

AgroEcological Transitions

Changes and Breakthroughs in the Making

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AgroEcological Transitions: Changes and breakthroughs in the making

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1 Introduction

In 2010, the initiative was taken to organise international workshops with scientists from different disciplines with the aim of improving system innovation processes in agriculture. The first workshop about SISA (system innovation towards sustainable agriculture) was held in Lelystad, the Netherlands. At the time, the European research agenda on agricultural innovation was largely characterized by two visions on innovation in agriculture. The first was based on the emerging Knowledge-Based Bio-Economy (KBBE) paradigm with the overall objective of combining life sciences with techno-scientific innovations to develop the means for an efficient use of agricultural resources. The alternative vision built on the Agricultural Knowledge Systems paradigm with the objective of developing ('co-creating') relationships between all relevant knowledge producers and stakeholders, including the farmers.

In that situation, the SISA initiative aimed to foster scientific reflection on "Transitions for Sustainable Agriculture", as expressed in the title of the edited volume of the first SISA workshop (Barbier and Elzen 2012). Our starting point was that making agriculture more sustainable was not simply a matter of choosing one vision over the other, but paying attention to, understanding and reflecting on processes in dominant socio-technological systems, knowledge regimes, and design practices. We concluded that it was key to analyse ongoing developments, practices, actions, projects, while paying attention to the development of 'novelties' in niches, and how niche developments start and contribute to transformation processes in the agricultural system (or 'regime') at large. The second SISA workshop, held in Paris from 22-23 May 2014, built further on these understandings and intended to seek synergies between the fields of sustainability transitions and agroecological thinking. The present volume brings together the papers discussed at the workshop.

Over the past five years, the notion of 'transitions' has gained much wider recognition in agricultural research and policy. The challenges and opportunities of sustainable agriculture have been addressed in the work of many organizations, including government bodies, NGOs, professional organizations and research institutions. Various publications, including White Papers by the EU (e.g. EU 2009) and different national governments, as well as FAO reports (e.g. FAO 2010, 2014) define future targets and objectives to improve sustainability in various agricultural sub-sectors like animal production, arable farming, or glasshouse horticulture. Furthermore, the take-off of the KBBE vision (e.g. EU 2012) has sparked growing concerns about the sustainability of heavily promoted technologies, like biomass for fuel, feed and fibres (e.g. EU-SCAR 2015). This has also led to public and policy debates on ethical and economic issues related to the multi-functionality of agriculture.

But are these debates and increasing concerns translated into concrete actions? And do actions lead to changes towards a more sustainable agriculture? Many scholars are sceptical about agroecological

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transitions, expecting emerging examples of greenwashing in agriculture as have been demonstrated in various other domains.

The differentiating expectations concerning the possibilities of agroecological transitions are not only due to differences in visions about desirable futures, but also to diverging levels of confidence in possibilities to govern the development of agri-food systems in a sustainable direction. Furthermore, and not least important, there is no precise definition or shared understanding of what sustainability entails. The term sustainability is commonly used while involving a diversity of stakeholders' expectations. Yet, increasingly the public as well as various policy arenas demand changes to agricultural production so as to be able to feed a growing world population in a sustainable way. This is visible in the rapidly growing number of alternative approaches, while social movements and civil society initiatives are increasingly pressing for changes of the agricultural system at large. In public debates, the current ways of food provisioning are questioned and debated by a broad variety of stakeholders. Jointly, these can be seen as a movement towards a reflexive governance (Voss et al. 2006) of food systems that include the conditions of producing as well as consuming food products, recycling and avoiding food waste.

Two "Grand Challenges" have gained recognition in policy arenas: climate change and loss of biodiversity. Especially after the Paris COP 21 climate conference in 2015, it has become widely recognized that the development of industrial societies has seriously harmed the planet and there is an urgent need to move in a different direction. In the domain of agriculture, this has led to an increasing attention to the concept of agroecology that features in the title of this volume. Agroecology has been coined by scientists with the intention to open up scientific preoccupations and to contest technocratic governance of agricultural innovation, oriented towards agricultural intensification, commercial benefits and expansion of global trade (such as the Mansholt Plan to promote land consolidation and agricultural intensification in order to conquer the markets; Mansholt 1952).

While the negative effects of such intensification and globalization became more and more visible in association with the socio-economic vulnerability of many rural zones, agricultural research started offering an alternative vision. Altieri (2002; 2009) and Gliessman (2006) proposed to orient research more towards the needs of peasants harmed by technocratic farming systems. Dalgaard et al. (2003) considered agroecology as the study of interactions between plants, animals, humans and the environment within agricultural systems. Gliessman (2006) and Francis et al. (2003) further expanded the understanding of agroecology by putting a stronger emphasis on the notion of sustainable food systems. Moreover, the unique character of single farms has increasingly been recognised by scholars. Specifically, small farms and food sovereignty gained momentum in the overall discourse (Altieri 2009).

As a notion travelling between many arenas, agroecology became ambiguous, with an inter- and transdisciplinary character. Hence, it is a buzzword (Tittonell 2015) describing relations between humans, ecosystems, traditional farming, innovation and technology to trigger practical actions. Many prominent global players, scientists and practitioners have attempted to define agroecology. For instance, the OECD views agroecology mainly in connection with the environmental challenges, i.e. as 'the study of the relation of agricultural crops and environment' (OECD Glossary), while FAO defines it as an 'integrative study of the ecology of the entire food system, encompassing ecological, economic and social dimensions' (FAO 2015). The latter definition proposes to focus on interactions in virtuous cycles and ecosystem services that underpin agricultural production. These relate to multiple aspects of farming systems including pollination, natural pest control, crop-livestock integration, soil biodiversity, nitrogen fixation, drought resistance, agroforestry, water management, aquaculture (including ponds and wetlands on farms), cover crops and crop rotation, perennial cultivation, wildlife, energy and building communities. Due to the complexity of agroecological farming systems, this list is anything but exhaustive.

Civil society organisations and peasants movements (e.g. Via Campesina) have proposed agroecology as an alternative to mitigate negative impacts of the growth-oriented innovation system and as a way of life (Rosset and Martinez-Torres 2013). These organisations typically combine ecological and human-rights based values, which are expressed in new forms of societal organisation. For instance, Community Supported Agriculture, seed savers and food sovereignty groups have emerged from these principles. The

wellbeing of peasants, family farmers, indigenous people and rural workers, typically marginalised in the technocratic innovation system, has also gained more attention. The need for social innovation has been emphasized as opposite or complementary to technological progress. Thus, the focus is placed on the biopolitics of not only nourishing humanity, but also access to resources and distributive justice, defining people in their humanity (Coll 2014).

Currently, agroecological thinking captures a critique of the agro-food regime at large rather than the critique of the green revolution dominating the early days of agroecological thinking. It targets new ways of doing research and producing knowledge, new ways to fulfil needs and secure access to resources and to engage various stakeholders in decision-making on issues related to the production and consumption of food (Holt-Giménez and Altieri, 2013). Furthermore, it puts a strong emphasis on inclusion of actors who are usually marginalised within the dominating socio-technical regime.

Although the interest in agroecology is rising, a large divide exists between those who think that we should and can change our ways of producing and consuming food, and those who doubt about the potential of alternative ways of farming to halt climate change and radically reduce environmental risks. The latter perspective is evidently dominant and leads to a variety of incremental changes that leave the overall agri-food system basically intact. While most governments' adopted the notion of sustainable development as a basic policy principle, it has become increasingly obvious that a 'post-industrial' society will not necessarily result in a more sustainable society, i.e. a society that is characterized by a better balance between economic, social and ecological goals. Ensuring that ongoing transformation processes lead to more sustainability is a major challenge for societies in general and for agri-food systems in particular. In this context, the relations between agronomic science, agricultural technologies, and public and private expectations are at stake. Agroecology, as a concept, acknowledges this by questioning actual research practices (Francis et al., 2016).

To underline the need for radical, systemic changes, we have chosen the term "AgroEcological Transitions" for the title of this volume. It stresses that a transition towards sustainable agriculture requires more than improving agribusiness as usual. To us, agroecology refers to broad and varied processes of experimentation and innovation that often start in niches and have the potential of transforming the dominant agri-food system into a more sustainable one. Analysing these ongoing processes will increase our understanding of transformative change. The chapters of this book reflect the need for such insights by analysing a broad variety of agroecological 'breakthroughs-in-the-making'.

2 Presentation of the volume

All chapters in the book are concerned with pathways of transformative change, highlighting different aspects of these processes. Using the vocabulary of the multi-level perspective on sustainability transitions (Geels 2002), the portfolio of the agroecological transition studies in this book is organised in three parts. They each aim to address a specific dimension of transition processes: learning in niches, niche-regime interactions, and regime transformations.

2.1 Part A: Learning in niches

The six chapters in Part A focus on how various actors are tinkering with new agricultural practices that involve social, technological or institutional novelties. These new practices are varied, ranging from new ways of producing meat or rice, to permaculture communities. The chapters give an account of a diversity of experimental places, re-design approaches and change initiatives in animal production, permaculture, cultivar breeding, and various other agricultural domains.

Stimulating reflexivity is a key feature of the re-design projects described by **Bart Bremmer** and **Bram Bos** in their chapter. This design approach by the name of RIO (a Dutch acronym for Reflexive Interactive

Design) aims to undertake a complete re-design of Dutch animal husbandry systems. Over the past 15 years, it has been applied to a variety of animal sectors, three of which are analysed in this study. In a RIO project, a variety of stakeholders (ranging from farmers to NGOs) designs a new animal husbandry system that is integrally sustainable, i.e. sustainable on a variety of dimensions. Although the heterogeneity of the stakeholder groups made interaction difficult initially, the reflexive nature of RIO projects, by which taken-for-granted perceptions and tacit routines are made explicit and scrutinized, eventually resulted in shared learning, a better mutual understanding, network formation and the articulation of promises. This formed the basis to design new animal husbandry systems that are radically different from the present.

The chapter by **Julie Ingram** and **Damian Maye** describes the Permaculture community in England, an emerging group or sub-niche that questions the operations of the mainstream agricultural regime. The community advocates a radical shift in patterns of thinking and acting towards new agri-food systems framed around agroecological principles. Sites include home gardens, community gardens and farms, public spaces, allotments and smallholdings. The question of the study is how knowledge systems within these alternative innovative agricultural groups develop and interact with the mainstream Agricultural Knowledge System (AKS), using the notion of boundary-work. The chapter shows how many members of the permaculture community question the operations of the mainstream agricultural regime and advocate a radical shift in patterns of thinking and action towards new agri-food systems, particularly in smart cities.

Claire Lamine starts with a counterfactual question: why did societal pressures for sustainability virtually not influence cultivar breeding in the French peach and apricot industry? Breeding strategies hardly change, although modern cultivars often taste badly, have a poor environmental performance (pesticides issues) and negatively impact prices and hence producers' future perspective. The chapter provides a socio-historical analysis of changes in cultivar breeding in the peach and apricot sectors since the 1960s, analysing innovation strategies in niches of sustainable cultivars. It combines evolutionary economics and multi-level frameworks with an ethnographic analysis of ongoing changes, based on an approach anchored in the French pragmatic sociology. A study of recent changes in public research and in cultivars' evaluation and registration while uncovering the controversies in several "mainstream" or "transition" arenas leads to a balanced answer to the research question.

In their chapter on 'Community Supported Agriculture' (CSA) in Hungary, **Bálint Balázs**, **György Pataki** and **Orsolya Lazányi** describe an interesting inversion. While CSA is rather new in Hungary, it has a longer history in other parts of the world. This inversion underlines that in a state of societal crisis, agricultural activities that are supported by a community of practice, might catalyse social change and enhance consumer-producer cooperation in order to regain control over the ways in which food is supplied. The authors describe how CSA farmers pursue a set of socio-economic practices (in production, assortment and delivery of boxes, investments and pricing, and community building) to reach beneficial socio-ecological outcomes at the community level. They introduce the term 'agriculture supported community' as a specific but previously unexamined form of moral economy whereby farmers create communities by relying on external financial resources and reaching out to trust-based personal networks or ethical consumers.

The chapter by **Boldizsár Megyesi** describes different models-in-use of agri-food production in a Hungarian rural micro-region. Building on the concept of 'alternative food networks', the author explores the factors and resources that determine farming technologies and specific practices that inspire different models of agri-food production. The research arrives at a distinction of three forms of knowledge (local/traditional, managerial and scientific knowledge) and four types of farming within the studied area (agricultural companies, medium-size farms, small-size farms and social farming).

The chapter by **Marcia Ostrom** analyses trends in the attitudes and behaviours regarding food consumption and food sourcing in the north-western United States. A theoretical framework on social movements is utilized to investigate the role of consumers' ideological orientations and the effectiveness of local agri-food initiatives in driving larger food system innovation and institutional change. The way food is framed by many residents in the regions has expanded beyond personal health and culinary preferences and started to include the economic and agro-ecological challenges of farmers and farm workers and the

need for equitable food access. The study thus shows how alternative agri-food movements have succeeded in opening up the public discourse about food.

2.2 Part B: Niche-regime interactions

The six chapters in Part B focus on interaction processes between niches and regimes. In various concrete cases, including fruit production, dairy farming, alternative food networks, the authors analyse how the innovating actors position themselves vis-à-vis the actors operating in the dominant regime. Driving forces that govern gradual sustainable transformations either through public support and policy making or through organised action and initiatives from the stakeholders involved are explored.

George Vlahos, Pavlos Karanikolas and Alex Koutsouris explore the pattern of transformative change in an emerging transition from an intensive, towards an integrated farming system for canned peach production in Northern Greece. They use the concepts of niche and regime to analyse how integrated farming has originated from within the incumbent regime. A major driving force behind the change was a policy change at the EU level that led to the development of a new entity, a 'niche-regime', that was facilitated by the launching of an integrated farming standard. Central to this change process were the innovative activities of Agrocet, a standardisation and certification organisation that operated under the Greek Ministry of Agriculture.

The chapter by **C. Shambu Prasad and Debashish Sen** describes a case in which a global niche became established firmly. The study explores transition and system innovation theory in a non-European context with the System of Rice Intensification (SRI) in India. Proposed as an integrated and agroecological approach to rice production, SRI has received much attention from its early uptake in the 1980s in Madagascar. Balancing between critical assessment and celebration of extraordinary yields, this study focuses on the dynamic evolution of SRI in India, by comparing three different states to highlight the diversity of technical and institutional arrangements in system innovation. The comparison shows the role of networks in complex and multi-actor innovation systems. It provides a better understanding of the politics of knowledge and contestations among actors that accompany the management of sustainability transitions in developing countries, specifically when knowledge hierarchies are strong.

Paul Swagemakers, Pierluigi Milone and Flaminia Ventura address the interdependence between niches and regimes. In two case-studies on 'alternative practices' in dairy farming in the Netherlands and Italy, they analyse the organization of projects and the practices developed by farmers and government intermediaries. They illustrate how newly evolving institutional arrangements help farmers to adopt resilient strategies. The alternative farm optimization trajectories root in the experience and skills of pioneers, and the capacity of hybrid actors (i.e. actors who operate in the regime as well as the niche) like farmers, government representatives, and researchers, to create and adapt organizational structures that improve the optimization of agricultural production, food chains and environmental concerns. The Common Agricultural Policy for the period 2014-2020 stimulates farmers to develop alternative practices.

The chapter by **Boelie Elzen, Arni Janssen and Bram Bos** presents a tool that can be used to stimulate transition processes. It builds on the recognition of a wide range of 'bottom-up' innovation initiatives by entrepreneurial farmers in agricultural practice. In the tool, the 'Learning and Experimentation Strategy' (LES), the central unit is a 'promise'. A promise describes a novelty in terms of its attractive features from specific sustainability perspectives, as well as its problematic or unknown features. In this chapter, the tool is developed further by presenting a 'portfolio of promises' which is basically a database with a variety of novelties that provides information on their sustainability potential as well as their weaknesses. It can be used by farmers to take decisions on changes they want to make on their farm, as well as by strategic actors and policy makers to inform a broader innovation strategy. The authors describe how they tested the tool in a number of different situations in the domain of animal production.

Jan Buurma, Karel de Greef and Volkert Beekman address how social movements trigger change processes in a regime by analysing the dynamics between NGOs, researchers and sector organisations in

the domain of Dutch pork production in the period 2005-2012. An activist NGO, that primarily raised normative pressure on the current production and consumption system, is contrasted with a moderate NGO engaged in partnerships with the pork sector to experiment with alternatives. While the activist NGO sought to stimulate consumers to buy less meat, the moderate group developed better housing systems and an intermediate market segment for animal-friendly pork. This implies that the NGO's addressed different areas in terms of the multi-level perspective: in one case the area between niche and regime and in the other case the area between regime and landscape.

Allison Loconto, Anne Sophie Poisot and Pilar Santacoloma combine social movement theories with the sociology of innovation. This combination, the authors argue, allows a better understanding of the diversity as well as the similarities of dynamics in the case studies. The fourteen case studies analysed in the chapter concern the creation of various market arrangements in developing countries, based on local networks linking sustainable agricultural practices to (global) markets. Standards facilitated this linking. The study shows that in many cases, the market arrangements rely upon technological innovations ascribed to capital-intensive production systems, which illustrates that they merely concern incremental innovations within the sustainable intensification paradigm. The findings also suggest that both community and international dynamics influence the development of institutional innovations in developing countries, even in the cases which focus primarily on local network building.

2.3 Part C: Regime transformations

This final part addresses the role of knowledge in regime transformations through diverse lenses. The chapters present different types of social-scientific research: sociology of education, system thinking, communication studies and practices-based approaches.

Erika Quendler studies the role of education on sustainable development by analysing how education entities and employers train students on the manifold aspects of sustainable development from a systemic perspective. The chapter enriches the transition research agenda with a number of insights from the sociology of education and knowledge systems with a brief overview of the discussions about: (i) the need for change in Higher Education Institutions (HEI); (ii) the ways to make the labour market regarding competences, skills and knowledge for sustainable development in the field of life sciences more transparent; and (iii) the role of system innovation in education towards developing reflexive skills, and elaborating guidelines for further research. A general key observation is that HEI training programmes suffer from the same inertia as incumbent socio-technological systems: there is a strong tendency to continue business as usual and only incremental changes take place.

In their study drawing on concepts of system thinking and transition management, **Frank Nevens, Erik Mathijs** and **Philippe Vandenbroeck** describe the interactive research process in which they have crafted an analysis of the agri-food system in Flanders, while exchanging intermediary results with a multi-stakeholder reflection group. They combine the multi-level perspective as a general interpretative framework with system thinking methodology to visualise underlying system narratives and enhance reflexive thinking as a test case for the actual workability of integrated systemic approaches in transitions. The process resulted in a description and analysis of the central regime of the agri-food system in Flanders, highlighting a number of 'systemic hotspots', i.e. loci of tensions that cause sustainability concerns.

Pieter J. Beers and **Barbara van Mierlo** present a study on the reflexivity of initiatives that aim to contribute to socio-technological regime change. Reflexivity is defined as an emergent systemic property of an initiative, *i.e.* its ability to interact with and affect the institutional context in which it operates. They start their analysis by observing that reflexivity is seldom clarified conceptually although mentioned very often. As a consequence, its relation with learning and reflection are unclear and rarely studied empirically. In the study reflexivity is operationalised as changes in rules, discourse, practices and relations in order to be able to critically study the relation between learning and reflexivity in a case study in the Dutch greenhouse sector. It was found that, as often assumed, learning indeed sometimes appears to increase reflexivity. The

authors, however, also provide evidence of situations in which reflexivity changes preceded learning and situations in which there was no relationship at all.

The chapter by **Patrick Steyaert, Marianne Cerf, Marc Barbier, Alix Levain** and **Allison Loconto** focuses on intermediation activities at play in situations of sustainability transitions in relation to what the authors call the 'environmental paradox'. The chapter draws upon four case studies of intermediation activities in complex situations. Based on a comprehensive analysis, the chapter identifies key functions of intermediation activities, involving a strong articulation of objectification and inter-subjectification processes. The authors suggest that these activities are a combination of three properties of intermediation, which they term contextualization, performativity and reflexivity. By comparing the case studies they observe that, while sustainability transitions are driven by expectations in terms of efficiency and measurement, they are also characterized by generic attributes of 'wicked problems' that make these expectations hard to fulfil.

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