; in the collaborating organisations (e.g. CSIRO, AusAID) and at the level of personal practice.

Keywords: *Systemic innovation, learning systems design, innovation platform processes, institutional design; institutional complexity*



Workshop 1.3: Innovation Platforms as Drivers of Institutional ChangeConvenors: **Janice Jiggins, Ray Ison, Niels Röling****Why platforms for innovation and how – lessons from West Africa**Floquet AnneLaboratoire d'Analyse des Dynamiques de Développement (LADYD) Université d'Abomey-Calavi, Benin,
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Many innovation processes driven by West African smallholders evolve without organizational support or social engineering over decades until they either die out or come up as mainstream sets of practices. Would they have evolved more rapidly and have swifter up- and out-scaled, if platforms had been set up at specific points of the processes, when and how? In order to discuss this question, we build on the results on innovation process case studies in Benin and reflect on their patterns and drivers, especially on how stakeholders coped with organizational and institutional innovations required for technical innovations to emerge and come to scale. We then analyse some specific features of platforms (in terms of scale, scope, segment of the innovation process and facilitation) developed by a range of institutions including CGs-, CORAF funded projects and Cos-Sys, including our own experiences of facilitation of a newly born yam-based platform. We consider the advantages in terms of better networking and voice but also the risks of project-dependency and club building. In conclusion we discuss about conditions for platforms to remain potential powerful organizational patterns sustaining innovation processes when going to scale.

Keywords: *innovation process, innovation platform, West Africa***Innovations for institutional change towards adaptive co-management of human inhabited National Park in Mozambique**Nícia Givá, Nadarajah SriskandarajahEnvironmental Communication, Department of Urban and Rural Development, Swedish University of Agricultural Sciences, Uppsala, 3ngiva@gmail.com

Protected area management has been an area of inquiry where institutional innovations are being continually attempted, particularly when the challenge of reconciling conservation goals and human livelihood needs are beyond the scope of existing management regimes, institutions and mindsets. Limpopo National Park (LNP) in Mozambique as part of a Transfrontier Conservation Area presents a classic case seeking systemic transformation to fulfil its mandate. LNP hosts 27000 people clustered into 44 communities dispersed along its buffer zone. Rain-fed farming systems constrained by cyclical droughts and wildlife encroachment make the communities' livelihoods vulnerable. This situation combined with poor performance of the park management to provide for previously agreed livelihood needs have contributed to poor relationship between park management and communities. A systemic action research approach through a series of iterative workshops were undertaken at district, park, and community levels as ways of creating space for all relevant actors to share their perceptions and worldviews of the situation, allowing learning process to occur and new forms of interaction and communication to emerge. The process to date has consisted of two streams of inquiry. The first is working towards capacity development of park staff through experiential and social learning to build on knowledge and professional competences needed for supporting institutional innovations. The second consists of engaging community, park and other actors in facilitated communication and deliberative processes towards institutionalizing innovations for adaptive co-management as a long term possibility. This paper reflects on the process of building capacity, creating spaces, and making opportunities for greater engagement between park management and communities as aspects of multi-level innovation platforms being drivers for institutional change towards adaptive co-management and farming systems transformation.

Keywords: *Institutional change, Innovation platforms, Adaptive co-management, Systemic Action Research, Mozambique***Innovation platforms for Institutional change: the case of Pesticide Stewardship Network in the Ethiopian Rift Valley**Tadesse Amera, Nadarajah SriskandarajahEnvironmental Communication, Department of Urban and Rural Development, Swedish University of Agricultural Sciences, Uppsala, atadesse2002@yahoo.com



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 Convenors: **Janice Jiggins, Ray Ison, Niels Röling**

Ethiopia grows a wide range of crops for domestic use and the export market. Widespread use of more and newer range of pesticides, with different levels of persistence, associated with growth in the crop production sector, combined with aerial spraying programs against migratory pests have reached critical proportions in farming areas of the Ethiopian Rift Valley. A part of our research has been to study the threat posed to human health and the environment by the accumulation of pesticides in the region. We have also been viewing the Pesticide Delivery System (PDS) in Ethiopia as comprising of policy makers, researchers, pesticide manufacturers, wholesalers, vendors, civil society and farmers as end users. Based on the premise that all actors and institutions in the pesticide delivery system have to be engaged in efforts to reduce pesticide hazards, a multi-actor network of all institutions in the national PDS was established and legally registered in Ethiopia as the Pesticide Stewardship Association (PSA). System-wide pesticide stewardship implies the building of a shared sense of responsibility within institutions at all levels of the PDS to bring about an ethic of reduced and responsible use of pesticides to minimise the impact on human and environmental health. The network was viewed as a platform for collaborative learning and collective action driving institutional change at many levels. National, regional and local level engagement of the actors in the PDS has been attempted and these took the form of policy dialogue workshops, pesticide risk communication and risk reduction dialogues involving local authorities, and action oriented training workshops and Farmer Field Schools among vegetable and cotton growers. This paper will discuss the opportunities and barriers associated with the functioning of the multi-actor network across the PDS as an innovation, and the utility of 'stewardship' for systemic transformation when it is adopted by the pesticide industry as well as those working towards reduction of pesticide use, in the low income farming sector in Ethiopia.

Keywords: *Innovation platforms, Institutional change, Pesticide Stewardship, Ethiopian Rift Valley*

Unravelling group dynamics in institutional learning processes

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Innovation Platforms are created to allow different stakeholders working within different domains of activities to learn to work together towards a common development goal. Learning to work together requires institutional learning- accustomed ways of communication and interaction are questioned, reassessed and reformulated to create a common understanding and shared codes of conduct through which meaningful collective action can occur and succeed. Innovation Platforms thus require 'institutional voids' in which such type of learning can occur. We want to contribute to the discussion of innovation platforms as drivers of institutional change by taking a closer look at the group dynamics within emerging social bodies (König und Schattenhofer 2006). With this we aim at understanding and supporting successful trans-disciplinary group formation in the context of innovation processes (Knierim et al 2012). Specific attention will be given to the occurrence of and the dealing with 'institutional voids' at such multi-actor interfaces (Volmerg 2000). We further aim at understanding the emergence of different team roles, such as collaborative leaders and knowledge brokers, and how they can be distinguished. Moreover, we aim at addressing how individuals take on different roles such as leadership and catalysing functions and how decision making powers are delegated (Wellbrock et al. In Review). Finally we aim at understanding how shared institutions are formed to help different stakeholders interact. With this reflection we want to generate insights that can help to facilitate and ease the formation of innovation platforms in the future. Knierim, Andrea; Siart, Sonja, Müller, Kathrin; Bokelmann, Wolfgang (2012): Sozialwissenschaftliche Agrarforschung – Theorie und Praxis am Beispiel des Innovationsnetzwerkes INKA BB. Paper angenommen zur GEWISOLA 2012. https://gewisola2012.uni-hohenheim.de/fileadmin/einrichtungen/gewisola2012/Beitraege/Knierim_et_al_GEWISOLA_2012.pdf [accessed 14.09.2013] König, Oliver; Karl Schattenhofer (2006): Einführung in die Gruppendynamik. Heidelberg Volmerg, Ute: Entwicklungsphasen in Gruppen. In: Klaus Antons: Praxis der Gruppendynamik; 8. Durchgesehene und ergänzte Auflage, Göttingen:312-324. Wellbrock, W., Roep, D., Mahon, M., Kairyte, E., Nienaber, B., Dominguez Garcia, L., Kriszan, M., Farrell, M., In Review. Arranging public support to unfold collaborative modes of governance in rural areas. Journal of Rural Studies.

Keywords: *collective action, institutional voids, team roles, group formation*



Workshop 1.3: Innovation Platforms as Drivers of Institutional ChangeConvenors: **Janice Jiggins, Ray Ison, Niels Röling****Insights from the New Zealand experiment in Farmer First Research**Janet Reid, Rob BrazendaleInstitute of Agriculture & Environment, Massey University, New Zealand, J.I.Reid@massey.ac.nz

The Farmer-First Research programme was established at Massey University in 1991. The programme was strongly grounded in the work and thinking of people like Norman Simmonds, Robert Chambers, Janice Jiggins and Niels Røling. At the time of its establishment, the programme was argued to represent the beginning of a fundamental shift in how agricultural research priorities were set and how agricultural research was implemented. The specific needs and circumstances of farmers were to be central to defining what research would be done and the active involvement of farmers in research was considered a priority. The Farmer First Research programme ended after approximately 5 years in 1996. The authors of this paper were researchers employed within the programme at the time. This paper will critically reflect on the Farmer First Research programme and explore the impact the programme had, but also the reasons it failed to gain long term purchase within the institutional context at the time. The factors that influenced the outcomes of the programme are considered guided by the innovation systems analysis framework proposed by Hekkert, Suurs, Negro, Kuhlmann and Smits (2007). Researchers involved in the programme had limited background and training in participatory research methodologies. Consequently the methodologies used were insufficiently rigorous to support research findings that would challenge conventional bio-physical research paradigms. Institutional barriers to acceptance of the validity of research findings were experienced. This critical reflection on the Farmer First Research programme is highly relevant to New Zealand agriculture today. Central government has recently made significant investment into a Co-Innovation approach to technology development. The philosophies and approaches in Co-Innovation have many parallels with those purported in Farmer First Research. The insights from this reflection will provide useful insights and identify potential pitfalls for those seeking to implement Co-Innovation today.

Keywords: *Farmer First, New Zealand, Co-innovation, critical insights.*

Choice-making in facilitation of agricultural innovation platforms in different contexts; Experiences from Ghana, Benin, and Mali

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Platforms provide an increased capacity for learning and coordinated innovation. The value of platforms for innovation is widely recognized, but more understanding is needed of the choices made in facilitation, to enable platforms to perform effectively within varying value chain contexts. This paper applies a comparative case study analysis of four innovation platforms in West Africa that aim to create institutional change for the benefit of smallholders. Each institutional context (emerging or developing value chain, a well-established value chain with more or less distortion by politics and rent-seeking behaviour) constituted a specific type of constraint and required different facilitation choices. Comparison showed that it is imperative for facilitators to have a clear platform purpose and design criteria, and good situation and actor analyses, and to interactively design small platforms, fit to create institutional change in a given context. Platforms need actors with representative and performative capacities relating to the issue at stake, but also communicative qualities. Then there are situational facilitation choices: local level platforms need more structuring of deliberation, data-gathering, networking, and advocacy than higher level platforms. However, what emerged as essential for all was delicate mediation and dynamic agenda-setting. This created trust, relationships, and momentum for mutually supportive team action and institutional change.



Workshop 1.4: The development of more entrepreneurial farming systems and the move towards a more farm-level approach to innovation and learning

Convenors: **Pieter Seuneke, Thomas Lans, Martin Mulder**

Workshop 1.4: The development of more entrepreneurial farming systems and the move towards a more farm-level approach to innovation and learning

Convenors: **Pieter Seuneke**, Wageningen University, Rural Sociology Group
Thomas Lans, Martin Mulder, Wageningen University, Education and Competence Studies Group

Crucial in the development of more sustainable farming systems is the need for more entrepreneurship. This workshop explores the learning processes related to the development of entrepreneurship and aims to stimulate a new debate which employs a more farm-level, work-related or situated approach to innovation and learning.

Learning to run a business: transforming charcoal production of family farmers in Santa Catarina, Brazil

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Charcoal production is an important source of income for many family farmers along the coastal region of the Santa Catarina State, Southern Brazil. However, the activity is considered illegal, and farmers depend on middlemen to bring the product into the market. To change this situation, a participatory action-research project was set up with the purpose of developing farmer's entrepreneurship. In order to achieve this goal, the main activities of the Project consisted on the creation of a brand, the design of a charcoal package and the organization of a farmers' association. All these activities have been accomplished so far as a result of a social learning process expressing purposeful concerted action towards entrepreneurship.

Keywords: *entrepreneurship, concerted action, social learning*

Assessing learning regimes leading to sustainable intensification at the farm level: a new perspective for management assistance for family farms

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To help design advisory approaches tailored to farmers' needs, we propose to highlight the different learning processes that lead to more sustainable farms. To this end, we have defined the concept of 'learning regime' as the set of mechanisms that are triggers for and lead to the acquisition of new knowledge and skills, allowing the head of the farm to improve his production and management methods. This concept has been tested in the cotton-growing basin of Bobo-Dioulasso in 30 farms considered innovative in five technical areas related to environmental sustainability. The results show that there are four different types of regimes (transformer-observer, reactive-networker, optimizer-self-reliant and imitator-dependent). These results call into question the assumption of homogeneity of farmers' capacities to change their routines to acquire new skills and know-how. However, given that the nature of technical changes implemented is heavily influenced by the informational context in which the producer operates, supporting the learning of sustainability calls into question, in particular, the ability to empower farmers' vis-à-vis this context. While this work's contributions are currently mainly conceptual and methodological, it opens up new perspectives to improve processes and tools to support the emergence of a more sustainable agriculture.

Key words: *learning regime, family farm, sustainable intensification, Burkina Faso*

Can management advice to small-scale farmers trigger strategic thinking?

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To contribute to the question of what fosters entrepreneurial learning, we consider the building of strategic thinking to be an entrepreneurial learning process, identified through the concept of proactivity. We consider that entrepreneurs are not "born" but "made". We analyse the role of management advice on entrepreneurial learning, exploring the building of proactivity of small-scale farmers. We assume that all farmers, whatever their



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resources and education levels, can build more proactivity through the learning process triggered by advice, through training and exchange about agriculture, and through better command of management tools.

Through a field work in Benin based on the analysis of learning processes in a management advice for family farm (MAFF) approach, we considered a sample of nineteen farmers before and after one year of training, to analyse the evolution of their proactivity. Through technical and management training based on planning, follow up and evaluation tools, for both literate and illiterate farmers, MAFF approach enables farmers to better understand their environment, assess their own resources and situation with “new eyes” and enact differently in this environment. The level of proactivity before the training is also a strong element influencing the learning process: proactive farmers act more quickly toward change, but farmers considered as “not proactive” before training attribute important changes triggered by MAFF, discovering their power on their environment and the possibility of change, acting toward more planned activities, leading to more reflexive strategic thinking.

Farmers’ entrepreneurship is triggered by MAFF, enabling them to build their strategic thinking, being more proactive towards change. Those results also show that change, especially on entrepreneurship, is quick, built during the first year of MAFF, but longer time is needed for a full learning process leading to more autonomous strategic thinking and good command of management tools.

Keywords: *farm management, strategic thinking, proactivity, learning process, entrepreneurial learning, agricultural advisory services, extension*

Doing the Unthinkable: Linking Farmers’ Breadth of View and Adaptive Propensity to the Achievement of Social, Environmental and Economic OutcomesLesley M. Hunt¹, John R. Fairweather¹, Chris J. Rosin², Hugh Campbell²¹Lincoln University, New Zealand, ²University of Otago, New Zealand

To adjust to a world that is changing socially, environmentally and economically, farmers will need to farm sustainably and be adaptive, entrepreneurial and resilient. They may have to farm in ways that are unthinkable to them. We suggest that supporting and encouraging farmers’ social and environmental ‘breadth of view’ or awareness of the impact of their farms on the wellbeing of themselves, their families, communities and the wider world environmentally and socially may lead to them being more likely to adapt and change their practices.

By calculating attitudinal indices of social and environmental breadth of view, propensity to adapt, and importance placed on financial criteria from a farmer survey we were able to link the way these qualities interacted to affect farmers’ practices and actions, through comparison with on-farm data collected from farmers in the ARGOS program. Using a ‘good farming’ perspective to interpret what we found, we demonstrate how breadth of view informs farmer’s actions and practices in two ways: to conform or to change. Farmers with the broadest breadth of view and the highest propensity to adapt, were more entrepreneurial through adjusting their practices more to the world in which they found themselves and were able to farm financially successfully and environmentally sustainable.

Keywords: *sustainability, adaptation, resilience, entrepreneurial, social breadth of view, environmental breadth of view, good farming, social wellbeing, environmental wellbeing*

Innovation and Social Learning in Agricultural Systems**Case Study: Murcia, Spain**

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Agricultural activity is still a key factor for rural development. The high competitiveness of Murcia’s agriculture is everyday having to face new problems and challenges. The imbalance between natural resources and their regeneration capacity is due to the high agricultural and industrial holdings that have been instituted in recent decades as well as to southern Spain’s own meteorological problems. In addition, social difficulties also add up. Because of the existing problems, and with the aim of finding effective solutions to obtain the highest profitability and first quality products, certain entrepreneurs have adopted competitive strategies based on quality and innovation in the production process, under the conceptual basis of “Working With People” (WWP) and from a social learning perspective that encourages the resilience of the sector. The actual and future trend is that for the



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managing of agricultural systems, measures where agriculture development and environmental conservation coexist should be taken, allowing the progression towards a sustainable agricultural model. Measures taken in this direction and under the conceptual framework WWP by the Agrarian Transformation Society Camposeven will be looked at and discussed.

Keywords: *rural development, intensive agriculture, innovation, product certification, organic farming, Working With People, resilience*

Toward an integrative perspective on learning in innovation initiatives: The case of the Dutch greenhouse sector

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It is widely acknowledged that innovation goes hand in hand with learning. However, theories in the realm of sustainability sciences mostly concentrate on diversity and learning outcomes, whereas theories from the educational sciences mostly focus on learning as interaction. In this contribution, we aim to benefit from an integration of these perspectives in order to better understand how different interaction patterns contribute to learning. We studied an initiative of greenhouse growers that moved towards more client-oriented business models by innovating their value chains, while at the same time increasing their societal acceptability (societally responsible innovation). As action researchers we collected extensive transcripts of meetings, interviews, and various other documents. Transcripts were segmented into qualitatively different interaction episodes. Next, we used an open coding strategy to identify different patterns of interaction. Then we coded which episodes resulted in a learning outcome. Preliminary analysis suggests that seemingly "negative" attack-and-defend patterns of interaction certainly can result in substantial results, while seemingly "positive" synthetic interaction patterns, where participants strive to build on each other, can result in rather bland interaction without substantial outcomes.

Keywords: *Innovation, greenhouse growers, social learning, negotiation of meaning*



Workshop 1.5: Returning to the farming and food systems as they are - action and phenomenon based learning as prerequisite for transdisciplinarity

Convenors: **Geir Lieblein, Edvin Østergaard, Tor Arvid Breland, Charles Francis**

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Convenors: **Geir Lieblein, Edvin Østergaard, Tor Arvid Breland**, Norwegian University of Life Sciences
Charles Francis, Norwegian University of Life Sciences/University of Nebraska, Lincoln

The purpose of the workshop is:

1. To create a shared understanding of how different universities relate to challenges of the current disconnect with extra-university stakeholders,
2. To explore ideas for how to deal creatively with these challenges in each university and as an international learning community,
3. To develop plans for action, both at individual institutions and through collaboration among universities.

Bridging the Gap between Academia and Food System Stakeholders

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The well-known gap between theory and academic courses at universities and applications of this knowledge in farming and food systems have been identified as barriers to practical development. Production specialists in academia have assumed that focus on increasing crop yields is intrinsically beneficial and will help farmers regardless of scale and need for inputs, including increasingly expensive technologies. Farmers and others in the food system recognize immediate needs and challenges that must be overcome to reach profitable levels of yields and income while not ignoring environmental and social implications of new technologies. There is often lack of communication and shared agenda among the players, including common research priorities, essential questions that address current realities on farms and in communities, and shared long-term visions. An educational programme in Norway that explores the ecology of food systems has been designed to lower the barriers to communication by focusing on student learning together with stakeholders and by seeking application of biological and social sciences to improve farming and food systems as well as related activities. Guiding philosophy for the agroecology MSc education program at NMBU – Norway includes whole systems perspectives and phenomenology as guides to learning, which we summarize along with a description of the two-year curriculum in an intensive introductory course. The process includes frequent communication between students embedded in the farm and community with their stakeholders. We combine individual with social learning, integrate biophysical with socioeconomic sciences, and apply a team approach to building human capacity to understand complexity and uncertainty in food systems. One outcome is development by student teams of a series of potential future scenarios that will help stakeholders achieve their own goals. Over the past decade, more than 230 students have participated in this holistic educational activity, and there is growing demand for this type of learning experience in the Nordic region and elsewhere.

Keywords: *agroecology, experiential learning, phenomenology, action education*

Facilitating International Education: Doctoral Programme in Agroecology and Capacity Building

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Phenomenon-based and action-centred learning is the foundation for a planned international doctoral program in agroecology and capacity building. Designed for mid-career and young professionals interested in agricultural and food systems development, this program will integrate and make available the technical and educational expertise in agroecology that is current dispersed among a number of universities in Europe, Africa, and the Americas. Placebound professionals will be able to access courses, select academic advisors, and choose dissertation supervisors from among those in the network, while enrolling and completing a doctoral degree in one of the participating university graduate programs. Distance learning methods, social learning through blended courses and group projects, and regional technical and educational workshops will integrate graduates in a network of agroecology professionals that embraces a whole-systems perspective and transdisciplinary approach to learning for responsible action. Many graduates will quickly assume important administrative roles in universities, ministries of agriculture, or the non-profit sector, thus we include courses and practical experiences in capacity



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building to embrace progressive ideas in budgeting, personnel selection and improvement, and program visioning and management. A new generation of agroecology-oriented leaders in research, education and outreach will be comfortable in dealing with complexity and change, coping with food production in a time of climate change, and encouraging such multiple goals as food security and sovereignty, efficient use of scarce resources, promoting a liveable environment and enhancing ecosystem services. To be successful this program will require multinational and local monetary support consistent with the size of the task. Creation of an equitable and accessible food system is essential for reducing world hunger and creating well-being for all.

Keywords: *distance education, advanced agroecology degree, agroecology, experiential learning, capacity building, farming systems, food systems*

Action- and partnership-based PhD research – a case study between agronomy and social sciences

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In research projects based on questions which emerge from practice and from interactions with different stakeholders, researchers engage with research partners in a cooperative and interdisciplinary approach. In PhD projects, including a diverse network of partners and interdisciplinarity may be challenged by the short duration of the projects and by the positivist and reductionist approaches in which students are initially trained. Based on a concrete PhD research project on small-scale organic seed production, the objective of this work is to elucidate how interdisciplinarity and an action-base can nevertheless gradually be integrated by PhD students into an approach best termed as *involved research*. Reflection on the roles of partners, their involvement, motivation and points of view and on the evolution of questions posed during interactions between students and stakeholders contributes to recognizing the role of each partner, situating research postures, and identifying the types of knowledge and transformations produced. While PhD students and their research projects can evolve towards more holistic and constructivist approaches, it is crucial to maintain opportunities for reflection during their research in order to realize the potentials of involving all those involved in the projects and produce effective social learning processes.

Keywords: *action-based research, PhD project, partnership, participatory plant breeding*

Creating Student Confidence for Communication with Stakeholders: Agroecosystems Analysis Travel Course

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Communicating effectively with farmer stakeholders is often a challenge for agricultural graduates, especially if they lack prior farming experience. A summer travel course in the U.S. Midwest was designed to meet these goals: to provide students from a wide range of study areas in agriculture an opportunity to learn directly from Midwest farmers; to visit a range of farm operations from small to large; to learn about practical crop and animal production as well as whole-farm systems; to gather essential information to evaluate current farming systems and alternatives; to work together as student teams to process and integrate the information into both oral and written project reports; and above all to gain confidence in communicating with farmers. This last objective helps develop a key capacity for graduating students to use on future jobs and a capacity rarely met in the conventional on-campus course curriculum. Students were guided in their evaluation of farms and their potentials for long-term sustainability using production, economic, environmental, and social perspectives and parameters. In addition to the final project team reports, students prepared individual learner documents that followed reflection on their own learning and participation as members of a project team. Feedback from students about communication with farmers has been highly positive over 15 years of the summer course and their evaluations have been instrumental for informing faculty-designed changes in the evolving agroecology learning landscape. This summer educational experience was established in 1998 as an educational activity of the North Central Institute for Sustainable Systems (NCISS) that included three landgrant university partners: Iowa State Univ., Univ. Minnesota, and Univ. Nebraska – Lincoln, and continues today in their respective Departments of Agronomy.

Keywords: *agroecology, client communication, farm interviews, agroecosystem analysis*



Workshop 1.5: Returning to the farming and food systems as they are - action and phenomenon based learning as prerequisite for transdisciplinarityConvenors: **Geir Lieblein, Edvin Østergaard, Tor Arvid Breland, Charles Francis****Assessing Agroecology Education: Qualitative Analysis of Student Learner Documents**Anna Marie Nicolaysen, Tor Arvid Breland, Geir Lieblein, Suzanne Morse, Charles Francis
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Student learner documents have been used each semester for self-evaluation in a full-time, sixteen-week agroecology course in farming and food systems. These provide an in-depth reflection by each student of their learning process and personal role in classroom, discussion sessions, team field activities, and interactions with stakeholders on farm and in the community. Learner documents submitted over a period of 13 years were studied through text analysis to organize the content with a systematic classification process of coding and interpret the documents by identifying themes. This qualitative data reduction identified core consistencies and meanings from a large volume of text. The approach allows for an empirical, methodological controlled analysis of the descriptions and expressions from students, exploring how they view the learning experience within their context of understanding and communication. Thus, the perspectives of the students' texts can be better interpreted by educators who want to evaluate student experience in understanding key systems issues, higher order conceptualizing of challenges facing clients, and building personal capacity for applications in thesis projects and lifelong learning. Results of this evaluation are used to redesign learning activities in the classroom discussions, the field projects on farm and in communities, and in assessment of learning. While students are acquiring tools and perspectives that will guide their future studies and life work, teachers are learning how to improve the educational process that will better help those students achieve their goals.

Keywords: *Learning assessment, student self-evaluation, teaching improvement, agroecology, qualitative text analysis*

Engaging Researchers with Learning and Innovation Networks for Sustainable Agriculture: Evidence from EuropeAnna Augustyn, Gusztav Nemes
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The concept of engaged scholarship, focusing on relationships between researchers and Learning and Innovation Networks in Sustainable Agriculture (LINSAs) are elaborated. We examine the current EU rural policy rhetoric, promoting closer linkages between scholars and practitioners to foster innovation, and the actual state of art. The study is based on the experiences gained with a recent EU FP7-funded project SOLINSA and four workshops at major rural events. Observations and interviews reveal that alongside formal arrangements for research-practice partnerships, action research can offer promising methodological solutions to facilitate this interface, especially when supported with participatory and visual tools. There is still, a lack of wider recognition of this type of research in the university tenure process and limited rewards or appreciation of capacities of researchers working in this way. Greater attention should be given to promoting cooperative research with stakeholders, and to fostering capacity building of researchers through modification of the management process and reward structure in the academy. We conclude with recommendations for solving this challenge as well as ideas for further research.

Keywords: *engaged scholarship, action research, SOLINSA, learning and innovation networks, LEADER*

Experiential Learning in a Transdisciplinary Setting – Learning from Experiences in Rural Development studiesSusanne Hofmann-Souki, Jany Jarquín, Juana Cruz Morales, Myriam Paredes Cauca and Ronald Herrera
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Local actors in rural development often claim that they are objects of research and sources of “data”, that are helping students and researchers advancing their careers, but get little knowledge in return nor see benefits of the research to them. People in rural areas are often targeted in governmental and non-governmental programmes with little participation in design. Universities have a dual role to produce information and to educate future decision-makers and programme managers. Development of participatory research and experiential learning methods has been driven by the need to highlight experiential know-how of practitioners and thus help bridge the



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gap between academic and non-academic knowledge and skills. Competency-based curricula can lead to including active learning in academic study programmes, for example problem-based learning that confronts students with complex, ill-defined phenomena to stimulate multi-dimensional learning. A Latin-American – European project SERIDAR aims at increasing relevance of university research and education through transdisciplinary networks for rural development in selected Latin American regions. A joint Competence Centre is being created as an international network of universities and other research institutions, grounded in local stakeholder networks where a variety of non-academic and academic actors collaborate. One purpose is participatory prioritisation of locally relevant knowledge needs and topics for research and capacity-building. A joint doctoral programme and individual student and team research projects pursue this research. Methodology of transdisciplinary student team research in pilot projects are described, where we are using a didactical concept based on experiential and Problem-Based Learning; lecturers become facilitators of learning. Goals are developing competences of students in three dimensions: thematic knowledge, analytical and research skills, and social learning competencies such as teamwork techniques and client orientation. We describe theoretical foundations, criteria and methodology in running pilot projects.

Keywords: *Competence-based curriculum development, Problem-Based Learning, active learning, stakeholder participation, university – practitioner networks*

Transdisciplinarity as an emergent property in an agricultural research for development project

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An agricultural research for development project on the East India Plateau is analysed retrospectively using a conceptual model for transdisciplinary research. The analysis reveals strong similarities, and some marked disparities, between project practice and the conceptual model. Transdisciplinary characteristics of the research project include:

- Participation of scientists (hydrologists, agronomists, animal scientists, agricultural economists) and non-scientists (farmers, development professionals) in the research process.
- Integration of research activity and interpretation of results across discipline boundaries.
- Deliberate creation of learning experiences as an outcome and consequence of participation in the research process.
- Application of research results in formats useful for the practices of farming, development, and science.

The most marked discrepancy between the project and the conceptual model was the inadequate development of a shared understanding of the transdisciplinary research process, including clarity around boundary issues. The significance of the conceptual model for ongoing project research and emerging research opportunities is discussed, including how that model may be modified as a result of this development experience.

Keywords: *Farming systems, rural livelihoods, poverty alleviation, agriculture for nutrition and health (A4NH)*

MSc Agriculture students working with ex-campus stakeholders: experiences and challenges

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Both domestic and international students in the Agriculture MSc program at University of Copenhagen increasingly enter the programme without a contextual background of “agriculture” and with solid but fragmented disciplinary and applied knowledge acquired in other courses. For many students this raises concerns whether their knowledge, skills and competencies are sufficient when they confront reality on the job. It is this apparent lack of professional confidence in students that led us to explore alternatives. When revising the program we focused on competencies in contextualizing general knowledge, in working systemically with complex problems and in reflection on the learning process and environment. In a mandatory nine-week full time course we team up with a partner enterprise which is a large organic and conventional vegetable cooperation with the aim of developing solutions and creating value for the owners and other involved stakeholders. Students physically visit the partner enterprise four times, for a total time of three weeks, and use Kolb’s learning cycle as a guiding reference through a structured work process. Deliverables from the course are a scientific group report, a group partner document, a group learning document and an individual learning document, all of which form the foundation for an individual



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oral exam. Students who complete the course indicate that learning from stakeholders provides both important knowledge that complements that from the university as well as confidence in communicating with farmers and other agricultural entrepreneurs.

Keywords: *education, sustainability, ex-campus, value creation, Kolb*



Workshop 1.6: Linking scientists and farmers, research and application - methods of on-farm research projects in livestock sciences

Convenors: **Christine Leeb, Christoph Winckler, Katharina Schodl**

Workshop 1.6: Linking scientists and farmers, research and application - methods of on-farm research projects in livestock sciences

Convenors: **Christine Leeb, Christoph Winckler**, Division of Livestock Sciences, University of Natural Resources and Life Sciences, Austria
Katharina Schodl, Doctoral School of Sustainable Development (dokNE), University of Natural Resources and Life Sciences, Austria

Applied projects in livestock sciences increasingly involve on-farm research and a combination of various research areas. This workshop aims at discussing different approaches in the realm of on-farm livestock farming research by using experiences gained from different projects dealing with topics linked to livestock farming systems like animal health and welfare, environmental issues, farm development plans, sustainable farming practices, etc.

Economic efficiency of small group housing and aviaries for laying hens in Germany

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Husbandry systems for laying hens in Germany have changed fundamentally during the last years. The ban on conventional cages for laying hens has led to a significant change in production structures and thus improved animal welfare. Laying hens in Germany in conventional production systems are only permitted to be kept in small groups (13 %), floor housing (64 %) or free-range systems (15 %). The question on the economic efficiency, animal welfare and environmental impacts of keeping hens in welfare-friendly alternatives is raised. Therefore the Federal Ministry of Food, Agriculture and Consumer Protection commissioned an interdisciplinary project on the collection and the analysis of data to characterise the economic, animal welfare and environmental impacts of small group housing or aviaries of laying hens in practice.

This abstract focuses on the calculation of costs and returns in selected German farms and the analysis of their determinants in small group systems in comparison to (multi-daylight) floor-housing systems (aviaries) for laying hens. Limited information is available on the Small Group System, which is new and still under debate in Germany. Therefore calculations of costs and returns and the analysis of their determinants in small group systems in comparison to the presently mainly used (multi-daylight) floor-housing systems (aviaries) for laying hens are necessary.

The empirical basis is a survey of 65 herds in northern, central and southern Germany using a convenience sample. However, the participation of farms with very large herds was small. The calculation is based on a concept proposed by the German Agricultural Society.

In both systems production costs decrease with increasing herd size due to improved biological performance. The recorded farms with aviaries get more revenues per egg, while the farms with small group housing achieve a positive balance of returns and costs only if the size of the herd exceeds 10,000 hens. On the revenue side, farms with smaller herds have distinct advantages because they better exploit the options of direct marketing. In small group systems the decline of the returns per egg with increasing herd size is less pronounced than the drop of the costs, so the margin of returns and costs increases. In contrast to small group husbandry, in aviaries the margin of costs and returns declines with increasing herd size. This implies that an increase of size has more positive impacts on farms with small group systems than on farms with aviary systems.

Keywords: *Laying hen, economic evaluation, cost of production, economy of scale, small group housing, aviary, multi-daylight floor housing*

Adoption of goat production technology at the farm level: A case of arid regions of Egypt

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The study was carried out in the coastal zone of Western Desert of Egypt, which extended from Alexandria East to Libyan border west. It is classified as arid zone. The agro-pastoral production system prevails in this area. This system has been faced by 14 years of drought from 1995 to 2011. Over the last two decades, several goat technological interventions and development projects consist of breeding and nutrition were implemented in this



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area in order to improve goat productivity and profitability. A survey was conducted with 262 Bedouins aimed to assess the effect of such long drought incidence in their socioeconomic vulnerability and demonstrate the most frequently adaptive process developed by Bedouins to reduce the negative impact of drought. Moreover, this study aimed to analyze the potential impact of such alternative technologies, highlighting aspects determining their success or failure. Bio-economic data were collected and submitted to cost-benefit analysis. Analysis of data showed that drought produces a large number of impacts that affects the economical standard of living. The drop in agricultural income during a drought year was in the range of 40-80 per cent of average rainfall-year income. The various Bedouins coping mechanisms were inadequate to reduce the negative impact of drought. Results highlight small ruminant role on alleviating poverty and helping household to deal with climate variability. The share of small ruminant in the households economy in the average and dry years ranged from 54.6 -57.1%. The study revealed that Bedouins adopted breeding technology (74%) and nutrition technology (23%). Adoption of the technology is significantly affected by Bedouins education level, age, farm size and contact with extension agents. Infrastructure and support services must be established to enable such technologies to succeed and reach small-scale breeders. Based on the findings and conclusions of this study, specific recommendations were made to reduce effects of drought crisis.

Keywords: *Agro-pastoral system, survey, drought vulnerability, goats and adoption process and development projects.*

Linking researchers, advisers and livestock farmers in a multidisciplinary approach to analysing working conditions on farms

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Work is an important issue for livestock farmers nowadays and this topic draws attention from researchers as well as from advisers. The French Livestock Institute piloted a 3-year partnership project aimed at studying on-farm innovations to improve farmers' working conditions. This project developed a multidisciplinary approach combining economic, sociological and technical perspectives on livestock farmers' work, and involved researchers, advisers and farmers. We chose to involve farmers in the production of data, crossing the factual and descriptive data with their experiences and views, but also asking for their opinion on the results. We also involved actors in 6 different regions with two goals: to conduct investigations on farms and to enable the appropriation of the method by advisers.

A team composed of researchers and extensionists was in charge of designing and managing the research programme based on on-farm interviews (a total of 55). In the questionnaire the 3 different dimensions were addressed through sociological, economical and organizational aspects.

The participants of the team pooled their own knowledge and methods to build a common questionnaire. A test was arranged in some farms with advisers as interviewers and this enabled improvements to be made to the structure of the questionnaire and to the way questions were asked. Training for the interviewers was organized.

Data processing at national and regional level provided several deliverables including a national analysis, 6 regional analysis, farm monographs, and publications for farmers and advisers. Several local meetings took place to discuss the results with the interviewees (farmers), the interviewers (advisers) and sometimes stakeholders.

The participants of the project team now consider that linking researchers, advisers and farmers in this multidisciplinary approach was very profitable. All of them say they have expanded their vision and understanding of farmers' working situations and argue that this has led them to change their research or advice practices.

Keywords: *work organization, productivity, livestock farming, farmers' perceptions of their profession*

A deductive approach to animal health planning in organic dairy farming: Method description

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Organic farming is often directly associated with an enhanced level of animal health and welfare. However, in spite of ongoing efforts in the fields of animal science, the animal health status in organic dairy farming does not in all



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respect meet consumers' expectations. Reasons are manifold and differ considerably between farms as do the multi-factorial production diseases. Success of animal health planning highly depends on a sound diagnostic procedure at farm level and farmers' intrinsic motivation to improve the animal health status. Both aspects are essential preconditions for the identification and implementation of the most appropriate farm-specific management measures.

In this paper, a participatory and farm-centric methodological approach is described, facilitating the comprehension of farm specific processes and encouraging farmers to increase animal health status. The system 'organic dairy farm' is described and vital key variables that play a role in the way the system behaves are determined in intensive workshops involving relevant stakeholders. On the basis of farm protocols, milk recordings, and animal based measurements the animal health status is determined for each farm and discussed in a 'round table' situation involving the different perspectives of the farmer himself, the local veterinarian and an agricultural advisor. By making use of the impact matrix as an innovative diagnostic tool to deal with the complexity of the farm system, the interconnectedness of 13 system variables is assessed at farm level. The method is used to gain a comprehensive insight from different perspectives and achieve agreement about the systemic functional role of relevant factors involved in the development of multi-factorial production diseases. Based on the on-farm assessment and the impact matrix analysis the discussion results in the formulation of farm-individual goals and the identification of measures that are expected to most likely improve animal health in the farm specific situation taking into account the availability of resources. The participatory process facilitates knowledge exchange and collective learning.

For animal health planning to be effective, farm-specific interconnections have to be taken into account instead of focussing on general recommendations. The impact matrix analysis promises to be an effective method to reduce the complexity of the farm system and to identify measures which can be expected to have a relevant impact on the animal health status. Thus, reducing health problems deriving from complex interactions is expected to benefit from the integration of different perspectives.

Keywords: cow, systemic, impact matrix analysis, advisory, participatory, complexity

A normative planning device to link economics with practice: the case of up scaling in dairy farming

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Nowadays, the complexity of farming decisions demands for interactive and communicative planning, which takes into account the farm specificity. On the one hand, whole-farm planning techniques becomes necessary, on the other hand, communicative techniques must help to keep it simple in order to treat problem-driven questions appropriately. This paper describes first-stage results of a process of combining whole-farm planning with communicative techniques in a decision support system for dairy farmers. Scale enlargement, a possible often idealized solution after EU milk quota abolishment, is used as a case. For dairy farmers, helped by their advisers, who want to expand their farm as a reaction to this change, the straightforward question is "what is the optimal scale for a specific farm?". The answer to this question is not generic, but proved very farm-specific. The whole-farm approach consists of mathematical programming to capture essential decision influencing factors such as farm and farmer's characteristics. In this paper we describe an action research between advisers and scientists, which has led to the incorporation of mathematical programming in a DSS that is currently used for advising farmers with growth aspirations. Although farmers and advisers are not familiar with this technique, first results show that it works. Some success factors defined are the fact that every party involved in this research is convinced of the usefulness of implementing mathematical programming in a DSS. It was also clearly stated that advisers were the end user of this tool so a wider range of farmers could be reached. Moreover these advisers learn by doing. By modelling themselves they learned a lot about mathematical programming. This ensured that the modelers thought about what was entered into the model and problems were quickly solved. In conclusion the way the results are presented to the farmers is crucial for a successful implementation. However some challenges are still in search of an answer.

Keywords: participatory action research, DSS, success factors, advisers, dairy farms



Workshop 1.6: Linking scientists and farmers, research and application - methods of on-farm research projects in livestock sciencesConvenors: **Christine Leeb, Christoph Winckler, Katharina Schodl****Balancing multi objectives in Southland, New Zealand: Footprinting Dairy Cow Wintering**

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Wintering dairy cows on forage crops in New Zealand is under increased scrutiny from society due to potential environmental and animal welfare issues. Farmers in the southern South Island are looking for alternatives or ways to improve the performance of their wintering systems. However, they need to balance a range of objectives for their farms like profitability, labour requirements, effects on the environment, feed supply and quality and animal health and welfare. This paper reports on a project involving six commercially operated dairy farms, each using a different approach to dairy cow wintering: pasture and silage, foraging on brassica crops, stand-off pads, loose housing with slatted or woodchip flooring and a free stall barn. A range of performance indicators were monitored over a three year period on each farm. Pasture, supplement and crop yields and quality were assessed and milk solid (MS) production and reproductive performance recorded. Nitrogen (N) losses were estimated using the OVERSEER[®] nutrient budgeting model. Animal welfare was assessed by body condition scores 4 times per year and lying times were measured for a 1 week period in each of winter 2011 and 2012. Profitability was assessed using costs per cow per week during winter. A whole-farm system approach was chosen to assess positive and negative consequences of choices, and to develop options to improve performance of the range of systems. We use radar plots to demonstrate the performance of each farm system on a range of objectives. Radar plots can be useful to discuss how to balance multi objectives in the dairy industry, to avoid un-intended negative consequences when changes are based on only one aspect of the system. Results from the monitoring resulted in the development of a wintering risk assessment tool for use by other farmers in the region to benchmark the performance of their wintering system and identify areas for improvement.

Keywords: *dairy farming, wintering, farm system, radar plot***ProPIG: Challenges and opportunities for on farm pig researchers – how to collect sound scientific data on animal health, welfare, nutrition and environmental impact and act as a facilitator to improve those aspects at the same time?**

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Robust and competitive organic pig production needs to encompass low environmental impacts and good animal health and welfare. In theory, improving animal health and welfare reduces environmental impacts through decreased medicine use, improved growth rates and feed conversion efficiency.

Within the CoreOrganic2 Project “ProPIG” 8 partners across 7 countries record data on 75 organic pig farms regarding animal health (e.g. treatment incidences, lameness), welfare (e.g. exploratory behaviour, intact tails), nutrition (diets calculation, feed analysis) and soil (vegetation cover, soil analysis). Furthermore, calculations of nutrient balances and Life Cycle Assessment for several contrasting scenarios (indoor with outside run/partly outdoors/outdoor) and the development and evaluation of farm specific improvement strategies are carried out.

Opportunities are:

- Researchers from various backgrounds (veterinarians, animal scientists, biologists, soil- and LCA experts), technicians, PhD- and Master-students learning across disciplines and levels of experiences is facilitated.
- Application and communication on farm, direct feedback regarding scientific methods and expertise and new knowledge gained from farmers’ experiments and opinions.
- Combination of scientific facts and farmers experience allows compiling a comprehensive catalogue of improvement strategies, which is also communicated across farmers and situations.
- Assessing, evaluating and discussing various different areas on farm, relationships and potential solutions between those areas can be identified (e.g. thin sows, feed ration, deworming, number of feeding places).

Challenges are:

- To perform scientifically sound sampling strategies (e.g. animals, soil) within one day visits for several disciplines trying to balance representativeness and detailed description of individual parameters versus completeness of parameters across several different fields.
- To learn about new topics so that it can be applied on farm (e.g. collecting treatment records) and discussed with the farmer (e.g. how to interpret results from soil samples).



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- Many topics to be covered and in some cases farmer knows more than researcher- researcher is no longer “the expert”.
- New experience to act as facilitator to encourage farmers for improvement.

To conclude, both is needed – experts on individual fields and researchers, which are able to act as facilitator; To face the challenge of sound on farm data collection, expert teams need to identify key indicators for each area to collect on farm, but also Software (e.g. Tool “PigSurfer”), can support efficient data entry and immediate feedback.

Benefits and challenges of the on-farm implementation of measures aimed at integrating aspects of sustainability into pig fattening

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In the course of a PhD-project measures were developed, implemented and evaluated, which aim at integrating aspects of sustainability into pig fattening. The selected measures comprise an increase of space allowance for the animals, provision of straw as manipulable material, omission of tail docking, use of GMO-free feedstuffs and improvement of animal health monitoring by reporting slaughterhouse findings to the farmers. Subsequently, these measures were implemented on three (currently operating) pig fattening farms in Austria. Finally, the impact of the combination of measures is evaluated regarding animal welfare, economic and environmental aspects as well as taking into account quality of work and life of the farmers using already established scientific methods.

This paper specifically addresses the benefits and challenges of implementing the measures on commercial pig fattening farms and how these challenges and problems were faced in the project.

Benefits of on farm research comprise the possibility to include the farmers’ (practical) knowledge and to take into account problems and limitations farmers encounter during their actual work (e.g. limited time for additional work or being dependent on other partners in the production chain like breeders or abattoirs). This aspect holds especially true for projects with an applied focus and helps to improve the applicability of results.

One of the main challenges lies in creating a ‘flexible’ study design, which can be adapted to varying on-farm conditions on the one hand (e.g. one farm’s breeder did not want to omit tail docking) and is still strong enough to produce sound scientific results on the other hand. In this project, the study design was therefore adapted for each individual farm to meet all these requirements.

Moreover, it is important to be able to react to and take into account unforeseeable changes or problems on the farms e.g. by preparing a decision tree for what to do in the case of a tail biting outbreak. Additionally, the farmers’ motivation and interest in the project as well as interpersonal relations play an important role and can sometimes be a huge challenge for the success of such a project. Hence, trust-building measures like the joint formulation of contracts and confidentiality agreements have been taken.



Workshop 1.7: Collaborative learning to solve problems and develop innovations in complex systems: focus on methodologiesConvenors: **Brigitte Kaufmann, Christian Hülsebusch, Anja Christinck****Workshop 1.7: Collaborative learning to solve problems and develop innovations in complex systems: focus on methodologies**Convenors: **Brigitte Kaufmann, Christian Hülsebusch**, German Institute for Tropical and Subtropical Agriculture (DITSL)
Anja Christinck, seed4change (Research & Communication Consultancy)

The aim of this workshop is to discuss and reflect on approaches and methods used to enhance collaborative learning of practitioners, scientists and other societal stakeholders that aim at solving problems in complex 'real world' situations. We are interested in methods used to generate knowledge in collaborative learning processes, to improve access to information and information exchange, and finally to evaluate such processes relating to the generation and diffusion of knowledge in a transdisciplinary research setting.

Collaborative learning for self-driven change in complex situationsM.J. Restrepo, M.A. Lelea, A.Christinck, C. Hülsebusch, B. KaufmannDITSL GmbH - German Institute for Tropical and Subtropical Agriculture, Germany, m.restrepo@ditsl.org

'Real world' systems change when actors (collectively) change their actions. Hence, research that aims at supporting self-driven change requires methodologies that integrate and expand different stakeholders' knowledge and capacities, and leads to action. This can be achieved in a collaborative learning process that involves actors belonging to different activity systems (e.g. doing research, farming, governing) with their different interests, perspectives, access to information and types of knowledge. They jointly seek to find solutions and develop innovations in complex systems in a process of dialogue (questioning, contradiction, debate, understanding), discovery (observation, experimentation, diagnosis, reflection) and application of the new knowledge and practices.

This paper aims to assess collaborative learning methodologies used in research projects dealing with the management and governance of farming and food systems. The assessment is based on a reflection/analysis of case studies presented at the 11th European IFSA symposium, April 2014 Berlin. We examined the case studies focusing on the following aspects: (1) the identification and interaction of stakeholders, (2) the collaborative learning process itself, including shared problem view, knowledge integration and capacity building, and (3) the outcomes of the process in view of the 'real world' problem that was addressed.

The analysis showed that case studies differed in the degree of involving multiple stakeholders with diverse interests and knowledge, thus pointing to the necessity to make the stakeholder integration process more explicit to allow for learning from success and failure of previous projects. A common finding for the collaborative learning process was that trust among the different stakeholders was key to promote knowledge exchange and mature reflection. The most common outcomes from the collaborative learning process were related to participants' perception of gaining something meaningful, such as new relationships and new knowledge or skills. Most importantly, stakeholders became aware of their role in the process of change.

Keywords: Collaborative learning, participation, change process, knowledge integration, capacity building

Agro-sociosystems diagnosis: cognitive maps to formalize stakeholders' knowledge and viewpointsC. Tardivo^{1,2}, S. Delmotte¹, C. Le Page², JM Barbier¹¹ INRA, Département SAD, UMR Innovation, France, ² CIRAD, UPR GREEN, France

This communication presents a method for implementing an agro-sociosystem diagnosis as a preliminary step to support collaborative learning for agricultural development at regional scale. We assume that a two-step investigation has to be undertaken for such a diagnosis: a description of the agro-ecosystem and of the economic settings of the region, and a stakeholder analysis aiming to support the design and the evaluation of the participatory process. Cognitive maps are supposed to be relevant in order to address those both analyses.

Twenty semi-structured interviews were conducted in a south-of-France agricultural region, the *plateau de Valensole*, with various stakeholders concerned by the development of agriculture and having different missions and knowledge (heads of cooperatives, advisors, representatives of public organizations, representative of farmers' unions...). They focused on the description of the region and its agricultural systems, the issues related to them and their possible evolution. Based on interviews' transcripts, twenty cognitive maps were built, one for each



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of the twenty interviews. Each of them contains the concepts quoted by the interviewee (such as farms, natural resources, organizations...) and their links characterized by cause-effect relationships. The presentation of two resulting maps shows that cognitive maps enable a clear representation of the agro-sociosystem, and that their flexibility make possible to encompass the diversity of knowledge, disciplines, scales, and viewpoints represented by the interviewed stakeholders. It is therefore possible to compare stakeholders' viewpoints, activities and networks. Maps give also information about agricultural systems and their dynamics.

Such cognitive maps can be completed and validated thanks to second interviews with stakeholders. They can also be aggregated in order to give representations of the governance system and of social networks. The aggregated cognitive map can also be the basis of the building of a conceptual model for the whole system.

Keywords: *agro-sociosystem analysis, cognitive maps, stakeholder analysis, agricultural systems, agricultural development*

Collaborative design of alternative cropping systems and their spatial distribution in the territory, to limit the risk of water crises

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Some hydro-systems are in structural water deficit: human water uses are too high to allow a good ecological status of aquatic ecosystems. The Adour-Garonne watershed (116.000 km², South-West France) is emblematic of such situations, with recurring occurrence of quantitative water management crises due to high agricultural withdrawals during the low flow period. Since opportunities to store more water is limited, authorities require the agricultural sector to reduce its demand, which results in a conflicting situation as irrigation is a key production factor for farming systems in this area. Our study is embedded in the governance challenge of conciliating water resources protection and economic viability of agriculture by re-thinking agricultural land use in interaction with both agricultural land managers (i.e. mainly farmers) and water managers. Our objective was to design and assess alternative agro-hydrosystem (i.e. new cropping systems and/or new distribution of cropping systems over fields and new water resource management strategies). We developed a problem-oriented approach based on a variety of modeling methods and on the participation of actors. We used models to integrate local knowledge with scientific and statistical information in order to specify the problem (system and question) and then formalize the proposed alternatives. We then used their computational potential to simulate the consequences of designed alternatives on a complex system, with precise spatial and temporal insight on a 10-15 years' time horizon, taking into account the climate variability. This communication describes the participatory process that allowed two groups of local stakeholders in opposition to each design alternatives for water management strategies and cropping systems, specifying the spatial, economic, organizational and technical constraints of their implementation. The groups involved farmer representatives on one hand and representatives of the aquatic environments law on the other hand. We present a formalized alternative from each group and discuss their potential to prevent quantitative water management crisis, and to be integrated into a consensual one.

Keywords: *spatial planning, system design, participatory approaches, boundary object, modeling, multi agent modelling*

From information giving to mutual scenario definition: Stakeholder participation

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Rubber farmers in Xishuangbanna Dai Autonomous Prefecture, Southwest China, which is part of the "Indo-Burma biodiversity hotspot", have experienced a massive increase of their income through introduction and intensification of monoculture rubber (*Hevea brasiliensis*) plantations. This robust economic growth is coupled with dramatic losses of ecosystem functions and services during recent decades. Only recently a call for "sustainable rubber cultivation management" has been spread. The Sino-German project "SURUMER: Sustainable rubber cultivation in the Mekong region" is looking for an integrative, applicable, and stakeholder-validated concept for sustainable rubber cultivation. Aiming at solving problems of the complex rubber-dominated land use situation in Xishuangbanna region, a practice-tested methodology is developed for enhancing collaborative



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learning within the project and beyond, of practitioners, scientists from different disciplines and other stakeholders.

The objective of this paper is to present the concept on stakeholder involvement of SURUMER – an iteration of discourse instruments and communication measures –, as well as its stepwise development after internal and external evaluations. Preliminary results with respect to their strengths and weaknesses are discussed as well as the consequences for further process adjustment – including potential and limitations under the specific working conditions.

Three key stakeholder groups have been identified so far, namely innovative rubber farmers (often the village heads), regional decision-makers (prefecture administration and rubber companies), and provincial politicians.

In the first project phase, methods of participation tended to be more passive, such as information on the project (exhibition, newsletter), informal talks, workshops and village meetings. Qualitative empirical communication research has been conducted including a baseline stakeholder analysis and an in-depth analysis of stakeholders' problem perception, their interests (goal conflicts and synergies), and their formal and informal communication networks.

In future, more active participation is intended; a transdisciplinary research setting which supports co-learning processes. One of its main elements is participatory scenario development including discussions of the economic and ecologic trade-offs of land use different strategies – its operationalization under Chinese conditions a Sino-German research consortium being a challenge to process management.

Keywords: *stakeholder involvement, transdisciplinarity, sustainable rubber cultivation, communication, China, Xishuangbanna, action research*

Integration of knowledge in inter- and transdisciplinary research projects: Use of constellation analysis in a project of sustainable land use management

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Inter- and transdisciplinary research projects can serve as learning networks for sustainable land use transitions since they enable processes of joint knowledge production and mutual understanding. However, this can only be achieved if the challenge of integrating heterogeneous forms of knowledge is taken seriously and supported by applying appropriate methods of knowledge integration.

In this paper we refer to experiences of the ELaN project, which is being carried out in Northeastern Germany. ELaN aims at linking technological innovations for water, nutrient and carbon management with organisational innovations for an adapted land use management. Governance innovations are supporting the the implementation and economic valorisation of these integrated model solutions. This solution-oriented project is being carried out in close interaction between a number of disciplines as well as with different stakeholders.

For inter- and transdisciplinary research projects a common understanding of the existing problem(s) is an important starting point. A joint problem description provides a basis for the integration of knowledge from different disciplines as well as from scientific and practical actors. For the ELaN project, constellation analysis was used to facilitate joint problem description. Constellation analysis (CA) is a visualization tool which aims at the creation of a focused image of the dominant elements of a problem and their relations. Disciplinary scientists and stakeholders are requested to agree on a constellation resulting from the relations between the central elements, which allows identification of major conflicts and open questions. This paper presents the use of constellation analysis for describing problems of land use and water management for fenlands in Northeastern Germany. It is based on expert interviews and discussions between scientists and stakeholders.

Application of CA in the ELaN project has shown that it is a suitable tool for organising processes of mutual understanding which are challenged by different disciplinary languages, norms, cultures and methods. It is also a good basis for the analysis of the different logics of action which form the background for different views and rationalities. Even if these logics cannot be overcome by such methods, their recognition helps to identify systemic constraints on sustainable pathways.

Keywords: *knowledge integration, interdisciplinarity, transdisciplinarity, sustainable land use, land use management, fenlands*



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Convenors: **Brigitte Kaufmann, Christian Hülsebusch, Anja Christinck**

A co-development approach to investigating wintering options on dairy farms in southern New Zealand

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The Southern Wintering Systems Initiative is a collaboration between farmers, researchers and extension experts aimed at optimising animal performance and profitability, and reducing the environmental impact of dairy farming wintering practices in southern New Zealand. Prior to the commencement of the initiative, the importance of wintering practices was highlighted in a farmer survey. This survey allowed the project team to tailor the project to the needs of farmers in the region. Monitoring and analysis of technical results were combined with tool development, enabling farmers to evaluate and optimise the practices on their farms during the project. A key component of the initiative involved co-learning with the monitor farmers playing a central role. Important features of the methodological approach were: (1) extensive farmer surveys; (2) active participation of monitor farmers; (3) interaction between farmers, researchers, policy makers, developers and consultants; (4) co-opting other farmers to critique the results and help with the extension of the project findings. This project has provided some key lessons about the ways in which the knowledge of farmers, researchers, developers and consultants can be integrated, to advance understanding and improvement, in an area of critical importance to dairying in southern regions in New Zealand. Integral to the success of the initiative was embedding the aims, results and tools in the DairyNZ regional extension programme allowing the results to reach a large number of farmers and other stakeholders. To extend these further, groups of farmers utilising similar wintering systems were established centred on the monitor farmers: Communities of Practice. The key lessons of the first three years of the project and the initial experiences with the Communities of Practice are presented.

Keywords: *dairy, wintering, farm system, research, extension, co-development*

Joint learning through facilitation of locally managed innovation funds

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Prolinnova (**P**romoting **L**ocal **I**nnovation) partners in eight countries in Africa and Asia facilitated a farmer-managed process of allocating “Local Innovation Support Funds” (LISFs) for locally relevant experimentation and innovation. The LISF is a new institutional arrangement for joint learning by farmers and other key actors in agricultural research and development (ARD). It gives smallholders – men and women – the means to design, implement and evaluate their own processes of exploration. It supports decentralised farmer-led experiments and sharing of findings, both from farmer to farmer and through formal extension channels. The management committees for LISFs – usually district-based – involve in some cases only farmers, in most cases also other ARD actors. These local networks are linked through a national Prolinnova platform of actors from state and non-state organisations who seek to integrate farmer-led participatory research and extension, based on local innovation, into mainstream research, development and education. The work with decentralised LISFs was designed to achieve this institutionalisation from the bottom up. This paper focuses on how piloting LISFs led to social learning through joint monitoring and reflection: i) learning by the multiple stakeholders involved at local level (including local government) about how to manage LISFs to promote local innovation; and ii) learning by other ARD actors at higher levels in institutions of research, development and education about how to support local innovation processes.

Keywords: *local innovation, multi-stakeholder platforms, farmer experimentation, learning*

Evaluating innovative scenarios to enhance mixed crop-livestock farms sustainability: a partnership methodology based on long-term farmers’ strategies

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Mixed crop-livestock farms are again attracting worldwide interest, as they are considered to be a good way for sustainable intensification of agriculture, by limiting environmental problems while allowing a productive and



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economically viable agriculture. The incentives of the Common Agricultural Policy and decreasing workforce availability nevertheless marginalized these farms in Europe since 1970. Ensuring the survival of sustainable mixed crop–livestock systems is therefore a challenge for European agriculture.

This study aims at developing a methodology to evaluate innovative scenarios to enhance mixed crop–livestock farms sustainability. As research studies evidenced continuity and consistency in long term farm changes, we assumed that past farmers' strategies should be the basis for relevant future studies. Analysis of farming system dynamics should thus allow defining innovations relevant according to farmers' choices, more likely to be adopted. A partnership group with farmers, mayors and technical advisers has been formed to develop the innovative scenarios through collective meetings. The study has been led in the French Coteaux de Gascogne, a less favoured area of south-western France, where farmers have limited specialisation. Currently, half of the farms use mixed crop–livestock systems.

As a first step of the analysis, we analysed farm trajectories from 1950 to 2005 to assess types of farmers' long term strategies to maintain mixed-crop livestock farming. Four "paths to last" in mixed crop–livestock farming were enlightened. In view of the current evolution of the driving forces, the partnership group selected "maximizing autonomy" and "diversification of production units" as suitable paths to maintain mixed crop–livestock systems in Europe.

On the basis of these two types of trajectories, we have co-constructed with local actors two technical prospective scenarios. In line with the type "maximizing autonomy", forage legume intercropping enabled to autonomously feed the bovine herd while maintaining soil fertility. In line with the type "diversification of production units", fattening heifers allowed a commercialization through short circuit. These scenarios have been simulated on local farms and the simulation results were discussed in collective meeting. This methodology allowed to i) strongly involve local actors through collective meetings and ii) an original future study based on a retrospective study integrating long time changes.

Keywords: *mixed crop–livestock farming; scenarios; partnership evaluation; trajectories of change.*

Reflections on and lessons from a deliberative process for water management – a New Zealand case study

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In this paper we describe an approach, which involves inclusive participation by a wide range of community stakeholders, policy makers, and an interdisciplinary science team, that can be used to enable communities to take an active role in, and contribute to, the management of natural resources. This process is based on participatory deliberation of a series of ex ante scenarios – with a varying degree of catchment resource development. Scenario deliberation was facilitated through repeated face-to-face workshops informed by interdisciplinary science models and community knowledge. The process involved social learning in which participants came to understand their own and other stakeholder values for the catchment and the environmental, economic and social impacts for themselves, others and the community of each scenario. It allowed community outcomes to be made transparent through use of a tool called the deliberation matrix, so that their input could form part of management decisions for environmental issues. We describe and reflect on the deliberation process

Evaluation of the process revealed that participants were impressed with the deliberative engagement process and had gained confidence that the process will lead to positive outcomes. The process allowed participants to learn new and relevant information regarding the environmental issue at hand. However, there were a number of areas where the process could be improved or where issues require further consideration. These were: the intensity of the time and effort required from the participants; the transparency of the process; a need to communicate and use information appropriately, and the low level of trust which participants placed in local government policy makers.

Keywords: *Water management, public engagement, deliberation matrix, participative democracy, reflection*



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Convenors: **Brigitte Kaufmann, Christian Hülsebusch, Anja Christinck**

'Shift happens': Co-constructing transition pathways towards the regional sustainability of agriculture in Europe

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Stakeholder engagement and participatory processes are becoming increasingly established research requirements, enabling the building of trust in, and acceptance of, research outcomes. Contributing to the EU-funded FP7 'FarmPath' project, partners across Europe developed a 'visioning process', in order to involve stakeholder groups in the identification of multiple future transition pathways towards sustainable agriculture at the regional level. The project aims to identify the social and technological innovation needs for attaining these 'ideal' and shared visions, and to assess how possible institutional arrangements, support measures and socio-technical networks amongst actors within the farming community, policy, technology and wider society can lead to the increased regional sustainability of agriculture. Approaches to 'futures thinking' highlight the contribution of visioning to strategic planning and transdisciplinary communication, as well as permitting flexibility in response to uncertainty and the consideration of consequences, leading to potential policy redirection. The paper will focus on the visioning processes undertaken in the two contrasting regions of the North East of Scotland and Alentejo, Southern Portugal, providing a detailed discussion on the key features of the visions identified and analysed by the wide range of participant groups, including active farmers, young farmers and 'new entrants', as well as rural land users and those with 'official interests'. A key theme in the Scottish case is the widely-held desire to 'reconnect' the non-farming rural and urban 'public' with the activities of farmers, in order to build a greater understanding of food production processes, as well as contribute to a general respect and empathy for the natural environment and rural community. In the Portuguese case, most striking was the willingness to engage in this process by the different types of farmers and other actors involved, as well as the shared goal to maintain the Montado, the extensive silvo-pastoral system characteristic of the region, and to operationalise support and regulatory mechanisms that guarantee this maintenance. Finally, lessons learned from the stakeholder engagement process will be discussed, as well as the contribution of this method to collaborative learning, and as a meaningful and robust transdisciplinary process.

Keywords: *Transdisciplinarity, stakeholder engagement, transition theory, sustainable agriculture, collaborative learning*

Re-think agricultural practices to improve water quality: two participatory methodologies for collaborative learning

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In the water catchment areas (WCA) defined following the European Water Framework Directive (2000/60/EC), agricultural action plans should be developed in order to improve water quality. However, the coordination and facilitation between the various local stakeholders is not easy and does not facilitate the writing of action plans, which are often not defined regarding the specific issues of the area until now.

In this context, in order to support the design of action plans that would address specific issues of each water catchment area and that would be shared by the local stakeholders, two different participatory approaches have been designed by researchers from the French National Institute of Agronomy, involving the diversity of stakeholders concerned by the water quality problems.

The first approach, Co-click'eau, is based on the design and evaluation of scenarios of changes in agricultural practices at the scale of a water catchment area, in partnership with local stakeholders. It has been tested in 2011-2012 on three WCA in three different regions of France (Nord-Pas-de-Calais, Haute-Normandie, Centre). The second approach, experienced in Burgundy region in 2011-2012, aimed to support the process of change initiated by a group of voluntary farmers, who proposed an original action plan based on an obligation of results and not of means, and iterative assessment on a long term perspective.

The purpose of this paper is to assess collaborative learning generated in these approaches.



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For this purpose, we conducted semi-direct interviews in 2013 with 35 stakeholders who participated in the approaches in each WCA. This sample was built to cover the different organizations the stakeholders belong to. Our results show that action plans in the different WCA do not always take into account the results of these collaborative approaches. However, in all the WCA, these approaches contribute to learning of the social stakeholders, in various ways: learning of technical knowledge, of methodological knowledge, about the stakes, about the others and organizational learning. Thus, we show that these approaches lead to information exchange, but also to collaborative knowledge generation.

Keywords: *participatory approaches, learning, water catchment, nitrate, pesticides, stakeholders*

From systematization to learning

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Recognizing that a large part of the information resulting from a given field project is lost, and that most of the lessons drawn from its implementation are not shared, many organizations are dedicating time and energy to “systematizing” their work and sharing the results, and with it hoping to increase results and impact. A word first coined in Latin America, systematization refers to a process which seeks to organize information coming from a field experience in order draw lessons from it. This process aims at a critical reconstruction and interpretation of a particular case. As FAO put it in a recent (2013) document, this is an iterative process through which an experience is identified, valued and documented. “Thanks to this approach, the practice can change and improve and may thereafter be adopted by others.”

Earlier guidebooks presented the theoretical need for such a process, describing its evolution and advantages. Others emphasised the need to collect as much information as possible, and to organise it in a logical way. Aiming at the successful implementation of a systematization process by practitioners in the field, ETC Andes produced and distributed a short manual in 2007, highlighting the need to define a given case and describe it, but also the need to analyse it in detail. Working together with many different organisations, the processes started on the basis of this manual led to positive results. Yet, although most individuals and organizations involved in these systematization processes made it clear that their interest in them responded to the fact that “we are a learning organization”, more attention was given to publishing a product, as a document to share, than to internal learning processes, or to the need sharing the lessons learnt and helping others to follow them. Between 2011 and 2013, IFAD's interest in supporting knowledge management processes in East Africa gave the opportunity to facilitate a series of systematization processes in Ethiopia and Zambia, and in doing so, to focus on some necessary adaptations of the process. This paper presents the methodological changes tried so as to ensure that a systematization effort does lead to a continuous learning process, and some of the issues that need further attention.

Keywords: *systematization, capitalization, documentation, learning*

Changing institutional culture: PM&E in transdisciplinary research for development

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Agricultural research in Vietnam is typically disciplinary in nature and conducted in specialised research centres following research agenda that are predominantly determined by national priorities rather than local agendas. Such a research culture has not served the mountainous northwest of Vietnam very well, a region that is characterised by an ethnically diverse population, a large proportion of which live below the poverty line. The main source of income, and also the main opportunity to overcome severe poverty in this region, is maize cultivation, which, however, is often practised on steep slopes causing considerable soil erosion resulting in unsustainable production. To address this serious natural resource management issue within the complex socioeconomic context, a transdisciplinary and development oriented approach towards research is required.

From 2009-13, the Australian Centre for International Agricultural Research (ACIAR) invested in a research for development project addressing these complex issues in the northwest of Vietnam. The Australian partners



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introduced a system's approach and as such initiated the formation of collaborative transdisciplinary teams involving a range of Vietnamese organisations to conduct participatory research activities. This research firstly aimed at understanding all aspects of the existing farming system and subsequently attesting sustainable soil management practices and finding suitable crops to diversify production. This paper will describe the use of a Participatory Monitoring and Evaluation system as the key method providing researchers with the opportunity to experience the realities of the farming systems under study and understand how farmers manage the system as a whole rather than in fragments. This experience allowed the research team to design a methodology of a transdisciplinary nature to effectively address the need for a sustainable and diverse production system appropriate for the socio-economic realities of the communities. A very important step for the successful use of the PM&E system was the transformation of the concept as introduced by the international research partners in the project to a formulation of terms and exercises that resonated better with the Vietnamese ways of operationalising participation.

Keywords: *Transdisciplinary research for development, participatory monitoring and evaluation, Northwest Vietnam*

Establishing transdisciplinary research and learning environments for rural development – a network and process model

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The Latin-American – European project SERIDAR aims at increasing relevance of university research and education through transdisciplinary networks for rural development in selected Latin American regions. A joint Competence Centre is being created as an international network of universities and other research institutions, grounded in local stakeholder networks where a variety of non-academic and academic actors collaborate.

One of the desired outcomes is an institutionalised participatory process of generating and implementing research and education activities together with local stakeholders in rural development related subjects in the partner countries.

The organisational development process so far has included the identification of local stakeholder networks in which the universities have integrated themselves with specialised facilitators and researchers, the participatory elaboration and prioritisation of locally relevant development goals within the networks, the identification of knowledge needs and possible topics for research and capacity-building activities. Research topics are being taken up within a joint doctoral programme as well as students' individual and team research projects, many with a transdisciplinary approach. Some stakeholder needs are addressed with specific capacity-building or mentoring activities. Furthermore, partners have started to prepare joint research proposals on internationally relevant aspects of these topics.

This paper presents and analyses the underlying inter- and transdisciplinary model of collaboration within the SERIDAR network. Conclusions and options for improvement are derived as a basis for discussion in the workshop.

Key words: *Agricultural Knowledge Systems, stakeholder participation, change processes, university – practitioner networks*

Innovative governance and dynamics of cognitive models for agriculture in territorial development. Lessons from a collaborative research program

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For and About Regional Development (PSDR) is the largest French research program focused on the analysis of rural and periurban dynamics. It is designed as both a process of scientific knowledge production, and building methods and tools for decision and action in the territories. In this paper we intend to analyze the contribution of the PSDR program in the construction and diffusion of agricultural and rural development models. The specificity of PSDR research devices and their integration in regional arrangements on research and action for regional



Workshop 1.7: **Collaborative learning to solve problems and develop innovations in complex systems: focus on methodologies**

Convenors: **Brigitte Kaufmann, Christian Hülsebusch, Anja Christinck**

development is analyzed. We show what kind of knowledge is produced, how it questions agricultural practices and rural development policies at regional level, and also the influence of these processes in terms of structuring networks and cognitive communities at local and interregional levels. In that way, we can assess the innovative role of the PSDR program concluding on its influence on “niches” organization standards diffusion, or transition process. The mobilized data to lead our analysis consist of a detailed knowledge of the PSDR device from our experience of management of the program and various documents produced by projects and animation teams in each of the ten regions involved in the program.

Keywords: *PSDR program, innovative governance, agriculture, rural development, cognitive models, partnership*



Workshop 1.8: Knowledge & innovation brokers: lubricating knowledge development & innovation in networks

Convenors: **Elke Wielinga, Laurens Klerkx, Michael Kuegler**

Workshop 1.8: Knowledge & innovation brokers: lubricating knowledge development & innovation in networks

Convenors: **Elke Wielinga**, LINK Consult, The Netherlands
Laurens Klerkx, Wageningen University, The Netherlands
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Relevant knowledge for stakeholders in farming systems is emerging from interaction, rather than streaming from research to users. Intermediary actors, bringing stakeholders together and lubricating the mutual learning process, appear to be crucial. Who are performing this role? What do they do? What is the position of researchers in such processes? In this workshop we look for experiences and insights.

Exploring the emerging 'intermediation' roles in agricultural extension education

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The purpose of this piece of work is to investigate, through a literature review, the role of intermediaries in agricultural and rural development. In the first place, a general view of the roles of intermediaries, (focusing on the two main types of intermediaries, i.e. facilitators and brokers), as depicted in literature, is provided. Following, the emergence of facilitators and brokers in agricultural literature is explored based on the turn from reductionist to systemic science as well as from the expert syndrome to participatory development. Such changes pose a major challenge to the dominant Transfer of Technology extension model and allow for the rise of a facilitation model; this is further reinforced by the sustainability rhetoric and practice. As a consequence the understanding of 'intermediation' has to be transformed from exploitation to exploration, i.e. from information dissemination to co-learning facilitation or from old to new KIBS. A number of examples from agriculture-related literature (and practice) illustrate such an argument. This review points to the fact that, at least as far as agriculture-related theory and practice are concerned, intermediaries as co-learning facilitators signify rather new roles requiring specific and, to a large degree, unexplored skills. Given that there is still a number of issues threatening the efficacy of intermediaries (facilitators and brokers), it is argued that there is an urgent need for facilitation and brokerage to be better described, operationally defined and well-evaluated so as to allow for both a better interpretation and guidance of practice.

Key-words: *extension, innovation, intermediaries, facilitators, brokers*

Developing models for transdisciplinary cooperation in the agriculture sector for European Innovation Partnerships

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European Innovation Partnerships (EIPs) are a new instrument to promote innovations and to overcome sector specific gaps in technology transfer. Particularly in the present day agriculture sector, there is a strong perception of a valley-of-death in innovation processes. This study had the overall objective to develop viable models for generating transdisciplinary cooperation on the federal level of Brandenburg in Germany in the pre-implementation phase of EIP. The formative approach combined two methodological streams conducted alongside a consultancy contract with the Federal Ministry in Brandenburg: first we set up a stage-gate-process elaborated initially for product optimization in industry. Secondly, we framed a design for business model development. The process aimed to 1. identify innovation gaps, 2. assess frame conditions for a consolidated transdisciplinary approach, and 3. investigate structural elements for a pilot innovation network. The gates were used to validate the results with regional stakeholders' requirements. The process revealed a need for organisational innovations atop of technical or service innovations. We therefore developed structural model elements for formal collaboration targeting the innovation capacity within the regional agriculture sector and validated the potential modes of operation against a set of predefined criteria. We highlight the significance of undertaking regular calibration with evolving overall policy planning and translation to the context of regional stakeholders. The approach provides for cross-sector involvement during the phase of planning and formation as long as there is a clear ex ante determination of a common vision for the region on the policy side. The function of innovation



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brokerage can be integrated into a newly formed innovation network if this function is not sufficiently provided for by existing organisations. We claim that the generation of regional organizational innovations may be one solution to address future challenges in the agriculture sector. The effort to form new organisations can be supported by methods from ex ante policy assessment and business model development.

Keywords: *business model development, innovation broker, Common Agriculture Policy, organizational innovation*

Third party roles of brokers in temporary knowledge networks

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Agriculture extension advisors play key roles as intermediaries, or brokers, within temporary knowledge networks including within Australia's innovation system which is generally referred to as research, development and extension (RD&E). The purpose of this paper is to provide insights into the intermediation roles of public and private agriculture advisers drawing on an empirical case study of an Australian dairy industry RD&E project, Project 3030. The findings suggest that the roles of privatised advisers are not substitutable with those of public advisers for a range of reasons that include how institutional rules are prioritised and social capital resources are invested. When called on to act as intermediaries within transdisciplinary (RD&E) initiatives, different roles and functions of public and private advisers need to be understood and identified to ensure alignment with project objectives and processes. This paper draws on empirical research based on a mixed methods case study that included social network analysis, participant observation and semi-structured interviews.

Keywords: *temporary RD&E networks, innovation systems, public and private extension advisers, intermediation, social network analysis*

An operational approach to Support Learning and Innovation Networks for Sustainable AgricultureDelphine Neumeister¹, Simone Helmle², Anne-Charlotte Dockès¹¹The French Livestock Institute, France, ²Justus-Liebig Universität Gießen, Department of Rural Sociology and Extension, Germany

In the framework of the European research project SOLINSA (Support of Learning and Innovation Network for Sustainable Agriculture), 17 learning and innovation-networks (LINSA) were analysed with a participatory approach, with the aim of learning more about the knowledge fluxes people need to get involved in to reach sustainable agriculture. Within a practice oriented, research-practitioner collaboration, the project used participatory approaches with the intention to test practical methods to support these networks. We have formalised an operational approach for transition partners –these are those people who support learning and innovation networks especially in their development. Analytical schemes, as well as methods which enhance social learning were tested in an experimental training course in October 2014².

Depending on the stage of development and on the involvement in the Agricultural Knowledge System (AKS), LINSAs express different kinds of needs, these require different and specific skills for transition partners. Supporting a LINSA involves different steps:

- Joint identification of a LINSA, and understanding its characteristics (players, objectives, scale, temporality, current learning and innovation processes, learning history)
- Joint analysis of needs, and formalising of the objective of the supporting activities. It involves the transition partners working with the LINSA's actors to define the outcome challenges the LINSA could face, its main supporting needs and the ways the transition partners could provide relevant supports.
- Carrying out the supporting activities. One function of transition partners is to facilitate reflexion on processes, i.e. learning mechanisms, communication and information fluxes, governance and decision making, networking and exchanges of experiences.

² This training course was led by a group of trainers which included: Niels Rump as the main facilitator, Anne-Charlotte Dockès, Delphine Neumeister, Dominique Barjolle, Simone Helmle, Gusztav Nemes, Talis Tisenkopfs, Gianluca Brunori.



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- Evaluation of the activities, and possible definition of a new set of objectives. The evaluation of the support activities allows the assessment of the effectiveness and efficiency of the support mechanisms, which will lead to a progressive improvement in the subsequent ones.

The SOLINSA project has tested some of the participative supporting activities with the use of a set of analytical approaches.

Keywords: *Transition partners, learning and innovation-networks, sustainable agriculture, participative methodology*

Efficient knowledge systems for supporting irrigation technologies in horticulture

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Knowledge is considered important for innovation, in general, but also for agriculture and horticulture it is seen more and more as a key resource in the scientific literature and political discussions. In that it is not only a basis for innovation targeting at competitiveness of firms, but also to master global challenges such as resource use, climate change etc. Water availability and water quality are among biodiversity, cultural aspects of landscape, soil functions and other public goods positively or negatively affected by agriculture and horticulture.

The importance and urgency of resource conserving irrigation in agriculture and horticulture have increased worldwide. Therefore, a lot of efforts have been undertaken in science and supplying industry to develop knowledge and technologies for water saving resource use. Two aspects are of major importance as adoption barriers of water saving irrigation technologies and management strategies of farmers (1) irrigation and fertilization are interdependent and (2) nitrate leaching and usability of management tools are key points when considering adoption of new irrigation technologies and management strategies.

Within this context a case study from Germany is presented, describing knowledge generation, intermediating actors and adoption of a science-based irrigation management tool for field vegetable production. The aim of our research was to analyse the existing knowledge and exchange processes in order to derive recommendations for further development of the regional knowledge system, especially for the development of processes and structures for knowledge production and transfer of new knowledge and know-how.

A framework for sectoral and regional knowledge systems based on the literature of sectoral innovation systems and knowledge management has been developed, and 10 problem-centered interviews with 14 actors from extension, experimental stations, farmers, service providers, supply industry, policy, marketing and water infrastructure providers were conducted. The results of the qualitative content analysis were presented to the relevant actors in a workshop, where the author facilitated the discussion about the knowledge system for irrigation and how it should be further developed against the background of future challenges. The paper presents results on success factors, the role of intermediaries, interaction mechanisms and knowledge assessment questions to discuss starting points for the further development of this knowledge systems and to generate lessons learnt on the role of intermediating actors in horticulture. We also discuss the role of research projects and their potential for temporal intermediation and suitable methodological approaches.

Keywords: *knowledge mechanisms, sustainability, vegetable production, innovation management, innovation broker*

Transition towards low-input cropping systems: characterization of actionable knowledge for technical change

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In the context of a current need for cropping systems adapted to new economic, social and environmental requirements, some agronomists have focused their research and advice activities on the re-design of cropping systems. Such adaptation requires firstly new knowledge on biological and ecological mechanisms supporting cropping systems less dependent on synthetic inputs, and secondly, tools (models, methods, participatory processes in which farmers have an active participation) for their design and evaluation. However, the new knowledge and tools proposed until now mainly concern a *de novo* design of completely described cropping systems. Thus, questions remain concerning how farmers may benefit from these resources in order to undertake



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progressive technical changes in their own cropping systems, without necessarily having a clear description of one specifically targeted cropping system. This led us to study the way farmers engaged in such technical changes are managing the available knowledge in the design of their action. To this end, different characteristics of knowledge were analyzed, and used to describe the kinds of knowledge mobilized or not by farmers, to understand the link between the types of knowledge and the induced potential for technical changes. We proceeded with different types of interaction between farmers and agronomists to bring out the relevant characteristics: we surveyed farmers re-designing their cropping system and advisors helping them in this action, we organized meetings with farmers (created situations) in order to bring out a clear approach, supported with a set of information materials previously characterized. Knowledge characteristics were studied regarding how they influence legitimation and validation for action, how they allow the farmers to refer to a systemic representation of productive resources and especially to a long term perspective, and how they allow them to act in their particular situation. Complementary axes of description include also forms of quantification, ways in which different time scales are addressed, ways in which knowledge refers to uncertainty and perturbations, ways in which different risks may be considered, and forms of integration of objects or techniques concerned in larger scales or combinations of technics. With a better understanding of what can be actionable knowledge for these technical changes, we aim at making proposals for adapting the knowledge produced to support such changes as well as the tools for cropping system design.

Keywords: *cropping systems design; actionable knowledge; knowledge characteristics; technical change.*

Acting as Agricultural Innovation brokerage in Italy: experiences from the Rural Development Programmes 2007-2013

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The European Rural Development Policy (RDP) 2014-2020 establishes the European Innovation Partnership (EIP) for agricultural productivity and sustainability to bridge the existing gap between science and practice and to allow the achievement of better and faster results compared to existing innovation approaches. The aim of the EIP is to apply the interactive multi-actor model of knowledge exchange in order to generate new insights and ideas and mould tacit knowledge into focused solutions that are quickly put into practice.

In this context, the innovation brokers should play an important role as knowledge suppliers, through connecting different actors of the innovation system, establishing the link between the research and the entrepreneurship worlds and arranging the collaborative networks. The concept of innovation broker is quite new in Italy since its Agricultural Knowledge and Innovation System (AKIS) has been based on public advisory systems for a long time. However, in the context of the implementation of measure 124 of Rural Development Programmes (RDPs) 2007-2013 the function of innovation brokerage has been played by different AKIS actors, such as farmers, producer's organizations, research and innovation centers, the Extension and Advisory Services and the LAGs.

Accordingly, this study analyses the different types of intermediation and functions applied by the AKIS actors, in view of profiling the innovation brokerage model applied in Italy, and proposing insight, tips and comments on how to face off the challenge of facilitating the sharing and creation of knowledge.

Keywords: *innovation brokerage, AKIS actors, innovation, EIP, RDP, advisors*

Become a broker: the metamorphosis of an advisor

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This paper explores the experience of an advisor in acquiring and implementing new skills aimed at stimulating and managing learning processes with different stakeholders. The paper also takes in account the role of researchers in such process.

The experience can be divided into three stages: the training course, the cooperation between advisor and teacher in a facilitation project, the performance of the new profession.

The training course was aimed at making the participants learn and experiment new ways of working and relating with farmers and rural people, based on cooperative learning in the attempt to move from a model of knowledge dissemination to a model of knowledge generation in an interactive network with a variety of actors. The course



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was structured with classroom activities, whose main topics were facilitation, participatory methods and communication techniques, and activities on the “field”, aimed at developing a working group with farmers under the coaching of researchers (Proietti, 2006).

After the training period, the advisor implemented her own achievements cooperating with the teacher in the realization of a project of “creative communication” with farmers. The advisor had the opportunity to see her teacher acting as a facilitator, to set up a working group with farmers and to cooperate in its facilitation (Proietti, 2006).

Finally, performing her new profession the advisor/broker set up (among others) a network among organic farms, who had no previous relationship, with the aim of drawing a new model of organization within / between farms and promoting collective learning approaches. Such network, which was studied as a case of LINSAs – Learning and Innovation Networks for Sustainable Agriculture (Brunori et al., 2013, Favilli et al., 2013), has been characterized by mutual understanding and sharing of knowledge and experiences, laying the foundation for a highly collaborative process among involved farms.

Keywords: *facilitation, cooperative learning processes, knowledge generation, participatory methods, communication techniques*

Concepts for Co-Creation

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There is growing recognition in rural development of the importance of lively interaction between farmers, researchers, policy makers, value chain actors, consumers and other stakeholders. Whilst in the past innovations were expected to flow from researchers to farmers as end users, new and sustainable solutions are now progressively viewed as emerging from joint learning processes. As Mrs. van Oost (EU) states: *The innovation model under the agricultural European Innovation Partnership programme (EIP) goes far beyond speeding up transfer from laboratory to practice through diffusion of new scientific knowledge (referred to as a “linear innovation model”). The EIP adheres to the “interactive innovation model” which focuses on forming partnerships - using bottom-up approaches and linking farmers, advisors, researchers, businesses, and other actors in Operational Groups.* (Van Oost 2012).

Such lively interaction does not occur spontaneously, especially not under harsh competitive market conditions. It takes deliberate effort, for which space should be created. My view is that the concepts and language associated with technology transfer approach are insufficient to describe what really matters in processes of co-creation. This is also true for the vocabulary associated with the neo-liberal market approach. Take for example the concept of the “knowledge broker” who, in the strictest sense, merely brings suppliers and clients together. Creative processes require more than that. Such vocabularies might blind us to certain elements crucial to understanding why some networks become creative while others do not.

Three concepts will be highlighted which, in my experience, appear to be useful in the understanding and stimulation of co-creation in networks: [1] *Vital Space*: this is the space in a network where people feel the freedom to contribute what they enjoy doing in connection to others. Here they feel recognised and useful, and there is curiosity, enthusiasm and creativity. [2] *Free Actors*: these are the persons or actors who do whatever is needed to create vital space in a network, whether they are mandated to do so or not. No network can function well without a free actor. [3] *Responsive Capacity*: this is the capacity of a network or system to generate effective responses to changes and challenges. Enhancing this capacity is the ultimate justification for free actors to intervene.

Keywords: *knowledge systems, networks, co-creation, facilitation, knowledge brokers*



Workshop 1.8: Knowledge & innovation brokers: lubricating knowledge development & innovation in networksConvenors: **Elke Wielinga, Laurens Klerkx, Michael Kuegler****How to strengthen the link between advisors and research in a privatized advisory system? – The case of Brandenburg, Germany**Ulrike Knuth¹, Andrea Knierim²¹ Leibniz-Centre for Agricultural Landscape Research, Institute of Socio-Economics, Germany, ² University of Hohenheim, Institute of Social Sciences in Agriculture, Department of Rural Sociology, Germany

Agricultural advisory systems are mentioned as one important partner in the European Innovation Partnership (EIP) 'Agricultural Productivity and Sustainability' and therefore new funding opportunities for private advisory firms become available. Consequently this requires from advisors to adopt new roles such as intermediaries, (knowledge) brokers, (process) facilitators or change agents, e.g. in research – practice networks. Studies of the last decades in Brandenburg observed fragmentation within the AKIS, especially among advisors, but also disconnected linkages with research. Privatization and commercialization of advisory services to the full amount and shortening of budgets for regional agricultural research are main reasons.

These observations motivated the authors to start an action research process together with advisors working in Brandenburg, which aims at searching for new ways to intensify the collaboration between scientific organizations and advisory services in Brandenburg. The action research process will include the phases of problem analysis, planning, implementation and evaluation closely related to the management cycle, but they are to be adjusted as the process continues.

So far, the kick-off meeting with interested advisors has been realized and delivered insights on how advisors view the regional research system and its interaction with practice. In general, the advisors assess the situation as "research in Brandenburg is almost invisible". In particular, they noticed, that linkages among actors from the organic farming context are more intensively compared to conventional farming "actors". The implementation of EIP has not (yet) been received as a chance for future activities and has been viewed quite skeptically, especially concerning the advisors' role within operational groups. The participating advisors concluded a strong need for more networking activities within the group of advisors (self-organization) and defined it as a topic to tackle in following meetings of this action research process.

Keywords: interface, agricultural innovation system, linkages, action research, privatization, advisor

The Impact of Agricultural Extension Services on Farm Household Efficiency in EthiopiaPaul Thangata¹, Teferi Mequaninte²¹ DAI, Africa Lead, Kenya, ² PhD candidate, Stuttgart, Germany

One of the major policy shifts in Ethiopia since 1992 has been the emphasis to improve the productivity of smallholder agriculture through increased use of improved agricultural technologies and extension. The Rural Capacity Building Project (RCBP) is one of the many programs designed to enhance smallholder productivity in Ethiopia. The project supports the government's endeavor to improve the access and quality of the agricultural extension system and make the service client oriented to address the demands of farmers and pastoralists. The overarching expected outcomes of the initiative are to expand the choices of adoption of new and usable agricultural technologies, increase agricultural productivity, and thereby bring significant positive income change for farming households.

Studies of grain farmers have investigated the optimal way of converting inputs into outputs, i.e. raising technical efficiency. Nonetheless, little attention has been given to the impact of agricultural extension services on productivity and efficiency at the farm level. This paper aims to fill this gap. We use data from household survey of 678 rural households in Amhara, Oromiya, SNNP and Benshangul-Gumuz regions of Ethiopia to estimate a stochastic frontier production function to analyze differences in technical efficiency between RCBP participating and non-participating smallholders. The analytical framework used in this paper follows the Cobb-Douglas production function model of the Stochastic Frontier Analysis (SFA). The SFA assumes the existence of technical inefficiencies of production of farmers involved in producing a particular output. The Cobb-Douglas production function expresses output as a function of inputs, which capture the degree to which farm households produce below the frontier level of production, i.e. inefficiencies.

Our findings show no significant difference in productivity changes and technical inefficiencies between project and non-project farmers, which could be explained by various farm specific and household characteristic variables. The results show land, input use, and labor are important inputs and are strongly associated with total output. The mean technical efficiencies were calculated to be 0.993 for both groups of farmers, indicating both groups being



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relatively efficient under their current resources, with little potential for reducing inputs or increasing outputs in the range of only 1%. The obtained measures of efficiency indicate that significant differences in productivity changes between project and non-project households are not as great as expected by the project planners.

The findings suggest that in addition to its investment in farmer training centers, the government might have to address the technological and institutional constraints of its extension services. Additionally, since farmers are already at the edge of the frontier, government may consider innovative agri-business approaches and farm entrepreneurial development by providing a large number of services, including allowing private advisory services and guaranteeing output purchase. We note that the present study is based on data from a single production period: a follow-up is recommended to collect data to examine technical efficiency in Ethiopia. This would help policy makers in strengthening the capacity of and investing more in extension services. This is supported by the finding that in the non-project group, access to extension was associated with higher household farm efficiency. Similar to other studies on productivity of maize farmers in Ethiopia, we find that access to extension services is important if farmers are to significantly increase agricultural productivity.

Keywords: *Technical efficiency, Agricultural extension services, Smallholder agriculture productivity, Farm entrepreneurial development, Private advisory services*

Government stimulation of operational groups for innovation in agriculture - Proposition for reframing the government support to operational knowledge exchange networks in the Netherlands, as an example for Europe

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The government stimulation of partnership-driven, multi-actor, operational knowledge exchange networks in the agricultural sector of the Netherlands started with a R & D programme (2004-2007) for the livestock sector. In the R & D programme livestock farmers and other actors were invited to apply for support for the knowledge elaboration about their innovative ideas.

Framing of the support of these networks in EU and government regulation frames (2007-2013) has been problematic, because the topic contains elements of both the sections about 'Education and Knowledge Dissemination' and about 'Cooperation in Innovation'. From the analysis in this article it is concluded that such projects are basically well categorized in the section 'Education and Knowledge Dissemination'. However, the aspects of 'problem articulation', 'plan' and 'plan design modifications based on progressive insights' fit better with the frame of the section 'Cooperation in Innovation'. The issue of knowledge dissemination from any of the project to the sector is yet another issue, since it is a collective problem of all the projects together. For collective aspects there is not yet a specific section or subsection.

In this article an alternative intervention concept is suggested, consisting of an integrated framing that resolves the current dilemmas. This framing may also serve as a conceptual hand out for the framing e.g. of the concept of multi-actor 'operational groups', as proposed by the European Commission in the Horizon 2020 Programme at international, national and regional level in the European Union.

The article elaborates on the suggestion that the framing is best addressed in a system of two parts with a simultaneous evaluation of both parts, consisting of an 'innovation investment part' for the plan design, and a 'knowledge development part' for the project execution. Both stages incorporate their own conditions. A distinct but not separate construction is proposed for the collective aspects. In the framing the applicants are encouraged to reserve part of the budget for the maintenance of a collective project execution, i.e. support centre for collective knowledge dissemination, and intervention groups for the collective support of the project convenors.

Keywords: *partnership-driven networks, multi-actor approach, operational groups, knowledge exchange networks, living networks, innovation stimulation, rural development support, EU, FP7, Horizon 2020, government support, tender regulations, regulation frame, public policy issues.*



Workshop 1.8: **Knowledge & innovation brokers: lubricating knowledge development & innovation in networks**

Convenors: **Eelke Wielinga, Laurens Klerkx, Michael Kuegler**

Can knowledge combination allow a sustainable conservation of native livestock breed? Study cases from Southeast Serbia

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The paper shows up results from research on the role and impacts of knowledge combination use in the area of Dimitrovgrad, South-Eastern Serbia. This area is of interest, because of local efforts to conserve indigenous Balkan farm animal breeds, agro-tourism, revalorization of local food products by the work of farmers and independent professionals involved in farming and rural tourism activities. The research was carried out through a farming style approach, including farm visits, meetings with local stakeholder and secondary source data. The study confirmed that knowledge network and local networks are an important component to achieve the conservation of native breed livestock by rural initiatives among farmers and revalorization of local products. The rural initiatives are supported by local organisations, private investors, external cooperation and local projects, and local organization. Conserving local animal resources provides a biological capital for rural livelihoods. In addition, has opened the access to other opportunities to enhance local development, but not only knowledge is a necessary means to develop in the globalized time, otherwise capacity building strengthening should be provided to local stakeholders.

Keywords: *local livestock breed conservation, knowledge type, sustainability, Southeast Serbia*



Workshop 1.9: Farmland (bio-)diversity in the hands and minds of farmers: Farming systems approaches to landscape protection and biodiversity preservation

Convenors: **Robert Home, Maiann Suhner, Silvia Tobias**

Workshop 1.9: Farmland (bio-)diversity in the hands and minds of farmers: Farming systems approaches to landscape protection and biodiversity preservation

Convenors: **Robert Home**, Research Institute for Organic Agriculture (FiBL)
Maiann Suhner, Swiss Academy of Natural Sciences
Silvia Tobias, Federal Research Institute for Forest, Snow and Landscape (WSL)

Agricultural areas are important providers of public goods, including biodiversity and landscape. In recognition of this role, many governments have introduced, with varying degrees of success, conservation schemes, which farmers are expected to implement. This workshop will share and explore experiences from transdisciplinary approaches that have been applied in response to the inadequacies of top-down incentive schemes.

Session 1: Landscape and biodiversity under pressure
Green belts in the hands and minds of farmers: a socio-agronomical approach of farmers' practices

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Biodiversity has dramatically decreased those last decades, mainly because of urban sprawl and the development of intensive agriculture. In France, this topic is addressed by the measure of the "blue and green belts", part of the Grenelle laws. The objective of this measure is to preserve or re-create paths to allow animal or vegetal species to move from one habitat to another one. We carried out a research project (PASSAGES) as part of a research program funded by the French ministry in charge of ecology (DIVA 3). This project aims to analyze how green belts measure can be implemented, and, especially how farming can contribute to preserve green belts. The objectives of the research are: 1. to identify the different elements localized in farming areas which contribute to green belts: permanent grasslands, high mountain pastures, hedges and borders, fallows, grass strips ; 2. to understand farmers' practices, their knowledge concerning these elements and the reasons of their practices ; 3. to point out which characteristics of farms and farmers practices seem to be favourable to preservation and maintenance of green belts. The methodology combined a cartographic approach to localize green belt elements in farming areas and an agronomical and sociological approach to analyze farmers' practices, based on deep interviews among a sample of 25 farmers. The studied area is located in the Alps, in the periurban context of Grenoble (Valley of Gresivaudan). The farming systems are mainly based on cattle or sheep production in the hillsides and on mix crops in the plains. The results of this work show that elements of green path are differently integrated in farming systems (i) depending on their nature (productive elements like grasslands versus unproductive ones like hedges) and (ii) depending on their function and usefulness in farming system (for example isolated trees which can offer shade for cattle or hedges which can hosted auxiliary insects). However the integration of these elements in farming system also depends on territorial context of the farming area as well as on how farmers consider them in a patrimonial, an esthetic or a sensitive point of view. Combining those criteria, we identify four different profiles of farmers' behaviors concerning green belts elements. These results suggest that public politics concerning green belts measure should not be only based on technical and economic criteria, but should also take into account both the different types of natural or semi-natural elements to be preserved and the different types of farmers' profiles.

Keywords: *green belts, biodiversity, farmers' practices, French Alps*

Where global masterplans meet local practices: conflicts and contradictions between mitigation and adaption initiatives

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With the development of large-scale international agreements, such as REDD, it is becoming increasingly important to examine the synergy between global masterplans, national endeavors and local actions in relation to environmental services provision and to mitigation and adaption to climate change. This paper will draw on a comparative study of two countries', Brazil and Nepal, strategies and practices to deal with carbon emissions, i.e. examining the tensions and contradictions between mitigation agendas and the roles, practices and interests of



Workshop 1.9: Farmland (bio-)diversity in the hands and minds of farmers: Farming systems approaches to landscape protection and biodiversity preservationConvenors: **Robert Home, Maiann Suhner, Silvia Tobias**

the actors in the programmes and projects related to REDD. The data has been collected from contrasting case studies within the two countries (REDD and non-REDD cases). Preliminary evidence suggests that while the lack of synergy between global plans and local practices might be seen as simply a matter of 'coordination', it actually reflects competing interests and agendas, both at national and local levels. The REDD plans are guided by a generic template, but how these plans are interpreted and implemented at national and local levels varies greatly, both between and within participating countries. The complexity of the REDD schemes creates a demand for actors who can plan and broker the processes. This complexity and the lack of an overarching reflexivity create a number of problems linked to transparency, complexity, lack of accountability and room for exploitation by powerful economic and political actors. This paper argues that these aspects often transform the planned results into unintended outcomes, depending on the particular configuration of local contextual factors and processes.

Keywords: *payment of ecosystem services, forest management, smallholder agriculture, climate change, Amazon, Himalaya*

The effect of forest proximity on biological control of pasture in Northwest Mato Grosso, Brazil: a cost-benefit analysis for land use policy

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This research aims to generate information for landowners and policymakers, to motivate them to take into account the value of the forest in agro ecosystems management in Northwest Mato Grosso. Pest control of pasture is analysed, as an important ecosystem service (ES) provided by the forest for a key economic activity in the municipality of Cotriguaçu. The value of biological control, and the criteria for maximizing it, will be assessed by the correlation between forest proximity and spittlebug (Homoptera: Cercopidae) infestation level on pastures, and its estimated economic loss. Different scenarios in terms of conservation strategies and better cost-efficiency will be generated from the estimated value of this ES with the opportunity cost of conserving the remaining forest.

Keywords: *Amazon, cattle ranching, pasture pests, biological control valuation, land use policy.*

Session 2: Regional development, incl. biodiversity conservation, strategies**Provision of Public Goods Through Mountain Meadows and Pastures in Aosta Valley (Italy)**

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The traditional exploitation of meadows and pastures in Aosta Valley ensures the provision of high valued public goods - biodiversity conservation, soil functionality, preservation of landscapes - to the whole local community and tourists. In Aosta Valley meadows and pastures cover about 54 000 hectares, of which 42 000 hectares are alpine pastures. There are about 300 alpeggi and about 200 of them are used for production of Fontina PDO cheese; about 29 000 cattle and about 3 800 sheep and goats are moved to alpine pastures in summer for grazing. The opportunity to exploit higher pastures must conciliate the need to store hay for feed in the valley floors. Therefore, in summer cattle move from valley floors to mountain pastures; in many cases not much wide farms in valley floor deliver their cattle, sheep and goats to other farms that own or rent large-sized alpeggi. The sustainable management of mountain meadows and pastures relies on a complex network of actors, involving local breeders, the owners of the alpeggi (also municipalities), cow's milk buyers, in loco Fontina PDO cheese making and the regional government. In order to ensure the appropriate management of meadows and pastures farms are mainly supported throughout the agro-ecological schemes of the Rural Development Programme, the goal of which is the protection of the environment, landscape and biodiversity, water quality improvement, greenhouse gas reduction, and so on. It is useful to point out that it is absolutely necessary to maintain support to farms that follow exploitation systems according to the approach described above for the future of the agricultural policy.

Keywords: *Alpine meadows and pastures, biodiversity conservation, soil functionality, landscape preservation, Aosta Valley*



Workshop 1.9: Farmland (bio-)diversity in the hands and minds of farmers: Farming systems approaches to landscape protection and biodiversity preservation

Convenors: **Robert Home, Maiann Suhner, Silvia Tobias**

Farmer Supported Biodiversity Conservation in Uttarakhand, India

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In Uttarakhand, India, it is estimated that roughly eighty percent of the farming is “organic by default” in rainfed areas, and in the hills, ninety percent of the agricultural land is rainfed. Some farmers have experienced depletion of the soil with the use of mineral fertilizers, especially when rain did not come as expected, but the influence of the GR has been much less in this state than in e.g. Punjab. Uttarakhand has a rich biodiversity both in wild plants and agricultural crops and there are ancient as well as new seed banks in use around the state. Local farmers’ organizations train and support farmers converting to organic practices and help to improve the farming methods of those farmers who have been using traditional, natural methods all along. During the conversion period, traditional, low-input production systems as in Uttarakhand often see an immediate increase in the yields after converting to organic methods, because the farmers make use of a number of on-farm fertility sources including vermi compost, crop residue, and animal manure. Multi-cropping is also used to increase production on small plots and to reduce the risk of loss where there is drought or other difficult climatic conditions. The farmers reported that their local food security is improved through biodiversity conservation and control over their own seed and other inputs. Local farmers cultivate a number of traditional crops that are famous for their taste and quality, which are sold as niche produce in Delhi and Mumbai, but there is a need to improve marketing. Many certified organic producers often receive a market premium only in urban markets, while at local markets a similar price to that of conventional produce is frequently paid. I found that the organizations that assist the farmers in this transition are crucial, because they teach the farmers new methods and give practical and moral support during a time when they feel uncertain making such a large change in how they make their living. Fieldwork for this research was conducted between February 2007 and October 2008, and I divided my time between field sites in the states of Punjab, Uttarakhand, Tamil Nadu, and West Bengal. Living in the villages for about a year, I interviewed 250 farmers and staff from farmers’ organizations.

Keywords: *Biodiversity conservation, mountain agriculture, agroforestry, sustainable farming*

Mountain agriculture at the crossroads, biodiversity, culture, and modernization, conflicting and interacting interests

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Mountain agriculture emerged at the intersection of the "wild economy," which focused on hunting, fishing and gathering wild plants and the agricultural based economy that is characterized by the domestication of animals and cultivation of the soil. Like other traditional systems based on pasture, the Swedish mountain systems is based on the use of inherited traditional knowledge and mountain pastures have over centuries created a very rare and rich habitat in the form of upland hay meadows. Today, both traditional knowledge and the rich biodiversity in the mountains are endangered by the implementation of modern practices that lead to a number of conflicts that go beyond the tragedy of the commons. One important source of conflict emanates from the changing role of the countryside, a role that creates expectations on farmers to deliver recreation, magnificent landscapes, new job opportunities, operate hotels, produce, cheese, maintain a cultural heritage and contribute to the conservation of native breeds. Another problem is caused by new support systems and regulations that create incentives to intensify the exploitation of summer farms by using the pastures for modern meat cattle breeds, which changes the landscape, but also makes traditional farmers upset, because of the risk of losing the traditions of summer farms.

An additional source of conflict is created by the state’s changing attitudes towards the mountain world, as the state aims to shut down all existing (state owned) leased mountain flats (fjällägenheter) by cutting down basic infrastructure. The remaining flats are located primarily in the northern parts of Jämtland. They contribute to the maintenance of a very unique flora and insect fauna. By comparing two cases, one in Klövsjö and one in the northern part of the region, this paper contributes with new knowledge about mountain agriculture, including interlocking interests, competitive activities, potentials and conflicts.

Keywords: *mountain agriculture, cultural heritage, biodiversity*



Workshop 1.9: Farmland (bio-)diversity in the hands and minds of farmers: Farming systems approaches to landscape protection and biodiversity preservationConvenors: **Robert Home, Maiann Suhner, Silvia Tobias****Session 3: Agro-environmental schemes for biodiversity****Agroecology: toward redesigning the relationship between farming systems and biodiversity conservation**

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Farming systems play an important role in the management of ecosystem services notably through biodiversity conservation. In EU, agri-environmental schemes encourage farmers to adopt multifunctional land use practices. However, both the weak ability to interest other than low-intensive farming systems and the dispersal implementation of agri-environmental schemes question the efficiency of top-down and parcel scale designs. Therefore, the integration of biodiversity concerns in farmers' practice choices still calls for innovation. A review of current literature led us to support agroecology as a lever of change in farming practices and to redesign biodiversity conservation at a landscape scale. Synergies between agroecosystem components are a central issue of agroecological practices and reconnect farming systems to ecological functionalities. First, so designed practices (1) favor farming systems flexibility and autonomy and (2) make biodiversity enter farming strategies. Second, these practices involve agroecosystems diversification which allows reconsidering biodiversity conservation in terms of landscape mosaic and presents new possibilities: (1) taking into account different gradient of farmland use intensity and different farm realities, (2) integrating functional aspects of biodiversity by conserving ordinary as well as vulnerable species and (3) ensuring an integrated vision of habitat distribution and connectivity. Finally, these symmetrical changes in farming and biodiversity conservation designs require the actors' capacity to implement innovations in their practices. So, learning processes are decisive in achieving change. By mobilizing reflexive governance theory, we question the role of collective action (coordination forms) in farmers' and biodiversity managers' acquisition skills. We hypothesize that changing collective action by practice-learning processes also changes the identities and the professional responsibilities of the actors.

Keywords: *agroecology, learning process, reflexive governance, farming systems, biodiversity conservation, redesign*

Sustainable landscape management – the view from the grassroots

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An alternative approach that has been applied in response to the inadequacies of top-down incentive schemes for enhancing biodiversity and landscapes, is to fund the collaborative efforts of farmers and other stakeholders in rural areas. Agri-environmental collaboratives have the potential to provide landscape scale management (as opposed to field or farm scale management) and a matching of public funding with in-kind and volunteer resources that group members provide. A major challenge, however, is assessment of whether management activities are successful, i.e. the money was well-spent. Accountability is crucial for public bodies providing funding, whereas local groups frame their activities differently. This paper explores the achievements of agri-environmental collaboratives in Germany and the Netherlands from the point of view of their members. A total of 45 key informants and groups members were interviewed. Groups frame their contribution to sustainable landscape management in six fields: their contribution as policy implementer and service provider; as the carer for 'everyday' landscapes; as communicator and mediator; their contribution to the maintenance and protection of landscapes (including species and habitats); raising awareness and changing behaviours; and generating income and economic benefits. Very little quantitative data are available on the actual impact of management activities in the landscape, and the data are held in various places and different formats. The findings highlight the incompatibility of public accountability requirements and the grassroots view of their contributions. Efforts are needed to acknowledge the contributions of agri-environmental collaboratives and ensure their ongoing commitment while at the same time enhancing monitoring and data management for both tangible and less tangible outcomes in order to meet accountability requirements.

Keywords: *collaborative management, bottom-up sustainability assessment, framing, landscape, effectiveness*



Workshop 1.9: Farmland (bio-)diversity in the hands and minds of farmers: Farming systems approaches to landscape protection and biodiversity preservation

Convenors: **Robert Home, Maiann Suhner, Silvia Tobias**

Farmer-typologies on the issue of environmentally friendly farming: integrating stakeholders as well as farmers to ameliorate the design of agri-environmental programmes

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Since on the one hand it is impossible to tailor agri-environmental programmes (AEPs) to the need of each single farmer and on the other hand a “one size fits all” approach may have severe shortcomings it seems reasonable to subdivide farmers into more or less homogenous groups. Typologies offer the possibility to gain more information about the respective group of farmers and their particular needs. Farmer typologies are above all relevant for farm advisers and policy makers. In order to develop farmer types of high practical value, it is necessary to integrate these groups directly at different stages of the development of the typologies. In order to integrate agricultural stakeholders as well as farmers, we decided to use Q methodology as a way to gain more insight into farmers’ environmental attitudes. As a first step we conducted 17 guided in-depth stakeholder interviews. Apart from gathering explorative knowledge on nature conservation in Austrian agriculture these interviews allowed us to derive the required Q statements for the on-farm surveys. Furthermore, the interviewees lead the research in a direction, which may enhance the probability of realization of the results. The interviewed stakeholders had different levels of distance to practical farmers. Thus, these interviews delivered a variety of viewpoints towards environmental friendly farming. In the next research step we are going to use Q sorting accompanied with guided interviews on 25-30 farms. Aim of this research step is to determine and describe the various types of farmer’s viewpoints towards the environment. These two steps offer the possibility to gain a richer picture of the environmental perspectives of farmers and could lead to the design of agri-environmental policies which take the specifics of the different types into consideration and can thus enhance the precision of AEPs.

Keywords: *farmer-typologies, agri-environmental programmes, stakeholder integration, Q methodology*

Motivations for implementation of ecological compensation areas on Swiss farms

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Ecological compensation areas are implemented on Swiss farms with the aim of encouraging biodiversity, but recent studies have found that the existing system of incentives for specific conservation measures is insufficient to halt biodiversity loss in the Swiss agricultural landscape. A project with the title “Score with biodiversity - farmers encouraging nature” (MVP) aims to contribute to a nature-friendly and economically strong agricultural sector, in which animal and plant species co-exist with agriculture in a way that is mutually beneficial. Two new instruments have been developed in the project. With a new points system, the performance of farms in the promotion of natural diversity is evaluated. The points system gives a clear indication to farmers where and how their contribution to biodiversity can be improved, and serves policy by enabling allocation of subsidies to be directed towards measures with quantifiable benefits for biodiversity. The second instrument is a new approach to consulting in which farmers collaborate directly with advisors to find the optimal measures to encourage biodiversity under the specific conditions of their farms. Farmers can then ensure their ecological measures are targeted to their local conditions and policy makers can be informed of which measures should be given priority support with incentives. As part of this collaboration, participating farmers were interviewed and asked questions about their attitudes toward nature conservation. It was found that farmers’ identities and their experiences with past nature conservation measures combine with their expectations of direct benefits, such as financial incentives, and their trust that the measures will produce the desired outcomes, to form a behavioural attitude. Swiss farmers display a strong sense of fairness, which drives them to comply with subjective norms, although they feel torn between a societal expectation to conserve nature and a wish to appear productive to their peers. We conclude by offering several persuasion strategies that are based on reconciling the apparent dichotomy between production and nature conservation. Furthermore, we recommend that any changes to the existing policy framework should be undertaken in a consultative process and that farmers be allowed the flexibility to implement measures that will produce the best conservation outcomes on their farms.

Keywords: *ecological compensation, farmer motivation, biodiversity, persuasion strategies, direct payments, agroenvironmental program*



Workshop 2.1: Healthy growth in value-based chains: From niche to volume with integrity and trustConvenors: **Hilde Bjørkhaug, Handan Giray, Gunn-Turid Kvam, Egon Noe****Theme 2: Feeding the future with sustainable agro-food systems: Alternative production, distribution and consumption views and approaches****Workshop 2.1: Healthy growth in value-based chains: From niche to volume with integrity and trust**Convenors: **Hilde Bjørkhaug**, Centre for Rural Research, Trondheim, Norway
Handan Giray, Suleyman Demirel University, Turkey
Gunn-Turid Kvam, Centre for Rural Research, Trondheim, Norway
Egon Noe, Department of Agroecology - Agricultural Systems and Sustainability, University of Aarhus, Denmark

Organic markets varies across Europe, but common is that organic food-chains have inherent problems in moving from niche to volume, while mainstream large-scale market chains have inherent problems in securing and advancing organic values. The Healthygrowth workshop aims to discuss examples of successful mid-scale organic value chains in order to learn more about how values are ensured in growth-processes.

Dynamics of Organic Livestock Value Chains in TurkeyHandan Giray¹, Duygu Akturk and Bahri Karli1Suleyman Demirel University, Turkey, handan.giray@gmail.com; handangiray@sdu.edu.tr

This paper aims at describing major issues affecting the organic livestock market in Turkey in order to identify its dynamics. According to the data in 2011, there are 137 producers involved in organic livestock production with 453 513 livestock; they produced 1 359 tones organic meat and 14 794 tones organic milk, while it was only 5 producers; 602 livestock; 400 tones organic meat and 1375 tones organic milk in 2004. Although there is an important progress in terms of number of producers and production in organic livestock sector in only few years, there is a problem with “positioning” in the market. The paper investigates organic livestock value chains and growth strategies through qualitative interviews with organic livestock producers in order to have a clear and comprehensive view of organic livestock value chain in Turkey. The main questions that we raise are “Why organic livestock production?”, “Who are the actors in the value chain?”, “How do they communicate along the supply chain?”, “What are their growth strategies and future perspectives?” and “What are the main challenges for growth?”.

Keywords: *Value chain, market positioning, organic livestock production***Understanding organizational evolution in organic food systems**

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When analysing the capacity for growth in midscale value based food chains one question seems unavoidable: How can we understand why some organizations parishes while others survive when they are operating within the same structural conditions? This question is central, not only in order to understand specific empirical problems but also because the question has theoretical implications. This is because the answer is not, as we will argue, to be found where one intuitive would search for it; in the social dimension, as bad management, but must be sought in the temporal dimension and in how these organizations observes the difference between the past and the future in the present. In order to understand how such different developments occur we develop an analytical approach based on systems theory as it has been put forward by German sociologist Niklas Luhmann. We then proceed to analyses two cases that despite they development under the same structural conditions experienced direct opposite evolution paths. By analysing these cases we demonstrate the theoretical insights derived from systems theory usefulness in analysing midscale value based food chains.

Keywords: *organic food chain, Niklas Luhmann, temporality, evolution, organizational studies.*



Workshop 2.1: Healthy growth in value-based chains: From niche to volume with integrity and trust

Convenors: Hilde Bjørkhaug, Handan Giray, Gunn-Turid Kvam, Egon Noe

Policy goals, research needs and research regarding organic sector in Finland

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Although the status of organic farming was established in Finland already in 1995 with the entry to EU, organic sector has remained modest in the food markets. As a possible explanation the presentation examines the correspondence of the research needs and actual research dealing with the organic supply-value chain in Finland. The approach is that of policy impact research. The research needs are inferred from the direct and latent articulations present in the policy discourse, which is captured by examining the goals and their justification in about 20 national policy documents from the past decennium; these deal either specifically with organic sector, with food and nutrition or with sustainable development, or they are more comprehensive and address several topics. The review on the concluded and still on-going research dealing with the organic sector over the past 15 years is based on a meta-study. The main information sources were the research data bases of the two main actors, University of Helsinki and MTT Agrifood Research Finland. This information is complemented with the relevant doctoral theses from all Finnish universities. Several bottle necks regarding the development of the organic supply chain are identified in the policy documents. These deal both with legislative and informative as well as with various practical hindrances. Preliminary results suggest that either the research design or communication of the research results to the relevant actors so as to open the bottle necks has not been very successful. Today the research is still very much biased towards primary production, and little attention is paid to the societal and policy aspects. The few studies focusing on the consumer attitudes and on the R&D aiming at promoting organic food within the public catering sector are also identified in the policy documents. Other important topics are formation, development and characteristics of the organic value chains and networks, and the prerequisites for their functioning, but research on these topics is modest. In future, the research will be coordinated by newly founded Finnish Institute for Organic Food, and the situation is likely to change. The institute stresses the need of science communication, adult education and co-operation with entrepreneurs in research. The transdisciplinary approach involving both the researchers and the practical actors enables designing the research so as to better respond to the needs of the organic sector and to the expectations of the society.

Keywords: *organic supply-value chains, research needs, research, meta-study, policy document analysis, policy impact study*

Institutional Adaptive Capacity of Organic Farmer Associations in growing Organic Agrifood Systems

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In this paper we present a draft analytical framework for analysing the influence of institutional change on the Adaptive Capacity of organic farmer associations in growing organic agrifood systems. We merge certain concepts from theory on complex adaptive systems and neo-institutionalism. Doing so, we define the Institutional Adaptive Capacity (IAC) of organizations and postulate dynamics of its development in growing organic agrifood systems. We use criteria from the Adaptive Capacity Wheel to assess IAC, and the Adaptive-Cycle heuristic to connect it with the growth of organic agrifood systems. We provide a short overview on the institutional change along the foundation and development of Austria's main organic farmer associations, Bioaustria, and the growth of organic farming in Austria. Then we look at these developments using the lens of our framework to give the reader understanding about its application. Furthermore we suggest in what phase of the Adaptive Cycle Bioaustria and its organizational environment could be, and show what this could mean for the IAC of Bioaustria. Finally we ask some questions that could be helpful for a more detailed assessment of the IAC of Bioaustria.

Keywords: *Adaptive Capacity, Adaptive Cycle, Organic Farmer Organizations, Institutional Change, Growth, Conventionalization*



Workshop 2.1: Healthy growth in value-based chains: From niche to volume with integrity and trustConvenors: **Hilde Bjørkhaug, Handan Giray, Gunn-Turid Kvam, Egon Noe****Conventionalization or diversification? – Development in the Danish organic production sector following market expansion**

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The organic food market is constantly evolving and organic products are exchanged at multiple markets constituted by particular forms of interaction between producers and consumers. The aim of this paper is to explore how the market influences organic production by looking at the relation between the market and producers engagement towards trust and quality building as well as farm level production strategy. We distinguish between four different market agencements, an arrangement of actors with agency: 1) standardizing market agencement, 2) personalizing market agencement 3) convenienising market agencement and 4) aesthetifying market agencement. Through qualitative interviews with organic producers and other actors in the Danish organic food market, several different strategies are identified. The data indicates that the market relation of the farmer influences production strategy and how trust and quality is build. In the standardizing market agencement producers applies an adaptable production strategy, trust and quality is bound to standards and labels. In the personifying market agencement the production strategy is diversified, trust and quality is negotiated directly. In the convenienizing market agencement production strategy is also diversified, trust and quality is negotiated indirectly via internet or mediated by word of mouth and in the aesthetifying market agencement production strategy is dedicated, trust and quality relies on external qualification.

Keywords: *Trust, quality, marketorientation, organic food***Healthy growth in mid-scale values based food chains**Gunn Turid Kvam Hilde BjørkhaugCentre for Rural Reseach, Norway, gunn.turid.kvam@bygdeforskning.no

This paper is a literature review of studies of mid-scale food values based food chains and healthy growth processes in the organic food sector. By midscale values based food chains we mean productions that are growing out of the niche/small scale market into larger volumes and sales. Previous research have shown that niche market chains might have inherent problems in moving from niche to volume, while mainstream large-scale markets have inherent problems in securing and advancing organic values. A main hypothesis is that mid-scale value based chains are able to deal with these challenges because they are based on a different form of marketing logic and strategies than either small- or large scale chains. As a first step in analysis of the success of mid-scale value based food chains is therefore to carry out a review of existing research. Main questions raised are: How are these value chains organized, and value distributed among actors? What seems to be the main challenges for growth? What kind of risks and options seems to exist? How do value chain actors manage to communicate integrity and consumer trust whilst growing? The paper disseminates findings of the CORE Organic II project HealthyGrowth.

Keywords: *Values based food chains, growth, integrity, trust, HeathyGrowth***The perception of organic values and ways of communicating them in mid-scale values based food chains**

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The rise of the organic sector in the past has led several businesses, cooperations and enterprises to prosperous growth. Organic products are gaining more and more popularity and proof successfully their ability to hold ground against conventional products on supermarket shelves. The crucial question remains how to maintain the original quality principles and values associated with the organic sector in times of over proportional growth.

The growing distance of consumers from producers reduces obviously the possibilities of direct feedback loops which in turn has consequences for farmers' identification with their produce at the point of sale. These issues encouraged partners from 10 different countries, to examine within the frame of the Core Organic ERA-net Project 'HealthyGrowth' factors supporting and hindering integrity and trust within growing organic businesses. The project focusses on mid-scale value-based food chains as a potentially promising alternative between direct marketing and anonymous conventional marketing channels. This paper combines a review of scientific literature



Workshop 2.1: Healthy growth in value-based chains: From niche to volume with integrity and trust

Convenors: **Hilde Bjørkhaug, Handan Giray, Gunn-Turid Kvam, Egon Noe**

on consumer values associated with organic products by consumers and producers with the 'Detailed Case Studies Descriptions' provided by project partners to assist case study selection. This shall allow answering the following questions: What are qualities and values that stakeholders along the value chain want to communicate and how can they successfully be communicated down- as well as upstream? How can effective communication substitute face to face relations in terms of relationship and trust?

Keywords: *organic values, mid-scale value chains, communication, convention theory*

Strategies for medium-sized values-based food chains during growth processes

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Growth of values-based food chains (VBFC) holds particular challenges. The disconnection between food producers and consumers require strategies that maintain and communicate values throughout the food chain. The objective of this paper is to analyse strategies organic food businesses have chosen to deal with growth, and in particular, strategies that focus on consumers' expectations and producers' business strategies. A literature review on the challenges of growing organic food chains provided the conceptual framework. Three case studies of organic food businesses were analysed accordingly, highlighting strategies for maintaining values along the chain. The analysis shows that the values of food chains and the related business strategies aiming to maintain and transmit these values differ significantly. The first case study business is - based on contracts - closely linked to the primary producers. This chain is characterized by the quality aspects of its products and process and the story behind its production system. The second one focuses on reliability within the partnership of chain partners such as farmers, processors, the wholesaler and the shop or market stall owners. The third case study is based on good cooperation and communication aiming to secure income and employment for the involved women in a remote rural area.

Evaluation of agroecology policy schemes in Andalusia driving cooperation initiatives for the mid-scale distribution and consumption

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More than 80% of the Andalusian organic production is commercialized to European countries and sold in large-scale channels. This causes a high risk of conventionalization and adoption of the inherent problems of the conventional distribution as well as damages the level of trust in organic values. From 2004 to 2007, the General Direction of Organic Agriculture of the Andalusian Government implemented agroecological policies within the Andalusian Plans for Organic Farming (I and II). Their main objective was to address sustainability of the whole agri-food system. Some of these policies are still implemented. Two of them are analysed as case studies. The Social Consumption Program was defined to supply schools canteens with local and organic products. Based on a farmer's groups linked to voluntary schools of a specific area, point was made in ensuring a territorially rooted program. This initiative led to develop an innovative and alternative distribution channel of organic products in the region. A regional network scheme for cooperation among local groups was fostered to strengthen the local initiatives and to enlarge the spectrum of products and their seasonality. Participatory Guarantee Systems (PGS), locally rooted initiatives, were connected among themselves at a regional level through networks implementation. These systems merge together farmers and stakeholders, and so they ensure a farmer to farmer/stakeholder and a stakeholder to stakeholder/farmer advisory system based on empiric and professional knowledge. For each study case, evaluation of aims, implementation strategies-mainly regarding participatory methodologies involving stakeholders-, and continuity is done in order to assess their suitability at an agronomical, economical and social level.

Keywords: *agroecology, public policies, local and mid-scale consumption, participatory innovation, organic food chain*



Workshop 2.2: Transition Issues in Production, Marketing and Consumption for the Agro-Ecological Development of Animal ProductionConvenors: **Yolanda Mena Guerrero, Francisco de Asís Ruiz Morales, Jean-Paul Dubeuf****Workshop 2.2: Transition Issues in Production, Marketing and Consumption for the Agro-Ecological Development of Animal Production**Convenors: **Yolanda Mena Guerrero**, Profesora del Área de Producción Animal del Departamento de Agroforestales de la Universidad de Sevilla, Spain
Francisco de Asís Ruiz Morales, Área de Economía y Sociología Agrarias, Instituto Andaluz de Investigación y Formación Agraria (IFAPA), Spain
Jean-Paul Dubeuf, INRA LRDE, France

To identify how transitions have been implemented in Animal production, marketing and consumption to enhance their sustainability through agro-ecological processes. To prioritize the most relevant factors at economical, social and environmental levels. To identify conditions, limitations and obstacles to organize the implementation of these transitions.

The untied qualification processes of the argan agro-forestry systems

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Agro-ecology is based on a close insertion of man in ecosystems (and thus needs a local control of the production of technical knowledge). Addressed at a territorial level, it calls the establishment of appropriate devices for valuation of products, resources and skills. The argan forests on the western slopes of the Moroccan High Atlas are intensive skilled labor agro-forestry systems. Its resilience is based on a close integration of man in the ecosystem and on the combination of multiple activities both at territorial and familiar levels. In this context, do the argan oil and argan kid meat qualification processes constitute development levers? Do they constitute, at the contrary, destabilization factors of familiar and territorial productive systems?

Keywords: *Territorial productive system. Socio-Technical approach, Geographical indications, Local knowledge, Relational knowledge*

Developing small goat holders to face food security, poverty and environmental challenges- Lessons from a comparative analysis in different regions of the world (governance, markets, production systems) for experiencing successful projects

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Farming and agri-food systems have to face urgent social and environmental issues linked between them. The Millennium Development Goals firm by the International Community have formalized these priorities. Poverty reduction and food safety are considered as a major challenge for at least 800 million people who are suffering hunger and extreme poverty particularly in rural areas. The development of livestock for small holders is often seen as a solution to reduce poverty

To explore and document the operational articulation between poverty reduction and preservation of environment and utilization of renewable resources in livestock production systems the results of a comparative study undertaken at the request of an International Organization are analyzed. This study was focused on development projects involving goats and compared worldwide significant cases (in Argentine Patagonia, Kenya Meru, South Western Morocco, "Comarca Lagunera" Mexico, Nepal, North Eastern Brazil, Rajasthan, Senegal, Tajikistan, Lara and Falcon State Venezuela). For each case, a SWOT³ analysis, a cost benefits study and a goat value chain approach have been undertaken and discussed during several meetings with actors involved in these projects. The study has provided operational references and tools and indicators have been built to support implementing and monitoring such projects in the future. It highlights that developing goats by small holders can be a viable and profitable activity in so far as consultations and appropriate diagnosis have been undertaken to prepare the projects. It confirms that small holders with low inputs goat production systems may have a good real

³ Strong, Weakness, Opportunities, Threats



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productivity and a high Internal Rate on Return (IRR) of the investments. It helped to show the different stake holders including those involved in political decisions that traditional low input goat activities, led by small farmers can help to keep rural life active and support other activities.

These results call for a paradigm shift in the mental models of development to promote human resources and capacities rather than sophisticated external solutions often based on the use of non renewable resources. Goats can often answer such MDG's as poverty reduction, gender equity, preservation of non renewable resources if their production systems are based on the valorisation of local resources with low external inputs (by-products, local forage, rangelands, local breeds). Thanks to appropriate business planning and governance, innovation implemented for these activities could be a good lever for ecological intensification, food safety and resilience in many rural areas by improving the potentialities of each region.

Keywords: *Competitive intelligence, project governance, Millennium Development Goal (MDG), goats, development strategy*

How public policies on livestock sectors could support innovations and transitions toward a renewed pastoralism in Corsica - A contribution to a prospective approach on the future of pastoralism

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Corsica has a high cultural pastoral background but is facing important challenges to keep one's livestock sector alive. The present public policies in favor of the livestock sectors and the several representations of pastoralism by the actors have been analyzed. We have identified that pastoralism, a production method based on the priority use of natural, local resources and more specifically range lands is seen by most of the actors as a rather idealistic and nostalgic activity and not as a viable technical option. The public payments to support livestock are important but either they promote a productivist model, either they are not based on a clear economic efficiency nor a clear strategy of pastoral development for rural areas. More generically, agro-ecological approaches could be a chance for the future of this sector if the public policies could support efficiently transitions toward a smart specialization strategy, based partly on pastoralism. To be viable, this option should internalize its ecosystemic services and more financial and human resources will have to be dedicated to support them. Re building an innovation system based on pastoralism, by developing specific capacities and enhancing the local know-how and skills would be also necessary.

Keywords: *Public policies, social representations, pastoralism, Corsica, agro ecology, transition*

Actions to increase sustainability in sheep production systems in disadvantaged Mediterranean areas: The organic conversion of the "Velojeña" sheep breed production systems

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The mountain areas of the Mediterranean basin are the territorial framework where many small ruminant breeds are present and most of them endangered. These animals are adapted to low favoured conditions, becoming agents to stimulate the economy, the environment and the population of these areas.

The Lojeña sheep breed is a breed listed as endangered. It is located in a mountain area (Penibético System) in Andalusia (Spain). Their production system is mainly pastoral and based on natural but low productive pastures. The average size of the herds is 570 sheep and two management models are present, according to the lambing period: spring or autumn. This animal is specialized in the meat production of 15 and 20 kg live weight lambs.

The continuity and improvement of this breed and its production system is the aim of its breeders' association. For this, different actions to improve its sustainability have been undertaken. Among these actions, the conversion to organic farming has been focused. We have shown that organic farming take an average of 4.75 years (± 1.11) in this sustainable production system. Lamb feeding, with low conversion rates, and the lack of specific value marketing chains for organic sheep meat, have been the two main problems identified for developing organic conversion.

These problems faced by organic sheep meat production and the strategies adopted to solve them are reported and discussed in this communication.

Keywords: *organic, sheep, marketing, feeding, pastoralism*



Workshop 2.2: **Transition Issues in Production, Marketing and Consumption for the Agro-Ecological Development of Animal Production**

Convenors: **Yolanda Mena Guerrero, Francisco de Asís Ruiz Morales, Jean-Paul Dubeuf**

Improving marketing of organic meat and cheese in Andalusia, through the valorization of its environmental contribution

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Andalusia is the first Spanish region in ruminant organic production. However, in this region, domestic consumption of organic meat is very low and, as a result, farmers have important marketing problems. At present, the main reason why consumers demand organic meat and milk, is for health, as these products are characterized by the absence of synthetic chemicals. However, organic livestock presents important issues related with the environmental benefit of this production model. The improvement of the knowledge regarding to such benefits will contribute to increase demand for meat and organic milk. In this sense it is important to identify and quantify the environmental benefits of organic farming and use this information to promote a market transition and consumption towards a more agro ecological approach. Aware of this challenge, the Regional Government boosts a research and development project, in collaboration with researchers from the University of Seville, Pablo de Olavide University and IFAPA of Granada. The objective of this project is to contribute to improving the marketing of organic meat and cheese, by generating simple and understandable indicators associated with environmental and social value of these systems. The aim of this communication is to present a preview of the results, among which include the following: (i) analysis and assessment of the economic viability of different models of ruminant organic production in Andalusia, (ii) measure of environmental value of organic farms, from quantifying their impact on the environment, promoting biodiversity and fire prevention, (iii) knowledge of the importance of environmental contribution of the organic model for consumers (iv) proposing a set of environmental indicators, associated with the product, for helping the increment of the demand of organic meat and cheese.

Keywords: *organic production, ruminant, marketing, sustainability*

International Finance Institutions hamper transition to higher welfare systems in animal production

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International Finance Institutions, like the International Finance Corporation (IFC) and the European Bank for Reconstruction and Development (EBRD), have been granting investment capital to large-scale animal agribusiness companies that considerably fall short of EU animal welfare standards.

Export Credit Agencies of EU countries have also been providing export insurances for the construction and equipment in agribusiness operations that do not meet the exporting countries' own farm animal housing standards.

Thus, public money of EU countries is used to support the establishment of housing systems outlawed in the EU in third countries like Turkey or Ukraine. This merely transplants the objectionable practices from the EU to transition countries and may, together with free trade agreements, contribute to the competitive disadvantage of EU farmers who meet higher animal welfare standards than the recipients of IFI agribusiness financing or the beneficiaries of export credit insurances.

These practices grossly obstruct the transition to higher welfare systems as initiated by EU policy in some fields of animal production. On the one hand, IFIs are missing the opportunity to support this transition by linking their financing to the implementation of higher welfare housing systems. On the other hand, such financing practices might create an unfair competitive situation for farmers applying these systems, both in EU countries and in recipient countries.

There are currently no binding animal welfare standards governing the IFIs' investments in the farm animal sector. In order to support the transition to higher welfare housing systems, all IFI financing and all export credit guarantees should be tied to binding animal welfare standards that at least do not fall short of EU standards. As a first step, the EBRD has just announced to address animal welfare by introducing binding criteria for financing practices in 2014.

Keywords: *International Finance Institutions, animal welfare, transition to higher welfare systems*



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Convenors: Yolanda Mena Guerrero, Francisco de Asís Ruiz Morales, Jean-Paul Dubeuf

Transition toward systems linking animal genetic resources to low inputs farming systems and on farm processed products; development logics of the Bretonne Pie Noire cattle local breed

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The Bretonne Pie Noir cattle breed is a French rare breed that was once threatened with disappearance but whose population has increased over the last 40 years. This turnaround happened because farmers used the breed (i) to conserve domestic biodiversity, but also (ii) by adding value to the breed as the result of individual dynamics and (iii) by including the breed in low input farming systems with a more environmentally friendly goal in Brittany, a region where intensive agriculture was causing environmental problems.

This local breed is thus a good subject to study of the transition to more agro-ecological agriculture. It also raises the question of the role played by the genetic resource - in conjunction with other aspects - in the design of such systems.

Interviews with a wide range of breeders enabled us to identify each breeder's project and the role the breed played in it, management practices, the links between breeders and other stakeholders, and the way the products of the breed are sold. These interviews were completed by interviews with restaurant managers and personal observations in markets to identify the kind of information that was passed on during the sale of products and the place of the breed in the sales argument. Finally we interviewed local civil servants to better understand past and present actions to support such systems. We analyzed our results to explore the notion of diversity and what kind of diversity we are talking about when we talk about agro-ecological livestock systems.

Keywords: local breed, addvalue, low input farming systems

Defining the Corsican cheeses as "pastoral products" - Main issues for market mediations

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Pastoralism has been discredited for a long time on the grounds that it would harm the agrarian activities. Today, it is generally acknowledged that pastoralism has positive qualities due to the grazing by herds of spontaneous resources. Pastoralism has become a matter of public interest because pastoral systems are low inputs, is environment-friendly and is associated to tradition. However, the products from this type of breeding do not have a real economic benefit of this turnaround. The paper analyses the possibilities to qualify the Corsican cheeses as "pastoral products," taken for an ideal-type, to understand how and to what extent the professionals of the market act to translate the pastoral features of insular cheeses. A survey conducted among producers and users of cheeses (restaurateurs, specialty retailers and prescribers) in the island and outside (Languedoc and Provence) asks: - what are the components of the corsican breeding (local breed, flock management and forage resources) taken for "pastoral features" and associated with insular cheeses? - what are the similarities and the differences of their market translations in Corsica and outside the island? First, we present the distinctive components of the insular pastoralism used by breeders and the actors surrounding production. Secondly, we consider how the professionals of the market develop commercial arguments and describe cheeses locally and outside the island. Then, practical ways of incorporating the conditions of production to the qualification operated by the market are presented. Finally, to highlight the mode of existence of Corsican pastoral cheeses we propose to define two ways of qualification that we name (i) associative logic in which market mediations connect productive practices - pastoral features - with consumption practices and (ii) dissociative logic that disconnect products from their conditions of production.

Keywords: Pastoralism, pastoral product, market mediations, associative logic, dissociative logic

**Workshop 2.4: The Role of Localised Agrifood Systems in a Globalised Europe**

Convenors: **Andrea Marescotti, Giovanni Belletti, Artur Cristóvão, Dominique Barjolle, François Casabianca, Paulina Rytönen**

Workshop 2.4: The Role of Localised Agrifood Systems in a Globalised Europe

Convenors: **Andrea Marescotti, Giovanni Belletti**, University of Florence, Italy
Artur Cristóvão, University of Trás-os-Montes and Alto Douro, Portugal
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Paulina Rytönen, Södertörn University, Sweden

The objective of this Workshop is to promote the exchange of research frameworks, methods and results and to strengthen the European SYAL network. The European importance of this topic is justified by the specific dimension of the relations between food and local communities or spaces, constitutive of its culture and recognized, for instance, through the protection of Geographical Indications and policies on rural development.

The effects of the legal protection of Geographical indications: PDO/PGIs in Tuscany

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Geographical Indications (GIs) are important tools adopted to underline that reputation, qualities and characteristics of a product are strictly linked to its geographical origin. The protection granted to GIs by the law may exert strong effects both on the firms and other stakeholders in the local production system. Indeed, GI protection affects not only the economic field, but also the environmental and social sphere of the specific geographic location. Understanding the effects linked to the legal protection offered to GIs can help stakeholders to draw appropriate rules, improve individual and collective action, and support the promotion of typical products. So far, academic literature has not handled this topic in a systematic perspective. The aim of this paper is to contribute to this debate by exploring the effects generated by the legal protection by PDOs and PGIs in Tuscany. Drawing from a general methodology for the evaluation of the economic effects of GI protection, we in-depth analyzed two specific PDO/PGI in Tuscany: "Fagiolo di Sorana IGP" (Sorana Bean PGI) and "Pecorino Toscano DOP" (Tuscan Sheep-milk cheese PDO) to capture the effects of the protection on firms and local agri-food production systems.

Sorana Bean PGI is a niche product cultivated in a small valley in Tuscany, mainly sold through direct marketing. On the other hand, Tuscan Sheep-milk cheese PDO is a traditional cheese produced in the whole Tuscan territory, and sold in Italy and abroad. The production is oriented towards supermarket, even though direct sales represent an important distribution channel, in particular for small dairies.

The research methodology consisted in some semi-structured interviews conducted with a representative number of Sorana Bean PGI producers and Tuscan Pecorino-cheese PDO dairies. The aim of these interviews was to compare the PDO/PGI product to similar products that firms were able to produce but obtained without following the production rules, to better understand the impact of protection scheme on the whole production process. In addition, the representatives of both Consortia were interviewed.

First results show that firms, although not well documented and conscious about real costs and benefits (extra-profits), use of PDO-PGI to attain a wide spectrum of results that are often far away from the expected ones. Besides, the way Product Specifications (PSs) have been drawn greatly affects the effects generated by the protection. In particular, loose PSs, as in the case-studies analyzed, menace high quality products and imply a decreasing average quality of the product supplied on the market.

Keywords: *Geographical Indications, PGI/PDO, Local production systems, Tuscany, Evaluation methods*

A crop model as an "intermediary object": Lessons from a participatory research on the agronomical bases of PGI Corsican Clementine typicity

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In this article, we build on an on-going participatory research conducted in Corsica to report the use of a heuristic cropping system model as a mediating tool to assist researchers and actors in the understanding of a challenging scientific problem: The agronomical determinism of the acidity of Corsican Clementine, acidulous taste being a



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strategic typicity attribute for this terroir product. The collaborative research included the participative conception and refinement of an acidity model, the use of the model to design an empirical validation method called Regional Agronomical Diagnosis (RAD), and the up-coming use of RAD's first results to refine the model. Iterations between actors' knowledge, model, and farm survey may continue in the 2 following Clementine campaigns, leading to a step-by-step convergence between model and reality. Our acidity model opens up perspectives for Corsican stakeholders, since it could be used in further participatory research to design innovative cropping systems in adaptation to emerging challenges such as climate change, or new varieties. However, the use of a model to understand an agronomical variable or to orientate field observation is not new. What is new is the fact of using such model as an intermediary objet in a participative device. Through its intrinsic infrastructure, the model structured interactions between actors, researchers, and experimental device, and it enabled convergence of representations between opposed epistemological postures. If the model appeared to be predictive, it would suggest that in localized agri food systems, local knowledge are crucial resources which can be channeled by researchers by using intermediary objects as mediating tools in the perspective of addressing complex scientific problems.

Keywords: *Clementine, acidity, cropping systems, participatory research, intermediary object*

Alternative Food Networks in Piedmont: farmers' direct sales and urban consumers

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Direct sales are a widespread and important typology of the so-called Alternative Food Networks. This research aims at analysing the territorial distribution of direct links between urban consumers and farmers in Piedmont (Italy). These links can take two basic forms: consumers going to buy agricultural products at the farm (on-farm sales), and farmers selling their products in urban areas (farmers' markets, community supported agriculture and buying groups). Firstly, the territorial distribution of direct sales practices (on-farm or elsewhere) will be analysed. This is made possible by the access to micro-data from the 2010 Agricultural Census for Piedmont, a region whose agriculture is characterized by a strong emphasis on quality products. The Census surveys whether the farms sell directly their products, and distinguishes direct sales to consumers between those made on the farm and those practiced elsewhere. In this way, we will have a geographical picture of the distribution of these practices. Secondly, we will analyse the determinants of the choice to sell directly to consumers with statistical tools like probit or logit models. Possible candidate variables are the structural characteristics of the farms (farm size, type of farming, etc.), the personal characteristics of the operators and of the farm households, the inclusion in strategic areas proposed by the National Strategic Plan for Rural Development Programs, and the proximity to urban areas. These two analyses will be at a regional scale, and will give an overall picture of the diffusion of direct selling among farmers. Unfortunately, Census data do not provide information on where farmers sell directly their products apart from on-farm sales. This is why we will analyse the composition of farmers' markets in the main urban area of the region (Turin). From the list of farmers selling in local open-air markets we will detect their provenience and their main characteristics. This will give a more precise insight on the territorial networks linking urban consumption to agricultural production.

Keywords: *direct sales, Alternative Food Networks, farmers' markets*

The attitude to promote value creation in GI areas through the adoption of rural development policies

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RESEARCH FRAMEWORK. The research of financial opportunities to promote value creation is a key topic in literature concerning geographical indications (Barjolle, 2006). However, the access to Rural development policies (Rdp) is not easy: therefore, value creation through consumption of Rdp is the result of an individual and collective entrepreneurial process within a GI area (Man, 2002; McElwee, 2005). The paper intends to look into different strategies of adoption of Rdp to promote value creation along a GI food supply chain. MATERIALS AND METHODS. Through a counterfactual analysis (Belletti, Marescotti 2011), we investigate buffalo farms working in the area of production of "Mozzarella di Bufala" PDO cheese. The analysis tests individual and collective actions aiming at value creation through access to Rdp. A first step concerns individual entrepreneurial behaviour and analyses the



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financials flows obtained by buffalo farms, with particular attention towards measures aimed at promoting value creation. A second step focuses on a collective entrepreneurial strategy and aims at looking into the eventual presence of integrated projects of supply chain. Quantitative and qualitative methodologies of analysis will be necessary to scrutinize individual and collective attitude towards measures of the Rdp targeted to value creation in this GI area. EXPECTED RESULTS. The paper explores eventual capabilities of farms working in GI areas to promote value creation. The underlining hypothesis is that farms working in GI areas should have higher probabilities to gain access to rural development policies with respect to other farms and, as a consequence, to give higher contribution to value creation.

Keywords: *consumption of rural development policies, value creation, Buffalo Mozzarella PDO*

Institutionalizing short food supply chains for sustainable resource management: challenging issues

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The paper will discuss the conditions under which proximity food chains contribute to territorial sustainable development. From existing lessons on products with geographical indication protection schemes, it will propose an analytical framework to query the relevance and limitations of labeling short circuits with a view to strengthening their link to strategies of territorial sustainable development. Built on an institutionalist framework for analyzing the issues of valorizing territorial resources, we want to test the assumption that of labeling can contribute to create and manage in a sustainable way resources related to proximity food chains. Is this certification required? What should be its shape and methods of implementation to support the efforts of proximity food chains and make them a part of territorial development projects with a view to sustainability?

The demonstration is carried out in three stages. In the first part, an analysis of the management process of common territorial resources is proposed. Its application to the comparison of two geographical indications (Comté and Cantal cheeses) can highlight issues of structuring collective action with the aim of managing territorial resources in a sustainable way. It also provides some prospects for proximity food chains' issues. In the second part, an analysis of the diversity of approaches to short-circuits highlights contrasting valuation potential of territorial resources by labeling. Finally, in the third part, we question about the meaning of labeling in respect of short-circuits philosophies. Paths for structuring collective action to organize proximity food chains are proposed in conclusion.

Keywords: *Proximity food chains, quality standards, territorial resources, sustainable development*

Is "local" enough? New localised food networks in the Swiss dairy industry

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In May 2009, The Swiss government abolished the national milk quota system. Since then and despite the creation of an interprofessional board to coordinate the Swiss milk market, sinking milk price, overproduction and discordance among actors resulted in a weakening of producers' position in the conventional and industrialised dairy sector. Without serious hope of quick improvement, farmers' organisations developed new projects to strengthen the position of farmers. Their first goal is generally to improve the farmers' incomes by gaining added value, notably by targeting consumers who are ready to pay higher prices for local products. While referring to alternative values (such as localism and ecological production), some of these projects conserve structures and characteristics typical of conventional systems. They are located somewhere between alternative and conventional food-systems. In this paper, we will present preliminary results from an on-going research based on three case studies. We will first describe how these in-between food networks evolved in order to develop the new products. Then, we will analyze how they use the 'local' labeling: it appears that the 'local' might endorse contrasting meanings in the three networks. Finally, we will explore how such initiatives might result – willingly or not – in more sustainable food systems.

Keywords: *Dairy, Switzerland, local food, farmers' cooperatives, Actor Network Theory, empowerment*



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Can systems using hyper specialized breeds be considered as localized agrifood systems? The example of the Belgian Texel breed.

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The Belgian Texel sheep breed is a meat purpose breed, the Belgian form of the Dutch Texel breed, with muscular hypertrophy. Comparing the situation of this breed to others hyper specialized breeds in Belgium raise the question of the existence of a Belgian breeding model.

We interviewed 11 stakeholders concerned by the Texel breed (breeders, scientists, veterinary, extension service technician, and butcher).

Those interviews have allowed us to discuss three dimensions of the Texel breed management:

1) The breed is actually a breeding animals propose breed.

Sheep meat is few consumed in Belgium and butchers seem to prefer crossbreed meat than pure Texel meat. As a consequence the main aim for breeding Texel is breeding animals selling. The breeders consider the selection activity as their activity, and underline that it is more interesting for them from an economical point of view to sell breeding animals abroad (United Kingdom).

2) The breed management follows a Belgian model and is as a consequence localized!

The Blanc Bleu Belge cattle breed is clearly a model for the Texel breeders and several of them mention the “Belgian eye of the breeder”. Producing meat in quantity is the core motivation in this breeding model (a breeding model that echoes an engineering culture where performance is a core motivation). Among the organization of breeding in Belgium, the breeding shows contests are important places where this model is shared by breeders, even among deferent species.

3) The breed is very well adapted to its breeding situation but what about it adaptive capacities?

The breed is mentioned as adapted to grazing (good quality grassland) and it is as well adapted to socio-territorial conditions of Belgium (small area). The breed is easy to breed (except during the lambing period very time consuming which means that flocks are often small flocks). It's considered as well adapted to breeding animal production for crossbreeding. However, most of the interviewed persons have mentioned failures in adaptation to changes in breeding conditions (bigger flocks, breeding in hot climate area for instance).

Thanks to this case study, we discuss the fact that qualifying an agrifood system as “localized” is not enough and that it is crucial to understand and analyze the anchorages in local as dynamics and in their dynamics.

Keywords: hyperspecialised breed, animal genetic resource, lock-in

Territorial anchorage of French dairy ewes sectors: Historical analysis of interdependence between given localized agrifood systems

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Nowadays, Roquefort (RF) Cheese is processed from milk produced by dairy ewes in Aveyron. But from the late XIXth to the end of the 70s, the RF processors used to buy milk in other areas: Corsica Island (CS) and Pyrénées-Atlantiques (PA). In the 70s, the dairy production skyrocketed in Aveyron so they “quit” the other areas. Dairy producers of PA and CS faced a crisis as the outlets were to re-build. In both territories, a new dynamic was set up: re-birth of on-farm processing (technical and cultural local memory) and implementation of other processors (local ones or multinational, cooperatives). SOCIETE DES CAVES, the main RF processor diversified its production remaining, even reduced, in each area of production. Furthermore, in the beginning of the 80s, local actors created PDO products: “Ossau Iraty” in PA and “Brocciu” in CS. These PDO still show difficulties in building consensus within the local actors system. The history of each territory seems relevant as it influence their actual situation. We assume that the common history of “Roquefort” implementation and the period that followed its withdrawal have conditioned the actual situation of both PA and CS systems: these last 40 years have been a period of re-appropriation (more or less complete and successful) of their productive system by the local actors. For our framework, we decided to use the concept of “territorial anchorage” with two main characteristics. First, a space and a system of actors have a dynamic way of interacting. In such perspective, a long-term analysis provides a relevant vision of the trajectory of local systems. It may help the actual situations more understandable and clarify the way they could evolve. Secondly, this concept integrates all kinds of relationships a community can have with its space, at various scales. Tightening activities to the area supposes a set of links with various intensity and



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anteriority (social cohesion, economic added-value, “terroir”). As these links have been recently reactivated or re-invented, some elements are becoming territorial resources. These mechanisms are also under “new” external forces (hybridization of on-farm cheese processing, use of the territory’s image). This concept permits the comparison of two territories with similarities and divergences. Both cases can “feed” each other from a different trajectory or different links to the area. It might help us replacing the role of PDOs and understanding the levers used and constraints faced.

Keywords: *Territorial anchorage, cheeses, dairy ewes, history, PDO*

Comparing registration efforts for Protected Geographical Indications in Austria, Colombia and Italy

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Geographical Indications (GIs), traditionally found in southern European Union (EU) countries, allow producers to defend their food products quality reputation while highlighting their geographical origin and value to consumers. The EU protected GIs normally require collective action for the registration process. But how much efforts are involved with these collective registration processes (e.g. reaching an agreement between local producers on the product specifications, demonstrate the link between product characteristics and its quality, discuss oppositions by other interested actors) and how do group and organizational characteristics impact on them? We made cross-country comparisons of selected Protected Geographical Indications (PGIs) such as Styrian Pumpkinseed Oil, Café de Colombia and Tuscan Olive Oil to assess the institutional framework and its effects on transaction efforts, benefits and risks before and after PGI registration. In our comparative case studies we used transaction costs theory as conceptual framework; data was collected through semi-structured interviews and document analysis. Preliminary results show that the selected GI cases have diverse contexts, approaches and legal frameworks (included implementing administrative procedures) with varying transaction efforts. While in the cases of the EU GIs farmers had to apply as organizations and reach a consensus between different stakeholders due to the democratic nature of the process (e.g. they had to join forces with local administrations to define the GI strategy due to a strong interest in identity products), in the Colombian case the registration process was managed by a robust coffee federation on the national level that acts on behalf of coffee growers since 1927. This implies that the ex-ante transaction efforts in the EU cases involved substantial time to consolidate the conflicting interests of large and more heterogeneous groups of supply chain actors. In contrast, the Federación Nacional de Cafeteros de Colombia absorbed the transaction efforts of farmers by taking the leading role and pushing the PGI registration process with less conflicts and discussions with Colombian actors inside and outside the Federación. We conclude that institutional frameworks, group size and heterogeneity, ex-ante organizational robustness as well as motivations for GI registration have an effect on transaction efforts. Furthermore, group processes can also result in indirect transaction benefits such as on social and human capital.

Keywords: *Protected Geographical Indications, registration, transaction efforts, comparative case study analysis*

Constructing the new rurality— challenges and opportunities of a recent shift in Swedish rural policies

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This article highlights the outcomes of the implementation of the New Culinary Country program implemented in to facilitate and speed up the emergence of the new rurality in Sweden. Results are based on focus groups and one group interview conducted in eight landscapes/counties during 2013 and a state initiated evaluation of the NCCP. The study answers the following questions: What has been achieved by the policy change so far? Which are the main challenges and opportunities of and for the NCCP?

The results show that the NCCP has led to a higher degree of regional coordination of actions and resources at regional level. Cooperation and coordination in turn have proved to be the main factors behind the most successful experiences. The main critique from regional stakeholders is that the shift in policy has led to a vast increased number of projects in which the local stakeholders, and especially primary producers and food artisans are expected to participate in. These projects are considered to take too much time from the producer’s own



Workshop 2.4: The Role of Localised Agrifood Systems in a Globalised Europe

Convenors: **Andrea Marescotti, Giovanni Belletti, Artur Cristóvão, Dominique Barjolle, François Casabianca, Paulina Rytkönen**

productive and economic activities. In addition, most projects are granted for a period of one year and the entities applying for the projects are often local organizations and NGO's. Some counties have developed strategies for their NCCP work, while others lack behind and while some counties, like Skåne, Jämtland and parts of Västra Götaland have come a long way. The most important challenges for achieving the goals of the NCCP are the fast decreasing number of farms, especially in the northern and inland parts of the country. An important merit of the NCCP is that it has fueled a large number of activities, branding initiatives, innovation both in the food and in the rural sector, some of which are accounted for in the article. In spite of positive results, the NCCP has met important critique because of poor performance. But it is likely that the full extent of changes will be visible first in one or two decades.

Keywords: territorial development, new rurality, rural development policies, Sweden

Defining a system of attributes to evaluate the multidimensional performance of local to global food value chains: thoughts from Switzerland

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In the context of growing consumers' awareness about the impact of food products on the environment, their health or on social aspects, a careful analysis need to be conducted to compare the sustainability performance of local VS global food value chains. The EU research project *GLAMUR* (Global and local food assessment: a multidimensional performance-based approach) will therefore analyse the performance of food value chains concerning five dimensions that cover the economy, social, environmental, health and ethical fields. Regarding local food value chains, it is known that these have a positive image supported by the perception of reduced negative impacts on the environment or other dimensions. However, a critical analysis of local food chains' performance in comparison with more global ones will help to objectively assess the real benefits and drawbacks of local food chains.

A specific selection of attributes around the five sustainability dimensions cited above will be used to measure the food chains' performance and compare them. These attributes of performance will be the result of a transdisciplinary participation of food chain actors involved in the food chains. Moreover, attributes will be selected following some criteria of feasibility, and in order that the list of data to be collected remains short and nevertheless sufficient. In the Swiss context, a selection of 18 attributes has been established in order to complete the multi-dimensional performance assessment and they are further described in this paper.

Keywords: Local, global, value chains, attributes sustainability indicators

Resilience to strategies to loose strictness of specification sheets in GI consortia

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This study contributes to the call of many scholars to investigate the relationship between group heterogeneity and cooperation patterns in GI consortia. Prior studies have shown that the access of external members with different characteristics negatively affects the strictness of GI regulation and at the same time loose cooperation ties among members. This work uses a case-study approach and analyses the Parmigiano Reggiano (PR) Consortium in Italy. Specifically, we applied a ground-theory approach and conducted 22 semi-structured interviews to stakeholders at different levels (consortium, politicians, large-sized dairy farms, small-sized dairy farms, ONG, members of PR route, PR museum) in the time frame May 2012-August 2013. While our study partially confirms prior findings on a positive correlation between number of new-comers in GI-consortia and efforts to loose strictness in the code of practice, it also reveals unexpected results such as increasing cooperation among sub-groups and creation of quality-gradients. Specifically, in our study we show how PR members organized themselves in sub-consortia (mountain PR, red cow PR, white cow) to better provide resilience to strategies to change and loosen the code of practice. It also shows that such sub-consortia positively affect external PR consortium's members thus acting as multiplier-effects in the Bourdieu tradition. The governance patterns highlighted in this study give evidence of a high internal dynamism within GI Consortia. The study discusses strategies and implications valuable both for scholars and for GI managers.



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Keywords: *geographical indications, resilience, specification sheet, cooperation, GI consortia*

Ecological arguments supporting local(ised) food

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Finnish consumers value local food, and they appreciate if it is produced in an environmentally friendly way (Peltoniemi and Yrjölä, 2012). Local food is, in general, considered environmentally friendly, although in scientific literature it has been questioned (e.g. Born and Purcell, 2006). Seppälä and coworkers (2006) also concluded that Finnish local food systems are not necessarily more environmentally friendly than mainstream food systems. Conclusions are, however, always bound to the framework behind the consideration. In this study, we aim to form a framework to assess ecological benefits of local food, and test it in an assessment of the range of local food products from three regions of Finland. Final target is to offer arguments that support local food – if these are to be found. Our framework leans on the theory of resilience and life cycle thinking of environmental impacts, and it consists on several aspects of ecological sustainability: biodiversity, climate change, eutrophication, ecotoxicity and natural resource use. These aspects represent the most critical environmental impacts and ecological issues related to food production and consumption, and presumably they vary between local and mainstream food systems. Biodiversity is considered at different levels from locality to products, and integration between ecological biodiversity and economic multifunctionality in promoting sustainability will be made. Climate change and eutrophication were assessed by life cycle assessment (LCA). Potential ecotoxicity impact of chemical plant protection was calculated with the SETAC consensus LCIA model USEtox™, and PestLCI 2.0 was used to model emissions with average Finnish field conditions. Emergy accounting and related sustainability indexes were applied to assess resource use and its impacts. The preliminary results will be shown in the seminar.

Keywords: *ecological sustainability, biodiversity, climate impact, eutrophication, ecotoxicity, natural resource use, life cycle assessment, emergy analysis*

The Role of Values in Farmers' Markets; Comparative Case Studies in Minneapolis and Vienna

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Over the past decade, contemporary farmers' markets (FMs) in the US have grown exponentially in popularity and numbers. Viennese FMs, on the other hand, can be seen as an historical form of traditional food-access, yet have been decreasing in size and losing actual farmers' as vendors. Could the US boom be an eventual passing trend, or could the values involved in the operational architectures of these FMs lean toward a new approach that may persevere? This paper explores a topic few have researched, the role of values in farmers' markets as an establishment, and does so using case studies in two different regions, Minneapolis, Minnesota and Vienna, Austria. The values described by farmers market managers, goals, mission statements and individual vendors of these two regions have been preliminarily examined to understand their role within farmers markets and how they may affect the markets and what they may have to offer for the future of FMs. Initial results show that FMs in Minneapolis have more of a connection to values as well as more varied prevalent values, illustrating the possibility of perseverance due to a value-laden governance structure and involvement with surrounding community. This finding leads to many suggestions for the FM model in Vienna not heavily focused on values or similar values.

Key Words: *Farmers' Markets; Values; IFOAM; Generative Ownership*



Workshop 2.5: Achieving co-benefits for sustainability and health through alternative agro-food systems

Convenors: **Rebecca Paxton, Bernhard Freyer, Milena Klimek**

Workshop 2.5: Achieving co-benefits for sustainability and health through alternative agro-food systems

Convenors: **Rebecca Paxton, Bernhard Freyer, Milena Klimek**, University of Natural Resources and Life Sciences, Austria

Alternative agro-food systems have the potential to produce positive co-benefits for health and sustainability. This potential stretches beyond the agro-food system, and may contribute to societal transformations. In this workshop we discuss what role agro-food systems can and should play in providing co-benefits for health and sustainability, and how desired co-benefits can be achieved or are currently being achieved.

Health Problems facing Chilli Growers in Kunri Area

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Capsicum (*Capsicum annuum* var. frutescens) in many countries of the world is grown as main vegetable crop. In winter *Aphis gossypii* Glover is a serious pest on chilli in Pakistan. Data was observed by questionnaire and water pan traps. Through percentage distribution of the respondents with regard to their knowledge about pollution which were injurious for their health and health disorder created by the use of agro-chemicals. Data indicates that 61.66% respondents reported that drinking water was exposed to pesticides, 81.7% of the respondents had to face the dust problem, 18.3% of the respondents had to face the pollution which caused by spray, while 56.6 % of the respondents were feel smoke pollution in the environment. My finding shows that 12.1% committed by suicides, a number of 32% affected by cancer and a greater incidence of 93% diagnosed (tiredness, headaches, aching, skin diseases, poor concentration, haziness, sickness, unnecessary sweating, body shakes) in the in the study area. From this study it was learnt that majority of respondents were not quite aware about the use of agro-chemical which is injurious for their health.

Keywords: Health, farmer, problems, chilli

Austrian organic farmers' perceptions of the relevance of environmental influences for health promotion

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Creating a sustainable health system requires a perception of health that includes the health impacts and promotion potential of non-medical societal sectors. With its wide range of direct and indirect effects upon human health and environmental sustainability, agriculture could play a prominent role in sustainable health promotion. Organic agriculture has been progressive in arguing that agriculture should take responsibility for its human and environmental health effects, and has sought to adapt farming practices accordingly. However, treating agriculture as a responsible actor in health management involves linking human and environmental health, not only in policy, but also in the health perceptions of those involved in the sector.

In this article we discuss how Austrian organic farmers understand and practice the concept of health, and examine the perceived relevance of the environment and practices affecting the environment upon human health. This forms part of a larger study in which we combine Social Representation theory with Critical Systems Heuristics to model organic farmers' representations of health. These representations consist of perceived sources of health motivation, power, knowledge, and legitimation. Thus defined, representations of health may have tremendous effects upon how farmers seek to maintain and improve health, or treat and prevent illness, e.g. through their farming practices.

The preliminary results presented in this paper indicate that environmental influences, and particularly those brought about by human impacts upon the environment, were considered relevant for farmers' health. However, the respondents perceived these influences as being beyond their control. They did not consider the environmental impacts of their own farming practices as having a relevant direct or indirect influence upon their



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health. Further research is required to determine the perceived relevance of their farming practices for the health of others and the environment, and whether this perception might motivate a sense of responsibility for health promotion.

Keywords: *health perception, environment, organic farming, critical systems heuristics*

Contribution of short food supply chains to sustainability and health

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Short Food Supply Chains (SFSCs) are increasingly taken into consideration by policy and decision makers. In the European funded research project FOODLINKS an analysis of 19 cases was carried out. SFSCs are varied in nature and practice. They exist in a range of forms in both commercial and non-commercial settings. In this paper a pair comparison of six different types of SFSCs was made: a) two "Face to Face initiatives; b) two proximate more complex SFSCs and c) also two spatially extended SFSCs. Key issues of the analysis were: activities, actors, type of products, area and territory, health and sustainability aspects, growth potential and innovation.

A special focus of the paper was on the contribution of SFSCs to health and sustainability.

Health & wellbeing: Some SFSCs have increased knowledge and concern about food amongst consumers and led to the adoption of healthier diets. The potential for healthier food in SFSCs is created by both formal measures (e.g. broad variety of fresh food) and informal measures (communication to consumers), but cannot always be fully reached due to trade-offs with other characteristics.

Environmental: Many SFSCs have minimised the use of resources such as fossil fuel or packaging, and/or use of less polluting methods of production (e.g. organic farming). This of course may vary significantly between different Short Food Supply Chains.

Social: The direct relationship between producer(s) and consumer(s) has ensured fairness and trust in many SFSCs, more social inclusion of people. SFSCs also can contribute to revitalise local communities in multiple ways (e.g. working places, strengthening local networks).

Economic: SFSCs to which consumers are committed in a more long-term perspective have reduced economic uncertainties. They help to preserve small and medium farms. SFSCs increase or help re-circulate community income and create new jobs; however the degree and relevance might strongly differ between SFSCs.

We can conclude that the degree of sustainability varies among different types of SFSCs, their products, locations etc. Also various participants in SFSCs may interpret sustainability differently and experience different impacts. Short food supply chains (SFSCs) can act as a driver of change and a method to increase sustainability, trust, equality and growth in agricultural, food, business, social, health and rural policy areas. Therefore they are of growing interest to policy makers.

Keywords: *Short food supply chains, sustainability, environment, social benefits, economic performance, health*



Workshop 2.6: Integrative and interdisciplinary approaches to the ecologisation of agrifood systems

Convenors: **Claire Lamine, Benoît Dedieu, Gianluca Brunori**

Workshop 2.6: Integrative and interdisciplinary approaches to the ecologisation of agrifood systems

Convenors: **Claire Lamine, Benoît Dedieu**, INRA SAD, France
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This workshop aims at discussing different integrative approaches to the processes of “ecologisation” of agrifood systems. We expect presentations of integrative approaches, which take into account the diversity of social actors and institutions involved in these transitions and their interdependences, and/or they involve different scientific fields in order to tackle the various aspects of transitions.

Technical and commercial change during transition to organic farming: towards a methodological approach based on the scope of the leaps forwards

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Over the last few years there has been increasing concern about the transition towards organic farming (OF). Depending on the case, this transition is said to be progressive, rapid or abrupt, compared to a given conventional system. Yet few tools are available for us to analyze and represent the mechanisms of the changes made in the production system when farmers convert to OF. Varying degrees of differences exist between conventional and organic systems, especially when it comes to their technical and commercial aspects. We posit that it is possible to characterize the processes of transition by analyzing the extent of technical and commercial changes between conventional and organic systems. The present study is based on the empirical results of surveys on cash crop farmers, and on available knowledge on collecting firms’ strategies in the Île-de-France region surrounding Paris. We develop an analytical framework to evaluate conventional farmers’ technical and commercial proximity to OF, and the changes potentially to be made in the case of a conversion to OF. To analyze farmers’ technical practices, we suggest a scoring system with principle-based indicators concerning the components of the cropping system. The analysis of commercial proximity to OF is based on relevant criteria concerning the organizational dimension of markets for organic produce. Results show the diversity of the size of the technical and commercial leaps to make to reach OF. In the region studied, we observed a majority of medium and large potential leaps by conventional farms, which highlighted the difficulty for conventional systems to technically and commercially attain OF. Taking into account the interactions between farmers’ practices and commercial strategies, this methodological approach is complementary to the existing theoretical frameworks of transition to sustainable agriculture. From an operational point of view, it could be useful to adapt the OF development programs in a specific region by identifying the technical and commercial barriers and opportunities.

Keywords: *organic farming, proximity to organic farming, change process, leaps, analytical framework, technical and commercial system interactions*

Upscaling grassroots innovation for sustainable agriculture: experiences from the Dutch dairy sector

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It is an open question how grass root innovations can have a wider impact beyond the people directly involved in their initial development. Processes of replication, scaling-up, but also translation and institutional entrepreneurship are likely to play different, but important roles in the institutionalisation of new innovations. However these processes, and the different actors involved in them (farmers, scientists and innovation brokers) so far have remained underappreciated in the literature. Our contribution to the workshop therefore has the aim to further explore these processes in which a local innovation become institutionalised on higher system levels. We will do this by presenting our study of the development and spread of the “kringlooplandbouw” (low external input farming) in the Dutch dairy farming sector. The concept of low external input farming got its start in the environmental cooperatives of the Northern Frisian Woodlands in the early 1990s and it a good example of grassroots innovation in which local farmers, together with scientists, civil servants, NGOs and farmer unions worked on the reduction of environmental loads and the improvement of the local landscape at the same time. Since that time, the concept of low external input farming has spread over the Netherlands and it has become



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somewhat of a catchphrase that has attracted the interest of farmers, researchers, consultants and politicians. As a result different networks in different regions have sprung up over the years that are trying different forms of low external input farming, sometimes even practices that contradicting and conflicting approaches. We will analyse the different actor coalitions that make up the different regional networks, alongside their different practices of low-external input. We will analyse these so-called “unfolding webs” (Van der Ploeg et al., 2008) and the overlap and contradiction between the various approaches and their typical sustainability discourses that accompany them. An important conclusion of our contribution is therefore that the model of adoption and diffusion is not an adequate model that is applicable on the spread of agricultural grassroots innovations. Instead, the political dimension of innovation networks and the negotiation processes between different groups of actors deserves more attention.

Keywords: *grassroots innovation, upscaling, participation, low external input farming, dairy sector*

An innovation systems model for innovation research in the bio-economy

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To cope with diverse global pressures, the petroleum based economy is transitioning to a bio-economy. Radical and incremental changes in the involved industries will be the cornerstone to successfully innovate towards this more sustainable system. However, the traditional innovation models such as technology push and market push will not suffice. Their inflexible, linear, uni-disciplinary, closed approach is unable to consider the diverse, multi-disciplinary aspects of the innovation system, leading to inefficient innovation efforts. Despite many valuable contributions, the widely recognized innovation system approach lacks the sophisticated models of the other, more traditional approaches. We therefore build on previous innovation models, related literature and interviews with innovation experts to develop a model for innovation research in this innovation systems perspective. The result is a comprehensive model with four important features. Innovation research is done in an (i) inter- and transdisciplinary manner to take into account the different techno-scientific aspects as well as socio-economic aspects of innovation. Also, the boundaries of the process and organization are systematically opened to a (ii) network with a wide variety of stakeholders to benefit from the various advantages of stakeholder participation. Furthermore, the process has no explicit starting point (iii) and is conceived as (iv) cyclic with possibilities for iteration and feedback to fully exploit the advantages of networking and stakeholder participation. In this paper this new model is developed and further illustrated with three bio-economy cases.

Keywords: *System Innovation, Bio-economy, Conceptual model, Participation*

Towards more sustainable agri-food chains: a new conceptual framework

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Due to pressures such as climate change, globalization, price volatility and scarcity of natural resources, our agri-food chain is urged to make a transition towards more sustainable production. How to organize such a transition, given the various stakeholders involved, and how to monitor progress still remain important challenges. Therefore, this paper presents a new conceptual framework that follows an integrated chain approach. First, it tackles the complex ecological and socio-economic challenges along the chain and its members (agriculture and food industries), and second, allows for decision support to chain members and policy makers. This framework combines two existing theoretical frameworks. The first framework is global chain value analysis (GCVA) of Gereffi (2005) which has its roots in institutional economics. GCVA categorises five governance types of value chains (markets – modular – relational – captive – hierarchy) based on three variables: (i) the complexity of information and knowledge transfer required to sustain a particular transaction, (ii) the ability to regulate transactions, and (iii) the capabilities of actual and potential suppliers. The second framework, originating from ecological economics, extends the set of traditional economic resources to various forms of capital in the production system. These are natural (land, water, ...), manufactured (buildings, machinery, ...), human (labour, skills,...), and social capital (networks,...). The economic system is considered to be fully embedded in the social system which in turn is embedded within the finite ecological system. Throughput of natural, social, human, and manufactured capital allows to describe agri-food systems in terms of maximal sustainable use of stocks and flows. The combination of these two frameworks allows to perform an integrated system analysis of the agri-food chain, including the



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governance structures and the boundary conditions for the various types of capital. This paper describes the new conceptual framework illustrated by means of a case study of the agri-food chain in Flanders.

Keywords: *Global value chain analysis, ecological economics, agri-food chain, transition, sustainability*

Practising agroecology: management principles drawn from small farming in Misiones (Argentina)

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In face of agricultural sustainability challenges, agronomical research has focused its efforts on the design of new production systems. In parallel, ethnographic-based studies of small farmers' practices in developing countries have shown the sustainability of the so-called traditional production systems and put them forward for the ecologisation of agriculture. Nevertheless, a gap remains between the rules used for agroecological design and the local practices of particular farms. Our objectives are then to draw principles for agroecological management from the in-depth study of farming practices in ecologically-based farms. Our strategy was to study small family farms in Misiones (Argentina). Far from single-crop farming, producers cultivate many different species in the same place at the same time, mainly to save labour and space. They also take into account negative and positive biological interactions between crops, mostly related to shade and light. The location of each crop and the interweaving of crops and livestock is decided at a micro-scale of individual plant or animal. Moreover, organising this diversity within a farm revealed itself as a socio-cognitive activity embedded in social networks of producers. These observed practices can be summed up in three management principles: i) adjustment and observation instead of control, ii) Variable temporal and spatial units within a supple management iii) Permanent at-home experimentation and specification of technical options. We discuss our results regarding the genericity of these principles and discuss the research paths to take these agroecological systems as models for the ecologisation of conventional systems.

Keywords: *agroecological management, diversity, practices, empirical knowledge, Argentina, small-scale farming*

TATA-BOX: "Territorial Agroecological Transition in Action": a tool-Box for designing and implementing a transition to a territorial agroecological system in agriculture

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Impact of agriculture on environment and human health, energy crisis and climate change enjoin policy-makers and farmers to rethink the model of agricultural production. One way is to promote a strong ecologisation of agriculture by reducing inputs and using ecosystem services at field, farm and landscape levels. Designing and implementing such an approach requires changing deeply the management of farming systems, natural resources and food-chain while dealing with a wide range of environmental and societal changes. To support this change, agricultural actors and researchers require new tools. Based on the concept of agroecological transitions, the Tata-box project aims at testing and adapting a methodology to help local agricultural stakeholders to develop a vision of the desirable transition of local agricultural systems and to steer it. The methodology is based on 5 steps:

- design and set-up a multi-actor system that will perform the design process and collectively define the "situation/problem" set;
- accompany the actors and researchers in the construction of scenarios of factors of change for local agriculture and natural-resource management;
- construct a shared vision of the organisation of strong ecologisation of agriculture that would address their local issues, both present and future, and that ensure a socio-economic control of local agriculture by local actors, and be resilient to future external changes;
- design the transition pathway to a strong ecologisation of agriculture using a "backcasting" approach. It consists of defining the transition steps, the strategies associated with each step, and the criteria (or indicators) for successfully attaining each step;
- design an adaptive governance form necessary for the transition developed in the previous step and define and implement the adaptive management necessary for the strong agroecologisation of agriculture.



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The field study project is a large agricultural watershed in the southwestern part of France (Aveyron & Tarn et Garonne). The Tarn river basin is about 300 km long from east to west and 50 km north-south, and covers a wide diversity of rural territories.

Keywords: *Adaptive Governance, Adaptive Management, Agriculture, Biodiversity, Collective action, Complex adaptive systems, Desirable states, Global change, Innovation, Interdisciplinary, Land management, Scenario analysis, Stakeholder engagement, Sustainable development, Trajectories, Water management*

How to break out the lock-in on crop diversification in France?

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Crop diversification is often presented as a way to improve the sustainability of agricultural production systems (reduction in the use of inputs and environmental damage resulting from their excessive use - pesticides, fertilizer, water). However, despite these benefits and various incentive programs, crop diversification is gaining little ground in France.

The objective of this study is to identify: i) the main obstacles to crop diversification at agro-industrial supply chain and farm levels; ii) the levers that can be employed to encourage these stakeholders to integrate greater crop diversity within their production system.

An interdisciplinary analysis framework was used, integrating farming system agronomy, organisational economics and economy of innovation. This theoretical framework is centered on the "technological lock-in" theory, derived from the innovation economy, and socio-technical transition theory, which proposes potential "break-out" avenues.

This framework is tested on twelve concrete crop diversification cases studies with three in-depth analysis. Our results show that the socio-technical system organized on the basis of dominant crops and the simplification of cropping plans is therefore an obstacle to the development of diversification crops as a result of various closely interlinked processes: (i) genetic progress that is less rapid than for "major crops"; (ii) a lack of crop protection solutions (agrochemicals one but also genetic and agronomic ones); (iii) a shortage of technical references concerning minor crops to explain low yield or quality defects at regional scale; (iv) a competition with "major crops" on the raw material market not only due to price but also accessibility and homogeneity differences (v) the diversity of coordination methods between the different stakeholders in the supply chains. Finally, to encourage the development of diversification crops, it would appear to be essential to act simultaneously on three levers supported by public action: (1) Promotion of new market outlets, (2) Coordination of stakeholders and structuration of supply chains and (3) getting R&D, advisory and plant breeding actors involved on a national and regional level to develop innovative technologies and varieties.

Keywords: *Crop diversification, lock in, supply chain, minor crops, farming system*

Diversifying farming cooperative strategies towards agro ecologic transition

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The French public authorities increased the pressures on the farmers so that they reduce their use of fertilizers and pesticides considered as the main factors of water quality degradation. The co-operative sector collects agricultural products, and provides the farmers with the inputs. Those firms that constitute the dominant regime in France are thus directly concerned with this ecologisation of cropping systems.

We analyzed the diversity of the action plans on water quality conducted by two types of actors: cooperative groups (trade and supply union of farming cooperatives) and local farming cooperatives. We characterized their strategies of management of volumes and quality of the products as well as the innovations for water quality management. As a second step, we analyzed more in detail the case of a cooperative implied in the creation of a new supply chain with an environmental strong potential in a vulnerable watershed.

Surveys have shown that due to changes in global landscape cooperatives have invested heavily in service activities and advisory accompanying the greening of agricultural practices. At the national level, this approach relied on the expertise, tools, and extensive territorial presence of cooperatives, helps build databases of agricultural practices, and also perform environmental assessment and propose action plans on areas where water



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quality is threatened by pesticides and nitrogen. The implementation of these services is underpinned by the maintenance of the current level of agricultural products collected (dominant regime). Regarding water protection, very few is done using radical innovation like crop diversification or changes in chemical input supply.

At the local level there is a variety of cooperative behaviors partly related to their economic size. Large cooperatives rely on advices based on the agronomic tools developed at the national level to improve the efficiency of inputs on vulnerable areas. Smaller structures can initiate or participate into real territory projects often supported by local communities. They seek new forms of supply chains and aim a territorial management of cropping systems in catchment areas. These projects can be qualified of territorial innovations that are not yet well stabilized. The local case we analyzed gives us the opportunity to a diagnosis of the main obstacles for such innovative projects (in term of agronomy of practices and local supply chain management).

Keywords: *agricultural cooperative, water quality, local project, territorial management, supply chain*

Improving resource efficiency of low-input farming systems through integrative design

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Whole System Design (integrative design) is an approach embedding social, economic and environmental phenomena into a design solution. The concept is based on the need for the integration of techniques such as system thinking, the development of partnerships and the use of trans-disciplinary skills to develop more sustainable and innovative solutions. This study aimed to test the hypothesis, if resource-efficient low-input cropping systems can be created by applying principles of integrative design to agriculture.

Fig. 1. Illustrates the process of applied design methodology. Data were collected from two low-input farmers from Western France that cultivate ancient wheat varieties, process grains on farm and distribute products through local markets. Life Cycle Assessment was used to track environmental impacts from the field to the consumer's table. To map out opportunities for improvements, interdisciplinary workshop was organised with scientists within the frame of the EU project SOLIBAM and results were consulted with farmers on a feedback-loop basis. Redesigned farms were compared to the business-as-usual scenarios as well as a generic reference – a bread made from conventional wheat from the region, processed industrially and supplied through a supermarket in France. Potential improvements achieved through redesign of the cropping systems ranged from 18 % reduction in non-renewable resource use up to 60 % for the Global Warming Potential. One of the cases was also shown to provide comparative advantage over the supermarket-based product. Solutions for improving resource efficiency included i.e. switching to higher yielding crops and cultivars, optimising crop rotations, optimising the timing and type of applied fertilizers or installing anaerobic digestion (AD) plants.

Resource efficiency of agricultural systems is often limited by the lack of innovation, suboptimal management and the lack of access to reliable environmental information. Integrative approaches to eco-design coupled with systematic assessment tools such as LCA show to be very effective in overcoming these barriers. The difficulty lays in their large-scale facilitation, as these are resource and knowledge-intensive. This could be changed in the future through the development of simplified ecodesign. These could be used for the use by farm advisory services together with other instruments to stimulate eco-innovation on farms.

Acknowledgement: This study was supported by the EU grant no. KBBE-245058-SOLIBAM

Keywords: *ecodesign, sustainable intensification, LCA, low-input farming*

Proposition of a framework for addressing the issue of ecological intensification of livestock systems

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In order to promote the development of farming systems to more sustainable forms, particularly to maintain production while respecting the environment, one must be able to analyze the systems in their complexity and dynamic, while providing the means to assess their position with respect to a more "ecologically intensive" direction. The frameworks of livestock systems approaches have to be adapted to this aim. This is what we have done as part of a study on the diversity goats livestock systems (GFS) of Livradois-Forez, a small region of French middle-mountain. Semi-structured questionnaires were conducted with 18 farmers, a sample selected to cover the



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diversity of livestock forms in this territory. We analyzed the operation of livestock systems looking for the system configurations (dimensions, buildings and equipment, labor force, combinations of farming activities, production project) and the combination of management practices (crops, herds and valorization of products), and what is the place of the goats system within the family farm long term trajectory. To assess the GFS operation with respect to a more ecologically intensive direction, we mobilized the five agro-ecology principles for design of sustainable livestock systems proposed by Dumont et al. (2012) to “read” the management practices. (i) adopting management practices aiming to improve animal health, (ii) decreasing the inputs needed for production, (iii) decreasing pollution by optimizing the metabolic functioning of farming systems, (iv) enhancing diversity within animal production systems to strengthen their resilience and (v) preserving biological diversity in agro-ecosystems by adapting management practices. We present the framework thus constructed and illustrate its application to our case study. We show the interest in understanding the diversity of livestock forms and identify what promotes or limits the development of these systems into more ecologically intensive forms.

Keywords: *agro-ecology, framework application, goat, sustainable livestock, system configurations*

Integrating crop and livestock activities at territorial level in the watershed of Aveyron river: from current issues to collective innovative solutions

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In developed countries, the development of interactions between crops and livestock could enhance sustainability of agriculture, as an alternative to the specialization trends. Strengthening integration of crop and livestock at farm and territory levels may improve metabolism efficiency of agricultural systems and enhance ecosystem services. It also allows diversifying income sources and creating activities locally. To design such Integrated Crop-Livestock Systems (ICLS), the socio-economic contexts must be taken into account to overcome sociotechnical lock-in, through situated co-design with stakeholders.

We present in this article a participatory approach to design ICLS at farm and territory levels in the Aveyron river watershed (South-West France). In this highly diversified area coexist irrigated or non-irrigated arable farming systems in lowlands and more or less intensive livestock systems in upper lands. With local stakeholders (farmers, land and water resources managers, environmental associations, collect and storage organisms, agricultural advisors) we built a diagnosis of local crop-livestock integration challenges and issues, identified the existing interactions and imagined promising options of integration. These options were articulated in two scenarios: a “territorial integration” scenario referring to large flows of products between lowlands and highlands, a “collective-level integration” scenario referring to small groups of farmers exchanging products and collaborating in a flexible way. These two scenarios have been discussed and assessed using a multicriteria assessment based on the participative diagnosis. Through our assessment and design participatory approach, stakeholders identified and described different ways for sustainable crop-livestock integration based on the local biophysical and social resources and the diversity of farming systems. At territorial level, integration would occur through collaboration between crop-specialized areas producing alfalfa for livestock areas. This collaboration would be driven by cooperatives and set on a large scale. At collective level, integration would occur through collective organisation and informal agreements between farmers, animated and organised by a farmers’ association. The combination of both approaches is discussed as an opportunity for deep crop-livestock integration and transition in farming practices towards more agroecological practices.

Keywords: *Crop-livestock integration, participatory design, multicriteria assessment, territorial metabolism*

Crossing two niches of agroecological innovation : the case of organic farming and conservation agriculture

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Among the different paradigms addressing the issue of the transition of agri-food systems, we situate our study in the agroecological paradigm, considering that agri-food issue includes employment, food governance, environment and consumption (Stassart et al. 2012). Within this framework, the present communication discusses the processes of “ecologisation” of agri-food systems through the analysis of the interactions between two agroecological niches : organic farming and conservation agriculture. Organic farming is a well-known model that



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prohibit the use of chemicals, that is subjected to public regulation and clearly identified on the market. Conservation agriculture aims to maintain soil fertility and prevent soil erosion through the application of minimal soil disturbance (reduced tillage), permanent soil cover and crop rotations. This model is recognized by the FAO but has less visibility in society than organic farming. In previous works, we mobilized the multi-level perspective of the Sustainability Transition Studies (Geels and Schot 2007) and developed the metaphor of the insularization to characterize the specificities of the transition process to conservation agriculture. The present communication uses this theoretical framework to analyze several farmers' transition pathways that articulate organic agriculture and conservation agriculture. The analysis will consider how these two models converge on some aspects while simultaneously presenting several technical, organizational and cognitive incompatibilities. It will aim to understand how farmers connect or disconnect these two models in different ways. Besides, this investigation seeks to provide a better comprehension of the crossing of different niches of innovation, the challenges and obstacles it brings about and the potential in term of sustainability.

Keywords: *organic farming, conservation agriculture, crossing niches, Sustainability Transition Studies*

How describing the evolutions, in a territory, of the interactions between livestock farming systems and downstream operators? Proposition of a methodological framework, based on the comparison of 4 territories and 2 types of production: milk and meat

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At the era of globalization, the evolutions of agrifood systems are not always towards more sustainable patterns and are caught up in tensions between delocalization and relocalization. The analysis of the evolutions of agrifood systems (linked to a type of production and sited in a given area) needs to take account the way in which the changes are involved at different levels: livestock farming systems, systems for processing and distributing agrifood products, and the development of the territories in which these activities take place. This goal supposes to have an adequate methodology to analyze these evolutions. Our work proposes such a methodological approach to report more particularly the joint evolutions of the livestock farming systems and the operators of the downstream sector in rural territories. It was elaborated with comparing four case-studies: 3 in France (Vercors and Livradois-Forez for milk production and Cévennes for meat production) and one in Uruguay. This methodological framework, based on an iterative way, is organized to describe and qualify the ongoing dynamics in the joint evolutions of the different elements of agrifood involved in these changes around time. It includes, for an area and a type of production the evolution of: i) the livestock farming systems, characterized by the diversity of breeding systems and collective actions set up by farmers to assert and market their production, ii) the downstream operators, involved in the territory, described by the types of operators and the relationships between them, iii) the interactions "livestock farming systems – downstream operators", for which we consider two forms: the marketing modes of products, i.e. the choices of product-buyers pairs, and the vertical coordination modes between breeders and downstream operators, illustrated by the elaboration and the implementation of a specification. With this methodological approach, we observe various dynamics which join evolutions of livestock farming systems and supply chains, incentive by farmers or by downstream operators, and different according to national context and characteristics of territories.

Keywords: *changes, livestock farming systems, downstream operators, territory, methodological approach*

Social Ecology - towards an integrative approach for analysing and assisting sustainability transitions of agrifood systems?

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Agrifood systems can be regarded as complex, socio-ecological systems, shaped by the interplay of socio-economic, cultural as well as natural processes and dynamics. Viennese Social Ecology has a longstanding tradition in dealing with complex socio-ecological systems. In its research, it attempts to bridge social and natural sciences by quantitatively analysing patterns and processes of energy/material/biomass flows, land use as well as time use, based on the basic concepts of social metabolism and the colonization of natural processes. In that sense, Social Ecology might contribute to a more holistic or integrative approach to analysing and assisting sustainability



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transitions of agrifood systems. At the same time and especially when analysing sustainability transitions of agrifood systems, Social Ecology might gain useful insight from other integrative approaches such as food regime theory (Friedman, Mc Michael) or transition theory (Geels). Against this background, the paper aims to shed light on similarities and differences between the concepts of Social Ecology and other concepts such as food regime theory or transition theory when analysing agrifood systems. Based on this comparison, we discuss the possibility and usefulness of an integration of alternative approaches within the concepts of Social Ecology. Finally, strengths and limitations of such an integrated framework will be tested based on empirical research on Austrian local food systems.

Keywords: *social ecology, agrifood systems, local food system, food regime theory, transition theory, sustainability transitions*

The co-production of sustainability by learning networks. The case of reconstruction of knowledge and practices around bread production

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According to transition theories, a full adhesion to sustainability paradigm for agro-food system requires radical changes, addressed to redefine the whole socio-technical system underlying food production and consumption practices. Through them a complex re-organization of systems of knowledge, rules and norms of behaviour, and a re-design of the organisational and material infrastructures involved in production and consumption practices take place. Many grassroots initiatives, developing out of the conventional system and aimed at creating alternatives to it, are showing the potentials and also the challenges of this complex process of change. It emerges as interaction and learning processes developing within hybrid networks, including all the diverse actors engaged in the change, prove to be crucial to this process of innovation. Within these networks actors mobilise their knowledge and create new frames of common understanding. This learning process results in shared knowledge which, translated into new attitudes and practices, allows a coherent re-configuration of all the components of the system, from the level of production to that of consumption.

In this paper we aim at adopting this approach to deal with the innovation pathways that are affecting one of the agro-food chains which has been most transformed over the modernization of the agro-food system, the production of bread. In response to producers' and consumers' needs, in Italy this chain is at the centre of a myriad of local initiatives. Moving on a common trajectory of social innovation, they are committed to redefine genetic materials (through a different approach to research), cultivation techniques and processing technologies (new knowledge and skills and appropriate equipment), organizational models (territorially and socially embedded), value chain (grounded on different shared values), cultural meanings. The learning processes that drive these changes stem from the interaction that develops among a variety of social and institutional actors.

The analysis develops through a case study on a specific learning network in Tuscany. On the background of the multiple changes involved within the whole chain, an in-depth analysis of the aspects which interest the reorganization of the production phase allows to highlight the challenges to be tackled in order to fully pursue sustainability.

Keywords: *learning networks, transition, social innovation*

From genetics to marketing (...and through hidden connexions and interdependencies): an integrative approach of the ecologisation of fruit production

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The fruits sector is characterized by a high international concurrence and marketing constraints as well as consumers' and societal expectations that are both contradictory and interdependent. For example, consumers want fruits free of pesticide residues and the society wants a more ecological agriculture and diversified landscapes, while retailers impose constraints regarding fruits' aspect and conservation which in turn go along with input intensive practices. Our project studies the lock-in effects and the transition pathways towards sustainability within peach and apricot clusters in southern France through an interdisciplinary network of scientists (sociologists, economists, agronomists and geneticists). It develops a systemic and integrative analysis combining a sociological framework partly anchored in transition theories with an ESR (Efficiency-Substitution-



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Redesign) approach. The first phase is devoted to a socio-historical analysis of this sector since the 1960s, and more specifically on the place of genetics and cultivar breeding in its trajectory, which indeed is often neglected in agrifood system approaches.

Along with a process of specialization and intensification at the farm and regional levels, breeding strategies mainly focus on improving yield and fruit capacity for packaging, storage and transport, on extending the production period (from 3 to 6 months for peach production) and on offering retailers a continuity in each product type over the whole extended season, through “varietal series”. These objectives neglect the environmental aspects (even though substantial work has been done for decades on resistant cultivars), and led to create and then market fruits that were easier to store and transport, but often disappointing in terms of taste. We show how these changes are due to the constraints which affect all the socio-technical system up to the breeding process criteria and to a deep reconfiguration of the network of institutions and actors dealing with fruit production (research institutes, breeders, producers’ organizations, retailers, etc.) and of their modes of coordination. We finally try to analyse reflexively the way we discuss with our partners (researchers, producers’ organizations, marketers, advisors) some core issues that are central to the construction of more ecological and resilient transition pathways.

Keywords: *fruits sector, transitions, agrifood systems*



Workshop 2.7: Sustainability of Dairy Farms - Concepts, Measurements and Empirical ResultsConvenors: **Ludwig Theuvsen, Birthe Lassen, Monika Zehetmeier****Workshop 2.7: Sustainability of Dairy Farms - Concepts, Measurements and Empirical Results**Convenors: **Ludwig Theuvsen**, Georg-August-University Göttingen, Department of Agricultural Economics and Rural Development, Germany
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Sustainability of dairy production is of increasing interest in the supply chain. Until today often single aspects are analysed but an overall picture of the situation in different farming systems is difficult to draw. The workshop focuses on conceptual frameworks and empirical results which show complex approaches to analyse sustainability in dairy production, considering ecological, economic and social aspects as well as animal wellbeing.

Session 1: Sustainability and adaptability of dairy farms**Sustainability of Management-intensive Grazing Dairies versus Conventional Confinement Dairies**Dale M. Johnson, James C. Hanson, Ray R. WeilDepartment of Agricultural and Resource Economics, University of Maryland, USA, dmj@umd.edu

Goals of sustainability have been articulated in the publication "Towards Sustainable Agricultural Systems in the 21st Century" (National Research Council). These goals include: 1. Be profitable. 2. Enhance environmental quality. 3. Increase the quality of life for farmers and society. 4. Produce enough to satisfy human needs. University of Maryland research has indicated that management-intensive grazing (MIG) dairy farms may achieve these goals better than convention confinement (CC) dairy farms. Financial data collected from dairy farms indicates that MIG farms were more profitable than CC farms on a per milk-weight, per cow, and per acre basis (Competitiveness of management-intensive grazing dairies in the mid-Atlantic region from 1995-2009, Journal of Dairy Science 96: pages 1894-1904. J.C. Hanson, D.M. Johnson, et.al.). Profits of MIG farms were also less variable, so that MIG farms faced less income risk. Grazing has other benefits as well. Grazing seems to be much healthier for dairy cows. Veterinary, breeding, and medicine costs are much less for pastured cows than confined cows. Because they are healthier, grazed cows can be milked longer (or culled less frequently). As a result, MIG farms have a larger number of higher quality animals for sale (for example, bred heifers). MIG farms are also less labor intensive. Less time is spent in crop production, feeding, and manure management. Costs of hired labor are thus lower in MIG farms than in CC farms. Other University of Maryland research addressed the environmental impacts of grazing (Management-intensive Grazing: Environmental Impacts and Economic Benefits, University of Maryland Fact Sheet, R.R. Weil, R.E. Gilker). This research found no evidence of excessive nitrogen leaching from the MIG watersheds. Neither N nor P concentrations were increased as stream water flowed through well managed MIG pastures. The benefits of grazing may extend beyond the farm itself, as the conversion of cropland to permanent grass may have implications for global warming and soil conservation, as well as quality of life for surrounding communities. As suburban development continues to encroach on farmland, and dairy farming becomes more economically challenging, MIG provides an alternative that can be both environmentally friendly and financial viable.

Keywords: *Management-intensive grazing, dairy, sustainability***Strategies for increasing dairy system production while controlling environmental footprint on dairy farms in Canterbury, New Zealand**D.E. Dalley, J.B. Pinxterhuis, D. Chapman, G. Edwards, K. Cameron, H. Di, P. Beukes, A. Romera
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Regional Councils across New Zealand are currently setting nutrient limits for groundwater, lakes and rivers in their catchments to preserve water quality. For the dairy industry, nitrogen (N) is the most pressing issue because nitrates from excreta and fertilisers can readily leach below the root zone of pasture into receiving waters. If the New Zealand dairy industry wants to continue to increase production, it has to at least hold, or preferably reduce, total N leaching from land contributing to milk solids (MS) production. Several management strategies and tools could be used for this purpose, but they have not been integrated into New Zealand farm systems to measure the



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production and environmental outcomes. The Pastoral 21 programme in Canterbury is comparing two farming systems taking two different approaches to future industry development. One (HSE) is based on a stocking rate (SR) of five high genetic merit cows/ha with up to 400 kg N applied as fertiliser per year, plus up to 800 kg DM/cow bought-in feed. This system is expected to be highly productive (2,200 kg MS/ha) and profitable, but with relatively high nitrate leaching. The second (LSE) has a SR of 3.5 high genetic merit cows/ha, up to 150 kg N/ha applied as fertiliser, and 40% of the pasture area in a diverse pasture mixture containing herbs and legumes. It is expected to be highly profitable and reduce N leaching by up to 45%, but produce 600 kg MS/ha less than HSE. Traditionally, dairy farm performance per hectare in New Zealand has been assessed using the milking platform area only. A comparison between the HSE and LSE systems, including both the milking platform and all other land contributing feed used for milk production, shows that this traditional performance metric over-estimates milk production and underestimates the potential environmental impact of the system. This paper reports on an approach to consider all hectares contributing to the dairy system when calculating physical performance or estimating the potential environmental impact of a dairy farm.

Keywords: *dairy, farm system, environment, nitrogen, productivity*

Adaptability within dairy farming systems as a precondition of sustainability

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Sustainability is the capacity of biological systems to endure and survive. This applies to farm systems as well as farm animals (as sub-systems). In a highly competitive environment outside and within farm systems survivability requires capabilities for adaptability. To cope with ongoing changes or unexpected disturbances, variables within each (sub-)system have to be adjusted to the disturbance variables. While adaptation and self-regulation within farm animals follow physiological principles, they largely depend on the ability of the management to provide appropriate protection against disturbances and resources, e.g. in terms of nutrients and energy suited to meet individual requirements. Analogue to survivability of farm animals, economic viability of farm systems depends on i) the degree of inherent and external disturbances, ii) the availability of essential resources, and iii) on the capacity of the farm management to steer the production processes and to find a balance in dealing with various demands. In a comprehensive study, 60 organic dairy farms were assessed with the objective to assess the preconditions and availability of resources to improve the animal health status of the dairy cows. Capacities for adaptability were assessed by using an impact matrix as a tool dedicated to identify farm specific opportunities and constraints in animal health management (Duval et al., 2013). The procedure enables a distinction between those farms which are able to rely on adequate resources and management skills developing a sustained production process and those who are expected to fail in the long run. Degree of disturbances, availability of resources and the capacities for adaptation differed widely between the farm systems. The previous results indicate that sustainability is a result of successful interactions of influencing factors within a (sub-)system in the first place requiring farm specific strategies. Thus, the approach to assess sustainability by making use of general indicators should be reconsidered.

Keywords: *animal health, impact matrix*

Evaluating the impact of intensification of dairy production on the sustainability and environmental safety

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The intensification of dairy production does, however, run the risk of overstressing the agricultural system, with a negative impact on the sustainability and environmental safety of the production itself. The increase in production intensity in the period stretching from 1993 to 2006 was analysed, presented and assessed on the basis of the development of the Educational and Research Farm at the Justus-Liebig-University Gießen, Gladbacherhof. The aim is, therefore, to use computer assisted business balancing models and data from the inventory management to show the development of the business for a defined period, so that conclusions can be drawn for its continued



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development. To gain a clearer understanding of the past development processes, the observation period was divided into three distinct stages (1993 – 1996, 1997 – 2001, and 2001 – 2006). The overall business production and reproduction processes were highlighted, differentiated for outdoor research (arable farming) and indoor research (livestock farming), taking into account the purchase of relevant resources and plant and animal market production. The operation was analyzed and assessed with particular focus on the data concerning structure, yield and reproduction of soil content. During the observation period the livestock numbers have grown from 0.5 LU ha/total agricultural land to 1.1 LU ha/total agricultural land. The change in livestock, in livestock numbers and feeding diets has brought about a continuous increase in the annual levels of organic fertilizers from livestock farming to supply arable land and grassland with nutrients and organic raw materials. The continuous increase in the supply of nutrients and organic raw materials per area unit as an expression of the increase in production intensity was not able to contribute to an increase in yield for the relevant arable crops in the investigation period. Continuous improvements in the results were achieved in the investigation period in the humus and NPK levels per ha of farming land. The humus supply rate rose from 80 to 120 %. Taking into account the changes in the soil content, the nitrogen balance increased from 40 to 80 kg/ha. Due to the unchanged yields, the overall nitrogen use on arable land dropped from 79 to 46%. In the present case it can be resumed that computer assisted business balancing models are able to evaluate the impact of intensification of the dairy production system on the sustainability and environmental safety.

Keywords: Dairy production, sustainability, environmental safety

Session 2: Dairy farming and climate change**GHG balance of arable forage production in Northern Germany**

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Ecological intensification of agricultural production, i.e. maximization of production without compromising a system's ability to sustain its productive capacity (FAO, 2011), is currently debated as a pathway to cope with a growing population and climate change. The rise of intensive livestock production is a major cause of environmental damage. Greater efficiency in use of resources along the production chain will be a key to reduce 'livestock's long shadow'. The objective of the current study therefore is to quantify the carbon footprint of forage production systems for two typical Northern German landscapes, which are representative for a range of north western European regions. A 2-year field trial had been conducted at 2 sites (Geest, Upland) in Northern Germany to investigate the yield, nitrate leaching and emission of climate relevant gases of different arable forage production systems (continuous maize, ryegrass ley, maize-based rotation) as affected by N fertilizer type (mineral N, digestate, animal slurry) and N amount. These data served as basis for a greenhouse gas (GHG) balance in order to quantify the product carbon footprint (PCF, kg CO₂eq per GJ NEL) of forage. Total GHG emission showed a linear increase with N application, with mineral N supply resulting in a higher slope. Product carbon footprint ranged between -66 and 119 kg CO₂eq/(GJ NEL) and revealed a quadratic or linear response to fertilizer N input, depending on the cropping system and site. At N input required for achieving maximum energy yield, the ryegrass ley caused a lower PCF than continuous maize or the maize-based rotation. The data indicate potential for sustainable intensification when crop management options are adopted to increase resource use efficiency. It is concluded that (i) a prioritization of protection targets (e.g. climate, biodiversity, soil, water) according to the specific regional status of environmental goods and (ii) the development of corresponding policy instruments is required to ensure both, high productivity and the provision of ecosystem services.

Keywords: greenhouse gas balance, carbon footprint, forage production, eco-efficiency, resource use

Implementation of greenhouse gas mitigation strategies on organic, grazing and conventional dairy farms

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Greenhouse gas emissions from dairy farms are a major concern. Feeding and manure management mitigations strategies to reduce green house gas emissions were simulated using the Integrated Farm System Model on 1 conventional, 1 organic and 1 grazing farm that had the same land base and the same number of cows. Results



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showed that incorporation of grazing practices for lactating cows on the conventional farm led to a decrease of greenhouse gas emissions (-0.16 kg CO₂eq/kg of milk) and at the same time an increase in net return to management (+\$7,005/year) when milk production was maintained. On the grazing and the organic farms, decreasing the forage to grain ratio in the diet decreased greenhouse gas emissions when milk was increased by 5% or 10%. However, the 5% increase in milk production was not sufficient to maintain the net return on these farms. When milk was increased by 10%, net return increased on the organic farm but not the grazing farm. Changes in manure management led to a decrease in greenhouse gas emissions (-0.08 kg CO₂eq /kg of milk) on the conventional farm whereas greenhouse gas emissions increased on the grazing and the organic farm. For the 3 farm systems, manure management changes led to a decrease in the net return to management. Simulation results showed that the same mitigation strategies will lead to a different outcome based on the farm system. Simulations also demonstrate that there are some feeding and manure management mitigations strategies that are an effective way of reducing greenhouse gas emission while maintaining profitability for each dairy farm system studied.

Keywords: *IFSM, greenhouse gas, production systems, life cycle analysis*

Carbon footprint and energy consumption of Luxembourgish dairy farms

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The carbon footprint as well as the energy consumption of Luxembourgish dairy farms shows a high variability. There are farms with a very high imbalance between emitted and stored carbon and as a consequence also high levels of carbon footprint per kg ECM. On the other hand, there are farms which are capable to produce milk with a considerably lower carbon footprint due both to a high level of carbon storage and/or to lower emissions of CO₂-equivalents. Also in the case of energy consumption we assist on a high spread between minima and maxima of observed results. This work examines the different causes of the variability, e.g. possibility of storage carbon via renewable energies such as biogas or via minimum tillage as well as efficient use of fossil energy sources and other production means, principally fertilizers and feedstuffs. At the end, recommendations for a sustainable footprint and energy efficiency in Luxembourgish dairy production will be derived from the main conclusions of the analysis.

Keywords: *Carbon footprint, energy efficiency, emissions of CO₂-equivalents, carbon storage, renewable energies*

A life cycle assessment case study of the carbon footprint of high performance Irish, UK and USA dairy farms

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Life cycle assessment (LCA) is the accepted approach to simulate the carbon footprint of milk. The objective of this study was to apply LCA to compare carbon footprints of high performance confinement and grass-based dairy farms. Physical performance data from research herds were used to quantify carbon footprints of a high performance Irish grass-based dairy system and a top performing UK confinement dairy system. For the USA confinement dairy system, data from the top 5% of herds of a national database were used. Life cycle assessment was applied using the same dairy farm greenhouse gas (GHG) model for all systems. The model estimated all on and off-farm GHG sources associated with dairy production until milk is sold from the farm in kg of carbon dioxide equivalents (CO₂-eq) and allocated emissions between milk and meat. The carbon footprint of milk was calculated by expressing the GHG emissions attributed to milk per t of energy corrected milk (ECM). The comparison showed the carbon footprint of milk from the Irish grass-based system (837 kg of CO₂-eq/t of ECM) was 5% lower than the UK confinement system (877 kg of CO₂-eq/t of ECM) and 7% lower than the USA confinement system (898 kg of CO₂-eq/t of ECM) when no GHG emissions were allocated to meat. However, without grassland carbon sequestration, the grass-based and confinement dairy systems had similar carbon footprints per t of ECM. Additionally, using different emission algorithms or methods to allocate GHG emissions between milk and meat affected the relative difference and order of dairy system carbon footprints. This indicates that further harmonization of several aspects of the LCA methodology is required to compare carbon footprints of divergent dairy systems. Relative to recent reports that assess the carbon footprint of milk from average Irish, UK and USA



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dairy systems, this case study indicates that top performing herds of the respective nations have carbon footprints about 30% lower than average systems. Although, differences between studies are partly explained by methodological inconsistency, the comparison suggests that there is potential to reduce the carbon footprint of milk in each of the nations by implementing practices that improve productivity.

Keywords: *carbon footprint, grass, confinement, milk production*

Session 3: Long-term viability of dairy farms**Economic Assessment of Dairy Farm Production in Kosovo**

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The aim of this study is to provide an economic overview and benchmark dairy cattle farming economic performance in Kosovo. A dairy cattle farming is the most important economic sector of agriculture in Kosovo contributing about 10 percent to total GDP. At present, there is no data or any comprehensive research about the dairy farm production economic efficiency patterns in Kosovo. As in many transitional economy countries, dairy foods are a dominant part of the diet and dairy farming and dairy processing industry provides direct employment and improves rural family life conditions. Data of at least 100 different dairy farms will be collected, recorded, and monitored on a continued basis and will become the basis of a benchmarking system. The study will utilize a number of about 60 input variables, which have an economic impact on the dairy farm income and costs. Focusing on a dynamic database and a spreadsheet model-based decision support system, analyses at the dairy farm level on dairy farm production and benchmark in the light of competitiveness and efficiency will be performed and conclusions for the farm future development will be drawn.

Keywords: *Economic efficiency, Model-based, Input variables, Competitiveness.*

Environmental, Social and Economic Aptitudes for Sustainable Viability of Sheep Farming Systems in Northern Spain

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Overall assessment of farming systems is an issue necessary to take into account due to multiple interactions in agriculture sector. Several studies have appeared the latest years trying to measure sustainability in one of its dimensions (environmental, social, and economic), or all together in order to give an answer to society demands for one hand and farmer's needs for the other. The main objective of this study is to find strengths and weaknesses of traditional milk sheep production in the Basque Country comparing with intensive farms that have emerged recent years, as well as trying to trace correlations between different indicators of sustainability. Economic, social and environmental indicators have been studied, in different categories. For economic aspects: profitably, self-sufficiency, diversification, cost structure, and stability. For environmental issues, energy, nutrient balance, waste analysis, GHG emissions, natural elements and diversity, land use and management, livestock census and land. And relative to social sustainability of farm the following dimensions have been analysed: Job characteristics, job creation in rural area, quality of life, work quality, animal welfare, landscape and traditions, product quality and nearness to consumer and gender. These indicators have been combined into a single index of sustainability (numerical integration) to every dimension, to present together into three diagrams (visual integration). This study shows preliminary results of an integrated study of environmental, social and economic aptitudes of sheep farms in the Basque County (Northern Spain) through a set of indicators and possible interaction between them. A holistic view of farms will improve viability options for survival of farms, as well as seeing correlations between social, economic and environmental aptitudes to adapt farms and farmers to new challenges.

Keywords: *sustainability assessment, small ruminants, sustainability indicators*



Workshop 2.7: Sustainability of Dairy Farms - Concepts, Measurements and Empirical Results

Convenors: **Ludwig Theuvsen, Birthe Lassen, Monika Zehetmeier**

Linking practice to policy: Dairy farmers' understanding of ecosystem services for long term farm

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During the last ten years the number of dairy farms has decreased with app 40% in Sweden. Low viability and low competitiveness are main reasons, but also a lack of interest among young people to chose to become a full-time dairy farmer. High investment costs imply an important threshold effect. We experience the consequences in different ways; loss of biological and ecological diversity; decreased economic activity in rural areas; erosion of social community, and changes on landscape level.

To survive there are two dominant strategies. The first is to increase in size (specialization), the second is to decrease costs and use local resources as efficient as possible. For the latter group, ecosystem services are purposefully integrated into planning of the agricultural production systems. The question of resources allocations, at different system levels, becomes crucial. As farmers will have a central role in the societal transition towards a bio-based economy, their experimental learning and practical knowledge, in terms of conservation and provision of ecosystem services must be taken into account. Thus, we argue that how small-scale dairy farmers handle the challenge regarding the continued maintenance of ecosystem services, and the question of resource allocations within a farm, is important to learn from when developing future strategies and policies for Swedish agriculture. This paper builds on field studies within a qualitative research project (AgResource) that focuses on farmers and their knowledge about local resources and ecosystem services, and its ecological effects on the farm and landscape scale, as well as its socio-economic consequences. We conclude that the experiences and knowledge among small-scale and resource efficient dairy farmers are important to learn from. Learning from practice to inform policy will support the necessary shift towards a bio-based economy. An integrated perspective on farm development, including farmers' view in ecosystem services, is crucial for long term farm sustainability.

Successful strategies in Austrian dairy farming: an empirical assessment

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In order to maintain high farm income, even with an increasing volatility in agricultural input and output markets, dairy farmers have to select certain production strategies. The most common applied strategies in worldwide dairy farming are the so called High-output and Low-input strategies. Aim of this work is to identify these strategies in an agricultural bookkeeping dataset and assess the economic impacts of the strategy selection. Furthermore, economic impacts are analysed with regard to volatile prices situations. Our analysis is based on a panel dataset from 2005 to 2010 of 509 voluntarily Austrian bookkeeping dairy farms. A Cluster Analysis is applied to identify homogenous farm groups which differ in their production strategy. The strategy is determined on basis of concentrate feed, machinery and farm energy input. In order to estimate the economic impact of the strategies we compare each cluster with all other farms by using Direct Covariates Matching. With this method we control for differences in site conditions and farm size which might bias the results. Whereas Matching is done on basis of the production period 2005/06, we compare the economic development of these clusters over the time period 2007 to 2010. With the Cluster Analysis we identify four strategies: there are two High-output clusters, one with rather big farms which are located in non-mountainous regions, and one with smaller farms located in mountainous regions. Furthermore there are also two Low-input clusters, but in this case the bigger farms are located in higher regions and the smaller farms in lower regions. High-output and Low-input cluster differ with regard to dairy cows, milk yield and, consequently, in total output and inputs. The economic impact analyses shows that the selection of a High-output strategy allows a higher increase of total output and farm income during periods of high prices. During times of low milk prices a positive impact on farm income can only be reached when production is increased constantly. With regard to the Low-input strategy we find that it is – due to the low input level – competitive during all price scenarios, even without increasing production.

Keywords: Dairy farming, farm strategies, cluster analysis, matching method



Workshop 2.7: Sustainability of Dairy Farms - Concepts, Measurements and Empirical ResultsConvenors: **Ludwig Theuvsen, Birthe Lassen, Monika Zehetmeier****A slacks-based Data Envelopment Analysis framework to identify differences in sustainability patterns between four contrasting dairy systems**AD Soteriades¹, P Faverdin^{2,3}, M March⁴, AW Stott¹¹Scotland's Rural College, UK, ²INRA, UMR1080, St-Gilles, France, ³Agrocampus Ouest, UMR1080, Rennes, France, ⁴Scotland's Rural College, UK, Andreas.Soteriades@sruc.ac.uk

World food production must increase to meet greater future demand without exacerbating climate change and despite dwindling resources. More efficient dairy farm production is therefore essential if farms are to become and remain economically, socially and environmentally sustainable. Data Envelopment Analysis has been increasingly used to measure dairy farm efficiency. However, all studies identified have used radial models that do not account for the farms' slacks, i.e. overused resources for a given production level. This study used a slacks-based measure of efficiency (SBM) in order to identify relationships between the technical, environmental and economic efficiencies of Scottish dairy farms by using data from a long-term genetic line × feeding systems experiment comprising of 4 distinct systems. The slacks allowed for the calculation of resource-specific efficiency patterns for each system. Results supported the assumption that technically efficient units were also environmentally efficient. Additionally, there was no clear relationship between economic and environmental efficiency. Notably, technically efficient units did not always manage to reduce their costs to the lowest possible level, compared with their peers. Further inspection revealed that systems on high forage tended to be more cost-efficient than systems on low forage. Furthermore, resource-specific efficiency patterns suggested that systems selected for increased milk fat + crude protein yield were better in minimizing their greenhouse gas emissions and nitrogen and phosphorus surpluses, compared to systems selected to remain close to the average UK genetic merit. Moreover, systems on high forage required a larger reduction in land use and fertilizer use than systems on low forage. A further step will be to test the hypothesis that the 'best' system is not necessarily the most efficient one, but the least variable one, i.e. further step will be to account for the experiment's temporal nature.

Keywords: *dairy farm experiment, contrasting systems, slacks-based Data Envelopment Analysis, efficiency analysis, resource-specific savings potentials, sustainability patterns*



Workshop 2.8: Farming the cities: exploring the role of agriculture and food in enabling sustainable urban food systems

Convenors: **Aurora Cavallo, Francesca Giarè, Clara Cicatiello**

Workshop 2.8: Farming the cities: exploring the role of agriculture and food in enabling sustainable urban food systems

Convenors: **Aurora Cavallo**, University of Molise and Cursa, Italy
Francesca Giarè, National Institute of Agricultural Economics, Italy
Clara Cicatiello, University of Tuscia, Italy

Urban, periurban and rural food systems close to the cities are increasingly important to food security. Planning for sustainable food production, distribution and consumption is an increasingly important issue for planners, farmers, suppliers, citizens. The capacity of urban contexts for food self reliance should be taken into account including environment impact, farmers practices, transport, consumption patterns, waste, governance of common resources.

Mainstreaming Urban Agriculture in the Middle East and North Africa: a multi-stakeholder approach

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Several constraints have limited the development of sustainable urban agriculture (UA) in developing countries mainly prohibitive urban policies and regulations. This article sheds the light on a multi-stakeholder approach that was implemented in Amman, Jordan by the Environment and Sustainable Development Unit (ESDU), American University of Beirut, Lebanon within the context of a project led by RUAF Foundation (Resource Centers Network on Urban Agriculture and Food Security) to mainstream urban agriculture in the Middle East and North Africa (MENA) region between 2007 and 2009. Participatory and Multi-stakeholder Policy formulation and Action Planning (MPAP) is a process of collaboration between public and private sector in the preparation, implementation and evaluation of policies and related action plans. The process reviewed the existing data and statistics about UA and food security and existing policies and regulations related to UA. An extensive stakeholder analysis and mapping of cultivated and vacant land in the city was carried out. Consequently, a multi-stakeholder forum (MSF) was established and a policy narrative and City Strategic Agenda were developed serving as an operational tool for UA in Amman. The efforts to identify key action points culminated in the municipality of Greater Amman taking the initiative to establish a specialized UA bureau with dedicated human and financial resources. The municipality and other interested and influential stakeholders adopted the city agenda as part of the city strategy for developing agriculture in 2009. The UA bureau has worked diligently to include UA as a major component of greening initiatives in the city and rezoning initiatives. In parallel, pilot projects were implemented such as rooftop gardening in poor neighborhoods, and vacant land assessment to serve as a database to link owners with farmers. The approach marked significant progress in bringing UA to table as a major policy point.

Keywords: *urban agriculture, multi-stakeholder approach, Middle East North Africa region*

Feeding the City - Foodsheds and Urban Agriculture in San Diego

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'Urban Agriculture' (UA) in its multifaceted forms can give new perspectives to urban revitalization strategies, particularly for fostering social inclusion in contemporary, fragmented communities. The paper aims to explore the most recent general policies in United States and particularly in California both on research and planning practice. Plans, programs and local projects within the general context of 'healthy food access', are exploring new strategies to pursue a valuable framework for agricultural re-use and rezoning of vacant and derelict urban areas. The experience of 'New Roots Community Farm' within the distressed neighborhood of City Heights in San Diego, CA, shows intriguing potential, matching social inclusion and physical-economic redevelopment.

Keywords: *Urban revitalization, Healthy food policies, Urban Agriculture, Social Inclusion*



Workshop 2.8: Farming the cities: exploring the role of agriculture and food in enabling sustainable urban food systemsConvenors: **Aurora Cavallo, Francesca Giarè, Clara Cicatiello****Sustainable development for a model of agriculture in the metropolitan systems**

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Constant innovation in the production techniques of the primary sector has contributed to the exploitation of natural and agricultural systems, particularly significant in highly populated areas. The work is based on the study of the interactions between the metropolitan area of Milan and the agricultural activities around it. Our project aims to develop a support for the Parco Agricolo Sud Milano (47,000 ha). We decided to assess the 3 scales of sustainability (environmental, social, economic) of farms. The idea was to create a means to guide farmers, institutions and researchers towards innovative and sustainable solutions: a seemingly difficult territory for agriculture, localized close to a large city, instead can be used positively. The survey was carried out through a tool that compares farms through indicators that characterize the 3 scales using calculations, measurements, evaluations. It assesses the strengths and weaknesses of the production system and the ways to improve the level of sustainability. We sampled 30 farms and collected their data (from database, interviews, estimates, observations, tabulated data). The approaches are many, thus we can focus our work on the indicators that affect the goals of the farms. We evaluated and edited the method by following what European policies have addressed, integrating agricultural production with environmental protection. The results highlight the need to link these assessments with the income prospects of the farms provided by the institutions: a high-quality production, the maintenance of biodiversity and rural traditions, promotion of the competitive farms. Farms will have a method to assess their performance and the cost of production of products, to compare them with other farms and obtain explanations of a higher or lower profitability. It will be evaluated the impact of the product differentiation, the use of different agricultural practices, the energy efficiency, the marketing decisions.

Keywords: *Sustainability, Innovation, Peri-urban rural areas***Exploring the role of Farmers in Short Food Supply Chain: the case of Italy**Luigi Mastronardi, Davide Marino, Agostino Giannelli, Marianna GaglianoUniversity of Molise, Italy, nardi@unimol.it

The aim of this paper is to explore the role played by the farmers involved in Short Food Supply Chain in Italy paying attention to the social, economic and environmental dimension of sustainability. The research is based on a set of indicator related to structural, employment and economic aspects. Producers play an important role on a social, economic and environmental dimension. But at the same time there are several differences in SFSCs experiences. While the role played by social dimension is relevant in Farmers' Markets and in Multi Chain Farms, the environmental dimension is higher in Solidarity Purchasing Groups and in Farm Selling Directly, and the economic dimension plays a key role in each one of the typologies. Nevertheless, SFSCs are fundamental to promote and to achieve sustainability on a local level.

Keywords: *Short Food Supply Chain, Sustainability, Farmers, Italy***The city welcomes the mountain: alternative food chains in Trentino**Blasi E., Cicatiello C., Pancino B., Franco S.

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Recent researches on the role of agriculture in urban and peri-urban contexts arise many questions about how the urban-rural link develops in regions and countries with different features. Indeed, although the importance of planning for sustainable food production, distribution and consumption is clear, the issue should be addressed of how it can be realized in different territorial contexts.

A very interesting case is that of mountain areas, where the proportion among urban and rural domain is very skewed towards the latter and, at the same time, farms face major environmental problems that in most cases jeopardize their competitiveness in the mainstream market. Alternative food chains may therefore play a key role in these contexts, especially for their ability to put farms in touch with the demand of consumers living in the urban areas located in the valley.



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The Italian Alpine region of Trentino is an interesting case study to analyze these issues. Most of the farms are placed in the slope of the mountains and manage very small plots, unless they have livestock so that many hectares of grazing land are needed. In this context alternative food chains have widely spread, with about 10% of the farms selling their products directly to consumers, through the most common forms of farmers' markets and direct selling at the farm as well as with more innovative patterns, such as solidarity purchase groups and community supported agriculture.

Indeed, the mountain environment makes it very difficult for farms to standardize their product according to the requirement of the large retailers. Through alternative food chains, the typicality of products and the savoir faire of the farmers – representing the two main factors of added value – are endorsed to get a higher price per unit, thus improving peripheral farms' revenues.

The paper discusses how the different alternative food chain patterns integrate in the mountain context, showing that the Trentino area, for its structural and cultural traits, is very well suited for developing these experiences. Although the size of the local market is limited to the number of consumers who live in the region – only 3 of the 217 municipalities have more than 20.000 residents – tourism and related activities may help to enhance the demand.

Keywords: *short food chain; rural-urban link; mountain farming; local products*

The local agrifood systems in face of changes in urban rural relationship: the foodscape of Rome

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The lack of productive urban land, the food insecurity, the uncontrolled urban growth, the lack of stable local food markets, the land use conflicts in the urban areas and a general lack of knowledge about the food production, fuel the debate about city and food in time of changes (Morgan & Sonnino, 2010). In the evolution of the urban rural relationship we can consider agricultural production not as the antithesis of the city, but of an integrated urban activity that contribute to the resilience of cities (Barthel & Isendhal, 2013). Besides scholars and institution seem move towards a new paradigm for a territorial agri-food system planning to improve the local management of food systems that are both local and global (FAO, 2011, Sonnino, 2013).

The paper explores the changes in rural urban linkages of Rome's province, focusing on its the development of the metropolitan area in the framework of a food sustainable planning and in landscape resilience. In this frame the case of Rome is interesting due to several reasons. First, Rome is the largest city in Italy, in terms of surface area and population, and was the largest agricultural municipality in Europe until 1992, when the municipality of Fiumicino separated itself from Rome. The special features of the case of Rome also concern the extent and size of the settlement developments characterizing the area: two thirds of the urbanized surface areas have been built up in the last fifty years, occupying mostly agricultural land (Bianchi & Zanchini 2011, Cavallo et al., 2013). The local food network behind agriculture in the city, within a number of integrated social agrarian cooperative, who represented an alternative food production system and landmark for many initiatives carried out by the civil society, associations, cooperatives, volunteer and school sectors. We focus on assessing the role that local flows of agri-food system can play in the frame of metropolitan food demand and consuming, try to explore how much land in Rome could be productively used for agriculture and how much could realistically be grown. These issues are important steps toward increasing knowledge and establishing a baseline for evaluating the potential role of Roman local food shed, even in terms of its impact on agro-ecosystems and landscape. Starting from the relationship between food and city, we are mapping rural urban linkages and changes in Rome's foodscape (Morgan & Sonnino, 2010), identifying a number of representative conditions - typologies - in the area of whole province of Rome. We can identify a set of recurring elements, whether criticality rather than opportunities, that holds together the relationships between urban space and the role played by agricultural activities in rural and periurban contexts.

Keywords: *Rural urban relationship, urban food planning, Rome*



Workshop 2.8: Farming the cities: exploring the role of agriculture and food in enabling sustainable urban food systemsConvenors: **Aurora Cavallo, Francesca Giarè, Clara Cicatiello****Food and beyond. Multifunctional farms in the metropolitan context of Rome⁴**Stefano Grando¹, Roberto Henke², Livia Ortolani¹, Francesco Vanni²¹ Associazione Italiana per l'Agricoltura Biologica, Italy, ² Istituto Nazionale di Economia Agraria, Italy

Urban and peri-urban farms can play a key role in the development of sustainable urban food systems. Although they are not able to feed the whole population of a city, both in terms of quantity and variety of the food required, their activity can be the base for the provision of a broad range of products and services that enhance the ecological, social, and even economic sustainability of metropolitan areas.

Building on the emerging stream of literature on the topic, the study looks at multifunctional role of peri-urban farms through an analysis of farms settled in the countryside immediately surrounding the urban area of Rome. The main objective is to identify the share and the characters of farms that have reacted positively to the process of urbanisation deeply modifying their production structure and their territorial relationships.

To achieve this objective, the first part of the paper aims at identifying market-oriented farms in the municipality of Rome and at classifying them according to three categories: traditional, adaptive and reactive peri-urban farms. The second part of the paper focuses on two cases of reactive farms, in order to explore more in depth the factors that have influenced their successful trajectories and the main drivers that led these farms into their renewed and multifunctional role in the Roman peri-urban agriculture.

Keywords: *peri-urban agriculture, multifunctionality, reactive farms, food production, public goods*

Between research and action: problems and conflicts arising in the construction of the MAP of the Solidarity Purchasing Groups in RomeCristina Salvioni¹, Maria Fonte²¹ Department of Economics, University of Chieti-Pescara, Italy, ² Department of Economics, Institutions, Management, University of Naples Federico II, Italy

The basis of this paper are the results of a research work which has been carried out between 2010 and 2012 within the project "Local agriculture and sustainable consumption in the alternative food networks" funded by the Ministry of Research (PRIN 2008). The main objectives of the project were to analyse the diffusion of the Solidarity Purchasing Groups (GAS) in the city of Rome and to analyse their characteristics, current status and future prospects. The aim of the university research team was not just the production of academic papers; rather to start an interactive mutual learning process with the GAS movement. To that end we organised open and public presentation of the research project and, since the beginning, we planned the construction of a digital map intended as an information and management tool for the Gas movement. As we will discuss in the following sections, some representatives of the GAS movement harshly criticised the mapping plan, both for the method of its construction and for questions of content. In this paper we present the main findings of the research and discuss the reasons at the basis of the conflicts arisen on the map.

Keywords: *Alternative food networks, sustainable consumption, Solidarity Purchasing Groups, Animation activity*

Local Food Systems: Opportunities and Threats in creation of local model in Lombardy (IT)Andrea Porro¹, Roberto Spigarolo¹, Stefano Corsi², Stefano Bocchi¹¹ Department of Agricultural and Environmental Sciences - Production, Landscape, Agroenergy (DiSAA), University of Milan (UniMI), Italy, ² Department of Economics, Management, and Quantitative Methods (DEMM), University of Milan (UniMI), Italy

Due to population growth on a global scale and changing of food habits in developing countries (food transition), the growing demands for food raw materials could lead to a different system of trade flows of food products and each country could be called upon to contribute more heavily to the production of food for domestic consumption. Several countries are designing policies to foster proximity agricultural production in order to meet local demand and capable to structure new models of short chains on a regional scale. Local Food Systems (LFSs) can be defined as alternatives to globalized food model that are based on complex relationships between agricultural production,

⁴ The case studies presented on this paper build on the work carried out in the on-going EU funded research programme SUPURBFOOD "Towards sustainable modes of urban and peri-urban food provisioning"



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processing, distribution and consumption in a given area. The main aim of the research is to analyze both demand and supply in the food chain addressed to mass catering in Lombardy, the most populated Italian region. The research was based, with regard to the school catering, on a questionnaire sent to all the Municipalities of Lombardy. In Italy, the municipalities are responsible for providing canteen service in primary schools. The questionnaire was created through a participatory approach with all the stakeholders involved in the regional food systems (Local Authorities at regional and local administrative level, Non State Actor and private sector, namely catering companies) under the supervision of the research group of the University, as leader of the project. The questionnaire allowed to collect a huge quantity of data as the number of meals provided, the frequency distribution of 47 products and their origin (from conventional, sustainable or organic agriculture). With regard to the other types of institutional catering (hospitals, kindergartens, day-care institute etc...) an average diet for each type of mass catering was calculated, referring also to national and regional guidelines. The present work has the objective of studying the dynamics of agricultural production and consumption for the over 212 million meals per year for schools, hospitals, nursing homes, etc.. Through the use of a Geographical Information Systems software the major constraints to the implementation of LFS model were studied and it has been proposed an evaluation approach of the concept of "local" for the different stakeholders involved, on different scales.

Keywords: Local Food System, participatory approach, demand driven, regional scale

The extent of urban agriculture and its contribution to food security in low income areas: The case of Msunduzi Local Municipality in South Africa

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Urban agriculture has emerged as one of the opportunities for cushioning urban families from poverty and improving household food supply. Rural to urban migration accompanied by stagnating economies has seen people who moved to urban areas struggle to make end meet. The practice of urban agriculture is becoming widespread in South Africa as well as other parts of Africa. It is practiced for a number of reasons, chief among which is food security and income generation. This paper presents finding of a study conducted to understand the extent of the practice of urban agriculture and its relative contribution to the welfare of poor urban dwellers, with respect to household food security. A survey of a randomly selected sample of 300 urban households was conducted in Msunduzi Local Municipality, KwaZulu-Natal Province. The sample included 150 urban farmers and 150 non-practicing people who were purposively selected for the study. Msunduzi Local Municipality forms part of the city of Pietermaritzburg. The sample was only drawn from low income township households.

Data was analysed for descriptive statistics and relevant statistical tests were conducted to compare means and assess goodness of fit or association among variables. The results show that women largely dominate urban agriculture and the practice is emerging as a means to cushion households from lack of food and economic hardships. Investment in women will significantly enhance the food security status of urban households. Although much income is not realised from its practice, there is significant potential to enhance its contribution if it is supported through relevant policies that avail production resources, such as land and water. The study recommends some policy interventions to improve the role of urban agriculture and target women producers in a way acceptable to the urban population and women's lives.

Keywords: Urban agriculture, food security, income, poverty, policy, women

AFNs in periurban areas: the meeting of food demand and supply as an emergent issue

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Alternative Food Network (AFN) is a broad term used for the definition of new food chains, characterized by a shortened relationship between the producer and the consumer, allowing to redistribute between them the social and economic benefits. In periurban agriculture, AFNs are a concrete way to better establish a direct contact between the urban area and its local farming system. At the local level there is also an increasing demand for local agricultural products by urban consumers as well as many examples of policies focused on the food provision for



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the city. At the same time the risk of having ephemeral experiences of AFNs, demand a deeper knowledge of the relationships between producers-suppliers and the other stakeholders of AFNs. The overall purpose of this contribution is to analyze the selling of local products in urban groceries and to compare their demands with the provision and production strategies of farmers involved in AFNs. The case study was the periurban area of Pisa (86.000 inhabitants, 6 municipalities). In this area, existing AFNs have already been described. Furthermore, several research and policy initiatives have investigated the role of short food supply chain in the area of the Province of Pisa (Piano del Cibo). To explore the relationships in AFNs, we surveyed 4 groceries with different legal status (association, cooperative, individual enterprise) which reflect different strategies to achieve a common goal: be an alternative of the conventional food distribution through the promotion of food quality. All the groceries are small, located in the city centre and they all have tried to have a direct contact with farmers-suppliers of the local products. The groceries involve about 10 farmers producing vegetables, meat, cereals, olive oil, while 32 farmers supplying these products and participating to AFNs were also surveyed in the surrounding area. Farmers' interviews underlined a high potential for the urban food provision for the city, nevertheless all shops have reported troubles to find the local farmers and a lack of knowledge about the agricultural production system. This result suggests a discrepancy in the network at the local level between the supply and the demand strategies. This point confirms on the one hand the need of a deeper knowledge at the micro level about the constraints and conditions that enable actors to be involved in AFNs and some troubles in finding practical instruments for translating into practices the policy's ambition.

Keywords: *periurban farming, food system, constraints, on-farm surveys, stakeholders' network*

School food procurement and Sustainability in northern England

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The paper is the preliminary report of a survey of the public procurement practices of fifteen local authority school catering organisations in northern England and Wales - based on nineteen interviews carried out during March - May 2013 – principally catering and procurement managers
Sustainable Procurement defined.

National government policies are described – spending cuts and the recent decision to offer free school food to all 5 to 7 year olds.

Most Councils are strongly motivated to source food locally or regionally and make use of several techniques such as informal supplier engagement, lotting and separation of distribution and supply. A minority of school catering organisations take their concern with sustainability further by purchasing organic food and/or reducing meat consumption. Government is considering centralisation.

Keywords: *local suppliers, meat, organic*

Multi-actor organization for urban food systems: short but collaborative supply chains

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The landscape of food systems in France becomes more and more diversified since CSA-like French Amap have generalized the idea of joint initiatives between food producers and consumers, others than farmers' markets and farm shops which are deep-rooted in French society. This seems especially true for urban and periurban areas. We observe and analyze a new model of short supply chains (SSC) which are organized as multi-actor short supply chains (MASSC). By definition, in these MASSC part of the logistic and marketing activities of one or several farmers is managed by an intermediate organization interfacing with consumers. The research objective is to qualify the configurations and analyze the innovative process of these cooperation models. We place this research in a branch of research related to the understanding of alternative food systems (Marsden, 2011, 2012). We have run semi-qualitative interviews on a selection of fifteen MASSC in France (12) and in the French-speaking area of Switzerland (3).

Key results are related to logistical solutions. MASSC create synergies among farmers, between farmers and consumers, and at a territorial level with a broad set of actors, like local authorities and associations. Cooperation



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means for individuals to pass a threshold in terms of logistical obstacles due to labor-intensive distribution and marketing activities which require specific skills. The use of ICT and local retail place allocated for free by local governments, firms or individuals limit distribution costs. MASCC also emphasize the use of innovative and sustainable forms of transport (cargo-bicycles, river-based transports, etc.) mostly in a marketing objective. Furthermore, the initiatives we have analyzed are often characterized by a strong social component. Associating structures of the Social and Solidarity Economy appear to be current practice.

These examples at hand, we state a tendency amongst these MASCC towards a high degree of professionalization with a strong social component. These multi-actor SSC can be seen as adding to a more general movement towards closely linking rural-urban food systems. As most of them have been founded less than 3 years ago, further analysis is needed to fully understand their strengths, their impact on farm viability, and their perspectives for urban food systems in the future.

Keywords: short supply chains, local food systems, logistics, organization, urban and periurban agriculture, local authorities

A meeting point between agricultural producers and consumers: the Italian Solidarity Purchasing Groups case study

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Short food chains represent an important opportunity to reduce the number of intermediaries between food supply and demand and to create a strong relationships between producers and consumers. Among the several types of short food chain, one interesting experience is that of the Solidarity Purchasing Groups (SPG). They were born to answer to the need of food self-sufficiency expressed by the urban contexts and, at the same time, they try to face the question of the ethical and social aspects of the food system. As other kind of short food chains, SPG express the growing interest in food safety and quality, as well as the need for new social and productive relationships.

The Purchasing Group is made of consumers buying together food and other goods directly from producers, without intermediaries, and then it redistributes stuffs among the group participants. Without ethical implications, the main objective of PG is to obtain favourable terms of purchase. Otherwise, if the group is interested in understanding the ethical and social aspect of the production system as well, such as the working conditions, the right remuneration for the producers, the environmental impact of production, the valorisation of local and typical productions and traditions, then the purchasing group becomes a solidarity one.

SPG are playing an important role in managing the dynamics among rural and urban areas. They contribute to create or maintain a viable productive environment in the peri-urban areas, allowing small farmers located in these areas to have access to the market, to programme the production, in some case to set in advance kind and quantity of production, and have a secure and stable economic return. For bigger farms, as for other kind of short supply chain, SPG are an opportunity to diversify the sources of income.

The aim of this work is to investigate the social, environmental and economic aspects driving consumers and producers to join a SPG. The analysis was conducted through interviews and questionnaires to consumers and producers in 5 Italian cities and related peri-urban areas along our country. Furthermore, our study allows to assess the impact that this kind of innovation on the retail chain has on the urban system of food and on the geography of agricultural production.

Keywords: short food chains, Solidarity Purchasing Groups, urban system

Growing food for self-consumption inside cities: lessons learnt from associative gardens in Paris and Montreal

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Associative gardens are one of the most developed forms of urban agriculture in industrialized countries. Their food function is a topic of interest for planners and for research; however, the actual quantity of food produced in associative gardens is poorly known. We investigated the food function of associative gardens in Paris and Montreal using a methodology combining questionnaires and qualitative in-depth interviews, monitoring of gardeners cropping practices and weighing of fruits and vegetables harvested in the gardens. We observed a high



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variability in terms of quantities harvested and in terms of yields, and therefore propose the notion of “utilized garden area” to explain in part this variability. We conclude with the necessity of exploring the qualitative aspects of food function, which are crucial to understand the strategies behind the choices of gardeners and their management of their garden and harvest.

Keywords: associative gardening, community garden, food function, food production



Workshop 2.9: **Greening the CAP**

Convenors: **Monica Commandeur, Flaminia Ventura**

Workshop 2.9: **Greening the CAP**

Convenors: **Monica Commandeur**, Nedworc Foundation, The Netherlands

Flaminia Ventura, University of Perugia, Dep. of Civil and Environmental, Italy

The political intention of “Greening the CAP” has turned into a frame for “Greenwashing the CAP”. In all EU countries scientists are now involved in “greenwashing” procedures, in order to please the economic interests of their governments. “Greening” can also be interpreted as / replaced by growing protein crops. With the current high prices for soya shred, one might expect that within a few years thousands of ha in Europe will be cultivated with protein crops. Is that a fair assumption? To what extent can we expect real transformations in the European land use? And how will the CAP intervene with expected developments.

Posters: **Greening the CAP yourself**

Monica Commandeur

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Agricultural knowledge and skills networks have become an widespread phenomenon in the Netherlands, since 2003. They are networks of farmers, who exchange their knowledge and skills voluntarily with a (sometimes wide) variety of others in order to contribute to the development of new knowledge and skills for the agricultural sector. The networks are financially supported in the context of the EU Rural Development Programme and led by a professional process leader.

Despite the disappointing advances of the EU policy to “green the CAP”, some farmers use these networks to take “greening” initiatives of their own. On these posters there are two examples. The first is about of a group of contractors who have set their focus on reducing the herbicides use by half on their contracted farms. The other is an example of various initiatives of pig breeders who have set their focus on bringing pigs back into the landscape.

Which farming models behind the new Greened CAP reform towards 2020?

Samuel Feret

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The 26th June CAP reform political agreement among the Council and the European Parliament has approved the European Commission proposal to dedicate a tiers of direct payments to an ecological component. From 2015 the so-called « Greening » will require all direct payments recipients that they observe three measures at farm level : crop diversification, maintain permanent grasslands and ecological focus areas (EFAs). However among the EU policymakers, very few have supported the greening principle at an early stage, almost having raised both rising burden and additional costs for farmers. Indeed excepted Commissioner Ciolos and French agricultural minister Stéphane Le Foll, nobody has defended the rationale of greening Pillar 1 of the CAP. This article will focus on three main issues : - Why finally greening principle has been approved while almost EU policymakers has opposed reluctance to it ? Our assumption is that almost of EU policymakers hadn't understood its agronomic/agro ecological rationale. The most illustrative controversy is that EFAs have been translated by an unacceptable set-aside while Commissioner Ciolos has emphasized on environmental competitiveness aspects. - Is greening really a paradigm shift? Regarding the CAP reform negotiations outcomes, initial weak greening ambitions have been considerably diluted. Crop diversification will allow monocultures on 70% of farm UAA. Permanent grasslands protection is an existing cross compliance requirement. EFAs is already in place in some Member States under cross compliance landscape feature protection. We assume it's not a paradigm shift but rather a 'dress rehearsal' for the next CAP reform. - Which alternative farming models is carried out by the greening principle? We believe that the weakness of greening proposals is that they missed any further explanation about features and transition pathways towards agro ecological approaches across the EU and that the 'political celebration' of EU farming diversity is not enough to build a strong and a sustainable EU green agriculture.

Keywords: *Greening; CAP; farming models; agro ecology*



Workshop 2.9: Greening the CAPConvenors: **Monica Commandeur, Flaminia Ventura****The CAP reform post-2013: an impact assessment on protein crop production**Roberto Solazzo, Filippo Arfini, Michele DonatiNational Institute of Agricultural Economics (INEA), Italy, solazzo@inea.it

On 26 June 2013 the Commission, the Council and the European Parliament have reached a political agreement on the reform of the Common Agriculture Policy (CAP) Post 2013. The objective of the paper is to evaluate the effect of the new CAP on the Italian farms focusing on the effect of the “convergence” and regionalisation of the direct payments as well as the three greening obligations provided by the reform proposal: the diversification of crops, the preservation of permanent grassland and the establishment of the ecological focus areas. Although the analysis will concern all production processes adopted by the farms considered, it will focus on the protein crop sector. According to the new CAP reform, Member States can use more than 2% of their national ceiling in order to support the production of protein crops. The evaluation will assess, in addition to the greening impact, the effects on the protein crop sector of different hypothesis of specific support implementation (or non-implementation). In this way, the elasticity of the protein crop production in response to different levels of support will be evaluated. The assessment of the CAP reform post-2013 will be developed by a quantitative micro-based model grounded on Positive Mathematical Programming (PMP) methodology. The farms concerned by the assessment are part of the Italian FADN database. They are localised in significant Italian production areas of protein crops. The evaluation will be carried out at farm level using the FADN weighting system, in order to make the simulation results more consistent with the production structure of the analysed area. The PMP model will provide a wide set of information in the different scenarios, concerning the modification of the land use and the effect on the main farm economic variables, useful to policy makers for understanding the dynamics induced by the revision of the actual CAP mechanisms. REFERENCES Donati M. and Arfini F. (2013). Application of the PMP model with latent information. Cesaro L. and Marongiu S. (Edited by), The use of RICA to estimate the cost of production in agriculture application of econometric and mathematical programming methodologies, INEA, Rome, 129-150. Matthews, A. (2013). Greening agricultural payments in the EU’s Common Agricultural Policy, *Bio Based and Applied Economics* 2(1): 1-27. Paris Q. and Howitt R. E. (1998). An analysis of ill-posed production problems using maximum entropy, *American Journal of Agricultural Economics*, 80, 124–138.

Keywords: CAP reform post-2013, Greening, Positive Mathematical Programming, Protein crops, Farmers Behaviour

Determining the feeding value and digestibility of the leaf mass of alfalfa (*Medicago sativa*) and various types of cloverHendrik Sommer, Albert SundrumDepartment of Animal Health and Animal Nutrition, Faculty of Organic Agricultural Sciences, University of Kassel, Germany, hendriksommer@uni-kassel.de

Looking for alternative sources for the supply of monogastric animals with high quality protein feed of home-grown origin seems to be one potentially most effective measure achieving the objectives of the Common Agricultural Policy (CAP) from 2014-2020 is to strengthen farmland biodiversity and reducing greenhouse gas emissions. An increase in the concentration of crude protein content by separation of the leaf mass from the stalk is expected to increase the feeding value of alfalfa and selected clover species for pigs. To assess the potential of concentrating crude protein, including, the leaf mass yields and the nutritive value of leaf mass which derived from different varieties and cutting dates were analysed for nutrient values and *in vitro* digestibility. In the year 2012 plant material of alfalfa, red clover, white clover, crimson clover and Persian clover was sampled from 3 cutting dates in three different locations; in total 90 samples have been examined. Nutrient content of leaf mass was determined by Weender and Van Soest analysis, the amino acid contents by chromatographic measurement. The highest content of crude protein in the leaf mass has been observed in Persian clover with 28.3 g XP 100 g DM⁻¹, followed by alfalfa with 28.0 g XP 100 g DM⁻¹. The concentration of leaf crude protein of red clover was 27.0 g XP 100 g DM⁻¹, of white clover 26.3 g XP 100 g DM⁻¹ and of Crimson clover 25.9 XP 100 g DM⁻¹. The concentration of digestible crude protein in the leaf amounts to 22.3 g dXP g DM⁻¹ in Persian clover, succeeded by red and white clover to 20.3 g dXP g DM⁻¹. The crude protein yield of leaf mass per ha and year of alfalfa (17 dt ha⁻¹), red clover (15.2 dt ha⁻¹) and white clover (12.6 dt ha⁻¹) was higher than for example the crude protein yield of faba beans (8-10 dt ha⁻¹). Separation of the leaf mass from the stems makes a relevant source of home-grown protein accessible to compensate for a lack of high quality protein feed in the nutrition of organic pigs.



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Keywords: *protein crop, greening, protein digestibility, pig nutrition*

CAP vs farmers: which beliefs moves incentives

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The conditional measures in Common Agricultural Policy integrate a great number of societal expectations and represent the tentative to channel private resources towards the achievements of critical environmental objectives.

The central idea of this work is relied on the farms as economic organizations that are able to mobilize the resources along the expected directions. Notwithstanding, the empirical evidence clearly indicates that the implementation of the conditional measures highly varies across European regions.

The paper aims to identify the motivations and the beliefs that could be considerate as key drivers from the stakeholders (first for farmers) for such “state of the play”. At the same time, the authors claim that the pure economic convenience is not a sufficient reason; in fact, the success story concerns with more complex motivations of the farmers, including the individual views of the environmental issues and the way they may be enhanced in horizontal relationships.

The paper focuses on the analysis of farmer's beliefs regarding the critical environmental challenges and on how the CAP aims at addressing the achievements through the conditional measure.

The author's conceptual perspective is based on the idea that the response about the public intervention in the conditional measures is primarily determined by the system of the farmer's beliefs. In this sense, the authors submit that this measures response emerges from a common perspective that, at the society level, can be thought as a public representation from which individual decision-makers infer behavioral beliefs motivating their strategic choices. On the other hand, beliefs are the cognitive bases of the attitudes the appraising states that intervene between a class of stimuli and a class of evaluative responses. Attitudes and norm interactions are at the basis of the behavior.

The authors propose the evidence of an extensive survey concerning 1.007 farmers interviewed in Italy in 2010. The focus of the investigation is the evaluation of the conditional measures. A series of ordered logic models is proposed to account the role of beliefs and public representation in the farmer's evaluation. Broadly speaking the results show that specific beliefs and existing level of CAP intervention are strongly influential on the farmer's evaluation. Finally, the authors suggest that the evidence may help the design of implementation program paying more attention to contextual actions aimed at mobilize the cognitive resources towards the societal expectations.

Keywords: *Policy evaluation, CAP incentives, farmer's behaviour and beliefs*

Perennial energy crops as a win-win for greening and farming the European agricultural landscape

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Future CAP will encourage land use changes that maximise the areas under permanent crops to ensure biodiversity by improving the conservation of habitats and provision of ecosystem services. Considering the simultaneous demands for food and energy from an ever decreasing agricultural area it is important to encourage permanent land use with its superior ecosystem services. We will present (1) a comparative impact matrix for biodiversity in perennial energy crops (PEC), (2) a tool to assess their economic and environmental drivers and benefits in the value chain, and (3) a model system for assessing ecosystem services and benefits from these perennials.

Short rotation coppice (SRC) willow is a publicly accepted choice of renewable energy from biomass and is rightly included as a Greening Option in Ecological Focus Areas. Results of the UK RELU-Biomass project show that SRC-willow rates highest in ecological terms, showing more plant species (11x) and pollinators (6x) than rotational break crops and also other PEC. SRC has a profound effect on the hydrological, carbon and nitrogen cycles, notably enhancing carbon sequestration and reducing GHG emissions.

We upscaled a series of quantitative, process-based (agro-environment) models from the field and landscape scale to the regional and national scale to derive simple but biophysically meaningful meta-models. Yield potentials



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(weather & soil dependent) were mapped for a series of arable and perennial energy crops and impacts of land use options were evaluated for different technology and climate scenarios. Combined with a semi-quantitative method to assess GHG emissions this tool enables the user to assess the land use and value processing chain for different economic and environmental scenarios. Examples at the national scale (UK) will be shown for PEC in comparison to the arable crops baseline.

A model-based evaluation enables the assessment of the impacts on water, carbon sequestration and nitrogen cycle. We compare the impact on the soil water and carbon cycle simulation scenarios for wheat-oilseed rotation and SRC willow at the field scale and then up-scale the simulation to the landscape/large field using spatially distributed soil, topographic and weather input variables to assess the variability and uncertainty of yield, ET and soil carbon maps for decadal land use change.

Keywords: *Greening, CAP, Energy crops*



Workshop 2.11: Larger fields, faster tractors, GPS, milk robots, automated egg production, ... Does this type of agricultural change contribute to lasting prosperity and resilience?

Convenors: **Karlheinz Knickel, Ika Darnhofer, Mark Redman**

Workshop 2.11: Larger fields, faster tractors, GPS, milk robots, automated egg production, ... Does this type of agricultural change contribute to lasting prosperity and resilience?

Convenors: **Karlheinz Knickel**, Independent Sustainability Strategies and Innovation Professional, SD Consulting Frankfurt/Main, Germany

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What type of farm modernization can be considered positive in view of the challenges facing our rural areas? Do we need to reorient, agricultural research and development? How about the millions of semi-subsistence farmers in Eastern Europe? We seek real-life examples of resilient farming systems that challenge classical paradigms. We are looking for case studies that express innovative development trajectories and adaptive capacity.

Rice, Smallholder Farms, and Climate Change in Bangladesh: Policy Suggestions for Climate and Social Resilience

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Smallholder farmers in Bangladesh face some of the planet's most unpredictable agricultural conditions. Annual flooding, cyclones and other natural hazards mean rice yields, the country's most important crop, are subject to huge fluctuations. Climate change is already happening in Bangladesh and the associated adversities are expected to increase the unpredictability of smallholder farming. This unpredictability is pushing Bangladesh's smallholder farmers away from cereal cultivation or out of agriculture altogether and because 80 per of Bangladesh's food produced by smallholders, this shift threatens the food security of the country. Increases in net production of rice as well as resilience of rice crops to the effects of climate change have thus become urgent and pivotal issues and challenges for the continued progress towards Bangladesh's goal of food self-sufficiency.

In the above backdrop, this article aims, firstly, to proffer a critical overview of rice production, small holder farms and agriculture in Bangladesh in the context of climate change; and secondly, to furnish selected policy suggestions towards greater climatic and social resilience of agriculture and rice production. The study makes several suggestions to policy makers for improving and expanding agricultural extension services, including (a) the provision of salt-resistant rice varieties to coastal areas, and (b) improvement of extension services with a focus on smallholder and women farmers - which may be relevant not only for Bangladesh, but also for similar territories in south Asia. The review is based on an extensive review of literature together with insights and experiences of the authors as practicing natural resource managers.

Keywords: *farmers, rice, climate change, agriculture, smallholders*

Development trajectories of mountain dairy farms in the globalization era. Evidence from the Vercors (French Northern Alps)

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The maintenance of dairy production in mountain areas pose a real challenge in a context of globalization, particularly in France where milk quotas are about to be dismantled. Although acknowledged and sustained for its multifunctionality, European mountain agriculture has significant natural constraints to contend with and cannot follow the same paths of development as in the plains (specialization, enlargement, industrial organization of labour). Mountain dairy farms have thus had to develop their own specific responses. The goals of this study are: (i) to analyze the recent changes in mountain dairy farming in the Vercors (Alpine uplands under residential and tourist dynamics); (ii) to characterize the diversity of farming system development trajectories; and (iii) to discuss the different responses adopted by dairy farmers to last over time, which are not based on the same adaptive resources.



Workshop 2.11: Larger fields, faster tractors, GPS, milk robots, automated egg production, ... Does this type of agricultural change contribute to lasting prosperity and resilience?**Convenors: Karlheinz Knickel, Ika Darnhofer, Mark Redman**

We thus developed an analytical framework that allows us to link evolutions in livestock farming systems and family-farm organizations, via a multi-phase process where each phase of investigation provides more finely grained detail. The process consists in analyzing individual data from: i) national census of agriculture (1988, 2000, 2010) to capture general trends and analyze family-farm trajectories between 2000 and 2010 on 68 dairy farms; ii) semi-directive on-farm interviews (n = 33), to analyze the long term processes of change beyond the family-farm trajectories.

Keywords: *livestock farming systems, family-farm trajectories, process of change, adaptive resources*

Swedish pig farming from a degrowth perspectiveErika OhlundSödertörn University, Sweden, erika.ohlund@sh.se

This paper analyzes Swedish pig farming from a degrowth perspective. Primary (two farmers) and secondary (two LCAs) sources serve as representatives of different types of pig farming systems, and their activities and attitudes are assessed related to three keywords in Latouche (2009)'s degrowth utopia, namely Re-evaluate, Reduce and Relocalize. It is found that the LCAs and the conventional farmer do not show any signs of any of the three keywords, except from one LCA that discuss a possible shift from extreme specialization towards mixing different types of animals in one farm, and the keyword Relocalize where the two farmers agreed on a need for Relocalization of agriculture towards more local production and consumption. The LCAs and the conventional farmer shared views on Reduction, stating that emissions should be minimized within the current large scale farming system, but not touching upon the issue of Reducing pig production or consumption. The organic farmer called for Re-evaluation of the role of pigs in the farming and food systems, where his attitudes and methods were different from the other examples in that he did not focus on measuring and optimizing his production, but rather on what seemed suitable for the ecosystem and his farm.

Keywords: *degrowth, agriculture, pig farming, LCA, Sweden*

Changes and resistance in family farming systems facing the agricultural intensification model in emerging countries. The example of Paraná State in BrazilSoares Júnior, Dimas, Pedelahore, Philippe, Cialdella, Nathalie, Ralisch, RicardoAgronomic Institute of Paraná (IAPAR), Brazil, dimasjr@iapar.br

During the period 1950-2000, the agricultural development model which is based on changes in technological improvement and commodities allowed a significant increase in global agricultural production. Beginning in the 70's, this model was consolidated in South American emerging countries as a result of the combination of government policies and strategies of large private groups. It has raised questions about the environmental and socio-economic consequences, particularly when adopted in family farming systems. The authors found changes and resistance in agrarian structures, farming systems and demographic aspects related to the dissemination of this model and their adoption by the farmers. The study was conducted in the state of Paraná - Brazil in two areas representing the history of rural diversity on the technical, socio-economic and human development dimensions. The work was based on the analysis of statistical data of the agricultural census (1970, 1975, 1980, 1985, 1996 and 2006), on the demographic census (1970, 1980, 1991, 2000 and 2010) and on the agricultural official database of the State of Paraná Agricultural Agency (1970-2012). The data were compared between the two areas and analyzed in alignment with the State of Paraná standards. The data exhibit a decrease in the numbers of farms and of the rural population, with a focus on the significant departure of young people and of women especially. The results also show a big reduction in the numbers of the middle-size farms, caused by land concentration and proliferation of extra-small farms in the suburbs of the cities. They also demonstrate the expansion of soybeans crops in both regions, however with differentiated modalities of insertion in the farming systems, and finally the recent survival of family farming systems despite the severe changes observed in the period.

Keywords: *agrarian structure, rural demography, family farms, soybean*



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Motivation for increased production among Norwegian farmers

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In the wake of the latest global food crisis the Norwegian government has stated a goal of 20 per cent increased food production by 2030. The goal is ambitious, and questions can be raised about both the realism of the goal and the strategies to get there. A critical theme is the production choices and strategies taken on the farm level. To what degree are farmers seeking compatible goals? The literature suggests that a complex set of mechanisms is involved in this. In the paper we present results from a representative biennial survey (2002-2012) among Norwegian farmers about their plans for future production. Do they plan for increased or decreased production or status quo? Have the plans changed over time? Moreover, how do the plans vary with socio-economic factors such as farm size, type of production and household income characteristics? What is the impact of the regional localization of the farm? The study is part of a larger integrated research project (AGROPRO) involving agronomic scientists, economists and social scientists. The overall goal in the project is to develop agronomic practices that contribute to increased and sustainable food production and to identify drivers and challenges for implementing this.

Keywords: *Agriculture, increased production, farmers, plans, Norway*

The local landscape attractiveness as the ground for innovative land management: acknowledging new place based interactions for resilient farm systems

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Around towns of Alentejo region, Southern Portugal, the landscape is dominated by an agricultural mosaic, where small scale farming dominates, composed mainly of olive groves combined with pastures, fruit orchards, and vegetable gardens, in the most fertile and water abundant soils. This is a totally different pattern than the large scale landscape of the extensive silvo-pastoral systems in the latifundia, normally associated with the region. It is not the most known, but it is the landscape most people live in or see in their everyday life.

These small scale farm units have increasingly lost their importance as production units over the last decades, even if farming has been maintained by aging local population. In the last two decades, these small farms became extremely attractive for new comers, who settle in the rural context as lifestyle farmers. These new comers have often high education and income and search for a new life quality. Further, there are local people who return to the land, due to the new values but also the result of the on-going economic crisis. Farming and the production of food have been losing their importance – but this importance is increasing again in multiple complex modes, contributing to the attractiveness of small scale rural areas. As farming is concerned, new arrangements emerge: the new owners may be able to keep farming, often with new or reshaped production objectives, markets and models; they may search for associated older farmers in the area who support them with their knowledge and with this maintain the traditional farm systems; they may change investing in niche productions; or they may let others, new comers or locals, use their land. According to the Multi-Level Perspective (MLP), these multiple land management arrangements, where production income is not the main driver and lifestyle a ground motivation, may be considered as a niche. The different actors are not formally organized, but new community and place based networks are emerging, working towards innovations that deviate from existing regimes. In the multilevel and multidimensional network of players that characterise rural areas today, this networking profile and capacity has a crucial role for the farm systems resilience. Nevertheless, in order to unfold, these innovative land management arrangements require close interactions with the dominant regimes, which are still missing or do not function.

Based on a MLP analysis of the new management models and using a local case study in Southern Portugal, this paper discusses, i) the role of the local landscape and of the place based interactions in the emergence of new and innovative farmland management arrangements, and ii) the issues limiting the anchoring of this niche in the agricultural regime and therefore also limiting its unfolding.

Keywords: *lifestyle farming, countryside consumption, multi-level perspective, place, farm management*



Workshop 2.11: Larger fields, faster tractors, GPS, milk robots, automated egg production, ... Does this type of agricultural change contribute to lasting prosperity and resilience?Convenors: **Karlheinz Knickel, Ika Darnhofer, Mark Redman****Resilience of family farms: understanding the trade-offs linked to diversification**Ika Darnhofer, Agnes StraussInstitute of Agricultural and Forestry Economics, University of Natural Resources and Life Sciences, Austria,
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Diversifying activities and thus income sources, both on- and off-farm, is a widespread strategy by family farms to enhance their resilience. Indeed, by building on several sources, family income is not affected as severely by e.g. price volatility for one commodity or by the effect of an extreme weather event, thus strengthening their buffer capability. Furthermore, diversification may encourage experimentation, thus broadening adaptive and even transformative capability. Yet, while diversity has clear advantages, it imposes high demands on the family members, especially regarding labour organisation. This includes the distribution of labour within family members, the coordination of labour peaks, and limiting the overall labour load. Based on the analysis of interviews conducted with Austrian dairy farmers, we show that farmers often miss early warning signs of work overload, not least due to social and cultural norms which push farmers to 'keep going', so that emotional and psychological exhaustion are not acknowledged. Thus it seems important to promote an awareness that while diversity has many advantages, it needs to be carefully managed to avoid over-burdening family members, which would reduce the resilience of family farm.

Keywords: *on- and off-farm diversification, workload, burnout, gender roles, dairy farms***Subsistence and semi-subsistence farming in Hungary. From modernisation to ecological and social sustainability**Imre KováchInstitute of Sociology, Hungarian Academy of Sciences, CSS, Hungary, ikovach@socio.mta.hu

This paper is a first outcome of research project (2012-2014) on land use and farming structure of Hungarian agriculture. The starting point is five key questions in relevant literature: what are social/lifestyle (tradition, social safety, prestige, autonomy, resistance, hobby, recreation, value orientated activity, social care, class/strata-dependency) and economical (supplement income, alternative food, lack of resources, property conservation, pluri-activity, self-sufficiency) motives of subsistence and semi-subsistence farming? Are there major differences in small-scale and subsistence farming between old and new EU member states? What are relevant differences between urban and rural semi-subsistence farming? What are major political/power relation issues about small-scale and subsistence farming and how are changes in politics shaped by farming and vice-versa? What is conceptual frame of newly emerging/traditional forms of small-scale and subsistence farming?

The paper presents a case study based on empirical work in Eastern Hungary about land use of farmers and other actors in agricultural production. First part answers the question of this workshop "do the millions of subsistence and semi-subsistence farmers in Central and Eastern Europe fit into this discussion?" The second part portrays local historical context and differences of socialist agro-system to contemporary modernisation of agriculture. Third part demonstrates structural changes of land use and conceptualizes the development to privatized farming using concept of sustainability, resilience and resource use. One chapter highlights the effort of local political coalition of farmers to maintain social sustainability.

Keywords: *farm structure, Hungary, ecological, social sustainability, comparison, old and new EU member states***How ICT is changing the nature of the farm: a research agenda on the economics of big data**Krijn PoppeLEI Wageningen UR, The Netherlands, krijn.poppe@wur.nl

Modern information-based technologies, such as self-driving tractors, GPS, milk robots, automated egg production, satellite data and social media, will change farm practices and agricultural structure and contribute to the prosperity and resilience of farming systems. Based on macro-trends and niche developments we argue that the food chain will become much more data-driven, based on up to date ICT. It will move away from a situation characterised by a low level of integration of data. This has a large potential impact on issues like sustainability, food safety, resource efficiency and waste reduction. The economic effects of such developments are still to be explored. At first sight it could lead to more closely integrated supply chains that make the farmer act as a



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franchisee with limited freedom. But the opposite could be true as well, with more transparency and easier options for direct sales in consumer food webs, using social media and smart solutions for the 'last mile' delivery. Like with previous technological developments, not all farmers will invest in new skills and where technologies are saving labour, farms will get bigger. Some farms or regions will become less competitive if the basic infrastructure (e.g. in broad band internet or GPS systems) lacks. Competition between advisors could increase, if they are able to serve farmers digitally. That could also mean that a part of such value added activities moves from the most remote rural areas to regions with clusters of knowledge.

As Allen and Lueck (2002) showed in their "Nature of the farm", that family farms are characterised by a low level of specialisation of the farmer's tasks, as the markets does not provide enough incentives to specialise. Due to a low profitability with a high level of risk and especially high transaction costs in factor markets as a result of moral hazard, family farms are competitive over more industrial holdings in most types of farming. ICT, higher food prices and demography could change that.

Keywords: *ICT, family farms*

Resilience trajectories of small farms

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This paper is based on the ongoing RURAGRI-ERANET research project RETHINK and preliminary findings from the case study in Latvia which focuses on resilience and development trajectories of small farms. In Latvia up to 95% of farms are considered "small" and being only partially integrated in conventional agro-food systems and commodity chains. Often this is considered as blockage for agricultural development in the country and small farming is approached as residue of the past. We challenge this view from Beck's reflexive modernisation perspective which invites to reconsider the modernisation's path in agriculture and we propose to look at small-scale family farming in the framework of resilience and sustainability. In particular we pay attention to small farms' survival and development strategies under difficult socio-political and economic contexts in North-East Europe, taking Latvia as an example. We look for 'hidden' potential of small farms that equally might be an alternative way to look at 'absences' in the mainstream agricultural discourse. We approach the current structure, problems, opportunities and strategies of small farms also as the offprint of controversies of hitherto agricultural policies which stipulated, perhaps, one-sided model of modernisation giving preference to large scale technologically equipped farms.

On the base of group discussions with national agricultural stakeholders, interviews with farmers and agricultural organisations, secondary data and literature review, we identified four place based development trajectories of small farms and corresponding farmer strategies: socio-economic specialization of farm, integration in food chain and/or territorial economical networks, development of human capital and social inclusion. These can be considered as preliminary prototypes of small farms development strategies or 'models of engagement' that will be further tested and elaborated in the case study. We present also some emerging relations between the identified small farm development strategies and components of agricultural modernisation and their outcomes which are evaluated as a degree of integration between prosperity and resilience. We distinguish between high, medium and low level of integration between prosperity and resilience that can be achieved through farmers' individual and collective strategies. At current stage of research it is yet difficult to establish how these particular trajectories are shaped by farmers learning, networking and communication with other food system actors and beyond and how they are backed upon local place-specific resources – these are the issues for coming case study analysis.

Keywords: *Small farmers, sustainability, resilience, development strategies*



Workshop 2.11: Larger fields, faster tractors, GPS, milk robots, automated egg production, ... Does this type of agricultural change contribute to lasting prosperity and resilience?Convenors: **Karlheinz Knickel, Ika Darnhofer, Mark Redman****What determines the resilience of farming systems? A case-study of the bovine farming sector in Belgium**

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Whereas farming systems in more North-Western countries are becoming increasingly modernized, with an emphasis on biological control, technological fine-tuning and optimization, this does not seem to contribute to a more robust agricultural sector. This is evident from, amongst others, the frequency with which economic crises hit individual farms and whole subsectors, the growing demand for counselling and advice for farming families in financial problems and the rapid decline in the number of farms. Several scholars, both inside and outside academia, advocate a shift in paradigm from one that is centred around optimization, control, technology and resistance to particular external shocks to one focused on resilience and adaptive capacity. Yet, research in this domain remains, save for a few exceptions, largely on a theoretical and conceptual level and practical implications for policy makers and farm managers are lacking. This paper reports on a qualitative study in the bovine farming sector in Belgium, investigating the factors that influence the resilience and adaptive capacity of a farming system. This study corresponds to the first phase of a larger project aiming to develop knowledge and offer recommendation for strengthening the adaptive capacity of farming systems, to both policy makers and individual farm managers. Its objectives are twofold: (1) identifying factors that influence – positively or negatively – the adaptive capacity of farming systems and (2) identifying farming families that have developed adaptive farming systems. Those farming families will be invited to participate in the second phase of the larger project, in which a transdisciplinary research trajectory will be conducted with the aim of developing practical recommendations for the development of adaptive farming systems. During this first phase, and in order to be able to advance to a more practical, we start by narrowing down resilience to flexibility at different levels: (1) input; (2) production technology; (3) output; (4) marketing; (5) finance and (6) income sources. Based on this, we conduct in-depth interviews with a non-random sample of bovine farming managers.

Keywords: *Agricultural resilience, adaptive capacity, bovine farming systems***Evolution of the contribution of family farms to public goods: case of a mountainous region of Poland**Emilia Chantre¹, Catherine Darrot²¹INRA UMR Agronomie, France, ²Agrocampus Ouest, Angers, France, emilia.chantre@grignon.inra.fr

Since their entrance into the European Union, farming systems in Eastern Europe are in a tension between the state injunction of modernization and the EU subsidies towards sustainability. The provision of public goods of these farming systems (i.e. goods that are non-excludable and non-rival, such as agricultural landscapes, farmland biodiversity, water quality for example) is therefore impacted. Our aim in this paper is to analyse the impact of EU subsidies on the contribution of public goods of family farming systems from Eastern Europe. Our case study is based on the case of Poland, which joined the Common Agricultural Policy in 2004. We focus on farms from a mountainous region in the south of Poland (Pieniny), characterized by bovine and ovine cattle breeding, with a transhumance system, production of milk, cheese, and honey, and diversified family farms. Our methodology is based on two series of farmers' interviews in 2007 (50 farmers interviewed) and five years later, in 2012 (8 farmers and one advisor). In 2007 the agronomical and economical interviews permitted us to draw a typology of production systems, and to analyze which public goods these production systems provide or alter. Then, five years later, one farmer representative of each type of production system was interviewed, in order to identify how his farming system evolved, and how the whole production system to which the farm belongs evolved. Our results show that : 1/ despite EU subsidies towards rural development, the smallest diversified production systems tend to disappear while the specialized production system, developed on bigger areas, persist; 2/ the disappearing of these small production systems provoke the disappearing of some public goods; 3/ the protection of some public goods by EU regulations and policies (of some species, like wolves) are in contradiction with the development of some production systems supported by EU policies.

Keywords: *public goods; Poland; family farms; cattle breeding.*



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Resilient farmers' strategies and policy regulations: the quest for modernization on Dutch and Italian dairy farms

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The ongoing modernization, specialization and intensification of agricultural production increasingly cause a disconnection between farming, nature and society, resulting in social, economic and ecological crises in the food chain. The development of alternative strategies that release farm development from the treadmill of economic pressure starts where practitioners successfully adapt their farm in a step-by-step innovation process. The central question in our case study research in the Netherlands and Italy on the application of agri-environmental management schemes and the processing of primary produce is: do farm modernization and multi-functionality performance go hand in hand, and if so, how? From case studies on the co-evolution between farmers' and policy makers' adaptive strategies we conclude that lasting prosperity and resilience depend on the flexibility in legislative frameworks and modern technologies. In the case studies new institutional arrangements provide monitoring and evaluation of farm activities so that farmers optimize productivity and sustainability of their farm activities. In this context, the concept of farm modernization deviates from its original trajectory. In its reshaped form farm modernization supports family farmers to optimize their productive performance whilst it simultaneously improves the socio-ecological performance of these farm practices.

Keywords: *institutional arrangements, social-ecological systems, territorial cooperation*

Assessment of two modern milk farms (low input versus high external input) in Switzerland focused on sustainability and resilience criteria

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In many countries there is a trend in milk production to either maximize the milk yield with high inputs and modern milking technology or to choose a low external input strategy with emphasis on grazing. What about the sustainability and resilience of such types of farms? In this paper a comparison of two modern milk farms in the same region and village in Switzerland with similar climatic conditions and new free-range stables has been made. Both farms are run collectively. Farm A is a non-organic milk farm (integrated production) with milk robot machinery and high input of feed concentrates for milk production without using pasture but with a concrete outdoor run. Farm B is an organic milk farm with consequent low input milk production with full pasture access during the season, outdoor run in the winter as well as a non-use of cereal-based concentrates anymore due to consequent breeding efforts. Both farms have been assessed using the RISE 2.0 system developed by the School of Agricultural, Forest and Food Sciences (HAFL) in Zollikofen in collaboration with the Research Institute of Organic Agriculture (FiBL), Switzerland. This system uses 10 main sustainability criteria, categories and indicates through benchmarking the state of the farm in different areas (positive, to be verified, problematic).

The overall sustainability assessment showed that none of the two farms is in a problematic area. Both are economically successful. Both strategies, if well managed, can be profitable. The farms score socially well due to the collective management. Regarding environmental sustainability: soil usage and water management is positive; nutrient flow and ammoniac emissions could still be improved in both farms. Farm B uses 40 % less energy with 30 % lower milk production/animal/year and score better in biodiversity than farm A. Animal health and welfare of the two farms is difficult to judge with RISE 2.0 system, but it is interesting to look from a resilience perspective. Farm A has a technology-based system of analytical and electronic tools (health status permanently controlled and irregularities reported). Direct observations by the farmers in the stable seem less important, although also done. The strategy of Farm B is based on a much lower feeding and milk productivity level, which reduces the risk of several diseases. The farmers observe mainly their animals on pasture or in the outdoor run and milking station. However their consequent grazing system, with varying climatic impact on the fodder quality needs a very well planned pasture system. It is interesting that both farms have relatively low costs for veterinarians. Further reflections are needed in which way the sustainability and resilience of such type of milk farms can be better assessed and improved.

Keywords: *milk farms, milk robots, sustainability assessment, resilience, low input, high input*



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Farmers' perception on options for farm development in a situation of limiting nearby surroundings

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Farmers are challenged to integrate changes in the biophysical and societal environment in the farm strategy. Scale enlargement is a dominant strategy for dairy farmers in The Netherlands and is a possible threat to vulnerable assets of regions. Regional development programmes aim to support farm development in such a way that vulnerable assets are protected. Stakeholders in regional development may differ in their perceptions on viability of options for farm development. New services and functions in rural areas are often seen as desirable options for farm development. The farmer as entrepreneur chooses a strategy based on the options perceived by him as viable for future farm income: the perceived Room for Manoeuvre (pRfM). For effective regional development programmes it is important to understand differences between (groups of) farmers in the pRfM. In a case study of 79 dairy farmers 4 clusters were found: 1) based on output (29 farmers), 2) based on the use of on-farm resources (21 farmers), 3) based on on-farm non-dairy activities (21 farmers), 4) based on off-farm income and ending dairy production (8 farmers). The clusters have a different focus on their location in relation to farm strategy. The clusters were related to current, planned and preferred activities using cross tabulation. 'Full-speed' dairy farming is preferred by 35 farmers of which 17 are outside cluster 1. Intensification of dairy farming is planned on 14 farms of which 9 are in cluster 2 and 3. Many farmers have a strong preference for more intensive dairy production, even when options for diversified farming are perceived as viable. Results may be influenced by the fact that all farmers in this case study were tenant farmers. This study shows that the construct perceived Room for Manoeuvre allows to distinguish between groups of farmers on their farm strategy in relation to farm location. In regional development this knowledge can be used in the design of support programmes for farm development, increasing the likelihood of a successful programme.

Keywords: farm development, strategy, room for manoeuvre, (agricultural) entrepreneurship, adaptive capacity, regional development, rural development, diversification

More sheep, more space ... Is farm enlargement damageable regarding sustainability in French Mediterranean mountains?

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In the Mediterranean mountains, in order to face the CAP, sheep farmers had to consider the following possibilities: growing, or producing certified lamb with more productive constraints but higher income, or diversifying farms activities. In this area, sheep farming is characterized by an important use of rangeland, sometimes collective ones, since the system is based on a great mobility, especially during summer time. Sheep, and sometimes farmers, move to higher rangeland where they stay for 4 months and where they find food to eat. They then come back at the end of summer and spend winter in / around villages. In this paper we'd like to pay attention to farmers who decided to grow, in order to increase their income, with sometimes 2000 sheep (vs. 500 for others). To be able to feed their sheep, they have to increase their mobility, since not enough food is available in local and surrounding rangelands. That's the reason these farmers and their sheep leave the alpine mountains during winter to reach Mediterranean plains to get available grass. Our paper wonders about the contribution of these big farms to local development and sustainability.

Our research is grounded on empirical data collected during a sociological survey (2012) in one of the most famous alpine area dedicated to sheep farming. In this paper, we describe how these farmers manage and take advantage from natural resources, focusing on the social dimensions of their reshaped activity. We insist on new and strong networks they need to develop, we describe the way that labour and familial organization is affected, and wonder about their professional legitimacy within the different sphere they belong. At least, we focus on their great flexibility, one of the main key of these productive systems. To conclude, we insist on the necessity to shift to larger scales, both at territorial and professional levels, in order to better analyse how, complementarily to others, these big farms contribute to rural development. We hypothesize that, in this very case, big sized farms can contribute in conciliating economy and ecology.

Keywords: sheep farming, French Alpine mountains, flexibility, mobility, rangeland



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Well-functioning landscapes – on re-coupling agricultural and rural development

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Agriculture and rural areas have been considered a unity for a long time; however, increasingly agriculture and rural development are being de-coupling. Due to ideologies of growth, competitiveness, resource-efficiency, expanding food markets and links to vertical flows of energy, feedstuff etc. intensive farming systems are integrated into global markets, but discarded many of their links to local landscapes. This also implies that global network of processing and consumption has become much more important for many farms than relationships to the social-ecological context in which they produce. Rural development in turn is increasingly concerned with nature conservation, tourism and residential developments of various sorts rather than with the future of farming. While agricultural industrialization is the driver of the de-coupling phenomenon in the more productive areas of Europe, the more marginal rural areas are de-coupled from farming through competitive disadvantages leading to wide-spread land abandonment. On this background there is a clear need both for rural development to restructure landscape patterns in a way that they better support multi-functionality (including agriculture) and for agriculture to become a more integrated part of the local place.

In this contribution, the tensions between agriculture and rural development will be conceptualized drawing back on a resilience approach. We first examine a general case of high nature value (HNV) farming. The implementation of the HNV concept in rural development programs serves as an example of the challenges that policy making are facing when dealing with a specific kind of farming systems that are coupled to the landscape ecologically, but increasingly de-coupled from social-economic realities. Through two other case studies, we then analyze how, new ways of re-coupling agriculture practices to rural development may be reinstated through planning processes. The paper concludes by reflecting more generally on the conditions for supporting multifunctional landscape through collaborative actions, with a focus on the role that 'alternative farm modernization processes' can play in a rural development context.

Keywords: *Re-coupling, collaborative planning processes, multifunctional landscapes*

An attempt to clarify the resilience concept for renewed strategies of agricultural and farm modernization

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The elastic concepts of vulnerability, resilience and sustainability became core concepts in social-ecological analyses of natural resource use and management. Relationships between resilience and sustainability have been critically discussed, whether they imply contradictory or complementary requirements. We discuss in detail one of the terms, resilience, for its application in agricultural development and modernization strategies and show that vulnerability, resilience and sustainability require successive clarification of their internal differentiations before they can be connected and the relationships between them specified. For this purpose a typology for social and ecosystem aspects of resilience of agricultural social-ecological systems (SES) is formulated. This typology requires to specify for resilience analysis the nature of the agricultural SES under consideration, the forms of coupling between ecological and social system components (e.g., loose or dense, functional or dysfunctional coupling), the properties of social and ecological resilience (e.g., diversity, redundancy, robustness), the organizational capacities required in resource management and modernization strategies (e.g., that of learning and adaptive systems), and the key actors in management strategies. We conclude that in the analysis of agricultural development the internal differentiations and the differences between the concepts of resilience and sustainability need to be specified, not levelled down through abstract concepts. Such levelling is found, e.g., in the analyses of Folke et al (Stockholm Resilience Centre) that tend to reduce sustainability to resilience. Our results are illustrated with examples of analyses of agricultural development from different European research projects.

Keywords: *resilience, sustainability, agriculture, farm modernization*



Workshop 3.1: **Soil management: facilitating on-farm mitigation and adaptation**

Convenors: **Julie Ingram, Sandra Nauman, Jan Verhagen**

Theme 3: Climate change: Farming system approaches to mitigation and adaptation

Workshop 3.1: Soil management: facilitating on-farm mitigation and adaptation

Convenors: **Julie Ingram**, Countryside and Community Research Institute, UK
Sandra Nauman, Ecologic Institute, Germany
Jan Verhagen, Plant Research International, Wageningen University, Netherlands

This workshop aims to bring together researchers to share experiences in two main areas: • Understanding opportunities for and constraints to implementing soil management that enhances mitigation and adaptation (at the farm, the institutional and the policy levels) • Enabling and supporting soil management for mitigation and adaptation with facilitation, advice, decision support and policy measures.

Assessing farmers' intention to adopt sustainable management practices for soil conservation across Europe

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During the past decennia, sustainable soil management practices (BMPs) have been developed in order to maintain or restore soil health which is essential to the resilience of the farm. However, the adoption rate in practice is rather low. Amongst other reasons, the BMPs might lack on-farm compatibility, or farmer's lack confidence in the presented measures. To increase the adoption rate of BMPs, capturing farmer's ideas in their specific farming context can aid future strategies to implement the BMPs. Therefore, the aim of this study is to identify and compare different barriers and drivers towards the adoption of BMPs. To unravel farmer's motivation and ability to implement a certain BMP, we applied a sequential mixed method approach based on the theory of planned behavior, a socio-psychological framework to predict human behavior (Ajzen, 1988, 1991; Wauters et al., 2013). Qualitative semi-structured interviews with farmers reveal a first indication of possible barriers and drivers. These serve as the basis for a broad quantitative survey in 25 major farm types across 8 European countries, all characterized by their own soil, climate, legislative and socio-economic context. Due to this context, the selected BMPs in the questionnaire differ among the major farm types, although two wide-spread practices such as cover crops and reduced and/or non-inversion tillage were questioned among almost all farm types. An EU-wide comparison between different regions allows us to better relate differences in barriers, motivators and farmers' intention to differences in bio-physical, economic, institutional, social and regulatory conditions. To obtain a correct interpretation and clarification of the most striking results, we organize regional focus groups with experts and farmers. The results will offer valuable insights to advice EU policy, extension and scientific research. They will be able to take into account the specific context of the different major farm types when developing strategies to increase the adoption rate of BMPs.

Keywords: *Adoption, farmers, soil conservation, theory of planned behaviour*

Barriers to adopting management practices aiming at soil fertility and mitigation across different farm types in The Netherlands

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Field management practices such as the use of green manure crops, incorporating crop residues (e.g. straw) or using organic fertilisers (e.g. compost) may serve twofold purpose: increase the quality of the soil on a farm and also contribute to climate change mitigation.

In The Netherlands, both dairy and arable farmers make limited use of these options as has been shown by a recent number of interviews with agricultural extension officers.

In an ongoing study we try to identify the barriers for adopting these management practices among both arable and dairy farmers on different soil types. In this study we follow the theory of planned behaviour.



Workshop 3.1: Soil management: facilitating on-farm mitigation and adaptation

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In the theory of planned behaviour three categories are considered to determine the decision process of an individual: the perceived possible effects of an action (the outcomes), the social context (the referents) and the degree of control (the control factors). During the winter of 2012/2013, semi-structured interviews were held with 20 farmers to assess the possible outcomes, referents and control factors for a number of management practices.

During summer and autumn of 2013 a large internet survey will be held among both arable and dairy farmers in different parts of The Netherlands to find out how farmers evaluate each variable for different management practices. As the questions are based on the semi-structured interviews, we use a bottom-up approach to increase our understanding on adopting management practices. In the analysis we will try to relate the perceptions of the farmers to conditions such as soil type, farm intensity and farm size and the economic context. In the winter of 2013 and 2014 we will conclude the analysis phase and be ready to present the first results.

Keywords: dairy farmers, soil fertility, mitigation, adoption, non-inversion tillage, grass-maize rotation

Barriers and incentives for managing soil organic carbon in six European countries: insights for advice and policy

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Farming practices that lead to declining returns and inputs of carbon to soils pose a threat to key soil functions, in particular the regulating and supporting functions related to climate change and removal of greenhouse gases. There is a need, therefore, to identify agronomic and soil management practices that can optimise soil carbon storage and crop productivity. This is the aim of SmartSOIL (Sustainable farm Management aimed at Reducing Threats to SOILs under climate change), an interdisciplinary project funded by EU Framework 7. As part of this project advisors and policy makers in six European case study regions were interviewed. The interviews were carried out to gain insights into current promotion, awareness and implementation of practices that potentially enhance soil carbon (with a focus on catch/cover crops, crop rotations, residue management, reduced tillage operations and fertilizer and manure management). Respondents were also asked about barriers to, and incentives and advice for, uptake of practices that contribute to soil carbon stocks.

This consultation found that there are no policies that specifically address soil carbon management in the case study regions. Aligned to this, advisor and farmer awareness of management practices specifically directed towards soil carbon is low. Most production related decisions are taken in the short-term but managing soil carbon needs a long-term approach. Key barriers to uptake of practices include: perceived scientific uncertainty about the efficacy of practices; lack of real life 'best practice' examples to show farmers; difficulty in demonstrating the positive effects of soil carbon management practices and economic benefits over a long time scale; and advisors being unable to provide suitable advice due to inadequate information or training. Most farmers are unaware of, or are not sufficiently interested in, the need to increase carbon stocks in soil. They are also unconvinced of the economic benefits of practices for managing soil carbon. Incentives are, therefore, needed, either as subsidies or as demonstrations of the soil benefits and cost effectiveness of selected practices. All new measures and advice should be integrated into existing programmes to avoid a fragmented approach. These insights will feed into policy recommendations.

Keywords: soil carbon, mitigation, credibility, salience, legitimacy, boundaries

Achieving improved soil management on-farm – insights from a New Zealand case study

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Despite a history of soil conservation since the 1930s, soil erosion remains a significant environmental and sustainability challenge in New Zealand and will almost certainly be exacerbated by climate change. Although central government recognises the issue of soil erosion, there are no specific national policy initiatives directed at reducing soil erosion. Central government's direct funding of soil conservation in New Zealand ceased in the early 1990s, a component of broader neo-liberal policy reforms.

An extreme rainfall event in 2004 resulted in widespread erosion in the Manawatu-Wanganui region. This event, in conjunction with a diverse mix of factors, led to the establishment of the regional level Sustainable Land Use



Workshop 3.1: **Soil management: facilitating on-farm mitigation and adaptation**

Convenors: **Julie Ingram, Sandra Nauman, Jan Verhagen**

Initiative (SLUI). This initiative is unusual in New Zealand because it is partly funded by central government, the regional council and farmers on highly erodible hill country land in the region. Soil conservation of highly erodible land on hill country farms is targeted in SLUI, with whole farm plans being the principal mechanism for shaping farm management. The implementation of the whole farm plans are supported by incentives for farmers and regular interaction with, regional council staff.

Drawing from the SLUI experience, this paper will present insights in to how improved soil management can be supported and enhanced at a regional and farm level. Results will highlight the importance of constructing and representing soil management issues in ways that align with central and regional government priorities, which may not include soil management. When improved soil management is not a priority, the important role of a network of soil conservation advocates, who are strategically positioned in central and regional government and who can shape policy that indirectly and directly achieves improved on-farm soil management will be described. The need for congruence between government policy, existing knowledge and the practices of farmers will also be illustrated, as will the critical role of intermediaries in translating policy into on-farm implementation.

Keywords: *hill-country erosion, Sustainable Land Use Initiative, whole farm plans, soil conservation, government, farmers*

Soil management for climate change mitigation and adaptation: framing and integrating the issue in the evolving policy environment

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Soil health is a core requirement for the maintenance of agricultural productivity under changing climatic conditions, and soil management has also been shown to be an important part of the mitigation response in the agricultural sector. In this context, soil management is increasingly a part of the climate change mitigation and adaptation agenda in the EU. Although the EU Soil Thematic Strategy provides an overall strategic framework for soil management in Europe, there is no overarching legal or policy framework for soil protection. Instead, soil protection and management are addressed in many different policy areas as secondary objectives (such as agricultural, resource efficiency and climate policy). In this paper, we examine the most relevant policy mechanisms and processes for soil management and its contribution to mitigation and adaptation in the agricultural sector in the EU. We focus on the issues of soil organic carbon, and how this can be most effectively framed as part of the evolving policy environment in the EU. In doing so, we also examine the regulatory, financial and communications challenges and barriers which are related to the nature and scientific understanding of soil organic carbon, and how these could be resolved.

Keywords: *soil carbon management, mitigation, adaptation, Common Agricultural Policy, rural development*



Workshop 3.2: Agroforestry research and practice in Europe

Convenors: **Dirk Freese, Pierluigi Paris, M. R. Mosquera-Losada, Paul Burgess**

Workshop 3.2: Agroforestry research and practice in Europe

Convenors: **Dirk Freese**, Department of Soil Protection and Recultivation, Brandenburg University of Technology Cottbus, Germany
Pierluigi Paris, Consiglio Nazionale delle Ricerche, Istituto di Biologia Agroambientale e Forestale, Italy
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Paul Burgess, Department of Environmental Science and Technology, Cranfield University, UK

Due to beneficial interactions between the different components of agroforestry systems (trees, crops, and/or animals), these land use systems provide economical and ecological advantages compared to conventional agricultural systems. The aim of this workshop is to provide a platform for the presentation and discussion of current scientific research outcomes and of actual developments in the field of agroforestry.

Decision-Making Factors for Agrowood Cultivation- A Qualitative Analysis for Brandenburg/Germany

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Agrowood as energy crop has increased in significance after German nuclear phase-out. The actual agrowood acreage is developing sluggishly despite its high bio-physical potential. We analysed 34 qualitative interviews with agrowood producers and related actors in Brandenburg to identify constraints and incentives perceived as crucial for agrowood production. As indicated in previous studies, economic risks like insecure income play a major hampering role. An outstanding negative factor is the undeveloped market. Other constraints as availability of land, machines and capital were confirmed. Suitability for poor sites, diversification of income and resistance towards weather variations promote agrowood. Unexpectedly support programs and laws are not perceived as determining. Actors' assessment of the decisive factors differs depending on independent or contractually-bounded production: Cooperation contracts dismantle economic, trade and machinery related constraints, offer long-term income and increase creditworthiness. Thus contracts contribute to an expansion of acreage while counteracting strongly market development, fundamental for independent producers.

Keywords: Bioenergy, agrowood, decision-making factors, governance structures, farm level, Brandenburg, qualitative research

Assessing ecosystem services in perennial intercropping systems – participatory research and development in Swedish modern agroforestry

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Edible forest gardens and silvopastures on semi-natural grassland are developed at 13 Swedish smallholdings within a Participatory Learning and Action Research (PLAR) project. The work started in 2012 with the aim to develop productive and economically sustainable agroforestry system and to provide scientific knowledge about the potential of such systems to generate essential ecosystem services. The project is a collaboration between researchers and farmers and the design and development of the systems are based on the knowledge and interests of all members of the group. Perennial crops that are edible and can be grown successfully in Swedish climatic zones are identified and a common design has been developed for the research aims. Research on tropical agroforestry indicates that such systems are more productive than monocultures and hold the promise to generate far more of the ecosystem services required for a sustainable food production and for society. Despite the small amount of empirical studies performed in temperate areas, agroforestry are often suggested to be an opportunity in the development of sustainable food production systems also under these conditions. This project aims at contributing to the knowledge on productive designs in temperate areas, as well as on kind of ecosystem functions that are significant and to what extent. To assess ecosystem services in such complex systems as agroforestry, with a fundamental principle to maximize useful variation in species and habitats and to be adjusted to local contexts, is time consuming and afflicted with large difficulties. Variables of concern are often slow



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processes (e.g. soil carbon storages, species compositions, mycorrhiza) and many repetitions are needed when variables are plenty. Relevant reference points need to be defined, moreover, the level of detail appropriate for the assessments of the ecosystem services has to be decided. An important task for the group is therefore to identify and develop relevant assessment methods for both the production parameters and for ecosystem functions. The results aim at providing information for public knowledge, as well as science-based policy recommendations for the development of perennial intercropping systems at farm scale.

Keywords: *Edible forest garden, silvopasture, semi-natural pasture, intercropping, temperate climate*

Effect of liming and organic fertilisation on soil organic matter in a silvopastoral system under *Populus x canadensis* Moench.

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Agroforestry systems are believed to have a higher potential to sequester C than pastures or field crops. This conjecture is based on the notion that tree incorporation in croplands and pastures would result in greater net aboveground as well as below ground C sequestration. In terrestrial ecosystems, soil organic matter is considered the most important store of C. The objective of this study was to evaluate the effect of two doses of lime (0 and 2.5 t CaCO₃ ha⁻¹) and three sewage sludge treatments (0, 200, and 400 kg total N ha⁻¹ year⁻¹ applied in two consecutive years) on soil organic matter at four soil depths (0–25, 25–50, 50–75, and 75–100 cm) in a silvopastoral system under *Populus x canadensis* Moench. in Galicia (Spain) eight years after establishment. The results showed a predominance of soil organic matter in upper horizons mainly due to the superficial litter deposition and the differences in root distribution. Moreover, the application of lime and sewage sludge to the soil surface implied that organic matter was modified by the treatments in the first centimetres of the soil. In general, the liming and the fertilisation with medium doses of sewage sludge (200 kg N total ha⁻¹) reduced soil organic matter probably due to the increase of the mineralization rate associated with these treatments.

Keywords: *agroforestry, afforestation, sowing, climate change, carbon sequestration*

Labile and stable soil carbon fractions in agroforestry systems composed of poplar and black locust trees, Germany

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Agroforestry is seen as a successful land management practice, which in addition to agricultural and wood production, may contribute to mitigation of greenhouse gas CO₂ and enhance soil carbon sequestration. This study investigates total, labile and stable soil carbon fractions at three agroforestry sites (Allendorf, Dornburg, and Forst) composed of poplar (*Max 1*, Muhle Larsen) and black locust (*Robinia pseudoacacia* L.) tree species. Sites are located along a rainfall gradient stretching west-east across Germany, and vary in age, soil texture and climatic characteristics. Composite soil samples collected at tree strips from 0-3; 0-10; 10-30; and 30-60 cm depth layers were compared with soils collected from adjacent crop alleys. Samples were analysed for total organic carbon (TOC) stocks, hot-water extractable carbon (HWC), and OC contents at 250-2000; 53-250; and <53 µm soil-size aggregates. Total OC stocks in 0-60 cm soil layer were the highest at the site with the highest amount of clay + silt, Dornburg, followed by Forst and Allendorf, comprising 92-107; 59-74; and 53-64 Mg ha⁻¹ cm⁻¹, respectively. Although no significant differences in the total OC stocks between tree strips and adjacent crop alleys were found for the 0-60cm layer, a vertical gradient with a significantly higher amounts of TOC, OC at macro-aggregates (250-2000 µm), and HWC was found in tree strips compared to crops in the 0-3 cm depth layer. This trend was attributed to a greater litter returns and higher amount of macro-aggregates in tree strips related to the lower soil disturbance, compared to the tilled crops. A better macro-aggregate formation in tree strips reveals its potential for C sequestration, as C occluded within soil aggregates has a slower decomposition rates and longer residence time, which in a long run may result in greater C accumulation in soils.

Keywords: *Soil carbon sequestration, soil particle size fractions, labile and stable C fractions, hot water-extractable C, alley-cropping systems*



Workshop 3.2: Agroforestry research and practice in Europe

Convenors: Dirk Freese, Pierluigi Paris, M. R. Mosquera-Losada, Paul Burgess

Quantifying the impact of alley cropping on environmental benefits

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Alley cropping systems (ACS) which include agricultural crops planted between rows of short rotation coppices enable production of woody biomass and crops at the same field. In addition, these systems are expected to produce a range of environmental benefits (i.e., positive externalities). Quantifying these benefits is considered a necessary step to establishing a reward mechanism for farmers who implement sustainable land use systems, like ACS, for the benefits they provide. The aim of this study was to use an indicator set previously linked with important ecosystem services provided by farming systems to quantify environmental benefits. Results obtained from several hypothetical farms located across Germany were used to compare the benefits provided by ACS with conventional agricultural system. The results suggested that ACS may contribute to provision of benefits with respect to improving soil fertility, water quality, erosion control and biodiversity. Possible negative externalities in terms of decreasing groundwater recharge could be mitigated by adapting management to site conditions.

Keywords: agroforestry, ecosystem services, indicators

Innovative Alley coppice Systems-mixing timber and bioenergy woody crops: 7 years growth and ecophysiological results in experimental plots in northern Italy, Po Valley

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Land use competition between food/feed and energy crops could exclude the establishment of SRC (short rotation coppice) on productive agricultural land. A solution could be the cultivation of multipurpose plantations producing biomass and logs for industry, as innovative alley coppice systems. These are mixed plantations of high value timber trees and SRC of poplars and willows. The advantages of this cultural model could be that: i) the farmers can receive payments for biomass every 2-5 years for 10 or more years when high value timber trees are in the juvenile phase, ii) the high value timber trees can be planted at definitive spacing, so that plantation thinning could be avoided, reducing production cost, iii) the SRC, with a rapid canopy closure, have a positive environmental impact reducing soil erosion and increasing biodiversity (soil fauna, birds and little mammals), iv) the SRC can protect the high value timber trees from wind and storm, v) a modulated light competition of SRC towards the high value timber trees causes the correct growth of their stem and the formation of a smaller number of thin branches, in comparison to traditional mono-cultural model of plantation forestry, reducing pruning intensity. This new cultural model has been tested in Northern (Piedmont and Lombardy) and Central Italy (Umbria) with a research projects coordinated in Italy by CNR-IBAF “Agro-coop”, funded by Italian Ministry of Agriculture, Forestry and Food policies in the frame of Woodwisdom-Eranet EUPF7. This paper refers the result obtained during the first 7 years of growth concerning biomass production of SRC, survival, growth, leaf phenology and form characteristics of the high value timber trees. The influence of the cultural model on soil moisture and nutrients and solar radiation during the seventh growing season are also studied with the aim to increasing the system efficiency in promoting the growth of both components, reducing competitive interactions.

Research funded by Moprolegno (2006-2009) and AgroCop Project-WoodWisdom-Net - ERA-NET Bioenergy



Workshop 3.3: Designing Cropping Systems for Adaptation to Climate Change

Convenors: **Thomas Döring, Frank Ellmer, Ralf Bloch, Johann Bachinger**

Workshop 3.3: Designing Cropping Systems for Adaptation to Climate Change

Convenors: **Thomas Döring, Frank Ellmer**, Humboldt-Universität zu Berlin, Germany
Ralf Bloch, Eberswalde University for Sustainable Development, Germany
Johann Bachinger, Leibniz Centre for Agricultural Landscape Research, Germany

This workshop employs an interdisciplinary approach to ask (1) how cropping systems can be designed that are able to adapt to climate changes; (2) how their resilience to extreme weather events can be strengthened; (3) what role collaborative on-farm research can play for improving the adaptive capacity of cropping systems; and (4) how solutions already available can be integrated into current systems.

The situation of current crop rotations in Northern Germany: risks and chances for future farming systems

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This study aimed at analyzing patterns of crop sequences over time throughout the German federal state of Lower Saxony from 2005 to 2012. Therefore, the IACS (Integrated Administration and Control System) data was analysed for the identification of spatial and temporal pattern of crops grown on farmer's fields. Lower Saxony is a region where maize growing had a steep increase and, therefore, was preferentially incorporated in farmer's decisions on crop sequences and crop rotations. Furthermore winter wheat, oilseed rape, sugar beet and potatoes play important roles in this region. We distinguished between crop sequence patterns (any sequence, that could be identified generally) and crop rotation (a recurring pattern representing meaningful agronomical background). Studying crop sequence patterns on farmers' fields during the six years (2005-2011), a total of 24 118 combinations of crops on 772 940 ha were determined. Only a small number of combinations represent a large proportion of the arable area. Continuous maize cropping covers 8.6 % of the whole arable area in Lower Saxony. The combinations of other crops are multiform. Typical crop rotations basing on oilseed rape or sugar beet are underrepresented on only 7% of arable land, respectively. The results suggest that crop rotation is an agricultural practice in transition.

Keywords: *land use data, maize, crop sequence, pre-crop*

Yield 2040: Risks and opportunities for the German agriculture. A modelling approach

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Increasing temperature as well as elevated CO₂ concentration and extended vegetation period will result in an increase in crop yield in the region of North Germany. This development may be counteracted by a prescribed water deficit due to less rainfall during vegetation period. However, climate will not only affect an increase of the means, but will have a variety of effects especially for the variability and the abundance of extreme weather conditions like summer heat, drought, or shifts in precipitation distribution. All these conditions have a more or less severe impact on crop production. These special environmental conditions might amplify the risk for crop yields. Moreover critical phases of plant production e.g. tillage, germination, flowering, harvest etc. have a differently weighted impact on the stability of the yield. We assume increasing risks for yield depression, or shortfall. Modelling cropping systems is a proper approach for a) estimating risks for future crop production systems, and b) investigation of practicable scenarios minimizing this risk. Therefore, the process-based decision support system for agrotechnology transfer (DSSAT) was validated with experimental data-sets (of 7 years, including diverse crop rotations) for common conditions of the Northern German lowlands. Based on three climate scenarios (PIK: RCP8.5; temperature: min, medium, and max) and detailed soil information we evaluate wheat yields for 4 regions of Northern Germany. Variations of yield risk will be provided as well as reduction strategies. Thus, we will develop and model scenarios with a variety of management techniques to minimize the risk and increase the outcome of crop yields. These scenarios can include: change in crop rotation by introducing new crops like soybean, lucerne, or sorghum, irrigation scenarios against the expected water shortage in the main vegetation period, soil management focused on water balance or preventing erosion etc.



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Keywords: *Crop yield modelling, crop yield risk assessment, DSSAT, regional model, crop growth models, fluctuation in crop yield, NaLaMa-nT project, critical phases in plant growth*

Farmer responses to multiple stresses in the face of global change: Assessing five case studies to enhance adaptation

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The global challenge of sustaining agricultural livelihoods and yields in the face of growing populations and increasing climate change is the topic of intense research. The role of on-the-ground decision-making by individual farmers actually producing food, fuel, and fibre is often studied in individual cases to determine its environmental, economic, and social effects. However, there are few efforts to link across studies in a way that provides opportunities to better understand empirical farmer behaviour, design effective climate change adaptation policies, and be able to aggregate from case studies to a broader scale. Here we synthesize existing literature to identify four general factors affecting farmer decision-making: local technical and socio-cultural contexts; actors and institutions involved in decision-making; multiple stressors at broader scales; and the temporal gradient of decision-making. We use these factors to compare five cases that illustrate agricultural decision-making and its impacts: cotton and castor farming in Gujarat, India; swidden cultivation of upland rice in the Philippines; potato cultivation in Andean Colombia; winegrowing in Northern California; and maize production in peri-urban central Mexico. These cases span a geographic and economic range of production systems, but we find that we are able to make valid comparisons and draw lessons common across all cases by using the four factors as an organizing principle. We also find that our understanding of why farmers make the decisions they do changes if we neglect to examine even one of the four general factors guiding decision-making. This suggests that these four factors are important to understanding farmer decision-making, and can be used to guide the design and interpretation of future studies, as well as be the subject of further research in and of themselves to promote an agricultural system that is resilient to climate and other global environmental changes.

Keywords: *Adaptation, Climate Change, Decision-making*

Agriculture, forest, climate: the road to new adaptation strategies in France (the AFClim foresight)

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Agriculture and forestry are particularly exposed to climate change. Although its effects are already tangible, stakeholders in these two sectors still face a lot of uncertainties about climate change and have difficulties in designing farming and forest systems adapted to the future climate. For these reasons, the Center for Studies and Strategic Foresight of the French ministry of agriculture carried out a foresight study, based on an interdisciplinary group of 30 experts. It aimed at designing adaptation strategies to climate change for agriculture and forest. This paper focuses on agriculture. Our approach started with 14 concrete case studies in France (9 in agriculture and 5 in forestry), accounting for the diversity in farming systems (cereals, winegrowing, fruit production, dairy breeding, etc.) and pedoclimatic conditions. For each case, we modeled the effects of climate change on the farming system around 2050, using agroclimatic simulations. Then, with the help of the expert group, we designed different technical adaptation options for each case. Afterward, we built four contrasting scenarios of socioeconomic context and matched the previous adaptation options with these scenarios.

Our results revealed three main adaptation strategies for cropping systems: securing yields through irrigation, avoiding water stress and diversifying crops. The most-likely chosen strategy strongly depends on possible future socioeconomic contexts though. In scenario "metropolization and consumerism", adaptation remains limited and based on technical optimization. In scenario "liberalization and focus on production", adaptation mainly relies on irrigation and negative environmental impacts could occur. In scenario "a mosaic of areas and stakeholders", adaptation strategies are very heterogeneous and reinforce local specialization, which causes mixed environmental effects. Adaptation to climate change is logically more pronounced in scenario "energy and environmental transition": cropping systems are deeply redesigned in order to enhance their resiliency through diversification and autonomy.



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Thanks to the AFClim foresight study, we thus brought new insights about resources and constraints for adaptation to climate change and showed that designing adapted cropping systems will require actions to raise awareness, collective action and integrated public policies.

Keywords: *agriculture, climate change, adaptation, case study, scenario, foresight*

Support building resilient smallholder farms to climate change: I. Livelihood profile and nutrient management in the loba province, Burkina Faso

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Climate change through increasing aridity disrupts nutrient cycles which are the basis of food production in agro ecosystems. Existing production systems in West Africa fail in maintaining a good enough nutrient cycling at farm level. Adaptation of smallholders to climate change requires rethinking and adjusting their existing production systems in order to improve their nutrient balance and to ensure an efficient provision of food demand. They need to be supported in this way with open decision-making tools (agent-based model) based on nutrient cycling and accounting for feedback loops. Adaptation capacities depend mainly on livelihood assets endowment. Our project in the loba province, starts by identifying livelihood profiles of smallholders and their link to the actual nutrient management. Three communities of the province were chosen through a cluster analysis using NDVI index, land use map, soil degradation information, and population density. Using soil map, six villages were randomly selected and 360 farms were surveyed. Five farm-types were found: Better-off, cotton-and livestock-based farms (Farm-type I); Better-off, non-farm activities preference farms (Farm-type II); Pro-poor, labourless-and landless farms (Farm-type III); Medium income, labour-rich, marketable food crop oriented and educated farms (Farm-type IV); and Poor, insecure-land tenure, livestock based farms (Farm-type V). Existing fertility management strategies are linked to farm's wealth, livelihood orientation, land access, labour availability and supporting policies. Better-off farm-types intensify fertilizer use with livelihood orientation and supporting policies while less endowed farm-types (III and V) intensify fertilizer use with land constraint.

Keywords: *Resilience, Nutrient cycle, Climate change, Smallholder, Burkina Faso*

Evaluation of crop varieties in a changing climate: on-farm vs. experimental stations

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Increased weather variability as predicted in current climate change scenarios is particularly challenging on sandy soils where the soil does not buffer well against shortages of water: Plant breeders increasingly attempt to find crop genotypes that can cope with these stress situations. While current variety recommendations are based on replicated small-plot trials in a specific region for which the trial is thought to be representative, genotype x environment interactions, genotype x management interactions, and increasing weather fluctuations make it increasingly difficult to predict which variety will be best in a given environment. An alternative approach is therefore to decentralize variety trials and place them on working farms. However, although on-farm trials offer potentially more relevance for direct variety selection on site, they are also likely to be subject to more noise and trial entries can often not be fully replicated. To evaluate the relative merit of on-farm trials vs. fully replicated trials conducted at experimental stations, we tested 6 maize varieties at four farms and at two stations in a region dominated by sandy soils. The variance of variety rankings over the years within each site was used as proxy to evaluate the consistency of variety information gained at each location. For dry matter yield, on-farm trials showed both the highest and the lowest consistency of variety ranking, with the consistency being intermediate at the experimental stations. For some quality parameters, namely non-fiber carbohydrate content and starch content, the majority of on-farm trials showed more consistent variety ranking over the years than the most consistent of the two replicated trials. This suggests that in terms of year-on-year reliability of maize yield and quality, on-farm trials may have the potential to complement, or even to outperform replicated variety trials. For both types of trials however, there is also scope for decreasing technical sources of variation.

Keywords: *genotype environment interactions, maize, on-farm research, stability*



Workshop 3.3: Designing Cropping Systems for Adaptation to Climate Change

Convenors: Thomas Döring, Frank Ellmer, Ralf Bloch, Johann Bachinger

Poster contribution

Watermelon (*Citrullus lanatus*) as live mulch for climatic change adaptation in African humid tropics' cropping system

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In-situ live mulch crops such as watermelon (*Citrullus lanatus*) can suppress weed populations resulting in reduced reliance on herbicides, reduced soil temperature, improved soil moisture, and additional income from sale of produce harvested in mixed cropping systems in sub Saharan Africa. The present investigations therefore seek to quantify the impact of various densities of in-situ watermelon live mulch on weed control, yield potential and climatic change adaptation capability strategy in the humid tropics amaranth production system. Treatments comprised three sowing densities of watermelon: 1.5 x 0.45m; 1.5 x 0.90m; 1.5 x 1.50m. Grain amaranth as an intercrop was transplanted at 0.75 x 0.75 m spacing. There was a control plot left bare without cropping and a check plot with only grain amaranth forming five treatments in each of five replicates in an RCBD design. Weeding was at 3 week intervals commencing 3 weeks after planting (WAP) of watermelon. Naturally occurring weed population was used. Averaged over the two consecutive croppings, amaranth grain and watermelon fruit yields were highest at 1.5 x 0.90 m watermelon plant spacing. All mulch densities transmitted less PPFD relative to the control. Soil moisture content was significantly greater in the live mulch treatments compared to the bare soil. Our research demonstrated that live mulch suppress weeds, had greater light extinction, and lower diurnal soil temperature amplitude that account for usefulness of live mulch in cropping systems and we believe offer opportunities in adaptation of agricultural production systems under climate change scenarios.

Keywords: watermelon, cropping system, climate change, humid tropics, temperature

Farm-level impact of climate change in Central Asia: An interdisciplinary approach for identifying policy priorities

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The increasing frequency of droughts is having a large negative impact on the livelihoods of rural populations in arid and semiarid areas of Central Asia. On the other hand, rainfall occurrences are becoming more extreme, leading to higher number and magnitude of floods in mountainous regions. On both cases, the poorest are hit the hardest. The climate change models project even higher level of weather volatility and extreme events in the future for the region. Several technologies, such as water-efficient irrigation methods, zero tillage, slope terracing, agroforestry systems have been found to positively contribute to the adaptive capacities of small-scale producers in Central Asia. However, wide scale implementations of such technical recommendations remains yet very limited. Therefore, this study investigates the constraints for adoption of technologies which can minimize risk associated with weather shocks. Specifically, the paper examines potential policy options to enhance the adaptation strategies. For this purpose, a representative household survey dataset with a total of 1600 respondents from different farming systems in Central Asia is analyzed. This dataset is used in the interdisciplinary modelling approach to investigate future crop yield changes associated with climate change, their impact on household welfare and climate change adaptation by households. The integrated modelling framework consists of climate module, crop growth simulation analysis and economic components. Scenario simulation with different policy options is implemented. The results of the study show that the impact of climate change varies across agro-ecological zones. The simulation results reveal positive gains in large-scale commercial farms in the Northern rainfed regions and negative impact in small-scale farms in the Southern irrigated regions of Central Asia. The negative impact could be further aggravated if irrigation water availability declines in southern regions due to climate change and expected water demand increases in upstream regions. Adoption of water-saving technologies could be considered as one potential option to cope with the negative consequences of climate change. However, lack of financial capital is shown as one of the main constraints limiting the adoption of more efficient technologies by agricultural producers. This is mainly explained by lack access to credit for small-scale producers and administrative constraints on farm-level decision-making on land allocation for different crops. Policy simulations show that improving the market infrastructure and regional trade between Central Asian countries could improve the financial status of small-scale producers and improve their climate change adaptive capacities.



Workshop 3.3: **Designing Cropping Systems for Adaptation to Climate Change**

Convenors: **Thomas Döring, Frank Ellmer, Ralf Bloch, Johann Bachinger**

Keywords: *Crop model, Stochastic optimization, Policy simulations, Trade liberalization, Adaptation strategies*

New sunflower genotypes with resistance to drought and good adaptation for organic farming

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In the period 2008-2013 at NARDI Fundulea research have been carried out in order to introduce drought-resistant gene from wild *Helianthus argophyllus* to *Helianthus annuus* cultivated species. Interspecific hybridisation, backcross and self-pollination, a rigorous selection under the water stress conditions was performed for: productivity; MMB, oil content; foliar and surface chlorophyll content, leaf pilosity and the stay green characters were performed. Drought resistance and yield quality improvement under organic farm conditions is a difficult goal due to polygenic determinism of these characters. Progress has been obtained for genetic characters studied (production, oil content and MMB) for all inbred lines presented. One of these lines presented improved values for all characters as compared with maternal lines. Four from seven inbred lines were improved achenes production and the other 3 improved lines have better capacity of oil production in drought conditions and in the organic farms technology.

Keywords: *interspecific hybridation, Helianthus argophyllus, Helianthus annuus*

Crop production under climate change in the Northern German Lowlands

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According to climate projections, we will anticipate an increase of the mean temperature in the Northern German Lowlands, combined with reduced water availability during the growing season. On the one hand this leads to a prolongation of the vegetation period and results together with the fertilization effect of rising CO₂-concentration, in a higher biomass production potential. On the other hand, the predicted higher evapotranspiration deficit during summer may result in increased water stress and yield variability. Irrigation is one promising on-farm measure of local adaptation to the risk of yield variability and failure.

Based on a bio-economic farm modelling approach we will examine a) how climate change affects the region specific production strategies and b) at what level of climate change the tipping point for investments into irrigation infrastructure can be found.

The Northern German Lowlands is based in two study regions: 1. Diepholz, Western Lower Saxony; 2. Oder-Spree, Eastern Brandenburg. The diversity of cropping activities as well as the complexity of farm structure is represented and modelled by typical farms chosen from a IACS-data based farm typology with different production potentials and patterns.

We are assessing changes of production due to introduced irrigation on the basis of existing technologies and yield for predicted change of environmental conditions. The modelling results will show possible shifts to alternative crop species, changed crop shares, and associated differing income for farmers but also externalities. Further economic, social, and ecologic indicators are assessed to describe hence changed cost structure of production activities the overall economic compatibility of irrigation as an appropriate means of adaptation to climate change.

Keywords: *modelling, land use, irrigation*



Field trips

Field Trip 1: Large-scale crop production on sandy soils

This field trip is organised by: **Frank Ellmer** and **Thomas Döring** (Humboldt-Universität zu Berlin)

In the federal state of Brandenburg there is one million ha of arable land available for farming activities. However, the fields are mainly characterised by sandy soils with comparatively low fertility and limited yield potential. This field trip explores potentials and limitations of arable land use in these environments and in anticipation of climate change conditions.

The destination of the field trip is the region of Teltow-Fläming about 50 km South of Berlin. Due to glacial genesis, soils there show large heterogeneity. Structurally, land use is dominated by large-scale arable farms producing animal feeds and bio-energy.

Agricultural Cooperative Trebbin

(http://www.agt-eg.de/agriculture_start.php?lang=en)

The agricultural cooperative Trebbin was founded in 1991 and is nowadays among the largest agricultural companies in Germany. The total farm area amounts to 4,100 ha agricultural land, of which 2,900 ha are arable fields and 1,200 ha are grassland. The main farm products are cereals, oil crops and cattle feed. The enterprise also operates an AD (anaerobic digestion) plant for biogas production, several servicing centers for vehicles and building machinery as well as a hotel.

Thyrow Agricultural Education and Experimentation Station



The teaching and research station is part of the Humboldt Universität zu Berlin, Faculty of Agriculture and Horticulture. The station was founded in 1937 and amounts to 13 ha. Experiments concentrate on long-term field trials, the earliest of which were started in 1938. Aspects of crop rotation, mineral and organic fertilization, and irrigation are investigated. Here researchers focus on the development of soil fertility on poor sandy soils.



Field Trip 2: Extensive grasslands on hydromorphic soils

This field trip is organised by: **Jutta Zeitz** and **Evelyn Wallor** (Humboldt-Universität zu Berlin)

Hydromorphic soils cover about 44% of the area in the federal state of Brandenburg region. They are principally used as grassland and, hence, affected by drainage and cultivation. Local climate trends intensify the importance of these soils according to their native functionality of carbon and water retention. The field trip exposes the participants to different hydromorphic soils and types of grassland uses in Brandenburg. The destination of the field trip is the region of Barnim, about 50 km North of Berlin. Due to glacial genesis, these soils show a large heterogeneity. Structurally, land use is dominated by large farms producing animal feeds and bio-energy. Precipitation is about 500 mm per year, which is less than the nationwide average.

Extensive pasture on Gleysols

The 250 ha large lowland is used as an extensive pasture since 1990. From May to October the cattle is fed on the meadows by regular turnover. In addition single parts of the lowland are mowed for hay production. The mean summer water table reaches 40 cm below surface and vegetation is dominated by *Lolium perenne*. Energy content of the growth certainly depends on time of harvest but reaches 6.34 MJ NEL per kg dry matter.

Native fen soils - the kettle hole mire Diebelsee

The Diebelsee is located in the north east of Brandenburg, within the UNESCO Man Biosphere Reserve „Schorfheide-Chorin“. Its surface area amounts to approximately 0.14 km². The lake was created in the last glacial period (Weichselian; 110,000 to 10,000 BP) by the Scandinavian ice sheets amongst many other depressions in the north-eastern part of Germany. The Diebelsee itself is a kettle hole mire and was formed by a large ice block that separated from the retreating glaciers. The oldest peat found in the mire is dated 13,000 BP (deposition of volcanic material: Laacher See Tephra) and was found 13.5 m below today's lake level.



The kettle hole mire Diebelsee is part of the Biosphere Reserve Schorfheide-Chorin (pictures spring 2007)





Field Trip 3: Agroforestry systems

This field trip is organised by: **Dirk Freese** and **Annika Badorreck**

(Brandenburg University of Technology Cottbus–Senftenberg)

The land use system which combines the production of trees and crops has several benefits which range from carbon sequestration, higher resource efficiency to less environmental impacts. The system is widely applicable, from afforestation, bio-energy production to silvopasture.

However, agroforestry needs to be adapted thoroughly to a region's characteristics. The field trip's participants explore different opportunities and constraints for marginal and degraded lands. The destination of the field tour is the region of Cottbus, about 120 km southeast of Berlin. The area called Lower Lusatia (Niederlausitz) is shaped by the lignite industry and extensive open-pit mining which is now under recultivation.

The UNESCO Biosphere Reserve Spreewald protects a unique landscape of natural and artificial watercourses of the river Spree with typical marsh areas, small fields and lowland forests.

Alley cropping in the Spreewald



At the experimental site of the climate change adaptation project INKA BB researchers and local practitioners investigate prospective or alternative uses of alley cropping for farmers in Brandenburg. These alley cropping systems consist of fast growing trees on farm land and historical agroforestry systems (silvopasture) in the Spreewald region. Their aim is to combine potential ecological advantages with required economic efficiency and to develop practice-relevant management recommendations.

Reforestation of the former mining area Welzow South



The second stop is a demonstration site with alley cropping, short rotation plantation, agriculture and reforestation of post-mining areas. The approach of landscape restoration is highlighted by new wine yards and artificial water catchment. Here, research focuses on the initial development of ecosystems.

Farming systems in Lower Lusatia

A visit at the nearby large-scale agricultural cooperative AG Forst e.G gives specific insights into production and management of agroforestry systems. The farm is engaged in dairy farming, cash crops and agroforestry.



Field Trip 4: Paradise lost? Food supply strategies in the metropolitan region of Berlin now and then...

This field trip is organised by: **Anna Maria Häring** and **Ralf Bloch** (University for Sustainable Development Eberswalde)

The field trip will introduce the participants to different approaches to farming and food supply systems which have resulted out of historically very different situations but all approach the concept of resilience. This excursion will introduce us to the region north/north-west of Berlin. This part of the federal state of Brandenburg is characterized by low rainfalls, predominantly poor soils and early summer droughts. Despite abundant surface waters agriculture is therefore expected to be particularly affected by climate change. A high share of the land area dedicated to natural parks, a national park and the UNESCO Man Biosphere Reserve Schorfheide-Chorin has fostered the development of organic farming in this region. Two of the farms visited are run organically.



Eco-village Brodowin - Paradise fruits for millions?

One of the farms in Biosphere Reserve Schorfheide-Chorin is the „Eco-village Brodowin“, Germany’s largest biodynamic farm (1,400 ha). With 85 permanent employees and 30 seasonal workers the enterprise consists of a range of branches. The farm itself, with a wide range of arable crops, vegetables and forages, a dairy herd, a milk goat herd and laying hens, as well as an organic dairy processing own cows and goats milk as well as milk from other farms to a wide range of dairy products. All produce is marketed via a farm shop, farmers markets, a box-scheme to the greater region of Berlin (4,5 Mio. inhabitants) and through a supra-regionally operating wholesaler. In total “Eco-village Brodowin” has an annual turnover of approx. 9 Mio Euro. Around 50.000 visitors to the farm each year learn about organic farming and the origin of their food. In addition to food production the enterprise is engaged in a range of innovation projects (e.g. as partner of the “Network Study Partner Organic Farm” of the University for Sustainable Development Eberswalde or the INKA BB project for developing climate adaptive farming systems) (Source: <http://www.brodowin.de/>)

Eden – a living earth

The „Vegetarian fruit growing colony“ („Vegetarische Obstbaukolonie Eden e.G.m.b.H.“) was founded in 1893 in Oranienburg north of Berlin, with the aim to introduce farming to the urban population. Around the same time, driven also by the founders of Eden, the first “Reformhäuser” were established in Germany. This led to a widespread distribution of the vegetarian movement and a critical reflection of food production, from which the organic farming movement also benefited (Source: www.eden-eg.de/).

Farmers’ garden – an urban paradise?

Farmers’ gardens originally were part of the subsistence strategy of farming families. Adapted to modern life styles the initiative “Farmers’ garden” (“Bauerngarten”) has set up an urban gardening project in the metropolitan area of Berlin. Traditional elements like geometric seedbeds or mixed cultivation of flowers, vegetables and medicinal plants, herbs and spices are revived and participants are sensibilised for natural processes. The founders of “Farmers garden” consider the concept an appropriate means for increasing food sovereignty in urban areas (Source: <http://www.bauerngarten.net/>)



Field Trip 5: Urban agriculture in Berlin: From traditional peri-urban farming to self- harvesting and community-gardens

This field trip is organised by: **Thomas Aenis** and **Severin Halder** (Humboldt-Universität zu Berlin)

Urban farmers will explain their view on urban agriculture and which role urban agriculture should play in the city of the future.

Throughout the excursion different urban and peri-urban farming system within or at the border of Berlin - the shifting zone from rural to urban landscape - will be visited.

Bauer Mette

Mette's farm is located right on the border of Berlin within the small town Berlin-Buckow. He is one of last traditional peri-urban farmers of Berlin with the traditional wide range of production: From crop farming to stock breeding. Beside visiting his grain plantations, cattle, sheep, horses and pigs Berlin residents can also harvest flowers and strawberries on their own or come to his famous farm festival called „Buckower Strohballenfest“. <http://www.bauer-mette.de/>

Bauerngärten



“Bauerngärten” is a young small company dedicated to urban farming. The company pursues an innovative direct commercialization policy in urban and peri-urban organic farming. Its main product, to which the company owes its name, is the farming garden (Bauerngarten in German), which consists in a community garden divided in individual plots for rent (with over fifty different sorts of vegetables) where the tenant can grow their own vegetables using tillage, seeds, tools, equipment, and irrigation provided by the company. <http://www.bauerngarten.net/>

Allmende-Kontor



“Commons-Office” (Allmende-Kontor) is a network for urban agriculture and community gardens in Berlin, supporting participatory city development at all levels and aiming towards the vision of a reclamation of the city for public use. The “Allmende-Kontor community garden” has been initiated and started on April 16th, 2011 as a pioneer use on the former airport Tempelhof. With 5,000qm and nearly 1,000 community gardeners it became one of the biggest community gardens in Europe.



Information about the 11th European IFSA Symposium

INKA BB

In Brandenburg, innovation pathways for rural areas are being developed that aim to integrate productivity increases with sustainable agricultural land use. With a specific focus on adaptation to climate change; scientists, practitioners and corporate actors cooperate in operational groups on land use and water management issues. On field, farm and regional levels, innovations for practical climate change adaptation are tested and evaluated. Together, these groups form the large Innovation Network for Climate Change Adaptation Brandenburg Berlin (www.inka-bb.de). Nationally funded from 2009 to 2014, INKA BB represents a model for a large and integrative regional Research and Development approach aiming at the creation, implementation, assessment and dissemination of innovations.

IFSA Europe Group

The regional IFSA association for Europe was **formed in 1992**, among others to appoint a European representative to the IFSA board. To emphasise its **international scope**, i.e. that the focus of its research is not just on Europe, the group kept its original name (i.e. "IFSA Europe Group") and did not change to "European Farming Systems Association" which would have been an alternative.

The IFSA Europe Group is organised as a **network of loosely affiliated individuals** and managed by the Steering Committee appointed for a period of two years. The group and its meetings are open to all those committed to farming systems approach. To emphasise its openness, the IFSA Europe Group does not have formal membership.

The main activity of the IFSA Europe Group is the organisation of its **biannual Symposium**. So far Symposia have been held in Edinburgh (UK), Granada (Spain), Hohenheim (Germany), Volos (Greece), Florence (Italy), Vila Real (Portugal), Wageningen (Netherlands), Clermont Ferrand (France), Vienna (Austria) and Aarhus (Denmark).

(<http://ifsa.boku.ac.at/cms/index.php?id=2>)

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The members of the Scientific Committee of the IFSA 2014 are: Jesús Rosales Carreón, Fleur Marchand, Lies Debruyne, Susanne von Münchhausen, Anna M. Häring, Henrike Rieken, Kristin Davis, Pierre Labarthe, Andrea Knierim, Michael Kügler, Sabine O'Hara, Janice Jiggins, Ray Ison, Niels Röling, Pieter Seuneke, Thomas Lans, Martin Mulder, Geir Lieblein, Charles Francis, Edwin Østergaard, Tor Arvid Breland, Christine Leeb, Christoph Winckler, Katharina Schodl, Brigitte Kaufmann, Christian Hülsebusch, Anja Christinck, Eelke Wielinga, Laurens Klerkx, Michael Kuegler, Robert Home, Maiann Suhner, Silvia Tobias, Hilde Bjørkhaug, Handan Giray, Gunn-Turid Kvam, Egon Noe, Yolanda Mena Guerrero, Francisco de Asís Ruiz Morales, Jean-Paul Dubeuf, John Dixon, Andrea Marescotti, Artur Cristóvão, Dominique Barjolle, François Casabianca, Giovanni Belletti, Paulina Rytönen, Rebecca Paxton, Bernhard Freyer, Milena Klimek, Claire Lamine, Benoît Dedieu, Gianluca Brunori, Ludwig Theuvsen, Birthe Lassen, Monika Zehetmeier, Aurora Cavallo, Francesca Giarè, Clara Cicatiello, Monica Commandeur, Karlheinz Knickel, Ika Darnhofer, Mark Redman, Julie Ingram, Sandra Nauman, Jan Verhagen, Dirk Freese, Pierluigi Paris, M. R. Mosquera-Losada, Paul Burgess, Thomas Döring, Frank Ellmer, Ralf Bloch, Johann Bachinger

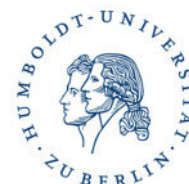
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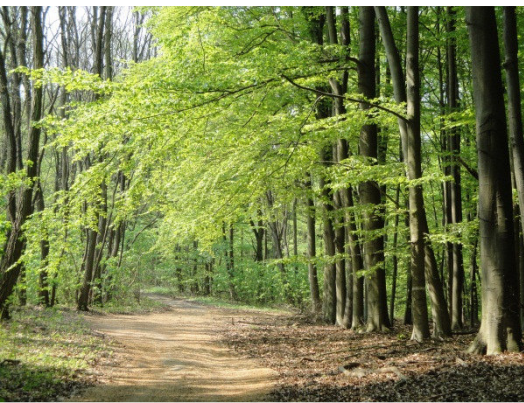
Thomas Aenis, Wolfgang Bokelmann, Frank Ellmer, Holger Fischer, Eva Foos, Anna Maria Häring, Otto Kaufmann, Andrea Knierim, Monika Meiser, Rebecka Ridder, Maja-Catrin Riecher, Heike Schobert and Jutta Zeitz

During the Symposium, they were helped by Renate Busse, Severin Halder, Julia Jahnke and Julia Schmid.

Field Trips: Frank Ellmer, Thomas Döring, Jutta Zeitz, Evelyn Wallor, Dirk Freese, Annika Badorreck, Anna Maria Häring, Ralf Bloch, Thomas Aenis, Severin Halder

The 11th European IFSA Symposium is jointly organised by:





Local Organising Committee

Thomas Aenis, Holger Fischer, Eva Foos, Andrea Knierim, Monika Meiser, Rebecka Ridder, Maja-Catrin Riecher, Heike Schobert

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All papers presented at this and previous Symposia of the IFSA Europe Group can be downloaded from the website.