REVIEW REPORT ON
DECENTRALISED & ECOLOGICAL SEEDS & FARMING IN THE EU

Authors:

Stephan Kampelmann, ULB (DULBEA/IGEAT)

Wouter Achten, ULB (IGEAT)

Tom Bauler, ULB (IGEAT)

Dimitrios Petalios, Independent Researcher

Case studies by Stefan Doeblin, Network Economy

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SYNOPSIS

1. The European agricultural model faces **economic and environmental crises**. Partly in response to current and future challenges, more **ecological forms of agriculture have emerged as a promising strategy towards a more sustainable food system.** This report addresses the profound changes that are needed to **achieve 30% ecological seeds and farming in Europe until 2030**.

2. Our analysis is based on a **review of the academic literatures** in governance, agricultural economics, environmental impact analysis and policy analysis. In parallel, **6 agrogeographic regions** in France, the UK, Switzerland and Germany **served as case studies**. Draft versions of the report have been submitted to an **international support committee including 13 academic experts and practitioners.**

3. We **define ecological agriculture** as the confluence of **organic seeds, farming and gardening**; production techniques with **no use of chemical fertilizers or phytosanitary products** (herbicides, pesticides, fungicides, etc.); an approach that ensure the **long-term balance of ecosystems** (agroecology); and **local and open pollinated (GMO-free) seed breeding and mass selection**.

4. A transition towards 30% ecological seed breeding and farming constitutes a **major socio-technical transition**. Viewing changes in the **governance of food systems as socio-technical transitions** gives credit to the many on-going transitional (local, citizen-based) decentralised initiatives in which **innovation is closer to a practice than to the handling of a single technological device**.

5. Alternative practices are mostly niche strategies that are impossible to understand without **taking into account their embeddedness in societal, political, economic, cultural or scientific dynamics**. Existing niches are nurtured by elements of the incumbent system: niches and niche strategies develop and generalize through **interactions with the regime**.

6. Common to many **promising socio-technical innovations in the food system** (such as Community Supported Agriculture, the Transition Town movement or food baskets) is their **decentralized nature**. Decentralization refers not only to geographical, but also to economic, political and organizational aspects. **Decentralization can be opposed to centralization**, which is a key characteristic of the current agroindustrial paradigm that dominates European food systems.

7. A transformation strategy based on **decentralization provides a potential solution** to some of the problems associated with **up-scaling**. The up-scaling of decentralized practices potentially allows expanding the space for the socio-technical transition practices without fundamentally changing the nature, identity and principles of the initial (local, citizen-based) initiatives.

8. In order to have substantial impact on European food systems, decentralized **niche practices have to alter their scale**. Indeed, more and more actors recognize that "the scaling up of these experiences is the main challenge today" (De Schutter 2010). But translations and generalizations of niche practices are never exact copies of the original niche strategy: up-scaling of experimental, localized, low-tech, alternative… niche strategies alters their very nature: once up-scaled and translated into the regime, the practices cease to be experimental, localized, low-tech, alternative… In many cases they will **loose their foundational identity and initial adherents** in the process. The absorption of the initially **local and activist organic movement by globalized supermarket distribution networks and certification organizations is an example of an up-scaling process that marks a profound transformation** (for instance by substituting the sale of organic produce in local trust-based networks with the import of certified organic products from other countries or continents and their sale in multinational supermarket chains).

9. Additional challenges in terms of the governance of decentralised up-scaling are pointing into two distinct directions: **niche management and space creating**. Relevant forms of space for socio-technological transitions include geographical 'spatial' space, 'interactive' participatory learning-oriented space and legislative institutional space. In many instances, niche management has been translated into a **governance of experimentation**.

10. Key foci in approaches to the governance of decentralized scaling (up) are based on **imitating, multiplying and networking of successful decentralised seeds, farming and food initiatives**.
    This decentralized up-scaling could be strengthened through the involvement of:
    - **Consumers who become producers**
    - **Slowing down** of consumption patterns
    - **Local communities and networks** to support, to educate and to complement each other
    - **Exchange of experiences and lessons** across **different levels of governance**
    - Research and evaluations adopting **holistic approaches** to environmental and economic impact analysis.

11. A **holistic perspective** can be adopted through the **value chain approach** that spans the farm and the market stage of the food system. An advantage of this approach is that it detects when changes in some part of the system (e.g. the farm stage) have repercussions in other parts (e.g. the market stage). **Scale is a crucial characteristic** of each phase of the value chain: in many cases scale is directly related to economic and environmental performance. S**cale should be seen as a strategy and not as an end in itself**: neither "local" nor "global" scales have any inherent quality other than their **relationship with desired socio-economic and environmental outcomes**.

12. W**hat do we know about the potential socio-economic and environmental impact of massive up-scaling of ecological agriculture through decentralization**?

13. Regarding the **socio-economic impact**, a review of the literature suggests that decentralized ecological agriculture can create economic welfare. However, these benefits are likely to be associated with a **series of economic trade-offs**.

14. Although the literature on yield comparisons of agroecological and conventional agroindustrial techniques is not fully conclusive, the yield per hectare of the former are probably not significantly lower compared to the latter in the short-run and very likely to be higher in the long-run. However, the decentralization of agricultural production **limits the capacity of farms and agrogeographical regions to specialize** in products and production steps **in which they have a comparative advantage**. This is likely to increase production costs, especially for off-seasonal products (e.g. tomatoes in the winter in Northern Europe) or in regions that are heavily dependent on the import of inputs (e.g. fodder imports to European meat producers from non-EU countries). Similarly, the **diversification of production** at the farm stage has potentially positive effects on per hectare yields, but it also **reduces the scale of each culture and therefore the scope for mechanization**. This could also increase production costs.

15. The (potentially) higher production costs in a decentralized, agroecological system do not necessarily lead to lower economic welfare. First, higher producer prices are not necessarily related to higher consumer prices and lower demand. In regions with **low demand elasticity to producer prices,** less specialization and more diversification **could lead to a substantial increase in jobs at the farm stage.** Second, decentralization can be seen as a form of import substitution that has a potentially positive impact on local food economies: **shifting demand from imported to local or regional products could boost local employment,** especially if the farm and the market stage (including processing and distribution channels) are decentralized. These positive effects could be reinforced through the **multiplier effect** when income from locally sourced products is again spent in the local economy. But again there are economic trade-offs: some of the increase in local employment will be accompanied by **job destructions in exporting or remote regions** so that the net impact on jobs is uncertain; and trading at lower scales in local or regional food networks is likely to **increase transaction costs**.

16. Also the impact on the resilience of the food system is not clear-cut. On the one hand, decentralized ecological agriculture is likely to **increase the system's resilience** against **fluctuations of product prices** on global markets; against **increases in input prices**, especially regarding the import prices of oil and fodder; against **speculation on the value of land** and development booms; against **political instability or military conflicts in exporting countries**; against the **abuse of oligopoly power** by agro-industrial multinationals (e.g. in the seed market). On the other hand, decentralized agriculture could **decrease the resilience with respect**

to endemic shocks, such as bad meteorological conditions and political, economic or social instability within each agrogeographical region.

17. As for **the environmental impact**, the academic literature indicates that the combination of ecological and decentralized agriculture hosts **potential to reduce negative environmental impacts, mainly by reducing negative impacts during the farm stage** (i.e. organic production). However, it is important to investigate this along the whole value chain of food products, in which different factors such as product type, cultivation input intensity, production efficiency/productivity, total of transport distances and transportation modes, shelf-life, etc. are taken into account. All of these factors harbor **trade-offs determining the final environmental balance**. In this context it is also **important to look at different environmental impact indicators**, as a single indicator (such as greenhouse gas emissions) only gives a very partial view on the whole.

18. We conclude that **decentralization is a promising socio-technical transition** strategy toward 30% ecological agriculture but recommend **to manage, attenuate or even eliminate some of the economic and environmental trade-offs** along the value chain **through three types of learning**.

19. **Conceptual learning.**
    a. The transition strategy needs to learn **clarifying its economic and environmental objectives**; decentralised food initiatives have so far focused only on specific objectives or specific scales. The clarification of objectives is crucial in order **identify trade-offs and formulate adequate political responses**.
    b. It also needs to develop **clear criteria to measure and evaluate the economic and environmental desirability** of alternative paths of up-scaling.

20. **Technical learning.**
    a. The up-scaling of decentralised ecological practices can be achieved through alternative ways. In order to improve their environmental and economic performance, we should **encourage experimentation** with different farm sizes; varying degrees of specialisation, diversification and integration; different types of decentralised distribution channels; alternative configurations of networks etc. Many of these experiments will involve a **better understanding of scale throughout all stages of the food system**.
    b. Such experiments require that **we learn to make space for them**. Relevant types of space include legal, economic and functional space.
    c. The decentralization of agroecological seed breeding and farming requires the **decentralization of the associated knowledge and qualifications**. The latter will to a large extent differ from the knowledge and qualifications that farmers need in a centralized agroindustrial system. The transition strategy has to find not only ways to produce and disseminate the knowledge in a decentralized way, but also to provide **incentives for incumbent and new generations of farmers to embrace the transition and make the necessary investments in new knowledge and qualifications**. Decentralized rural competence centers and close cooperation between researchers and farmers can be a valuable instrument in this regard.

21. **Social learning.**
    a. Implementing decentralisation and agroecological techniques requires **new networks combining different types of stakeholders** (e.g. round tables addressing bottlenecks that bring together farmers, retailers, consumers and public authorities) **and different levels of governance** (e.g. local, regional, national, global governments).
    b. Such networks **need innovative forms of management** allowing to curb the potentially high transaction costs and **a new culture of cooperation across sectors and scales as well as among consumers and producers**.

1 INTRODUCTION

1.1 PROMISES AND QUESTIONS

Many farmers, all over the world, deliver their production to agro-industrial food distributors and processors who then sell packaged and/or processed food to retailers and consumers. Large portions of the food system is under the control of large multinational companies selling plant reproduction and plant protection products, chemicals, fodders and a small number of food retailers. By and large, European agriculture adheres to the principles of conventional modern agriculture that can be defined as "capital-intensive, large-scale, highly mechanized agriculture with monocultures of crops and extensive use of artificial fertilizers, herbicides and pesticides, with intensive animal husbandry" (Knorr and Watkins 1984: x). This system keeps consumers remote from farmers. The distance between the consumers and farmers is not only purely spatial/geographical, but also economic, social and cognitive.

The current European agricultural model is not sustainable. Born and Purcell (2006) provide an eloquent summary of the extensive research on the profound changes that the agricultural production in developed countries has undergone in the past fifty or sixty years: "while these trends have increased crop yields in the aggregate, they also have increased injustice, environmental degradation, food insecurity, and oligarchical decision-making structures" (p. 199). The environmental impact of current European agricultue is not sustainable if measured in terms of its environmental footprint. Greenhouse gas emissions, excess nutrients and soil erosion, excessive water use and water pollution, biodiversity loss, risks associated with GMOs, the disappearance of traditional and/or open pollinated seeds of cultivated plants and dependence on imports are among the main concerns (Magdoff et al. 2000; Shiva 2000; Norberg-Hodge et al. 2002; De Schutter 2010; Servigne 2014).

A prominent strategy aiming at a reform of the agricultural model has translated into EU Regulations promoting organic farming and organic seed breeding. But currently the organic sector in Europe is still underdeveloped and mainly based on non-organic seeds. A more centralised regulation of seeds would create a shortage of organic and local open pollinated breeders. Few practitioners, even in the organic sector, understand how diversity is the basis of organic sustainability, with vegetable growers often preferring F1 hybrid seeds in order to be able to compete in a market that values standardization. What is more, in key markets like Germany, France, and the UK the demand for organic food exceeds domestic production. A considerable share of organic consumption is imported into these countries leading to "increasing social and spatial distance" between consumers and producers. According to Laura Raynolds, this disconnection is not an accident but "inherent in the global organic agro-food system" (Raynolds 2004: 725) and constitutes a development that could increase the environmental impact of organic agriculture.

At the same time, an array of new initiatives emerges all over Europe which try to reconnect urban food consumption to more locally produced food, be it through urban or peri-urban agriculture, local food labels, community-based agriculture, new distribution channels, or other practices departing from the predominant globalized coupling of an agricultural system with a limited number of distribution networks/entities. Initaitives like Community Supported Agriculture, the Transition Town movement or the Whoofing network aim for the empowerment of citizens, for the creation of new alliances between producers and consumers, for regaining "control over the system". A change towards a decentralized and more trustful agricultural production system promises to deliver sustainable and qualitative food products and generate social, cultural, economic, and environmental value. But can the relocalization of food systems really deliver all these promises?

Similar to the decentralisation of electricity production, the decentralisation of food systems poses a range of challenges related to the governance of the profound changes that such a transition necessarily entails. It also raises crucial questions regarding the economic and environmental impact of a regime change. How can the involved actors find ways to define the meaning of 'local' in different contexts and for different products? To what extent does decentralisation - and the often related move towards organic and alternative production techniques - create qualified and sustainable jobs? Who benefits and who loses from the new opportunities? Does a more decentralised agricultural system always foster biodiversity and reduce negative environmental impacts? These are some of the questions that any transition strategy needs to address in order to be truly convincing (De Weerdt 2009: 25).

1.2 OBJECTIVES, SCOPE AND STRUCTURE OF THE REPORT

The purpose of this study is to summarize state-of-the-art research on the social-ecological impact and governance of decentralised agriculture in the European Union in the perspective to formulate a evidence-based strategy towards 30% ecological seeds and farming in 2030. The report will discuss current trends and future potential for the decentralisation of food production based on the existing scientific literature in the fields of agricultural economics, environmental impact assessment and governance.

The scope of the study is mostly limited to European agriculture, with a particular focus on six agro-geographic regions that served as case studies which focus respectively on the Drôme Valley in France, South Hams/Devon region and Todmorden in the UK, Grishun in Switzerland, Bingenheim and North-East Lower Saxony in Germany (see appendix).

Despite this geographical focus, we are aware that European food systems "do not operate in a vacuum" but "depend upon regional, national and global forces, from trade, finance and policy systems to resource and environmental issues" (CPRE, 2012, p. 14). Indeed, as argued by Born and Purcell (2006), focusing exclusively on a particular scale while ignoring other scales of potential action can be "dangerous for both practice and theory" (p. 203). To avoid this caveat we have tried to take into account the most relevant interactions between European and non-European agriculture as well as the interactions between different European regions.

It was not possible to cover all types of agricultural production. For example, fibres, biofuel or heavily processed food fall beyond the scope of the study. We have focused on raw food, or lightly processed food (such as cheese, sausages, pies and baked goods) and its main ingredients. These products have arguably the highest potential in a decentralised and (agro-)ecological food system.

The report is structured as follows. The remainder of Section 0 presents a series of definitions which together form our conceptual framework. We notably define what we mean with the terms 'food system', 'ecological seeds and farming' and 'centralisation/decentralisation'.

The literature review on the impact assessment of both decentralisation and ecological production is included in Section 2. The review is divided into socio-economic impacts (Section 2.1) and environmental impacts (Section 2.2). The results of this impact assessment underline the potential benefits of transitioning towards a more decentralised, agro-ecological system, but also provide a more nuanced picture: being 'organic' and 'local' does not necessarily lead to desirable environmental and/or economic outcomes. The discussion in Section 2.3 stresses a number of issues that merit closer scrutiny in light of a EU-level transition strategy and notably point out conceptual and political choices that need to be addressed in order to avoid potential undesirable effects such as an increase of CO2 emissions due to organic but less efficient production techniques, locations or distribution channels; insufficient yields that could result from inappropriate products and/or production locations; over-diversification and increased transaction costs; reduced social-ecological resilience to endemic shocks; and possible negative consequences for social justice and equality. Our assessment calls for a nuanced analysis that

- ✓ takes into account the specificities of different products and production regions
- ✓ carefully assesses the environmental and socio-economic advantages and disadvantages of alternative scales during the farm and market stage
- ✓ identifies the winners and losers of a regime change in the food system, and in particular those that can be reached by 2030.

Building on the conclusions of the impact assessment, we then discuss the policies and politics of transitioning towards a more decentralised and ecological food system. Section 3 summarizes the existing EU policies that are related to organic farming and assesses to what extent the Common Agricultural Policy can play a role for the decentralisation of European food systems. Section 4 goes beyond EU policies and is concerned with the broader governance of food systems and the potential for transitions. The section summarizes the literature on the governance of systems' transitions (Section 4.1) and sketches different configurations that could underpin a more decentralised and ecological food system in the European Union (Section 4.2).

Section 5 provides conclusions and policy recommendations on the governance of a more ecological and decentralised agricultural system in light of our current knowledge on potential socio-economic and environmental impacts.

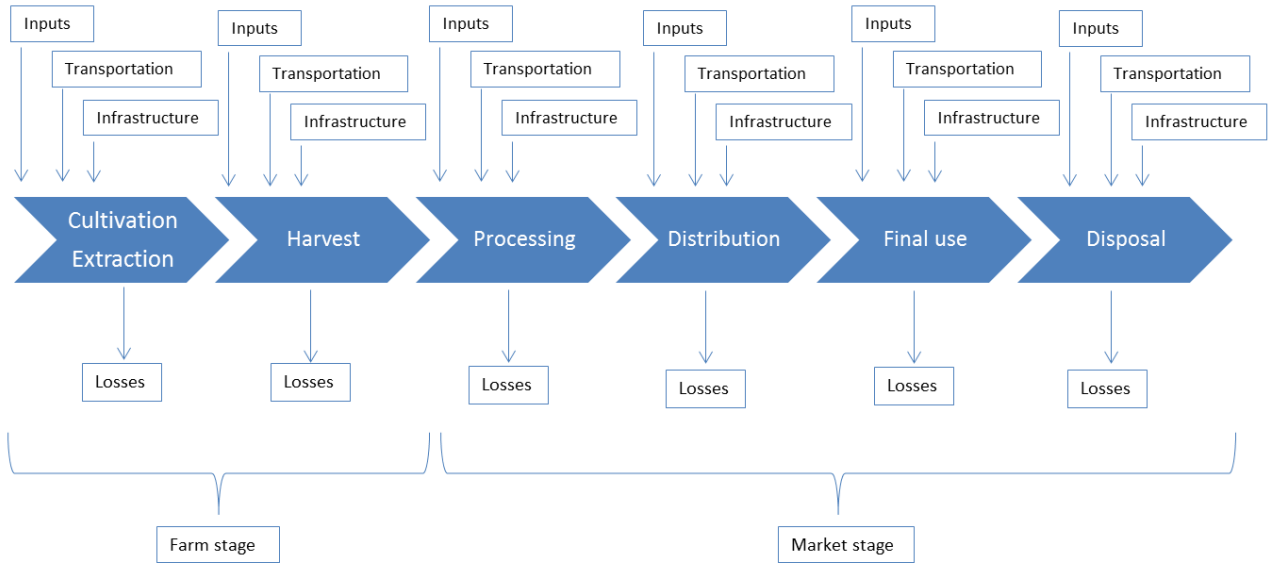
1.3 DEFINITIONS

1.3.1 FOOD SYSTEMS AND VALUE CHAINS

The academic literature on socio-economic and environmental impacts of food systems mainly evaluate agricultural/food products from a life cycle perspective. This means that socio-economic outcomes and environmental impacts are considered not only if they arise in the extraction/cultivation and harvesting phase (the 'farm stage') but also during processing, distribution, consumption and disposal (the 'market stage'). These different steps can be represented graphically in form of a generic flow chart (Figure 1). Analysing social-ecological impacts throughout the entire value chain provides several advantages: first, changes in one element of the value chain can lead to modifications in other parts so that the net impact needs to be assessed over the entire process; the actors and socio-economic relationships are different during the farm stage and the market stage; the framework allows for the identification of sequences but also important feedbacks. For instance, outputs of the harvesting (e.g. seeds) or disposal (e.g. compost) phase can be used as inputs in the cultivation phase.

In addition to the flow of food products through the value chain, the analysis of social-ecological impacts is incomplete if it does not account for a series of secondary flows that are also represented in Figure 1. These flows include the input factors, transportation and infrastructure as well as the losses that are generated during each phase.

FIGURE 1 – GENERIC FLOW CHART OF THE VALUE CHAIN IN FOOD SYSTEMS



Assessing the food system through the prism of the entire value chain amplifies the importance of agriculture in the economy. Taking the UK as example, the farm stage of the value chain accounts for only around 2% of the UK workforce (i.e. around 185,000 employees) that are occupied in growing crops, raising livestock and harvesting the land and sea. An additional 370,000 jobs are situated in the processing phase. The entire food supply chain - i.e. including transportation, distribution and preparation of food - employs more than 3.5 million people (more than 35%

of the workforce). In 2010, the food system generated around 90 billion pounds of Gross Value Added (GVA) in the UK, which is around 10% of total GVA.[1]

1.3.2 ECOLOGICAL SEEDS AND FARMING

The adjective 'ecological' is polysemic. Depending on the context, it may refer to the scientific analysis of ecosystems or a political movement concerned with the environment. When applied to food and food systems, it is often assimilated to 'organic' or 'biological'. In fact, in some EU Member States (MSs) such as Germany and Poland, the EU regulation on certified organic farming uses the adjectives 'biological' and 'ecological' as synonym. In other MS such as the UK, the legislation only uses the term 'organic'.

Similar to De Schutter (2010), we use the term 'ecological' in the sense of agricultural production that forms "a system aimed at producing food with minimal harm to ecosystems, animals or humans". The application of ecological science to agriculture is commonly referred to as 'agroecology', which can be defined as the "application of ecological science to the study, design and management of sustainable agroecosystems" (Altieri 1995). In line with the literature on agroecology, this definition not only exludes harmful inputs such as chemical phytosanitary products, but also stresses the importance of adopting a holistic approach inlcuding the balance of entire ecosystems. Finally, our critera for ecological agriculture also include local and open pollinated (GMO-free) seed breeding and mass selection (in French: 'sélection massale').

While our definition overlaps with the terminology employed in the EU regulations on organic certification, it should be noted that our definition is arguably more restrictive, especially as regards the use of ecological seeds which are subject to many exceptions (Rossmanith 2014). To summarize, in this study the term 'ecological seeds and farming' refers to the intersection of:

- ✓ organic seeds, farming and gardening
- ✓ farming and gardening with no use of chemical fertiliser or phytosanitary products (herbicides, pesticides, fungicides, etc)
- ✓ agricultural methods that ensure the long-term balance of eco-systems (agroecology)
- ✓ local and open pollinated (GMO-free) seed breeding and mass selection

1.3.3 CENTRALISED/DECENTRALISED FOOD SYSTEMS

A central tenet of the approach adopted in this report is that ecological production methods alone are not enough to ensure the overall sustainability of European food systems. The fundamental problem with focusing on the opposition between 'organic' and 'conventional' agriculture only is that it entirely misses the importance of scale and locality in analysing the social-ecological sustainability.

As a matter of fact, the tremendous shifts in production techniques over the last fifty years have been accompanied by equally important changes regarding regional specialisation and trade. Most of the food consumed in Europe is produced in a global system spanning several continents, to the point that today's food systems are "complex networks of relations stretched over a variety of spatial scales" (CPRE 2012: 10). Even products that are apparently 'local' can be tightly related to global production processes: a substantial portion of 'local' meat produced in the European Union is fed with corn from the United States or soybeans from Latin America…

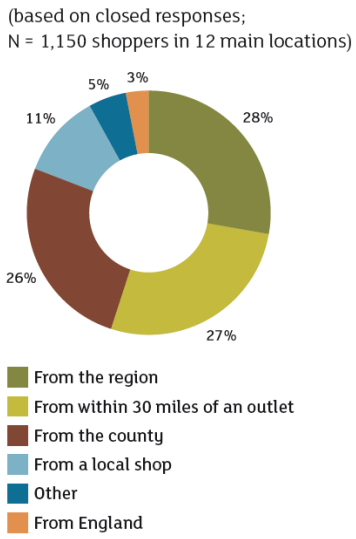
The issue of local/global food is also increasingly relevant in the organic sector. Raynolds (2004: 725) observes that "the organic agrofood system has been transformed from a loosely coordinated local network of producers and

[1] The figures in this paragraph are based on CPRE (2012: 14).

consumers to a globalized system of formally regulated trade which links socially and spatially distant sites of production and consumption". This development has led to a decupling of locality and organic production methods as "escalating demand for organic foods in the global North has fueled burgeoning imports of tropical products, counterseasonal fresh produce, and commodities produced locally but in insufficient quantities" (ibid: 725).

Especially among food activists and in socio-environmental movements, a wide-spread reaction to this phenomena has been the endorsement of 'local food'. Although the latter is an apparently obvious term that refers to a strictly defined geographical perimeter including both producers and consumers, the question when food should be considered as being 'local' is not easy to answer. Kneafsey et al (2008) present three overlapping conceptions of local food, respectively based on a) food produced, processed and retailed within a defined radius; b) product, process and place attributes of food; and c) food that deliver certain benefits. Other concepts define local food based on the type of outlets in which the food is sold (CPRE 2012: 14). Even the straightforward definitionof 'local food' based on a specific geographic producer-consumer distance can lead to very different interpretations ranging from a radius of 30 miles to the entire country (see Figure 2 below). Unsurprisingly, large supermarket chains such as Tesco define 'local' by referring to the national rather than infra-national scales.[2]

FIGURE 2 – CONCEPTIONS OF 'LOCAL FOOD' AMONG SURVEY RESPONDENTS IN THE UK



Source: CPRE (2012: 49).

The endorsement of local food, often under the banner the 'relocalization of agriculture' is intuitively appealing and has helped to federate the alternative food movement. However, it has also been vehemently critized on both theoretical and empirical grounds. Born and Purcell (2006: 195) have summarised this critique as the "local trap", a common fallacy that they define as "the tendency of food activists and researchers to assume something inherent about the local scale". In their influential article on this issue, Born and Purcell explain the key idea about the fallacy as follows:

> "To be clear, the concept of the local trap is not an argument against the local scale per se. We are not suggesting that the local scale is inherently undesirable. Rather, the local trap is the assumption that local is inherently good. […] Local-scale food systems are equally likely to be just or unjust, sustainable or unsustainable, secure or insecure." (ibid: 195)

[2] Source: http://www.tesco.com/greenerliving/greener_tesco/what_tesco_is_doing/local_sourcing.page [accessed 14 04 12]

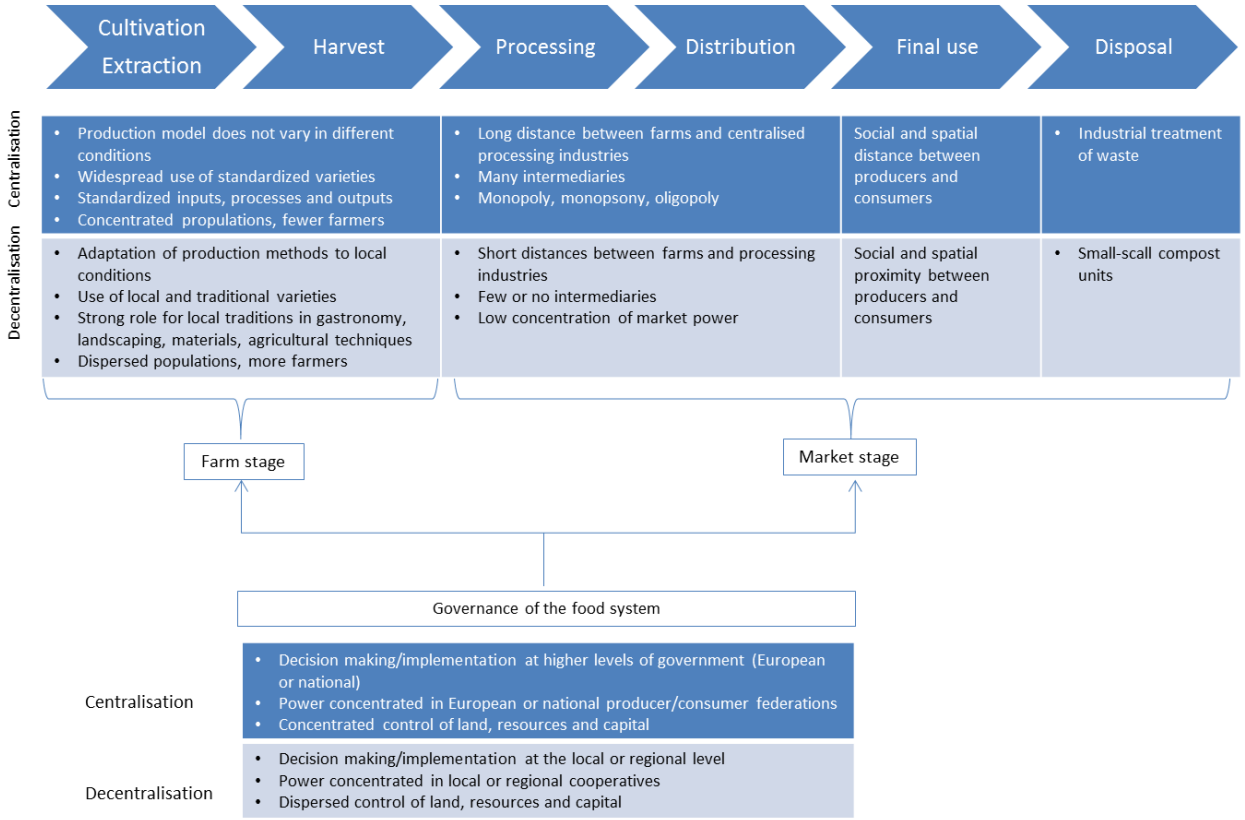
In order to avoid the local trap, Born and Purcell recommend to regard scale not as independent entities but as strategies: whether producing food at local or non-local scales is desirable or not, does not depend on the scale itself, but rather on who is empowered by these strategies.

We address this important issue by treating neither the scale (local vs non-local) nor production techniques (organic vs convention) as inherently good or bad. Instead, we skim the existing literature for evidence on the socio-economic and environmental outcomes associated with these different strategies in order to provide a more nuanced evaluation.

Moreover, we do not treat scale as a simple opposition between local and non-local food, but rather through the more broader distinction between centralisation and decentralisation. According to Beus and Dunlap (1990: 590), this is one of the major dimensions allowing to distinguish the "conventional agriculture paradigm" from the "alternative agriculture paradigm". To some extent, decentralization is to be understood here in analogy to decentralized systems of electricity production, which equally pursue the objective to spatially reconnect production units with consumers by (partially) avoiding the necessity to rely on distribution infrastructure/network grids.

We can use the representation of food systems and their value chains presented in Figure 1 to contrast centralisation/decentralisation. Figure 3 shows how the different phases of the value chain can be more centralised or more decentralised. For instance, the cultivation and harvest phases can be either characterised by a production model that does not vary in different climatic conditions (centralisation) or be adapted and therefore more heterogeneous in response to varying local conditions (decentralisation).

FIGURE 3 – CENTRALISATION AND DECENTRALISATION ALONG THE VALUE CHAIN OF FOOD SYSTEMS



In addition to the six different production phases of the value chain, Figure 3 also incorporates another important element of the food system that can be more or less centralised, namely its governance structure. The governance can

be characterised by policy making that attributes a more important role to the European or national level (centralisation) or to local or regional levels (decentralisation).

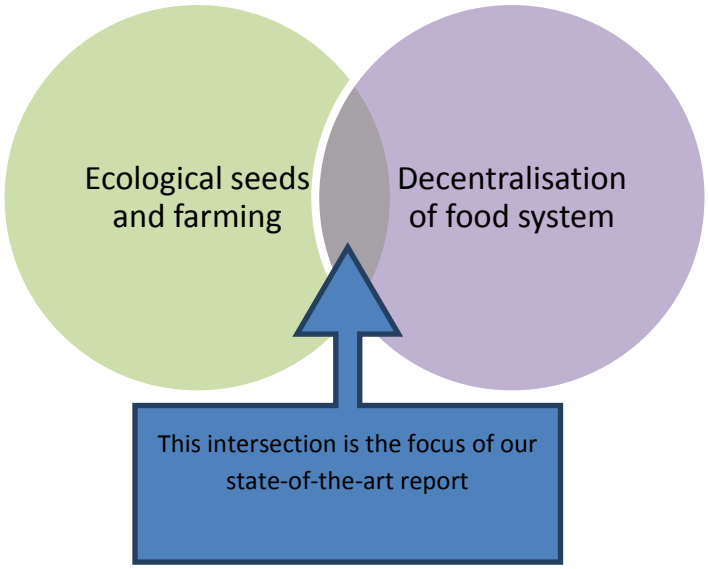
Based on the definitions of ecological seeds and farming and centralisation/decentralisation of the food system, we can distinguish different three main configurations of the food system:

a) a food system that is decentralised but in which traditional (agro-industrial) production techniques prevail
b) a system that attributes a central role to ecological seeds and farming but in which supply chains, market structure and governance remain centralised
c) finally, a system that combines ecological seeds and farming with a high degree of decentralisation

Despite the fact that the organic food movement has long been driven by local producers and small social and geographical distances between consumers and producers, it should be noted that both configurations a) and b) are increasingly common. Configuration a) can result from a special version of the 'local trap' if the endorsement of local food is not accompanied with a shift in production methods. Configuration b) has emerged in most MS of the European Union because demand for organic products currently exceeds supply and because much of the demand is directed towards tropical (such as bananas, coffee, tea, cocoa, and spices) or counterseasonal products (such as apples, pears, lettuce, and asparagus) (Raynolds 2009: 726).

In the context of this study, we are concerned with the socio-economic and environmental outcomes associated with configuration c), i.e. the intersection between decentralization and ecological seeds and farming (see Figure 4). This intersection arguably includes a range of production practices like different forms of local breeding, local farming and gardening in urban, peri-urban and rural contexts, community-based agriculture, and other innovative initiatives that spatially (re)connect urban foodstuff consumers to more locally produced food by questioning and complementing the current distribution networks. For instance, decentralization might reduce food losses.

FIGURE 4 –CONFUGURATIONS OF FOOD SYSTEMS WITH ECOLOGICAL METHODS AND DECENTRALISATION



2 IMPACT ASSESSMENT

2.1 SOCIO-ECONOMIC IMPACT ASSESSMENT

2.1.1 FARM STAGE

Specialization, diversification and integration

Specialisation and increasing farm size have been major trends in European farming since the 1950s. The literature in agricultural economics attributes this development to several factors: falling transportation costs and international trade forced agricultural regions to specialize in products in which they have a comparative advantage (Mazoyer and Roudart 2002); cost advantages that accrue from operating at a larger scale, for instance by using bigger, specialised machinery (Blomme 1993); and the preference of the distribution sector to source from a few big suppliers instead of dealing with a large number of small, diversified producers (King et al. 2010). Agricultural policy in Europe and the US has also played a role in this development. In the 1960 and 1970, US Secretary of Agriculture Earl Butz, for instance, argued that increasing farm size is necessary to "have a chance to grow into an economic unit that keeps up with the times" (Butz 1971: 5).

Instead of producing only one or a small number of products in a given agricultural region and importing the rest from other specialised regions, a decentralised food system requires producing a wider range of products within each region. While such regionalisation does not preclude that some farms within the region remain specialised, it can be argued that intra-regional diversification implies a larger number of relatively small farms. A study on local food webs in the UK indeed notes that "local food and small scale are closely related" (CPRE 2012: 39). Smaller farm size is attributed not only to the diversification of farms, but also to the smaller size of geographically bounded markets that in turn lowers the optimal farm size.

Intra-regional product diversification and smaller production units could lead to higher production costs: in many cases diversification implies lower economies of scale and the underutilization of comparative advantages. But some authors, especially in the literature on agroecology, have argued that smaller scale and diversification more than offsets short-term cost disadvantages by delivering long-term economic benefits. Based on the example of traditional Amish farming in the US, Berry (1987) and Logsdon (1986) conclude that the Amish are "the prime example of farmers who have eschewed the conventional wisdom of modern agriculture and who have generally prospered during a period of agricultural recession" (Beus and Dunlap 1990). This performance is attributed to the fact that "the Amish have kept their farms small and have remained relatively independent of the agribusiness complex upon which most farmers rely" (Beus and Dunlap 1990). For instance, smaller farms are typically less reliant on credit and less likely to default during episodes of low prices. Since the Second World War, the risk associated with excessive debt has greatly increased due to the fact that farmers haven take out ever-greater loans for expensive machinery, the purchase of seeds, fertilizers and chemicals, to the point that "the business farmer considers credit as one of his essential costs" (McMillen 1981: 365). Product diversity can also yield economic benefits if it increases the farm's resilience against price fluctuations of individual products. The overall impact on economic performance therefore depends on whether the lower economies of scale and underutilization of comparative advantages in a decentralised system are outweighed by higher economic resilience.

In addition to diversification, a decentralised food system also implies more integrated farms because more inputs would be produced within each agricultural region instead of being imported from other regions. Like for the case of output specialisation, the externalisation of inputs has been the predominant tendency in European agriculture: the share of external inputs in total added value has increased from zero on completely integrated traditional farms in the early 19th century to more than 50 % in modern conventional agriculture (Blomme 1993). External inputs have been identified as a main determinant of the greatly increased productivity of many European farms, as it allowed to overcome the main input constraint (the limited size of arable land) by the external sourcing of fodder and fertilizers.

The external sourcing of seeds has been an essential element of the agro-industrial model. It has lead to a highly centralised system in which a few large suppliers produce a limited variet of high-yielding breeds which are commercialised and cultivated in different regions. De Schutter (2010: 6) underlines how this strategy corresponds to the industrial model of production: "Most efforts in the past have focused on improving seeds and ensuring that farmers are provided with a set of inputs that can increase yields, replicating the model of industrial processes in which external inputs serve to produce outputs in a linear model of production."

The externalization of inputs also reflects the specialization of some farms and regions that have a comparative advantage in producing certain types of inputs. However, if defined as the ratio between inputs and outputs, higher productivity does of course not necessarily imply higher profits if the total cost of the external inputs rises more than the total value of the output. Indeed, some authors suggest that producing more inputs internally can lead to cost advantages. De Weerdt (2009: 24) argues that the empirical studies carried out by agricultural economist Ken Meter suggest "that farmers could reduce their spending on inputs sourced from far away by re-adopting old systems that combine crops and livestock, grazing livestock on renewable pasture and using the manure to fertilize their fields". It should be noted that there is a clear link between decentralization and the possibility of the internalization of inputs. As De Weerdt notes, the traditional production of inputs on the farm "really only makes sense on a local scale". More recently, many authors concerned with the depletion of fossil fuels ('peak oil') predict an inevitable rise in the cost of external inputs and transportation costs (Servigne 2014). The fact that farmers producing their inputs internally are less exposed to fluctuations of input prices – and therefore more resilient - is therefore likely to become more and more relevant in the future. Agroecology is a promising strategy in this regard as one of its core principles consists in "recycling nutrients and energy on the farm, rather than introducing external inputs" (De Schutter 2010: 6).

Economic performance of organic and conventional agriculture

The European market for certified organic food is rapidly growing. In 2010, the trade volume of organic products in the European Union reached 20 billion euros (Köpke and Küpper 2013: 3). A rigorous economic analysis of the organic sector is, however, not yet available. As stated by the DG Agriculture of the European Commission, "due to insufficient data on certain aspects of organic production and of the organic food chain (in particular sales and trade) a complete picture of the sector is at this point in time unavailable".

We can nevertheless compare organic and conventional agriculture with available data on economic variables such as labour intensity and farm size. According to the European Farm Accountancy Data Network, organic and conventional farms operating in the same sector and with similar size "seem to confirm that organic farming is more labour intensive for certain types of production" (DG Agri, 2013: 22). Table 1 illustrates the higher labour intensity in organic field crop farms and organic milk farms in Germany, France, Austria and Poland (organic crop farming in Spain appears to be relatively less labour intensive). By contrast, Eurostat's Farm Structure Survey shows that organic farming is less labour intensive at the aggregate level in most Member States. The relationship between labour intensity of different production methods and its impact on employment or production costs is therefore unclear and depends on the sector and the level of analysis.

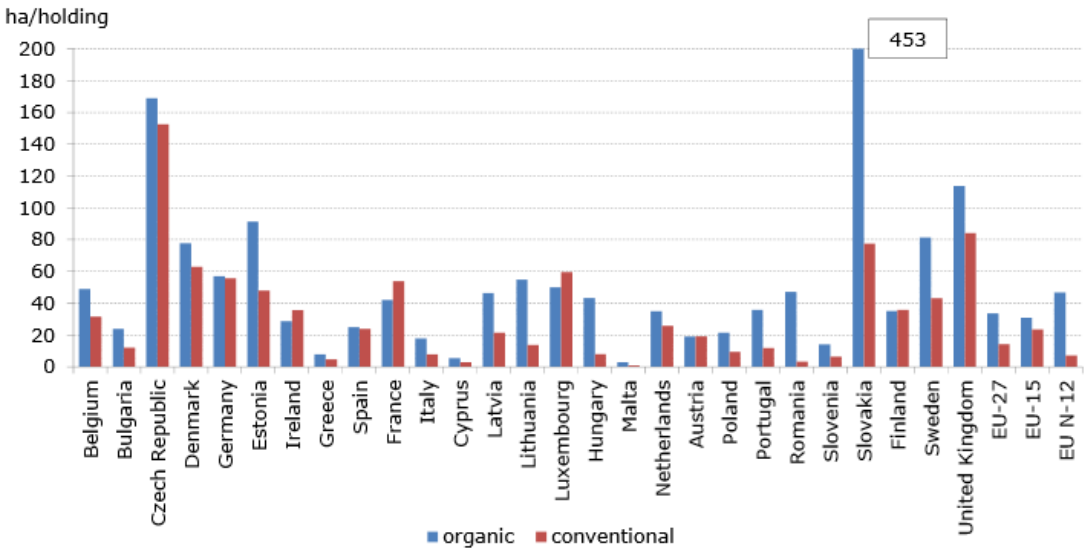
TABLE 1 : LABOUR FORCE INTENSITY IN 2008.

Countries	Avg. ha/AWU in field crops farms		Avg. dairy cows/AWU on milk farms	
	Conventional farms	Organic farms	Conventional farms	Organic farms
Germany	62.1	53.7	26.9	18.7
Spain	50.2	70.0	-	-
France	62.7	37.2	26.9	25.0
Austria	42.0	35.5	10.2	9.1
Poland	13.7	8.3	-	-

Source: Farm Economic Briefs n°4 (forthcoming) based on EU-FADN.

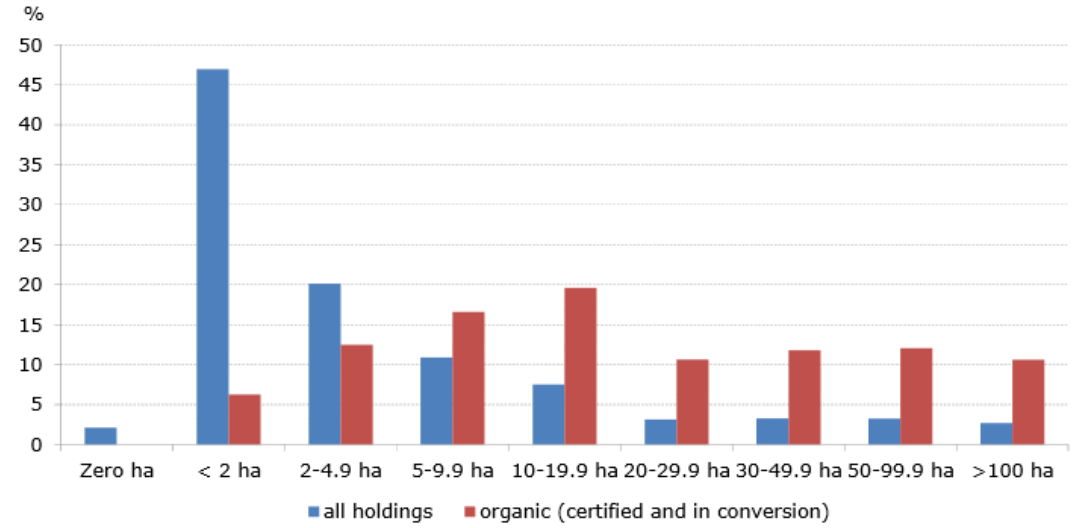
Another wide-spread assumption about organic farms is their relatively smaller scale. However, recent data from Eurostat's Farm Structure Survey suggests that the average surface of organic holdings is actually bigger compared to conventional holdings in most Member States of the EU (see Figure 5). This surprising result is partly due to the large number of small conventional holdings that are operated on a part-time basis: more than 60 % of all farms in the EU are smaller than 5 ha (compared to only 20% of organic farms) (see Figure 6). As a consequence, it is currently difficult to venture scientific inferences about potential (dis-)economies of scale associated with organic farming.

FIGURE 5: AVERAGE SURFACE OF ORGANIC AND CONVENTIONAL HOLDINGS IN 2010



Source: Eurostat FSS data (online data code: ef_mporganic).

FIGURE 6: SHARE OF HOLDINGS IN DIFFERENT SIZE CLASSES (ORGANIC AND ALL) IN 2010



Source: Eurostat FSS data (online data code: ef_mporganic).

Another important determinant for the relative economic performance of organic farming is yield per hectare. Some studies have concluded that the yields of organic farming match or even exceed conventional yields (Badgley et al. 2007), but an influential meta-study compiling results of 66 scientific articles provides substantial evidence that yields in organic systems are on average 25% lower than conventional yields (Seufert et al. 2010). The lower yields depend, however, on the context and are less important for perennials and leguminous plants (ibid: 230). Moreover, on weak-

acidic to weak-alkaline soils and in rainfed conditions the yields of organic agriculture are only 5% lower than conventional yields (ibid: 231). The authors attribute the weaker performance to limitations in the absorption of nitrogen in organic systems. By contrast, the systematic study by Pretty et al (2006: 1114–1119) finds that agroecological techniques could increase crop yields by as much as 79%.

The literature in agroecology often argues that key advantages of organic systems are stable or even increasing yields, whereas conventional yields tend to decrease over time (Martini et al. 2004). This view is also held by actors that were interviewed in the Grishun case study that argued that the economic benefits of small-scale organic agriculture take time to materialize: soil formation and improved water retention can take several years or even decades. The meta-study by Seufert et al (2010) supports this claim. As a consequence, the lower yields currently observed in organic systems could be more than compensated by relatively higher future yields, leading to the so far unanswered question whether the economic benefits of the 25% higher current yields of conventional agriculture are more than off-set by the cost of depleting the resources of the soil. The lower current yields of organic systems could also be off-set by their better water-holding capacity and water infiltration rates (Seufert et al. 2010); better performance under drought conditions and excessive rainfall (Letter et al. 2003); and higher antioxidant concentrations and less cadmium and pesticide residues (Baranski et al. 2014). Further research on system comparisons could help to validate these results in specific agroecologic conditions such as the Farming System Comparison in the Tropics that carried out by the Research Institute of Organic Agriculture (FIBL).

Comparing agroecological and conventional production systems is, however, subject to important caveats such as potential interactions between the two approaches. While the literature has established the potential benefits of certain agroecological techniques (such as integrated nutrient management, agroforestry, water harvesting or the integration of livestock into farming systems), De Schutter (2010: 1) argues that these approaches should not be considered as being diametrically opposed but instead as "complementary to better known conventional approaches such as breeding highyielding varieties". As a consequence, it can be difficult to distinguish the contribution of agroecological techniques if they are using elements of conventional agriculture such as high-yieldings breeds.

It should be noted that organic certification does not imply local or even national production. In Germany, for instance, the trade volume of organic agriculture has increased by 127 % in the last ten years, whereas the proportion of organically cultivated land has risen by only 47 % over the same period (Köpke and Küpper, 2013, p. 3). Different economic factors can lead to a decoupling of organic and local production: the demand for organic food covers a range of products for which many regions in the EU have a prohibitive comparative disadvantage (e.g. it would be extremely costly to produce rice or bananas in Nothern Europe); the demand for organic products does not necessarily follow seasonal production patterns so that organic products are imported during the off-season; finally, organic producers in different regions try to establish regional provenance as trade marks in order to boost exports to other regions or countries (Köpke and Küpper, 2013, p. 17).

A major driver of the decoupling of organic and local food has been the integration of organic food into the product range of large supermarket chains. Today, most supermarket chains take advantage of the popularity of organic products and their 20‑40% price premia (FAO/ITC, 2001, p. 6). This constitutes a fundamental change in the distribution of organic food that was "once supplied only by alternative movement venues such as farmers markets, box schemes, and small food coops" but has now made "dramatic inroads in conventional distribution channels" (Raynolds, 2004, p. 733). In Section 4.1 below we conceptualise the evolution of the organic market as "up-scaling" of a niche strategy and discuss the inherent tensions of such a movement, including a change in the identity of the niche practice. Indeed, the integration of organic production into supermarket chains not only affected the geography of production but also a series of other conventions along the supply chain such as "upholding industrial and commercial conventions in the establishment of large-volume, highly regimented, long-distance supply networks and the sales of standardized (often processed) products for affluent consumers" (Raynolds, 2004, p. 734). These tendencies are

visible in most OECD countries, although the role of conventional supermarkets in the organic distribution system appears to be the strongest in Denmark, Great Britain, Switzerland and France (see Table 2).

Table 2: Organic distribution systems in major markets.

Country	Conventional super markets (%)	Natural food and specialty stores (%)	Direct and other sales (%)
United States	31	62	7
Germany	26	46	28
Great Britain	74	15	11
Italy	23	60	17
France	38	46	16
Switzerland	57	21	22
Netherlands	2	96	2
Denmark	90	2	8

Source: Raynolds (2004, p. 733)

According to Dolan and Humphrey, J. (2000), the monopsony power of supermarkets vis-à-vis organic suppliers is the greatest in the UK where Tesco and Sainesbury each account for 30% of total organic sales, two companies that "virtually rule their national and international organic supply networks" (Raynolds (2004, p. 733).[3] These large retailers are "not only dictating product specifications and quality but also the planting, harvesting, packaging, transportation, and delivery of products" (FAO/ITC, 2001, p. 196). Similarly, US supermarkets "typically bypass local organic sources and establish strategic alliances and supply contracts with national and international producers and shippers to ensure large, continuous, and inexpensive organic supplies" (Raynolds, 2004, p. 734; King et al, 2010).

The combined effect of increased demand and price premia for organic products and their integration into the long-distance and bulk systems of supermarket logistics is that many countries import organic fruits and vegetables that could also be produced more locally.[4] According to Köpke and Küpper (2013), half of all organic apples and carrots that have been sold in Germany in 2010 have been imported from abroad (p. 10).

In all, it appears that the price premia that consumers pay for most organic products are not sufficient to incite conventional farmers to a) switch to organic production and b) sell their output on local or regional markets. The organic price premia are often captured during the market stage of the value chain, while producer prices in key markets such as Germany remain too low to render the conversion investments profitable for conventional farmers (Köpke and Küpper, 2013, p. 13). But higher producer prices alone would not necessarily put an end to the decoupling of organic production and local sourcing. While a relative increase in producer prices would probably incite more farmers to adopt organic methods, it would not necessarily incite supermarkets to modify their logistics and source more organic products more locally. For this to happen, the price premium that is currently associated with organic production methods would have to be linked to the local origin of food products (King et al, 2010); if the entire value chain is to be decentralised, the premium also needs to be linked to input factors such as locally produced seeds, for instance by creating recognisable regional varieties of seeds and appropriate labels.

[3] UK supermarket chains not only dominate the organic but also the conventional grocery market, with the 'big four' chains accounting for around 75-76% of all sales in 2012 (CPRE, 2012, p. 13).

[4] For the environmental impact of local versus non-local production, see Section 5.

2.1.2 MARKET STAGE

Vertical and horizontal networks

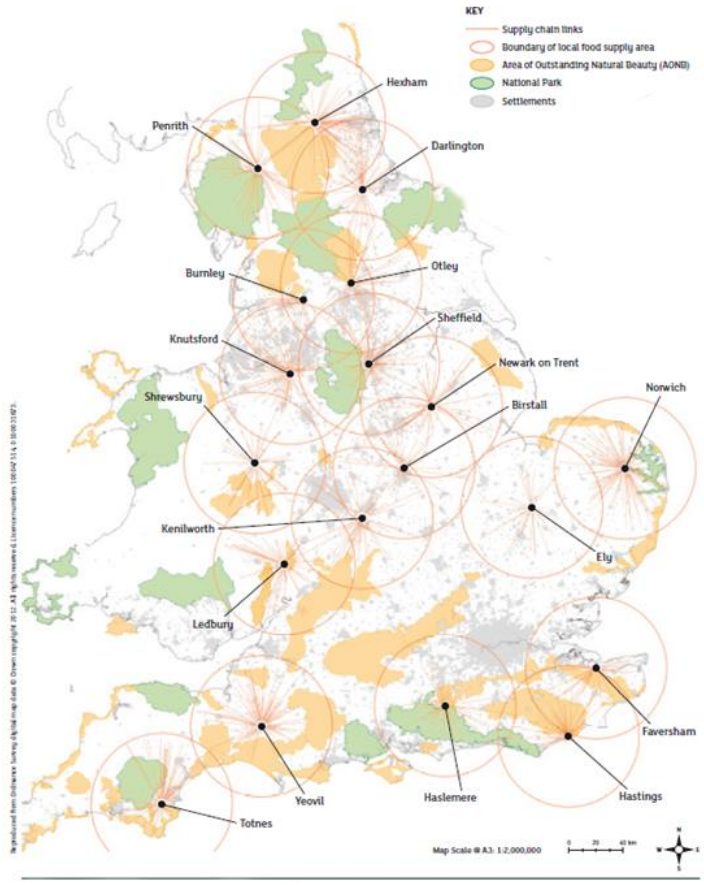
From the preceding discussion it is clear that the economic impact of decentralised and ecological agriculture strongly depends on processes that take place during the market stage of the value chain. As regards the distribution of organic products in OECD countries, Reynolds (2004) argues that we see today a "bifurcation between market- and movement-oriented organic distribution systems and consumers" (p. 734): the former refers to the distribution of organic produce through the supermarket industry and the latter to local niche channels such as box systems and community supported agriculture.

A promising framework for transitioning from local nice channels to a decentralised food system is the concept of 'local food webs' that has been coined by activist Caroline Cranbrook. The notion of local food webs emphasises the economic interconnectedness of a series of interdependent and heterogenous actors at the local or regional scale. It has been instrumental in showing why local food economies cannot be understood when researchers analyse local producers and their business models in isolation. The key argument is that local producers appear to perform much better when they operate in dense networks in which they interact with other players such as local suppliers and producers, distributors, retail shops, restaurants and consumer organisations. In other words, a decentralised food system requires not only the existence of local diversity on the production side; a dense local food web can ensure that the production reaches consumers through convenient channels and at acceptable prices and quality.

One of the main conclusions of Cranbrook's work is that supermarket chains and their national or international distribution channels can decrease the density of local food webs and thereby jeopardize the economic model of each of the actors of which it is composed (cf. Clarke and Bunga, 2009). For instance, a study from 1997 on the economic impact of a new supermarket chain outlet outside the market town of Saxmundham predicted that more than 80 percent of local retail outlets would close if the supermarket was built, generating substantial net employment losses in the area (Cranbrook, 2006, p. 10). It is, however, not clear which proportion of these job losses are directly related to the food system given that large supermarkets also sell non-food items.

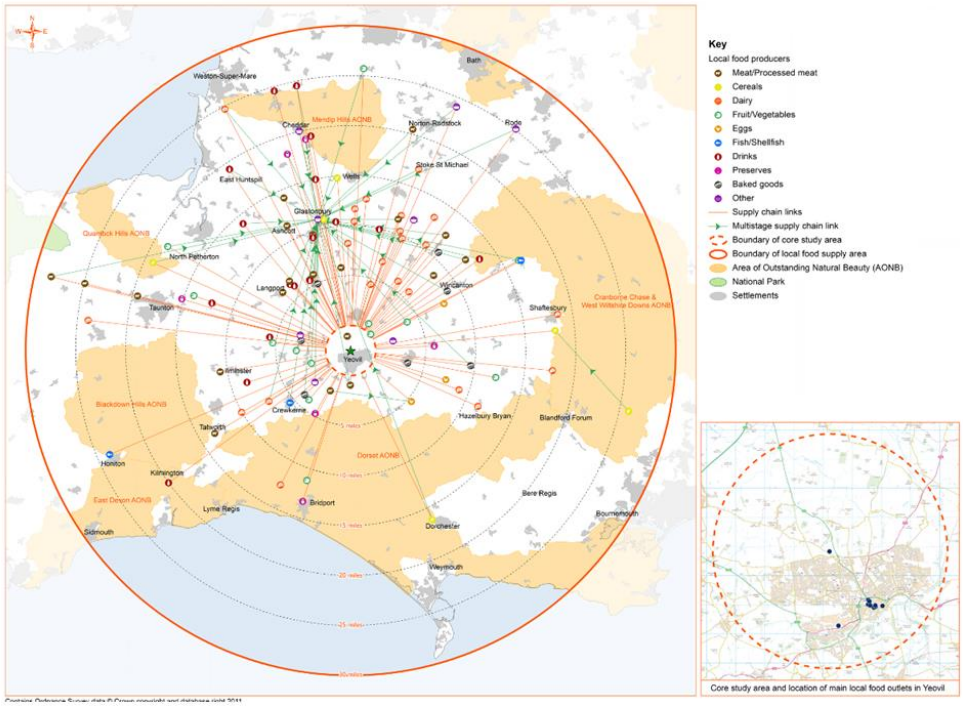
Through fieldwork in the project "Mapping Local Food Webs" carried out from 2007-2012 in 21 towns and cities across the UK, the Centre for the Protection of Rural England showed that most businesses in local food webs are small, with 69% micro-businesses with fewer than 10 employees (CPRE , 2012, p. 39; see Figure 7). An example of a network effect highlighted by the study relates to the interactions between local abattoirs, butchers and meat producers. In England, the number of abattoirs has fallen from 2300 in the early 1960s to 660 in the 1990s. This development has been accompanied by a shift in the distribution of meat: In the early 1960s traditional butchers' shops accounted for 97% of retail meat sales, whereas in 1990s 40% of the market in beef, veal and pork was sold in supermarkets. Without local abattoirs and dominated by the distribution channels of supermarkets, meat producers often have no access to local markets and have to sell their meat on national or international markets (CPRE, 2012, p. 46). Local food webs can therefore be seen as necessary infrastructures that can render local production and consumption economically viable. They can create logistical benefits for retailers and producers from sourcing and supplying produce locally, such as "shorter and quicker delivery times, lower transport and fuel costs and less or no storage needed, especially costly refrigeration, as well as keeping produce fresher" (CPRE, 2012, p. 9).

FIGURE 7 : MAP OF SURVEY LOCATIONS IN THE 'MAPPING LOCAL FOOD WEBS' PROJECTS BY THE CPRE



Source: CPRE (2012, p.8).

FIGURE 8 : EXAMPLE OF A LOCAL SUPPLY CHAIN FROM YEOVIL



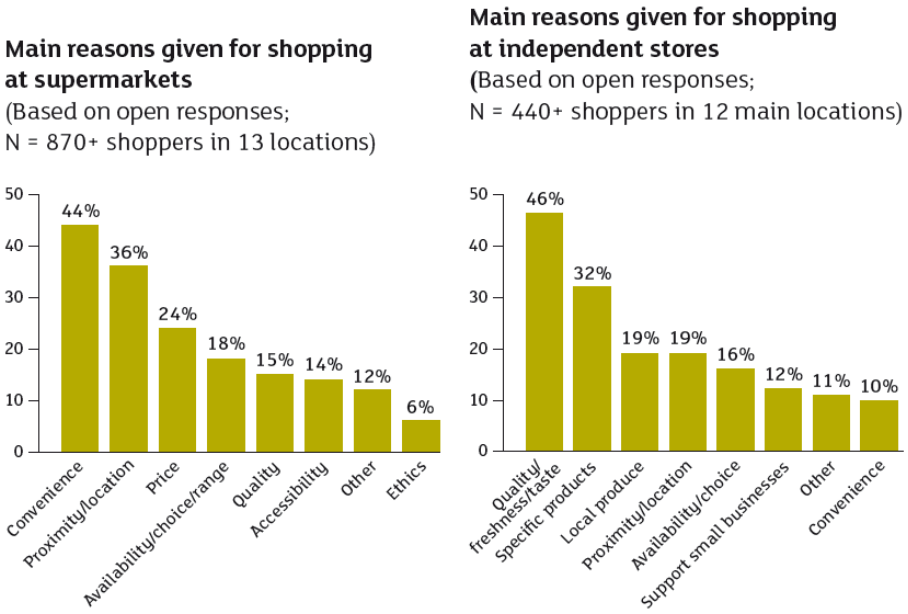
Source : http://www.cpre.org.uk/resources/farming-and-food/local-foods/item/3250-yeovil-local-food-web-map

Within local food webs, cooperation between producers can lead to bigger organically cultivated land units and therefore to economies of scale in the food production. Based on this observation, Köpke and Küpper (2013) propose to convert entire villages or even regions to organic agriculture. This could allow for "new and efficient cooperation between the market actors" including inter-farm cooperation, more efficient division of labour and a certain degree of farm specialisation within each village/region (Köpke and Küpper, 2013, p. 17). In such producer networks, it would also be easier for farmers to have external employments and facilitate farm succession.

A dense network is also important to make the distribution of local food profitable. King et al (2010) argue that speciality distributors such as Co-op Partners Warehouse in the Upper Mid Midwest of the United States play an important role in decreasing transportation costs in local food webs by avoiding the extremely time consuming direct delivery from producers to retail outlets (p. 2). They also see a role for regional supermarket chains in the distribution of local food, as they can combine the efficiency of stream-lined logistical chains with local sourcing.

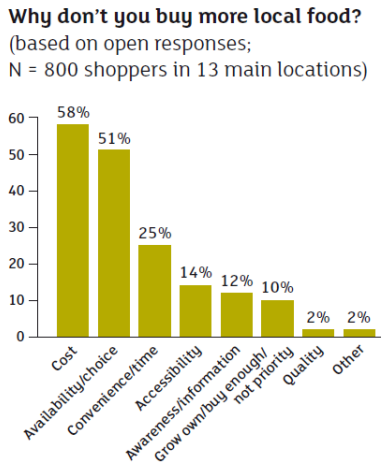
But there are also significant costs from operating within local food webs. The survey results of CPRE (2012) confirm that "both small outlets and suppliers find trading on a small scale at times frustrating and inefficient" (p. 10). Trading locally among multiple commercial partners can increase the time spent on invoices or orders; restrict the number of suppliers and their catchment area as well as the consistency, availability, types and range of produce that local retailers can offer (CPRE, 2013, p. 10). Also the consumers would incur losses if decentralisation means to move away from supermarket chains that are often perceived to be highly convenient (see Figure 9) and if the higher costs of trading within local food webs lead to higher food prices (see Figure 10).

FIGURE 9 : MAIN REASONS GIVEN FOR SHOPPING AT SUPERMARKET AND INDEPENDENT STORES.



Source: CPRE (2012, p. 49)

FIGURE 10 : MAIN REASONS FOR NOT BUYING LOCAL FOOD.



CPRE (2012, p.51).

While the approach of local food webs is appealing, network theory can help to nuance the analysis. Following the terminology proposed by Kneafsey et al (2001), the interactions within local food webs can be seen as 'horizontal networks' and "refer to links to non-agricultural interests in or near the local area" (Born and Purcell, 2006, p. 299). However, Kneafsey et al. (2001) argue that local economies need to find ways to combine such horizontal networks with vertical networks, the latter referring to a "broader set of processes which exist beyond rural areas". Focusing exclusively on horizontal networks can be a serious limitation as it ignores economic benefits that arise from the cooperation with external, non-local actors, for instance from attracting tourists or from importing of off-seasonal or non-local products from other regions.

Finally, recent contributions in scale theory remind us that the local scale of horizontal food networks is not in itself a guarantee for economic benefits – just as non-local processes are not inherently bad for local economic interests. Born and Purcell (2006) argue that "local systems can lead to greater face-to-face interaction that can lead to more trust and regard between producers and consumers", but warn that "this causal chain does not necessarily result in either better information for the customer or more sustainable or just food systems" (p. 203). Other mechanisms, such as appropriate labelling are "just as likely to provide reliable information as a farmer or merchant at a local farmers market who wants to sell and has an incentive to misinform" (p. 203). This being said, the CPRE research suggest that information about food quality and links between producers and consumers are easier to transmit within local food webs since local retailers are able to maintain direct relationships with both suppliers and customers as they often act as convenient information brokers (CPRE, 2012, p. 6). One retailer summarized his role by saying that "it's important that customers understand what farming entails and how farming and the business work. People need to understand how they are able to get the product they want for the price they want" (CPRE, 2012, p. 6).

This being said, the literature on horizontal food networks still needs to hypothesize more clearly which of the network characteristics (shorter transportation distances, informality, trust, number of interactions etc) are potentially related to beneficial economic outcomes (quality, freshness, competitive prices, local employment, income gaps, social justice etc). Empirical evidence testing such hypotheses is still rare; however, the literature in this area could probably benefit from insights in more mature field such as cluster analysis in geographical economics.

Import substitution and the local food economy

Advocates of more localized food systems typically emphasize the positive impact that these would have on the local economy. By and large, this literature is still more informed by activist than by academic publications. Economic benefits are analysed at different scales, such as individual towns and their immediate hinterland (Ward et al, 2013), particular types of local food systems (Saltmarsh et al, 2011) or nation-wide assessments (CPRE, 2012).

A common element in the economic narrative of local food activists is that local communities could gain from keeping profits within the local economic system instead of letting them 'leak out' to other areas. De Weerdt (2009) cites agronomist Ken Meter's assessment from his study of US regions according to which "every region that I've studied is losing hundreds of millions of dollars a year as dollars flow out of the community" (De Weerdt, 2009, p. 21). By selling farm products to other regions and importing food from elsewhere through the supermarket system, profits flow "to the supply industries, the service industries, to agriculture, and the financial sector — not to the farm and certainly not to the rural community." (ibid, p. 21). More generally, Beus and Dunlap (1990) see the "demise of family farms and local communities" as a negative side effect of large-scale, highly industrialized agriculture in the United States (p. 591).

Potential local economic benefits could arise through different mechanisms: first, the profits captured by non-local actors, especially supermarket chains, leak out of the community when they are transferred to the headquarters situated in other areas; second, a community can have a negative trade balance in food, i.e. its consumers spend more money on imported food than its producers earn from exports; third, the money spend on local food products could give rise to economic flows that are greater than the value of the initial transactions. In economics the last point is referred to as the multiplier effect and has been analysed extensively by the New Economics Foundation as the 'money trail' (Sacks, 2002).

BOX 1 : ECONOMIC VALUE OF LOCAL FOOD IN THE UK

The leaky bucket

Cranbrook (2006) reports that up to 90% of supermarket revenues immediately leave the area. In the UK, where supermarket chains account for 97-98% of grocery sales in 2012 (CPRE, 2012, p.13), around 87% of all money spent on fruits and vegetables would therefore leak out of local communities. What is more, spending in smaller independent outlets would directly support three times more jobs than at national grocery chain as the ratio of jobs per pound of turnover is much higher in smaller retail outlets than in supermarket chains: (46.000 pounds per job in local food outlets compared to 138.000 pounds in supermarket chains (CPRE, 2012, p.3; figures are on headcount basis).

The trade deficit

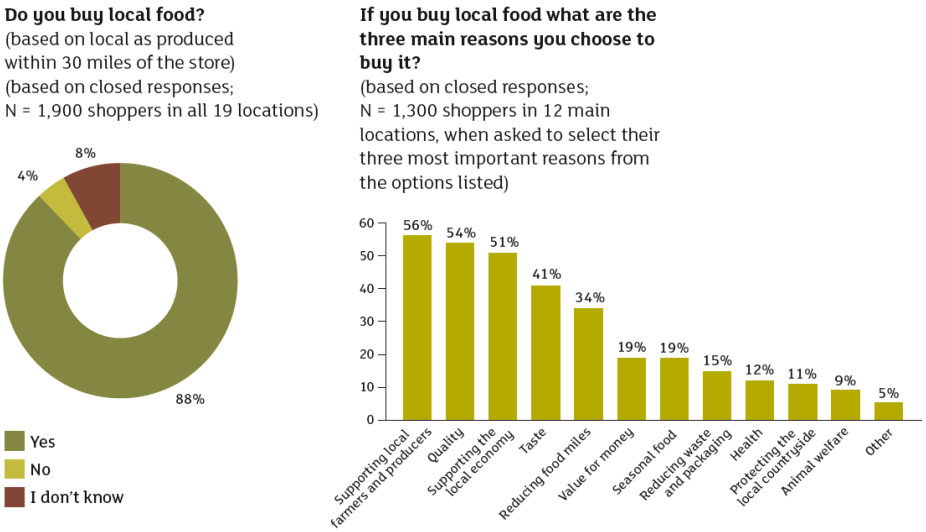
Regional data on trade balances in food is not readily available but can to some extent be inferred from national trade gaps. According to official DEFRA statistics, the UK trade deficit in food in 2009 was 18.5 billion pounds. This deficit is due to a 23% decrease of domestic vegetables and a 51% increase of imports over the last 20 years. According to CPRE (2012), "the UK fruit production between 1994 and 2004 fell by 24% by volume while imports grew by 38%. The UK is only 9% self-sufficient in fruit generally and this rises only to 16% for fruits native to the UK such as apples, cherries, pears and plums" (p. 17).

The money trail

Locally spent money recirculates and is often immediately spent (and earned) for other locally provided goods and services. According to research by the New Economics Foundation, the multiplier effect of one pound spent on local food in a local outlet is around 2.5 (NEF, 2001).

According to the CPRE survey, the economic impact on the community is the main reason motivating consumers to buy local food, with 56% citing the support of local farmers and producers as the main reason for their purchasing decision (see **FIGURE 11**).

FIGURE 11 : INCIDENCE AND REASONS FOR BUYING LOCAL FOOD.



CPRE (2012, p. 50)

While the economic value of local food networks is therefore potentially big, it should be noted that so far "there's been no instance of a community actually undertaking such a shift and seeing the predicted economic benefits

materialize" (De Weerdt, 2009, p.22). As a consequence, the predictions of potential value for local economies should be used with caution: the local food movement is still too new and too small in order to make robust inferences about the size of associated multiplier effects in terms of production and employment.

To some extent the decentralisation of food systems implies substituting imported for locally produced food, a strategy that economists refer to as 'import substitution' and whose economic benefits have been the object of protracted debates since the 19th century. The study of import substitution goes back to David Ricardo's critique of the British Corn Laws that imposed substantial tariffs on wheat imported to Britain from abroad. This protectionist measure, so the argument goes, does not allow different economies to specialize in the products in which they have a comparative advantage. According to Ricardo, the British economy would stand to gain by trading cheap wheat from abroad against British manufacturing products. In his still highly influential theory of international trade, he went on to show that the exploitation of relative comparative advantages would make all trading partners better off. Indeed, a decentralised food system could be highly inefficient as each region would produce goods in which it has no comparative advantage: instead of producing both fruits and milk in the South of Spain and the North of Belgium, given sufficiently low transportation costs both regions could increase production volumes and decrease relative prices by producing only vegetables in Spain and only milk in Belgium. Born and Purcell refer to this mechanism when they state that "buying locally can produce economic losses for the community […] if the community is missing an opportunity to benefit from another region's comparative or absolute advantage" (Born and Purcell, 2006, p. 202).

Apart from its debatable definition of what it means to be 'better off' – Ricardo focused exclusively on quantities and prices at the aggregate level – it should be noted that the theory of comparative advantage has distributional implications that are often overlook by mainstream economists. This can be illustrated by Ricardo himself, who has become an immensely rich businessman through investments in the British manufacturing sector. Indeed, the abolition of the Corn Laws in 1846 favoured factory owners in the manufacturing sector and hurt the class of landowners: the cheap imported wheat meant that wages in the manufacturing sectors could be decreased, leading to higher profits and competitiveness of the factories but also to lower profits and rents for the owners of arable land.

To be sure, having a comparative advantage in high value-added products is more beneficial than an advantage in low value-added products. Regions that have comparative advantage in commodity crops produce less value per hectare compared to regions that can specialize in fruits and vegetables production. In a decentralised food system, both commodities and produce would be dispersed among all areas, which could lead to economic benefits in regions currently focusing on commodities such as Iowa, even if their comparative advantage continues to be in commodity crops (De Weerdt, 2009, p.24).

To some extent, the political economy of decentralisation boils down to evaluate not only the economic gains for the local community, but also the economic losses that could result from a change both within the community itself but also elsewhere. Hinrichs (2000), for instance, suggests that existing power relations can allocate the potential economic gains derived from local food in a way that exacerbates rather than alleviates socio-economic inequalities. Moreover, as noted by Born and Purcell, "if the local community is relatively rich, its economic gains will worsen injustice at wider scales. There is certainly no social justice in Beverly Hills' capturing more of its own wealth for local investment" (Born and Purcell, 2006, p. 202). Indeed, each of the three channels through which local communities could benefit from local food correspond to losses in other parts of the economy: the areas in which supermarket headquarters are located and pay taxes stand to lose, as are the exporting regions – both directly through lower sales and prodits and indirectly through the multplier effect. De Weerdt (2009) concludes that "if some communities localize and not others, there will be winners and losers. And if all communities localize, it's a bit of a wash." (p.23).

The evaluation of winner and loser from decentralisation of food systems is further complicated by potential repercussions on other sectors. It is likely that local sourcing would lead to job losses in long-haul transportation and supermarket retailers, but could also shift consumption patterns in the tourism and real estate industries with some areas becoming relatively more and other less attractive due to the diversification of agriculture at the regional level.

Moreover, there are also potential health effects for both farmers and consumers chose economic impact is currently difficult to measure (Cross et al, 2009).

Decentralisation would also produce winners and losers at the international level. If more local apples were produced in the UK instead of importing them from France or elsewhere, obviously the fruit producers in exporting economies would be hurt. Benito Müller, director of energy and environment at the Oxford Institute for Energy Studies, goes as far as arguing that Europeans have "a moral duty to eat African strawberries at Christmas", pointing out that Kenya earns 100 million British pounds per year from produce sold to the UK (De Weerdt, 2009, p.23).

Decentralised food systems and economic resilience

Developments in system theory and agroecology have identified higher resilience to adverse shocks as one of the key advantages of alternative food systems (Aiken, 1984; Barthel and Isendahl, 2012; Servigne, 2014). The higher resilience is often linked to diversity during the farm stage (e.g. greater variety of crops and livestock on each farm, redundancy of farms producing a similar product mix), but also during the market stage (e.g. less complex and shorter supply chains, redundancy of distribution functions). Logsdon (1984) argues that there is an economic rationale for increasing diversity for individual farms as it decreases the farm's vulnerability to shocks such as input and output price fluctuations as well as credit default risk. Similarly, CPRE (2013) relates the opinion of farmers that local marketing and smaller scale leads to "more resilience to financial shocks because by not cropping on a large scale he can avoid high capital investment in expensive specialist equipment" (p. 9).

Some studies also suggest that decentralised small-scale farming can also help to respond better to meteorological shocks. Seufert et al (2012) conclude that organically managed soils show better water-holding capacity and water infiltration rates and "have produced higher yields than conventional systems under drought conditions and excessive rainfall" (p. 230). The absence of heavy machinery can also be an advantage in case of exceptional amounts of precipitation as illustrated by the experience of this UK farmer: "in a wet spring two to three years ago, larger scale producers couldn't get their potatoes out of the ground using machinery, but we could because we dug by hand; doing things with human labour can be less efficient but more resilient" (CPRE, 2013, p. 9).

This being said, due to several methodological problems we still lack robust evidence on the impact of decentralisation and ecological farming on economic resilience. Firstly, the types of adverse shocks that are being analysed are not always characterised very precisely and range from issues such as price fluctuations in factor or product prices to broad phenomena such as global climate change. It is likely that alternative food systems provide higher resilience for some of these shocks but lower resilience for others; research in this area has so far not been able to provide precise definitions of the different types of shocks that are being analysed, a problem is of course that due to the high uncertainty and fuzzyness associated with some of these shocks (e.g. the effects of climate change on local meteorological conditions or the effects of peak oil on transportation costs). Secondly, the time frame of the analysis is not always clearly specified. Indeed, the performance of a given economy to the same shock can be characterised simultaneously as resilient and non-resilient depending on the length of the observation period (Hill et al, 2012, Cowell, 2013). Thirdly, even if shocks could be appropriately defined, economic theory currently lacks appropriate tools to assess whether specific economic outcomes can be seen as resilience. By and large, economists typically define resilience as an economy that "bounces back" to a previous growth path after some external disturbance such as a demand shock (Bruglio et al, 2009). Outcome variables that are used to measure the rebounding behaviour of regional economies are regional employment, output measured by regional GDP or regional population (Hill et al, 2012). However, system theory increasingly "emphasizes how multiple elements interact to produce dynamic feedbacks making a system more or less adaptable, that is, resilient to stress" (Pendall, Foster and Cowell, 2010; p. 72). To a large extent this type of dynamic adaptability cannot be measured in terms of rebounding behaviour of individual variables: it requires a more holistic approach that is able to detect qualitative changes in the performance of the economic system. In particular, the available methodological toolbox for the economic analysis of

food systems is ill prepared to provide empirical assessments of trade-offs between conceptually heterogenous outcomes such as efficiency and resilience.

Despite these limitations, it seems unlikely that the decentralisation of food systems will always lead to higher resilience, so that the final evaluation of resilience will depend on the relative importance one gives to different types of shocks. On the one hand, ecological production methods, intra-farm product diversity and the decentralisation of input production such as seeds and compost can, at least theoretically, be linked to higher resilience vis-à-vis input and output price fluctuation, including transportation costs. On the other hand, a region that sources most of its food locally is more exposed to endemic disasters such as regional floods, draughts and parasites, but also to endemic political turmoil or economic instability. The benefits of sourcing from different regions are, for instance, frequently observed when late frosts diminish apple harvests in some regions (e.g. Northern Germany) but not in others (Southern Poland). Although in good years both regions can provide a sufficient harvest for their respective local markets, interregional trade between the two regions can diminish the risk of supply shortages in both regions.

2.2 ENVIRONMENTAL IMPACT ASSESSMENT

To follow the evaluation as explained in section 2, this section will discuss the impacts for two big life cycle stages. First we discuss the farm stage, which includes the steps from cradle-to-farm gate (cultivation, inputs used and harvesting). Second the market stage is discussed, which completes the life cycle from farm gate to consumers' fork (processing, packaging, distribution, consumption).

2.2.1 FARM STAGE

Several studies conclude that the production/cultivation phase is the most important regarding the environmental impacts of agricultural/food products, as it represents on average 80-86% of the total GHG emissions of food products (Vermeulen, Campbell, & Ingram, 2012; Weber & Matthews, 2008). The environmental impacts of this phase are strongly linked to inputs that are used (fertilizer, pesticides, machinery, etc.) and their embodied impacts. Decentralization of food production could influence both the intensity with which inputs are used, as the types of inputs are used (e.g. internal or external, organic artificial).

Input intensity

Decentralization of food production would mean that crops that are currently imported are grown locally and therefore have to cope with the local conditions. To assist in this coping several inputs (fertilizer, pesticides, greenhouses…) can be added to the production system in order to change the conditions to the crops' favour. However, these inputs generally represent increased production on the one hand, and environmental effects on the other. A comparative life cycle assessment between tomatoes produced in a greenhouse or in open-field in the Mediterranean region, shows that the tomatoes produced in open-field have a higher overall environmental impact, than the greenhouse tomatoes (Muñoz et al., 2008). Although the greenhouse tomatoes emit more GHG throughout their life cycle, they perform better on water use, non-renewable resource consumption, acidification, eutrophication, etc. The study of Muñoz et al. (2008) seems to indicate that the production efficiency justifies, also on environmental performance, the use of a greenhouse production system, including its irrigation, heating, etc. On the other hand a study on cereal and grain production in Italy shows that lower-input systems (mainly low on fertilization, irrigation and weed and pest management) have lower overall life cycle impacts on energy consumption, GHG emissions, eutrophication and acidification than higher-input systems (Goglio, Bonari, & Mazzoncini, 2012). This reveals a trade-off between input intensity and environmental performance, and reveals that input intensity can be environmentally optimized in relation to its product output.

The aspect of using inputs to adapt the conditions to the crop, directly relates to two other issues. First, the type of inputs which are used are important. Conventional systems generally use external inputs such as artificial fertilizer, pesticides, etc, whereas organic production systems would use organic fertilizer, integrated pest management, etc. (Gomiero, Pimentel, & Paoletti, 2011) often as internal inputs. Second, the type of the product grown is important. Local production could mean that local crops and varieties, adapted to the local situation, could be used instead of the conventional crops and varieties (Gomiero et al., 2011). Both issues can have significant environmental effects.

Conventional versus Organic production

Gomiero et al. (2011) present a rigorous review of studies comparing environmental performance of conventional systems with organic systems. Regarding energy use and GHG emissions they conclude that organic systems in general consume less energy, are more energy efficient (energy input/output ratio) and reduce GHG emission compared to conventional systems (Gomiero et al., 2011). However, regarding energy use, the difference became less significant when expressed as energy input per biomass output (Gomiero et al., 2011). This is due to the lower yields attained in organic farming. The reduction in GHG emissions is linked to the lower (energy) input, but also with the soil management which allows carbon sequestration. However, this is only a temporary effect as the carbon absorption of soil has limits (Gomiero et al., 2011).

Aside from the classical life cycle impacts, there is also extensive literature available on the impact of organic agriculture on biodiversity. In their literature review, Gomiero et al. (2011) show that there is ample evidence which shows that organic agriculture hosts more potential for biodiversity than conventional agriculture. This is both on the agricultural fields (e.g. by avoiding the use of synthetic pesticides, herbicides and fertilizer), but also on the landscape level. A mosaic landscape may host a higher diversity, mainly due to increased habitat diversity. As organic farming systems tend to add to landscapes' heterogeneity through their greater field and farm complexity, more than non-organic systems, organic farming may play a key role in enhancing biodiversity in the agri-cultural landscape (Gomiero et al., 2011). Next to general biodiversity, decentralization can also assist in the conservation of crop genetic resources. Galluzzi et al. (2010), for instance, argue that home gardens not only add to the inter- and intra-specific plant genetic diversity, but can especially assist in the preservation of local and traditional crop.

Apart from energy, GHG and biodiversity, Gomiero et al. (2011) further conclude that organic farming is beneficial for soil biophysical characteristics, soil biology, ground and surface water, and animal welfare and health.

2.2.2 MARKET STAGE

Regarding the supply chain there are three often used arguments to promote decentralization. Decentralization would reduce the geographical distance between producer and consumer, which would directly lead to less transport, and thus less emission of greenhouse gases. A local system would also reduce the intermediate steps in the supply chain (e.g. less storage, less retail, less packaging, etc.), which in turn would reduce the emissions of greenhouse gases. Furthermore, reducing geographical distance and reducing supply chain steps, would reduce food losses (wasting food) along the supply chain.

Transport

When using food miles as an environmental impact indicator, the assumption that local food production has a lower environmental impact than conventional food systems is indeed confirmed. However, when looking at all life cycle steps of food production, it is clear that the environmental impact is not only linked to the transport distances (see

Box 2 for a discussion on food miles). Impacts are also created in the cultivation phase (including production of fertilizers, field emissions, animal feed), in the processing phase, the packaging, etc.

Box 2 : Food miles

The concept of food miles relates to the geographical distance between the products' producer(s) and the consumers (Edwards-Jones et al., 2008; Weber & Matthews, 2008). Although the concept has served an important role in increasing public and political awareness on the environmental impact of our food systems (Coley, Howard, & Winter, 2009), there are arguments to consider it a poor indicator of environmental impacts of food products (Edwards-Jones et al., 2008). Certainly when the food miles are more explicitly linked to climate change and GHG emissions.

A first argument is that the food miles do not cover all transport steps involved to supply products to consumers (Weber & Matthews, 2008). Furthermore, the distance travelled between producer and consumer does not represent the bulk of the total transport. The daily food consumption of an American household involves on average 1640 km food miles, whereas the total supply chain for this consumption requires 6760 km (Weber & Matthews, 2008).

Secondly, the food miles indicator does not take into account the GHG emission intensity of different modes of transport, which can result in shorter distances having a bigger impact than longer trajectories (Oglethorpe, 2009; Weber & Matthews, 2008). A study on vegetable boxes in the UK found that GHG emissions caused by consumer home- shop- home trips can considerable affect the overall result (Coley et al., 2009). A trip longer than 7.4 km to buy 'local' vegetables is likely to surpass the emissions caused by cold storage, packaging, transport to a regional hub and final transport to customer's house by a large –scale vegetable supplier (Coley et al., 2009). Edwards-Jones et al. (2008) conclude that life cycle assessment is a better tool to assess potential benefits of local food.

While the cultivation phase contributes the bulk of the GHG emissions of food products (80-86%), on average, storage, transport, packaging and retail together represent 7-12% of the total emissions (Vermeulen et al., 2012; Weber & Matthews, 2008). This shows that reduction in transportation can indeed reduce the overall emissions, but also indicates that this might be part of a trade-off between transport distance and production efficiency. If the GHG gain is higher by displacing production to a faraway place (e.g. due lower cultivation emissions due to more beneficial climate) than by reducing the transport distances, local food might be less climate friendly than non-local food (Edwards-Jones et al., 2008).

Edwards-Jones (2010) reviews several examples of comparisons between emissions caused by local (UK) and non-local supply chains to show that local is not always the best environmental option Edwards-Jones (2010). In her overview she shows that local lettuce in winter (in greenhouse in UK) triggers more GHG emissions that importing lettuce from Spain (open field). However, in summer lettuce can be produced in open field in the UK as well, and no lettuce is imported from Spain. Müller-Lindenlauf et al. (2010) shows similar results for Germany. Regarding tomatoes, Edwards-Jones (2010) reports on a study concluding that energy consumption and GHG emission of imported Spanish tomatoes (from polytunnels or open field) are lower than similar tomatoes produced in the UK (in greenhouse). However, the eutrophication and acidification impacts of the Spanish tomatoes were less favourable compared to the UK tomatoes. UK grown Broccoli showed lower GHG emission impacts than imported Spanish Broccoli (both grown in open field), and the emission difference was mainly linked to transport (Edwards-Jones 2010). She further reports on studies concerning sugar, suggesting that the carbon footprint of sugar produced and consumed in Europe has higher impact than sugar derived from overseas produce. Regarding meat production, Edwards-Jones (2010) cites a study which shows that importing lamb meat from New Zealand to the UK has a lower overall carbon footprint than lamb produced in the UK. For beef production, Müller-Lindenlauf et al. (2010) show that, for Germany, importing beef from Argentina strongly reduces energy demand compared to local production. The GHG emissions related to this imported

meat is however higher than that of the locally produced meat. The differences between both are mainly due to the livestock production system rather than the transport distances. This same study also shows that in Germany local production of apples is less impactful for both impact indicators than any import scenario (Müller-lindenlauf et al., 2010). They further show that local, artisan bread has higher impacts on energy demand and GHG emissions than industrially baked bread. The difference in impact is mainly due to the baking phase (Müller-Lindenlauf et al., 2010). Transport can also be reduced by using local substitutes for overseas alternatives. Lehuger et al. (2009) compared locally grown animal feed (rape seed meal) with imported soybean meal and found that the soybean scenario is less environmentally burdening (for 10 of 11 impacts) than the rape seed scenario (Lehuger et al., 2009).

From this short overview it is clear that literature is not conclusive. The examples show that local production can have lower environmental impact than their non-local counterparts, and that transport can be the main factor in this. But, these examples also show that several other aspects can be important as well (Edwards-Jones, 2010; Müller-Lindenlauf et al., 2010). The examples show that both the seasonality and the local climate (see also later) are important in the local vs. non-local production. The impact intensity of the product as such is also important. Transport will be relatively less important for meat products than for vegetables, as the relative importance of the production phase of meat is higher than for vegetables. Weber and Matthews (2009) calculated that for meat the GHG emissions of the 'food miles' account for 1% of the total GHG emissions, whereas the food miles' emissions of fruits and vegetables represent 11%. Furthermore, comparisons also depend on the impact indicators on which they are based. Different impacts (GHG emissions, land area occupation, acidification, eutrophication) might give different comparison results.

Next to the transport emissions, there is also another aspect which relates to the trade-off between transport distance and production efficiency. It is estimated that one third of the fresh fruits and vegetables are lost before they reach the consumers (Prafitt et al. 2010). These post-harvest losses are generally higher in developing countries then in industrialized countries, which is generally linked with infrastructure (storage, handling, transport, etc.) (Prafitt et al. 2010). As the cultivation phase is generally the most impactful, these losses represent an equally large embedded impact, and therefore should also be taken up in the trade-off equation.

Supply chain steps

As explained above, decentralization would not only affect the geographical distances in the supply chain, but could also alter the type and number of intermediate steps in the supply chain. Although this remains partially linked to the transportation issues discussed above (less intermediaries, e.g. retailers, could mean less transportation steps), Oglethorpe (2009) notes that local food systems could also be linked with other production methods (which will be discussed in section 4.2.2), other distribution practices, different processing and other packaging practices which could have environmental effect as well.

Regarding distribution practices, Oglethorpe (2009) warns against local delivery or pick up in small vehicles, which are less fuel efficient (and thus less emission-efficient) per tonne-kilometre, and for increased delivery (and thus emission) frequency. He also makes a link between local production and home-processing. For bread production Oglethorpe (2009) cites a study which shows that home-made bread shows a higher energy consumption than industrial bakeries, mainly due to the lack of scale-effects (as in Müller-Lindenlauf et al., 2010).

Further related to the processing of the food, Oglethorpe (2009) also sees the lower use of preservatives, which in turn relates to the use of simpler packaging for local products. Both aspects could deliver a direct environmental benefit, but, as for the transport distances, represents a trade-off. Both preservatives, as packaging influence the shelf-life of food products (Oglethorpe, 2009). Effective packaging of food, protects food against damage, increases its shelf life and can reduce food waste (Williams & Wikström, 2011). As the cultivation phase of the product is the most important, it might be more interesting to trigger environmental impacts for adequate packaging and therefore avoid

food waste (Oglethorpe, 2009; Williams & Wikström, 2011). Knowing that consumers and food institutions in Europe and USA waste between 15% and 30% of all purchased food, and that more than half of that is wasted because it was not consumed in time (40% is wasted because households prepare and serve more than can be consumed) (Williams et al. 2012), a reduction in shelf-life by using less environmental burdening, but less effective, packaging might represent a higher impact through losses than a gain through reducing packaging impacts.

2.3 DISCUSSION

From the above it is clear that a combination of ecological seeds and farming and a decentralization of the food system can trigger considerable economic and environmental benefits, certainly when it involves a combined change in the cultivation phase (e.g. organic production, use of internal inputs, etc.) and production place, also affecting the remainder of the supply chain. However, these benefits cannot be taken for granted and depend on a range of factors.

As for the economic impact, a more decentralised food system has the potential to boost local economies and create jobs and economic value both during the farm and the market stage of the value chain. However, this conclusion is subject to a series of important caveats that merit closer scrutiny.

First, for economic benefits to materialize it is of utmost importance to analyse in more detail the types of production that can be converted to ecological production methods without jeopardizing the supply of food at affordable prices. In order to do so, we need more research linking the output performance of ecological production to economic variables such as yields and prices, especially over the long term. Existing research suggests that certain types of production, such as perennials and rain-fed systems, perform relatively better with organic than under conventional methods, while for other crops yields are still higher in conventional systems. Moreover, it is still unclear how ecological production relates to key economic variables such as labour intensity and farm size.

Second, the decentralisation of food systems also needs to be nuanced with the help of research on the relative costs and benefits of different aspects of the food system. Trading at the local scale with many intermediaries can be extremely costly for producers, intermediaries and consumers and rejecting all aspects of the logistical chain of the supermarket could mean throwing out the baby with the bathwater. Equally, not taking advantage of comparative advantages of different regions is also likely to lead to considerable economic losses. Instead of decentralising the entire value chain, we need a more careful analysis about the appropriate scale of each element.

Third, the economic assessment of both ecological and decentralised farming poses considerable methodological and conceptual challenges that render the analysis extremely difficult. For instance, it is currently not possible to adequately evaluate trade-offs of conceptually different outcomes such as efficiency and resilience.

Finally, even if the existing literature suggests that there are economic benefits from ecological production and the decentralisation of the food system, the desirability of a change in the current configuration requires further analysis of its distributional impacts. To be sure, both ecological and decentralised agriculture will generate winners and losers and more research is needed to identify how changes will affect different socio-economic groups and different regions.

Also the environmental performance of decentralization depends on many aspects and does not allow for one-sided arguments. On several aspects the literature is not conclusive or not sufficiently evolved. The available literature clearly shows trade-offs between productivity, transport distances and input intensity. Furthermore food losses along the chain, food processing and packaging are aspects which equally have to be considered in an overall balancing. Life cycle assessment is an increasingly important tool in agri-food sector to assess environmental impacts of food systems and to identify trade-offs.

Most covered impact indicators used in these studies are greenhouse gas emission and energy demand. Important indicators as water use, acidification, eutrophication and land occupation are less frequently tackled. Further, quite some work has been done on impact on biodiversity. Another very popular impact indicator is the food miles, but its suitability as environmental impact indicator can be criticized. In order to get a good view of the environmental performance it is important to look at several environmental impact indicators as a focus on energy and GHG emissions might produce misleading results.

Next to environmental impact assessment from a life cycle perspective, which focuses on damage impacts of human interventions on the environment, it is also possible to look at the services that ecosystems can provide to mankind (Arico et al., 2005), including agricultural production systems. In an evaluation of the ecosystem services of an agricultural production systems, the systems would be evaluated on the supporting, provisioning, regulating and cultural services that they provide. An evaluation on how decentralization of food production would influence these services is not straightforward, and would, for some services rely on comparative environmental impact assessment techniques (as discussed above). For some services (e.g. climate regulation) the impact assessments are inconclusive (as shown above), for others (e.g. pollination services, disease regulation) there are strong indications that organic agriculture host higher biodiversity (e.g. crop genetic diversity and insect diversity) and therefore also higher pollination potential and disease regulation (Gomiero et al., 2011). Because of this link, and the focus on environmental impacts we decided to restrict the environmental evaluation of decentralization of food production to the damage impact assessments. Although beyond the scope of this paper, it is interesting to note that decentralization of food production can also enhance the social and cultural services provided by the agricultural ecosystem (Galluzzi et al., 2010; Oglethorpe, 2009).

3 EXISTING EU POLICIES RELATED TO ECOLOGICAL FARMING AND DECENTRALISED FOOD SYSTEMS

3.1 A BRIEF REMINDER ON THE COMMON AGRICULTURAL POLICY

Agriculture in the EU is almost exclusively regulated by the Common Agrocultural Policy (CAP), a set of common objectives, principles and rules designed to ensure food safety as well as economic development of rural areas. Since its establishment in 1962, the CAP has been going through continuous and significant changes regarding the structure of farmers' support in order to meet financial, environmental and socioeconomic objectives and challenges.

The main priorities that were set in the last reform refer to three long-term objectives:

- Viable food production;
- Sustainable management of natural resources and climate action;
- Balanced territorial development throughout the EU.

For the achievement of its long-term objectives, the CAP relies on the policy instruments of Pillar I – income and market support measures (fully financed by EU budget) and Pillar II – Rural Development Programs (RDPs) (co-financed).

The income support provided under Pillar I aims to ensure the demand of products for the markets and rewards financially farmers for the provision of public benefits (i.e. higher quality and healthy for the consumer products, environmental protection, conservation and increase of biodiversity, animal health and welfare etc.), (European Commission, 2013 a). The RDPs[5] have a more structural character aiming to "foster the competitiveness of agriculture, ensure the sustainable management of natural resources and climate action and to achieve a balanced territorial development of rural economies and communities including the creation and maintenance of employment balanced territorial development", (Regulation (EU) 1305/2013). In this sense, Pillar II aims at improving competitiveness (Râmniceanu & Ackrill, 2007) and multifunctionality of agricultural sector through activities that deliver both social and environmental values (Mölders et al., 2014). Member States (MSs) have the option to further support their RPDs by transferring up to 15% of their national direct payments' envelope from Pillar I to Pillar II. Alternatively, they are also provided with the option to transfer funds in the opposite way (Pillar II to Pillar I).

The design and the implementation of the RDPs are based on a decentralized approach. MSs have the flexibility to tailor and adapt their national or regional RDPs based on their needs and local specificities according to EU strategic guidelines[6], to meet the objectives and priorities set at community level. Additionally, MSs have the option to include thematic sub-programmes in their RDPs and support them with higher rates. These thematic sub-programmes aim to address specific needs, covering among others, young farmers, small farms, mountain areas, the creation of short

[5] RDPs cover measures for the support of small farmers, young farmers, Areas under Natural Constraints – ANC, mountain areas, short supply chains, organic farming, agri-environmental schemes, quality food production, investment in agricultural infrastructure, innovation and knowledge transfer, cooperation, marketing and promotion of food products, community-led development.

[6] National and Regional RDPs upon preparation are evaluated and need to be approved by the EU competent authorities.

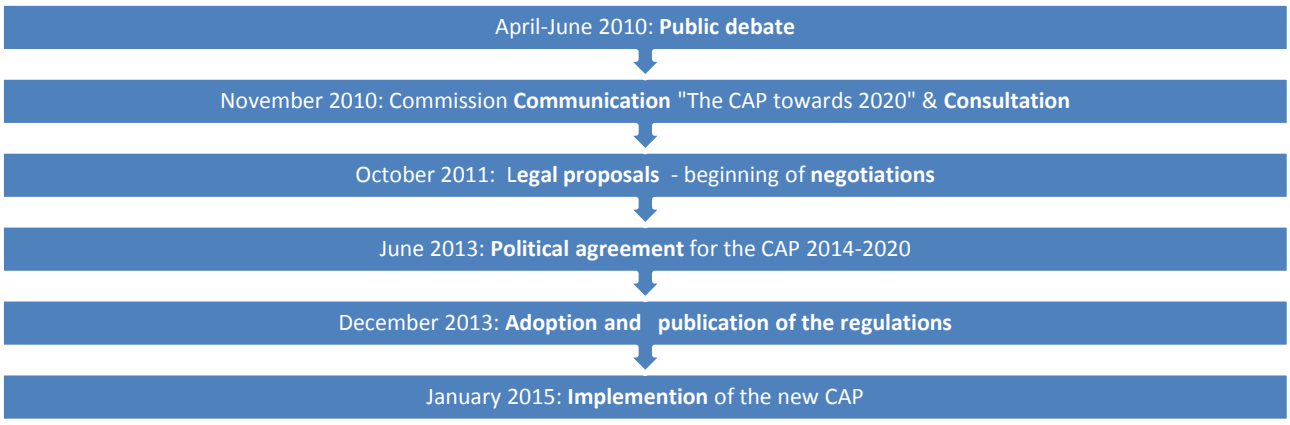
supply chains, women in rural areas and climate change mitigation and adaptation and biodiversity", (EU Regulation 1305/2013). Good policy design based on and driven by local characteristics plays an important role in the efficient use of Pillar II funds (Dwyer, 2013).

A new key element for rural development is the European Innovation Partnership (EIP) for Agricultural Productivity and Sustainability. The EIP for agriculture aims to build up and facilitate the communication between all the stakeholders and academia and to transpose innovation to farming practice and vice versa. This interaction among the actors is thought to lead to a more efficient and faster implementation of innovation and dissemination of information, strengthening the competitiveness and environmental awareness of the primary sector (European Commission, 2012).

With the Lisbon Treaty (December 2009) the decision making in the legislative procedure for the CAP changed from Consultation to Co-decision giving equally shared legislative power to the EP and the Council (Kovács, 2014; Greer & Hind, 2012; Thomson & Hosli, 2006; for a brief overview on the EU policy making process see Box 3). This turns the hitherto marginal role of the EP (Grant, 1997, pp. 175–176) into a more substantial one as it is now concerned with the budget and fundamental decisions related to the CAP (Greer & Hind, 2012).

The legislative procedure of the CAP 2014-2020 started with the submission of the EC proposals on October 2011. The structuring of the post-2013 CAP commenced on April 2010 with a broad public debate for the general public, stakeholders - including think tanks, NGOs and other actors - on the future of the CAP. The outcome was used for the formulation of the EC document "The CAP towards 2020: Meeting the food, natural resources and territorial challenges of the future". A Consultation for the Impact Assessment on the CAP 2020, took place before the preparation of the Legal Proposal and the beginning of the Institutional debate (DG Agri, 2014).

FIGURE 12 : THE SEQUENCE OF EVENTS IN THE DECISION MAKING OF THE CAP 2014-2020.



The political agreement on the CAP 2014-2020 was reached after two years of negotiations between the EC, the EP and the Council. On December 2013 the four basic regulations and the transition rules were officially adopted by the Council of EU Agricultural Ministers and published in the official Journal of the EU. With the publication of the regulations, the Member States are asked to prepare their National or Regional Rural Development Policy (further analysis below).

Box 3 : The EU policy-making process

The decision making process in the European Union (EU) involves the European Parliament (EP), the European Commission (EC), and the Council through the legislative procedures of the Co-decision (ordinary legislative procedure), Consultation and Consent. In the decision making procedure, the EC holds the right to initiate EU legal acts, by submitting proposals to the EP and the Council (1st reading). The Treaty article on which the EC bases its proposal determines the choice of the legislative procedure (Council, 2014).

The proposal can be adopted at the stage of the 1st reading, if both institutions agree on the initial one, or if the Council approves the amendments of the EP. In order to facilitate the agreement, the Lisbon Treaty authorizes the EC to alter its legislative proposal by integrating EP amendments. If the Council disagrees with the EP amendment, then it adopts its own position leading to the 2nd reading. The position of the Council at the 1st reading can be rejected, approved or modified by the EP. The amendments of the EP can equally be accepted or not by the Council. The latter option extends the legislative procedure to a 3rd reading with the formation of a "conciliation committee" (represented by equal members of the EP and the Council). If the conciliation committee proceeds in a joint text and both Council and EP adopt it, it means that the proposal becomes law. In any other case, no reconciliation of the committee or rejection of the joint text by either, the legislative proposal cannot become law (Council, 2014; Greer & Hind, 2012). The policies produced, are a result of an intergovernmental (Member States in Council) and supranational (EP and EC) bargaining and cooperation between and within these institutions (Greer & Hind, 2012; Aksoy, 2008; Thomson & Hosli, 2006; Grant, 1997).

3.2 EU SUPPORT FOR ECOLOGICAL SEEDS AND FARMING

In this section we investigate whether the current EU agricultural policy have the potential to support the development of ecological seeds and farming. The form of ecological seeds and farming that is supported by the CAP is based on certified organic farming. The fact that the use of GMOs is prohibited in organic farming (Council Regulation No 834/2007) leads us to the assumption that GMO-free farming can be also supported by policy measures underlying organic farming.

In the 2014-2020 programme period, organic farming has its own specific support measure under Pillar II providing 5-years area payments (maximum amounts set at EU level) to farmers for conversion to and maintenance of organic production, and/or support for certification expenses. Support to organic farming is part of the mandatory funding which has to be at least 30% of total RDP funding. MS have to allocate this amount to measures for climate change mitigation and adaptation as well as other environmental issues (EU Regulation 1305/2013).

Certified organic farmers, automatically recognized "green by definition", can claim the new Pillar I greening payment and also benefited by market support measures that have identified organic farming as a priority sector (ENRD, 2014). Moreover, organic farmers can also be supported by other measures under Pillar II with higher payment rates and higher eligibility scoring (Sanders et al., 2011).

In order to further enhance organic farming, most MS have introduced national or regional public support measures that are not (co-)financed by the EU. Similar to the EU funded and co-funded ones, national/regional measures cover financial support in production, processing, certification, marketing and promotion of organic farming and products, research and investment in the organic sector plus training and advisory services.

Another form of support for the development of the organic sector is the Organic Action Plan (OAP). This plan is not a direct financial support but an overall strategy that aims at shaping demand and supply drivers, education, information and communication that are supposed to foster the development of the organic sector. In many national OAPs quantitative mid- or long-term targets are set to increase the share of the organic land in the total Utilized Agricultural Land or the share of the organic food in the total food market. For example, in Norway the government aims to reach 15% organic production and consumption by 2020 (Bjørkhaug & Blekesaune, 2013). The French 'Organic Ambition Program', the government targets at least 20% of organic ingredients to be used in public procurement by 2017. In Slovenia, the target of the OAP is to reach 20% for organic land and 10% for organic food (produced in the country) in the total food market. In the Czech Republic, the target is to produce 60% of the national consumption of organic products within the country.

Based on case studies using qualitative and quantitative analysis, Sanders et al (2011) investigated the contribution of public support measures for the development of the organic sector and conclude that the organic area payments and the OAPs are the main factors in the development of the organic sector. These policies contribute to the increase of the organic area, the number of organic farms and the development of the organic market. The authors conclude that the organic area payments work as an incentive for farmers to convert to (or maintain) organic production while OAPs allow for strategic mixtures of policies that can be tailored to specific local needs of the organic sector. Moreover, the study argues that organic area payments and OAPs have boosted the development of the organic sector but policy packages are seen to be more effective. Policy packages are more successful when they include financial, legal and informational measures as their interactions seem to be determinant for the further development of the organic sector (Sanders et al., 2011; see also Stolze & Lampkin, 2009; Michelsen, 2002).

One of the challenges for organic production and the organic sector in general is the limited availability of organic seeds (European Commission, 2014a). The current regulatory framework allows the use of non-treated, non-organic seeds and vegetative propagation materials if organic ones are not available (Article 22, Council Regulation 834/2007). MS have established databases listing the available organic seed varieties and grant exemptions for the use of non-organic seeds under specific conditions (EC Regulation 889/2008). The EC proposals for the new organic production regulation, to be introduced in 2017, include the elimination of such derogations regarding non-organic inputs: the proposals would require the exclusive use of organic inputs in livestock and food production, including seeds, livestock feed and ingredients for food processing (European Commission, 2014b).

The obligation to use exclusively organic seeds can potentially increase organic seed supply and contribute to the development of the sector. It is likely to improve consumer trust towards organic food and would diminish the contamination risk from GMOs and pesticides. However, there is a need for the inclusion of suitable breeding techniques in the current regulatory framework. This is in line with concerns that have been raised regarding the use of Cytoplasmic Male Sterility (CMS) – hybrids. For many stakeholders, CMS is considered to be not far from genetic engineering and therefore should not be used in organic agriculture. For example the use of CMS in organic farming has been prohibited under private organic standards in Germany such as Demeter, Naturland and Bioland.

Although organic farming is generally regarded as being more sustainable and environmental friendly compared to conventional agriculture, an increasing numbers of scholars observe a tendency of "conventionalization" in the organic sector, i.e. the invasion of conventional procedures and the widening influence of agri-business (Buck et al., 1997; Guthman 2004; Darnhofer et al., 2010). The trends include increases in the size of organic farms (Langer et al., 2005; Best 2008), higher use of registered treatment in animals (Flaten et al., 2006) and increased use of permitted off-farm conventional inputs (De Wit & Verhoog, 2007; Padel et al., 2007). Many farms have been using practices that are authorized by the EU regulation but which could nevertheless turn out to be unsustainable (Padel et al., 2007). As a consequence, Guthman (2004b) argues that "certified organic farming not guaranteeing for its alternativeness". Van Huik & Bock (2006) conclude that the attitude of the organic farmers plays a determining role for the overall environmental impact of farming. Based on the attitude towards animal welfare issues, they defined two different types of organic farmers, the "ideological" and the "pragmatic". The first ones show ethical motives to become organic farmers and they focus on animals' natural behavior, whereas the latter ones seem to be attracted by the financial support and focus on the performance of the farm. In this sense, they conclude that pragmatic farmers' dominance may contribute to the conventionalization of organic farming.

While many organic sub-sectors are showing signs of conventionalization (De Wit & Verhoog, 2007), it is still too early to conclude whether the whole organic sector is heading towards conventionalization.

3.3 THE POTENTIAL ROLE OF THE CAP FOR THE DECENTRALIZATION OF FOOD SYSTEMS

In the programming period 2014-2020, the RDPs of Member States will focus on the promotion of local markets and short supply circuits, producers groups and inter-branch organizations, quality schemes, the restructuring of farms with low degree of market participation and farms in need of agricultural activity diversification in order to meet the EU priorities for Rural Development (Article 5 of EU Regulation 1305/2013). Furthermore, to enhance local actions and local development, MS can provide support through the LEADER approach to which they can allocate 5% of their total RDP budget (European Commission, 2013b).

Local markets development measures include quality schemes and off-farm diversification, but also measures for the restructuring and modernization of farms and initiatives related to food production and market systems such as direct sale channels, short supply chains and local food systems (Santini & Paloma, 2013; Karner, 2010; Aguglia et al., 2009). Policies aiming at local food production, distribution and consumption have been shown to provide social, public and environmental goods and can potentially stimulate agro-ecological farming (Wibbelmann et al., 2013).

Agri-environmental schemes, the LEADER[7] approach (Karner, 2010) as well as measures for the development of alternative food supply systems (farmer's markets, farm gate sales, pick-your-own, etc) have maintained local livelihoods and economies in marginal areas (Santini & Paloma, 2013). Moreover, as Dwyer (2013) underlines, schemes for education, farmers' training and consumers' awareness are important and effective regarding the development of local quality products and organic farming (ENRD, 2014). Organic farming policy can also be

[7] The LEADER approach (*Liaison Entre Actions de Développement de l'Économique Rurale)* is associated with local empowerment through local strategy development and resource allocation. The main tool for the application of the LEADER approach to area development and the involvment of local representatives in decision-making is the Local Action Group (LAG). The LEADER approach strives to create partnerships at a sub-regional level between the public, private and civil sectors contributing to the rural development process (ENRD, 2014 b).

supportive for the development of decentralized agricultural systems (short and local food supply chains), as organic growers usually rely on such systems to access the market (Santini & Paloma, 2013; Sanders, 2013).

However, case studies performed under the "Facilitating Alternative Agro-Food Networks (FAAN): Stakeholders' Perspectives on Research Needs" have concluded that these policies can also hinder the development of local markets (Karner, 2010), For example, measures under RDPs and LEADER that impose "high minimum levels" for eligibility to grants may be an obstacle for investments by small farms and processors. They also recognized possible hindrances due to strict legal constraints (hygiene, certification, trading rules and direct selling legislations), inconsistent legal frameworks (as in Hungary or Poland), or the overall economic system favouring large-scale businesses and industrialized food production (as in the UK). Thus, institutional support potentially fostering decentralized food systems needs to be further tailored to small scale entities (farmers and enterprises) and to reduce the administrative and financial burden (Santini & Paloma, 2013).

The development of decentralized food systems is not only a matter of monetary support. Regional and National authorities (National Rural Networks and Local Action Groups within LEADER) play a significant role in the development of these systems. They provide institutional support, technical guidance, training and consultancy for capacity building that are often tailored and to local specificities and knowledge (Santini and Paloma, 2013).

Re-localizing food production and economy, producers come closer to consumers, building a trust-based relationship. Farmers' and cooperatives' initiatives, either supported from public funds or not, driven by the increased consumers' demand for high-quality, local and environmental friendly produced food, boost the development of decentralized food systems. Education in a broad sense constitutes a key element for the society to understand the value and the importance of more sustainable and decentralized systems leading to their further development.

In order to integrate social, environmental and economic aspects of agricultural policies, the RDPs of MS can support multifunctionality of farms and the diversification of farming activities, combining the production of commodity and non-commodity outputs (Mölders et al., 2014; ENRD, 2010; Durand & van Huylenbroeck, 2003). Social farming is an example of multifunctionality and the diversification of farming activities. Social integration and community supported agriculture can be financed under the social inclusion priority of the RDPs activities related to health care (Article 35 §2 (k), EU Regulation 1305/2013; Dwyer 2013) and have been funded under previous RDPs in Austria, Finland, the UK, Sweden, Ireland, Belgium (Flanders), Slovenia and Italy (ENRD, 2010; Di Iacovo & O' Conor, 2009). So far the financial support for social farming took the form of training and support for business creation and development. Especially for young farmers, business start-ups have the potential to augment the diversity of farming types (Dwyer, 2013). Farmers who performed social farming activities have received direct fixed payments in Flanders (Flemish RDP 2000-2006) as a compensation for their agricultural income loss. In Slovenia's RDP 2007-2013, family farms have received support for supplementary on-farm activities (Dessein et al., 2013; Di Iacovo & O' Conor, 2009). In order to meet quality standards for the provision of services, this direct support is linked to Social Farming contracts with officially recognized institutions (ENRD, 2010; Di Iacovo & O' Conor, 2009). Supporting social farming activities is not only important for the legal recognition of social farming per se, but could also be an initiative for more farmers to get involved (ENRD, 2010).

Multifunctionality is of high importance in urban and peri-urban farming, as the non-commodity outputs and public goods require non-farmers' presence to be significant. It has been found that diversification of farming activities is higher in peri-urban areas than in rural ones (Carels et al., 2006). When it comes to rural areas the RDPs and the

LEADER approach are the main instruments for the support of such systems. Urban areas are mainly favored by other funding sources that include urban regeneration, social cohesion and charitable foundations (Karner, 2010).

It should be noted that agricultural policy and support measures in the EU are seen mainly oriented towards rural areas (Zasada, 2011) and therefore neglect urban and peri-urban agriculture. However, the current CAP 2014-2020 also supports measures that are "applicable to all farmers, including those located in urban and sub-urban areas who fulfill the eligibility criteria". Furthermore, under Pillar II there "are no distinctions based on territorial location except in the specific cases when support is exclusively provided to farmers located in rural areas" (eg start-up aid for diversification into non-agricultural activities in rural areas). MS under their RDPs have the discretion to anticipate support possibilities and to decide how to implement direct support schemes for urban and peri-urban farmers (European Parliament, 2014a; European Parliament, 2014 b). In order to meet the eligibility criteria for CAP support, changes should be made with regards to the minimum size of the farm[8] as well as to the requirements for the agri-environmental measures (Zasada, 2011).

[8] MS shall decide not to grand direct payments to farms with eligible area of holding less than 1Ha (Article 10 (1), point b, Regulation (EU) No 1307/2013).

4 NEW AGRICULTURE, NEW GOVERNANCE

The subsequent section will explore the question of "how to envisage the steering" of the current existing systems into a configuration in which 30% of farming and seeds would be agro-ecological and decentralised. Spelling out the governance question in terms of "steering" does create however some fundamental tensions (Voss, Bauknecht & Kemp, 2006) which we need to sacrifice here for the sake of simplification. Accurate conceptualisations of governance point to the very fact that *"governance, understood as a mode of social coordination, is different from governing; which is an act, a purposeful effort to steer, guide, control and manage society"* (Kemp & Parto, 2005). Governance pertains thus to a network of coordination activities in order to bring societal systems into realizing political/policy objectives. The coordination activities themselves evolve in a net of actors, where governmental institutions are put on an equal level to other stakeholder groups (i.e. private sectors, NGOs, citizens) in terms of initiation, implementation and monitoring. This precision is in our context important: while there might not be many governing activities by public authorities in the steering of alternative farming and seeding, the coordination activities within and between alternatives are within the boundaries of a discussion of their governance.

While literature on the governance of the current - and future – agro-industrial system, including governance of the current practices of organic farming and decentralised distribution systems, are plethoric, there is only a handful of insights offered in literature which we could frontally mobilize to investigate a partly decentralised farming & seeding system. In the terminology which we introduce hereafter, one would say that the governance of the regime is relatively well covered by existing literature (see in particular the chapter on EU-level CAP governance in this report), but that knowledge on the governance of the alternatives remains generally scattered and is an emerging field of academic investigation (Seyfang & Smith 2007). The following discussion remains thus at a relatively general, non-problem specific level. We propose to decompose our first-hand question into two distinct sets of questions.

Section 4.1 will explore the governance challenges related to the transition of the system itself. It will focus on the questions of how it is feasible to govern the process of generalisation of decentralised farming systems, starting from the state-of-play of today. The section will implicitly touch upon the substitution question: how to govern the existing agro-industrial systems into leaving sufficient room for the development of an alternative. We will use quite extensively the heuristics of Transition Approaches. In other terms, the section will pursue the question: evolving agriculture, evolving governance?

Section 4.2 will investigate in a much more prospective fashion the question of what could be the governance system of a decentralised farming system. Frontally, we will follow the hypothesis that a strongly altered agricultural system (i.e. a system which allows for 30% decentralisation to happen) will have induced a strongly altered governance system; or, in other terms, which governance do we need for a new agriculture?

4.1 THE GOVERNANCE OF SYSTEMS' TRANSITIONS

The development of 30% decentralized and ecological seeding and farming in the context of the current hyper-centralized, globalized agro-industrial compound of production and consumption of foodstuffs comes closer than anything to a systemic transformation of the current system. The analysis of systems' change in technology studies has a long tradition, including the exploration and understanding of the development of innovations (Geels, 2002). More recently, a particular pane of historical technology studies has joined up with a more sociological understanding of the dynamics. The ensuing conceptualisation into socio-technical transitions (van den Bergh et al. 2011) gives credit to the many on-going transitional (local, citizen-based) initiatives where the innovation is closer to a practice than to the handling of a single technological device; these conceptualization also emphasise that transitions are impossible to understand properly without taking into account their insertion in societal, political, economic, cultural or scientific

dynamics (Smith et al. 2005). The conceptual framework to perform socio-technical analyses has hardened as 'Transition Approaches' (Loorbach 2007), which develop the analyses of system's change with the help of the multi-level perspective (MLP) (Geels 2002). The MLP stipulates three distinct levels and their interactions: socio-technical innovations and alternative practices (e.g. ecological, decentralized farming) are *niches* (the first level) that evolve in a context of mainstream *regimes* (the second level, e.g. agro-industry and the retail industry). Both the alternative strategies that are adapted to specific niches and the mainstream regime are under the influence of large-scale characteristics of society, i.e. the *landscape (the third level)*, which defines issues such as the demographic change and the main economic paradigm. Socio-technical transitions, i.e. the elements of the system's change towards 30% decentralised ecological seeding and farming, are nurturing in a context where niches develop and generalize along pathways and interrelate with the regime (Geels and Schot, 2007); in the mid- to long run, the regime is adapted by the very existence of the niches.

In particular, Smith (2007) has developed an account of the socio-technical transition that the organic farming movement has undergone over the last 30 years or so (in the UK). His MLP-based analysis shows how a particular alternative niche practice (i.e. organic farming experiments from 1920s to 1980s) has managed over time to interrelate with the regime. These interrelations helped to prepare the terrain in order to translate a series of elements of the alternative practice of organic farming into the mainstream (e.g. agricultural colleges starting to provide courses on organic farming; research on productivity of organic farming attracting mainstream governmental research funding; subsidies for conversion into organic farming being implemented). In his words, "the organic movement transformed into an organic industry" (Smith 2007, p442), contributing to the generalisation of access to organic food. In the terminology of the MLP, the organic movement performed an *up-scaling*.

Another example of niche strategy up-scaling is the development of the Transition Town movement, which started as a local activist group promoting a discourse centred on "localism, ecology and sustainability" (CPRE, 2012: 4) in the small market town of Totnes in the South Hams district of Devon in South West England (see annexed Case Study). Over a relatively short period of less than a decade, this niche strategy has been exported into a large number of locations in the UK, continental Europe and North America. The local groups developed links with some elements of the mainstream regime, for instance through engagement with local municipalities and the local business community, especially in the food retail and food production sector (CPRE 2012). It is, however, still too early to assess whether the up-scaling of the food-related chapter of the Transition Town movement will have a lasting effect on the food regime or how the up-scaling will affect the identity and functioning of the movement itself: the "Transition Town Hanover" (a city with more than 500,000 inhabitants) arguably represent a rather different phenomenon compared to the initial group in Totnes (8,500 inhabitants).

Such translations of elements of the niche practice from niches into regimes are therefore not, or at least very rarely, exact copies of the original niche strategies. The organic, biodynamic localized experimentations of the 1970s have near to nothing in common with the large-scale, industrial organic farming products distributed in our supermarkets today and of which up to 80% is imported from outside the EU (in Section 2.1.1 we discuss how the up-scaling of organic production was accompanied with profound changes in its economic organisation, including its integration in globalised distribution networks and practices). And the standardisation, normalisation and certification dynamics made it that what is distributed in specialised retail sectors (e.g. organic food shops) is not necessarily closer to the 'original' niches configurations.

This being said, it should also be noted that up-scaling of niche strategies does not necessarily imply increased centralisation or industrialisation: there are many alternative mechanisms through which niche strategies can achieve greater scale. However, most of the up-scaling processes have in common that they either reflect a) an *evolution* of the niche strategy through which the strategy adapts to other environments outside of the initial niche; b) a process of *colonization* (or *invasion*) by the niche strategy of environments with very similar conditions to the initial niche; or c) an *expansion* of the niche environment itself, for instance through wider changes in the regime or the landscape.

4.2 CONFIGURATIONS FOR A GOVERNANCE OF DECENTRALISED FARMING AND SEEDING

In the continuity of these translations, Smith (2007) points to the emergence of a paradox which is of particular importance for our governance discussion here. The up-scaling of experimental, localised, low-tech, alternative… niches has a fundamental consequence in terms of altering the very nature of the niche: once up-scaled and translated into the regime, large panes of the practices are simply not experimental, localised, low-tech, alternative… anymore, loosing their foundational identity and as a consequence loosing often their initial adherents. This again has consequences into terms of what motivations, expertise, visions, connections, networks… the up-scaled practices are able to rely on; notably, when faced with new emerging constraints or difficulties. In other words, the paradox entails that the smaller and less up-scaled socio-technical practices are the more resilient they might well be in the long run. Identical paradoxical phenomena – between sought-after up-scaling and disturbing loss of identity and competences and hence fragilisation of the movements - have been seen (e.g. van Gameren et al. 2014) in short circuit food distribution chains, such as in GASAP/AMAP/CSAs.

Challenges in terms of the governance of scaling are pointing into two distinct directions: niche management and space creating.

The governance of scaling (up), as seen from a societal and policy perspective, has been conceptualized recently (Coenen et al. 2012; Raven et al. 2012) as being a matter of creating the necessary respectful *space* for niches to emerge, grow and translate into viable alternatives. Space has to be seen here as geographical 'spatial' space, 'interactive' participatory learning-oriented space or legislative institutional space. With respect to the latter, the creation of institutional legislative space has been seen as a crucial factor for organizing governance approaches (Grin 2011) to suit niche developments. In many instances, this has been translated into a *governance of experimentation*. The challenge for public authorities being to favour the development of niches without interfering into their very development, but by supporting the emergence on their territory of a culture and practice of experimentation with alternatives. Such a support scheme might revolve into the active support to network creation, facilitating exchange of information and best practices. In many instances, however, the most pressing challenge to governmental support schemes has been identified to be the factual organisation of a legislative grey zone where some of the legislative pressure (for instance in terms of respecting certain sanitary standards, or justifying and reporting activities) is softened for participating members (Hendriks and Grin, 2007; Grin 2011). In these instances, the aforementioned governance of experimentation can evolve into forms of temporary, controlled passiveness for instance at the level of monitoring legislative compliance.

It should be noted, however, that legal constraints can constitute both an obstacle but also a protection for small-scale agriculture. While many current agricultural regulations appear to favour strategies that are already scaled up (for instance the harmonization requirements in EU Seed Directives or the EC regulations emphasising ex-post analysis of produce), other are arguably protecting farmers from external competition or potentially dangerous innovations (like import tariffs or bans on GMOs). The debates on Transatlantic Trade and Investment Partnership (TTIP) often stress both the TTIP's potential role as creating new obstacles for local experimentation (for instance by increasing competition from cheaper imports into the EU) but also as softening existing protections (for instance by allowing the import of food products with less restrictive hygiene or production standards).

For the scaling of ecological and decentralised agriculture, relevant types of space creating could include *legal* space (e.g. adapting seed laws that reduce barriers for smaller producer of open pollinated seeds, but also through laws on animal welfare or environmental impact management that put organic and conventional producers on an equal footing); *economic* space (e.g. by curbing real estate speculation on peri-urban agricultural land through land use planning through permanent public ownership or permanent categorization of agricultural land; protection against import dumping); and *functional* space (e.g. through the provision of decentralised infrastructures such as mobile slaughterhouses, regional seed banks, mills, fruit presses etc).

Quite different in its reading of niche development, Transition Management (TM) has consolidated today into a pro-active, procedural portfolio of 'management tools' which interlink principles of participation with prospective exercises and self-organized experimentation (Loorbach, 2007). While the basic idea still is to provide for some protective space for niches to develop, the emphasis is on actively facilitating, organising, archiving and analysing the steering of interactions between a selected group of innovative stakeholders (i.e. frontrunners) of a set of emerging niches in a particular domain (e.g. renewable energy production). As a governance approach and research activity, TM is today intensely inserted in Dutch (and Flemish) environmental and resource policies, which at least partly run on TM-style processes to create change. TM only starts to actively engage into wider policy domains in particular with urban redevelopment and hence (peri)urban agriculture.

Key foci in both approaches to the governance of scaling (up) are on learning-by-doing (e.g. via handling experimentations on the ground) and doing-by-learning (e.g. via participatory initiatives of envisioning futures). Both approaches attach primary importance to learning (Fiorino, 2001) at the level of the public actors and the innovative niche actors. In particular, three modes of learning have been identified (Farrelly and Brown, 2011) to make a potential difference: technical learning (i.e. how to organize governance, how to select appropriate public policies and adequate instruments), conceptual learning (i.e. how to replace thinking of target-setting into a broader context of envisioning futures and change) and social learning (i.e. how to organize a learning and self-organizing network of public and innovative actors).

As mentioned, there is not much readily available literature on the governance of scaling (up) of decentralized agricultural systems to ground a thorough discussion on state-related governance mechanisms. However, there are good cases in the domain of energy production, and in particular in the realm of cooperative, local, decentralized, renewable energy production. These analyses (e.g. Baasch et al. 2012) point to the fact that much of the capacity for inception of state/niche interactions and continuity/stability of initiative lies within the availability of a series of well-defined competences of local authorities. It appears that innovative decentralisation basically relies on the innovative capacities of local authorities. These results – taken from the energy production sector - are partly counterintuitive to the existence of the aforementioned "Smith-paradox", which underlined that there are limits to the presence of state-actors in the development of radical production alternatives. The empirical accounts show that the decentralization of highly interconnected socio-technical systems in the energy compound does happen under the condition that an actor exists with the capacity and competence to provide for long term guaranteeing of a certain stability of the framework (for instance, in institutional terms). In the energy regime, that particular capacity lies today almost exclusively in the hands of public authorities. Whether these starting conditions are identical for the domain of decentralized agriculture remains to be seen.

5 CONCLUSIONS AND RECOMMENDATIONS

The final section pulls all elements together and provides policy recommendations on how the governance of ecological and decentralised agriculture could be improved by 2030.

The report reviewed potential impacts of promising initiatives regarding ecological and decentralised agricultural transitions in Europe – a sample of which is documented in our case studies (see appendix). Moreover, we stressed potential analogies with decentralised renewable energy production, a sector in which many local municipalities in the EU displayed political willingness and sufficient institutional leverage that helped creating niche environments in which decentralised renewable energy production systems could be experimented and eventually grow out of their initial niche environment. This being said, a similar thrust for decentralised ecological agriculture systems has yet to materialize. Crucially, European agriculture currently lacks a strategy for transition practices to evolve, either by up-

scaling the niches or the niche practices into full-blown regime changes. This report aims to contribute to the conceptual, factual and systematic basis of such a strategy.

Methodologically, we adopted a value chain approach in which all steps of the production chain, divided into a farm stage and a market stage, are analysed in terms of their socio-economic and environmental impact. Crucially, we conceptualised decentralisation as a strategy and not an end in itself. This choice recognizes that the local scale does not have any intrinsic superiority compared to other scales and allowed us to provide a more nuanced view on the socio-economic and environmental costs and benefits associated with up-scaling of ecological and decentralised agricultural practices into a regime change of European food systems.

The report is grounded on the existing literature in environmental impact analysis, agricultural economics and governance. Our main recommendations for a EU-level strategy towards 30% ecological and decentralised seeds and farming are divided into three complementary dimensions of governance improvements: conceptual learning, technical learning and social learning. All our recommendations have in common that they envisage the up-scaling of decentralised and ecological farming but address different aspects of the profound changes to the European food system that would accompany such a move.

Conceptual learning

Although clear targets are vital to gain political momentum, a successful strategy for a transition of the European agricultural system has to go beyond target-setting thinking and conceive of the transition in more holistic terms of envisioning futures and change. This implies broader reflections about the objectives of system transformations that include the following elements:

- ✓ **Clarify economic and environmental trade-offs.** The up-scaling of decentralised and ecological seeds and farming will inevitably come with trade-offs and generate winners and losers. The transition strategy needs to define concepts that clearly recognize these trade-offs in order to be able to address them appropriately. For example, decentralisation and ecological farming can have negative consequences for conventional farmers and peripheral regions with no direct access to urban markets. Farmers in these regions are already disadvantaged and could become even more so in a decentralised system that increases the economic values of geographical proximity to urban hubs. The potential creation of value in decentralised systems should provide benefits at other scales, for instance through the use of multifunctionality incentives (e.g. payments to peripheral farmers for the provision of ecosystem services such as biodiversity).
- ✓ **Develop clear criteria to evaluate the economic and environmental desirability of alternative futures.** The transition governance needs to define criteria for the evaluation of environmental impacts in order to ensure the sustainability of up-scaling. So far local food initiatives have generally adopted partial rather than holistic viewpoints. For instance, local food activists are typically more concerned with CO2 emissions due to transportation than emissions during the farm stage, although the former only represent only 10% of total emissions. This is a serious shortcoming and could increase rather than decrease environmental costs. Using more holistic methods such as Life Cycle Analysis or Value Chain Analysis could also help clarifying the environmental benefits of ecological and decentralised farming and seeds.
- ✓ **Improve the understanding of up-scaling.** Scale should be seen as a strategy and not as a quality with intrinsic value. The desirability of local or regional production systems is not derived from their scale per se but depends on the net economic or environmental benefits that they can deliver in the long run. Decentralisation as a transition strategy raises interesting conceptual

issues about scale: How can we up-scale a niche strategy that by definition operates within a relatively narrow geographical space? What are the boundaries of "local" or "regional" markets? We have discussed the relationship between scale of production, transportation, distribution and economic outcome variables such as transaction costs, efficiency and unit costs; we also reviewed evidence on the relationship between scale and environmental performance. Our findings suggest that a transition strategy stands to gain by using different scales for each step of the value chain; it could even be beneficial to use different scales within each step of the value chain, for instance by differentiating products (while there are lower economies of scale and transportation costs in the production of seeds, the production of cereals or potatoes requires a relatively larger scale). Crucially, up-scaling of decentralised and ecological seeds and farming can be achieved through conceptually different processes: a) an *evolution* of current practices that adapts them to other environments outside of their current niche; b) the *introduction* of ecological and decentralisation into environments with similar conditions to the niche which they currently occupy; or c) an *expansion* of their niche environment itself, for instance through wider changes in the regime or the landscape through the transformation of the legal, physical or functional space.

Technical learning

The second type of learning refers to the technical elements of the transition governance and strives to select appropriate public policies and adequate instruments. Technical learning should address the following dimensions:

- ✓ **Experimentation with ecological and decentralised practices.** Experimentation is a key step of up-scaling and can take place at different levels of governance. These experiments could be concerned with the farm stage (ecological farming techniques, farm set-up), the processing stage (decentralised processing units like abattoirs, mills or presses) or the distribution stage (decentralised logistics and hubs, decentralised shopping venues). It is crucial that experiments are designed at the outset to allow for their systematic evaluation environmental and socio-economic benefits. This is rarely the case today.
- ✓ **Space making.** Both experimenting and up-scaling require space to develop and grow. Relevant types of space could include *legal* space (e.g. forms of temporary, controlled passiveness for instance at the level of monitoring legislative compliance; adapting seed laws that reduce barriers for smaller producer of open pollinated seeds; or laws on animal welfare or environmental impact management that put organic and conventional producers on an equal footing); *economic* space (e.g. by curbing real estate speculation on peri-urban agricultural land through land use planning, permanent public ownership or permanent categorization of agricultural land; protection against import dumping); and *functional* space (e.g. through the existence of decentralised infrastructures such as mobile slaughterhouses, regional seed banks, mills, fruit presses etc.).
- ✓ **Networks.** The research on food webs underlines that the economic viability of decentralised and ecological farming requires the insertion of individual strategies into networks of complementary and even redundant actors. However, the coordination and communication within such networks can be costly compared to the more efficient mainstream production and distribution networks and requires innovative governance models. In the Netherlands, for example, a platform composed of gardeners and farmers, organic seed breeders, governmental representatives, agronomic experts and retailers has been able to set up a network on ecological seeds that spans both the farm and the market stage. This approach increased both

supply and demand for ecological seeds in The Netherlands. According to Rossmanith (2014), a similar platform in Germany did not succeed due to the absence of retailers in the network.

- ✓ **Decentralisation of agroecological expertise.** Agroecological approaches can provide technical knowledge with potentially great environmental and socio-economic value. For instance they could turn some of the linearities of current food system value chains into circular flows, mainly by transforming outputs of later stages (such as compost, seeds, manure etc.) into inputs at earlier stages (Servigne 2014). However, agroecology is "highly knowledge-intensive" and "based on techniques that are not delivered top-down but developed on the basis of farmers' knowledge and experimentation" (De Schutter 2010: 6). This knowledge can only be provided in a decentralised system if it is accessible at all levels of governance. The geographical location of agro-ecological training and research centres in the countryside could help bringing knowledge closer to the farm stage (see our case study on Lower Saxony where a competence centre for ecological farming – "Öko-Kompetenzzentrum" – has been situated on the countryside). The creation and dissemination of agroecological knowledge could not only help improving the environmental and socio-economic impact of decentralised and ecological farming, but also improve the perception of farmers as knowledgeable environmental stewards.

Social learning

Finally, a third type of learning refers to how the learning itself can be organized into self-organizing networks of public and innovative actors.

- ✓ **Multi-stakeholder and multi-level governance.** Multi-level governance and multi-stakeholder decision-making could facilitate the management up-scaling of decentralised and ecological farming. A key challenge in this regard to blend the perspectives of decentralised and ecological niche strategies with those of conventional rural agriculture, peripheral farmers (including the global South) and different strata of non-farmers. Public actors could try to achieve a balance in governance networks between competing interests at all levels. Currently, local food initiatives are often disconnected from the perspective of conventional farmers, especially from the experiences of small-scale part-time farmers that are locked into the current agricultural regime. Conversely, national and especially European governance institutions are typically disconnected from local or regional niche strategies and predominantly adopt agro-industrial perspectives.
- ✓ **Social relations between producers and consumers.** Another important dimension of multi-actor governance are initiatives that breach the gap between (predominantly urban) consumers and (predominantly rural) producers by fostering mutual social learning on both sides.
- ✓ **Action-research.** A particularly promising area of multi-actor learning consists of exchanges between field actors/innovators and researchers. These interactions are increasingly labelled as action-research and could render academic and civic research more fertile and relevant
- ✓ **Regional cultures.** Social learning could also encompass up-scaling of niches through the rediscovery of regional culinary heritages, the reinforcement of decentralised regional food networks (such as the "food webs" in the UK) and the accompanying formal and informal institutions underpinning them (culinary networks, food in schools, local vegetable gardens, etc).

All three types of learning will require substantial investments into agricultural transitions and therefore require a departure from the marginal role that food systems currently occupy on the European agenda. Olivier De Schutter's conclusion as UN Special Rapporteur on the right to food described the state of affairs very eloquently: "For almost thirty years, since the early 1980s, neither the private sector nor governments were interested in investing in agriculture" (De Schutter, 2010). It is not unlikely that the level of investment will be comparable to the previous agricultural regime change – the " Green Revolution" of the 1940s and 1960s – which was in many respect

diametrically opposed to both decentralisation (it led to the adoption of standardised technical solutions) and ecological seeds and farming (through the massive use of artificial fertilisers, pesticides, herbicides etc). As pointed out by Nathanael Johnson (2014), part of this revolution was that "Norman Borlaug, the father of the Green Revolution, was able to rapidly spread improved seeds around the world, instead of breeding strains to be adapted to local conditions." But he also stressed that seeds were only part of the up-scaling process during the Green Revolution as the latter also relied on "tremendous investments from governments around the world to pay for wells, canals, and transportation systems to move harvests and fertilizers". Johnson reports the opinion of agronomist Melinda Smale that building "agricultural systems that are truly adapted to local environmental conditions" requires "enough investment in agriculture to sustain various types of research, and farmer training institutions in each of those environments". A key difference between the previous regime change and decentralised ecological agriculture is that the latter involves a multitude of conceptual, technical and social solutions whereas the former was based on the idea of a one-size-fits-all technology whose relevance for today's agricultural challenges is sharply criticised by Smale: "We should dispel this myth of the silver bullet. That's just bullshit. What works in one place will not work in another. You cannot export a single uniform model" (Johnson, 2014).

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APPENDIX. CASE STUDIES FOR DECENTRALISED AND ECOLOGICAL SEEDS AND FARMING IN EUROPE

Stefan Doeblin, Network Economy S.A., Brussels

Supported by

Maurice Sanciaume, Paris

Hannah Townsend, Backfastleigh, Devon

Eva Neuls, OekoRegio e.V., Uelzen

Ksenia Gerasimova, University of Cambridge

Overview of case studies

Vallée de la Drome, France

South-Hams/Devon, England

Grischun, Switzerland

Bingenheim, Germany

North-East Lower-Saxony, Germany

Todmorden, England

The following six case studies about the regions Vallée de la Drôme (France), South-Hams/Devon and Todmorden (England), Grischun (Switzerland), Bingenheim and North-East Lower Saxony (Germany) complement the desk-top study on « Decentralised and Ecological Seeds and Farming in Europe » coordinated by the Université Libre Bruxelles (ULB).

We wanted to identify regions in Europe which are already showing more decentralised and ecological seeds and farming projects, why it happened there and what we can learn from the experience in these regions. Our investigation was guided by the following issue:

- The role of key persons
- Elements that have been necessary or supportive for faster and more successfully developments
- Does each region show specifics to support the start-up and success?
- Highlights of each region impacting beyond its border
- Lessons learned

Summary of conclusions

All decentralised and ecological projects we studied have been created and started by entrepreneurs, pioneers and key engaged people in all regions with the exception of Grischun, where the larger cooperative enterprise COOP brought the initiative of organic project into life in the form of a financial commitment to purchase organic products. In consequence this region is the only region with low direct sales activities of the ecological enterprises products.

The selected regions have not been very wealthy in the past ; they are partly mountain areas, partly flat but all regions are showing some resistance in history against centralised power. This resistance led to the settlement of innovative people which are thinking outside the box.

All regions are demonstrating that networking is key to support each other's projects to becoming more sustainable. Physical associations, organisations and well connected people with their individual projects and engagements are necessary to complement each other and to build a local economy based on ecological principles. The governance structures are mainly network oriented (horizontal) and not hierarchical. The regions developed strong relationships between new local initiatives and the existing local small businesses. A couple of key persons have typically initiated the process but over time the local economies do not depend on them any longer. Research centres like private/public competence centres or universities are very supportive and accelerate the development process due to shared resources and know-how.

The success of decentralised and ecological seeds and farming also depends on additional and complementary projects that help building a local value chain and a sustainable ecological market ; they keep purchasing power within the local community. Most regions combine farming with social, spiritual and economic services that are complementary to the food network like tourism, education, social and health services. Additional supportive activities like repair shops and workshops for craftsman are important to make the local economy more stable. The networks render the local economy more efficient : they create local value chains and bring local demand and local production together.

Vallée de la Drôme : BioVallée, Université de l'Avenir and others

September 2014 Stefan Doeblin, Maurice Sanciaume

Short description

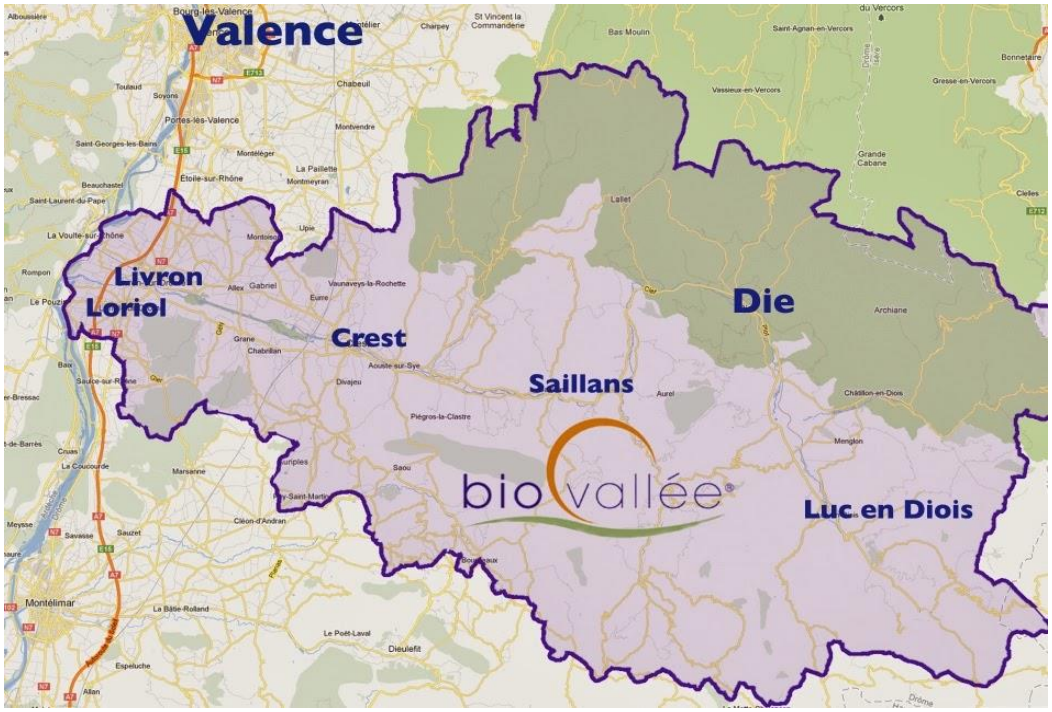
BioVallée is a project initiated by a network of 102 local communities located in the East of an axis Valence/Montelimar along the Drôme river. It covers 2000 km2 with a population of 54,000 inhabitants. This is the French territory with the highest level of organic agriculture in terms of land use (today this proportion stands at 26% and will certainly be even closer to 1/3 at the end of 2014). The organisation Communauté de Communes du Val de Drôme (CCVD) has created a trademark called "BioVallée". The Vallée de la Drôme is one of the few places where organic farming already started in France in the mid-70s.

The Vallée de la Drôme is ideally located between two protected areas: Vercors Regional Natural Park and the future regional nature park of Baronnies. There is an interesting history of resistance, innovation and different thinking in the valley. The Huguenots and the Protestants escaped to the valley during persecution periods some centuries ago and until today there are a lot of active protestant churches. During World War II "la Résistance" was very strong in the valley. High mountains surround the valley. As the soil is poor and stony and therefore not ideal for large farms, most of the farms are small or mid-sized.

The valley is located in an area where climate is influenced on one side by the Mediterranean Sea and on the other by cooler continental/mountain climate. This provides an ideal territory for a wide varieties of plants, dry and warm summers, snowy but relatively mild winters. The valley is known for its rich biodiversity. It is often compared to California and is well suited for growing medicinal or cosmetic herbs.

The first Demeter farms in France have been located in the valley due to its special climate and the first transitions from industrial agriculture towards organic farming happened in the valley more than 40 years ago. 2 activities have been instrumental for organic agriculture: plants for cosmetics and medicines. An example of this activity is the company « Herbier du Diois » which started in 1980 and now transforms and sells herbs and plants from 300 local producers. Wineries have also pioneered the organic transition 20 years ago. A well-known example is the winery owned by the Achard family.

There is also a strong culture of NGOs protecting nature. We can mention one of the first regional organisation in France called FRAPMA. This BioVallée initiative started on the Drôme river water quality improvement through well designed water treatment plants. Current and future initiatives go beyond agriculture and incorporate energy (efficiency, renewable, transportation), education, training and new local industrial activities.



Governance

As indicated earlier, BioVallée is a local initiative coming from CCVD which got financial support from the Region Rhône Alpes on a 5-year plan starting in 2009 and a budget of €10 Million.

The Vallée de la Drôme also hosts some important NGOs like:

- The association Négawatt promoting the deployment of renewable energy at large scale to eliminate the use of nuclear plants: http://www.negawatt.org/
- Terre de Liens, which is linked to organic farming transition, in the way that it aims to buy land from conventional agriculture to pass it on to farmers for transition to organic farming. http://www.terredeliens.org/
- "Ecole de la nature et des savoirs' promoting training for permaculture among other things,
- L'association les compagnons de la Terre: an organic farms incubator
- « Biovallée » is the organic trademark supporting and coordinating project activities linked to organic farming/agriculture energy efficiency and renewable energy
- The citizen initiative called l'Université de l'Avenir (UA), a network of skills, know-how and labs in the valley to support projects and share resources
- Les Amanins – elementary school and activity centre, combined with an organic farm.

Individual leaders which are partly still active have launched these projects. Organisations are now based on broader membership and leadership. They have a wider reach at national level (like Terre de Liens). Entrepreneurs sometimes sponsor them and they are now managed by the "second generation of leaders" (like for the case of Les Amanins). Those different groups identified the opportunity of working together in the early 2000s and created a network called University of the Future (Université de l'avenir). Its founder Rodolphe Balz is still very active but supported by large group of experienced people. There is a project to set up a virtual platform for exchange of know-how and coordination of projects and also includes fund raising tools. After more than 8 years of existence the University has acquired a big site to develop the physical part of its activities (research & education centre, organic farm, residence for senior people). The network has the ability to attract and integrate new projects. They find a place somewhere in the valley and become a member and receive information and support as needed and as it is available.

On the organic food transition there is an overall framework initiated and coordinated by Biovallée including supply and demand.

On the supply side this includes finding land for new farmers, transitioning land from conventional to organic, training people and finally setting up structures to aggregate supply and reach transformers and or consumers using short circuits. The setup of one of the first French "incubators" for organic farming and conversion: Terre de Liens and Compagnons de la Terre (moving land from conventional to organic) provides help during the transition. In addition there are research activities and creation of a trademark related to biovallée production. In 2009, the Biovallée initiative was included in a 5-year plan of the Rhône Alpes region as a pilot project on the transition to local organic production/consumption and self-sustainability for energy through energy efficiency and the development of renewable energy, new housing and education. The plan also includes a drastic reduction of waste produced either by household and companies while finding ways to recycle the remaining part.

Biovallée received a €10 Million budget for the 2009-2014 plan. This project also received support from European Regional Structural Fund. To increase local demand and facilitate the provision of canteens and restaurants, Biovallée has initiated the creation of intermediate structures of supply, such as Agricourt and La Carline. They complement the offer of Agrilocal General Council, which directly connects producers and buyers.

Economic structure

How many new jobs have been created in the organic sector in recent years? Unit the end of 2015, 1000 new jobs are expected from different economic activities, which is a very impressive result.

The organic production

The production of plants for perfumes, aromatic and medical purposes in the organic agriculture has started around the 1970s. The surface of the valley to grow local organic herb plants for aromatic and medical is limited to 1456 ha, which is 23% of the total surface of the region growing plants for aromatic and medical products. The total surface used for medical and aromatic herbs represents around 35 % of the national surface of France used for growing ingredients for organic perfumes, aromatic and medical products. In the last 10 years the surfaces quadrupled. The transformation and commercialisation and new development structures enabled this growth.

Biovallée

The Biovallée is promoted as a label/trademark and advertises the modernity of the valley as a community. The department of Drôme has been labelled as the first one to be named organic department of France, with currently 933 organic producers (source Agence BIO / OC).

Smaller communities have settled down in agriculture, renewable energy, culture, and art. Visitors will be astonished to see how many bio labels are located and how many organic shops are accessible in each village.

The Biovallée de la Drôme has a size of around 60km * 40 km and involves 102 small municipalities. It has already achieved around 30% organic farming. Actions and objectives until 2020 are:

- to have 50% of farms and land used in organic production,
- to provide 80% of food from organic farming, which are mainly used in local catering and partly being exported
- to decrease of 50% chemical inputs in conventional agriculture
- to divide by 2 by 2020 waste sent to recycling centres
- to increase local training with high level courses related to sustainable development
- to create 1000 new jobs in the area related to sustainable activities: farming, energy efficiency /renewable, construction, others

The big challenge will be organic seeds. Even in the Biovallée most of the seeds are not certified organic or are hybrids. Actually there is only seed exchange between the farmers but no professional ecological seed breeder is located in the area.

Rodolphe Balz is among the pioneers with the creation of Sanoflore which has been sold to l'Oréal in 2003 and with a new activity called IRIS. http://www.ineedra.org/france/LETTRES/article/index.html/pres-ARTICLEFICHE_artid-27_artthemeid-1

He is also one of the founders of the certification organization called Nature et Progrès and of the organic cosmetic label Cosmebio. He has been involved in organic food distribution through « Les nouveaux Robinsons ».

With the support of the Chamber of Agriculture, Agribiodrôme, the Rhône-Alpes region and the department of Drôme, BioVallée helps local organic food companies and cooperatives to source as locally as possible. They offer assistance in response to calls for projects, networking, financing of development operations, technical support conversion. Local governments (cities and villages), Department de la Drôme and Region Rhône Alpes are funding partially the Biovallée trademark and its projects. Detailed information can be found in French on the following website:

http://www.biovallee.fr/agriculture.html

Rural activities are focused on fruits: peaches, apricots, kiwis and summer fruits, nuts, apples and pears. There is also a small wine producing area, which produces a famous sweat kind of Champagne (Clairette de Die) of the Valley.

Breeding sheep and goat is quite developed in small farms located in the upper part of the valley. They usually transform their milk production into cheese. Biovallée is in negotiations to use COOP, the Swiss food distribution company with its cooperative structure, to sell organic fruits and vegetables (Geneva is 200 Km from Valence and well connected by train).

Training is also implemented by the Community of Communes of Val de Drôme (CCVD), as the program "it moves in my canteen" tries to train and educate school canteen cooks in integration of organic products in their menus. Ultimately, this program may also affect organic restaurants, retreat centres, holiday homes, hotels and restaurants.

As energy efficiency is an important priority of Biovallée there is a pilot project to grow hemp to be used to insulate houses. Through renewable energies the valley wants to become energy independent till 2030 (except transport) and energy positive by 2040. Even for transport they are experimenting with alternative fuel for cars. There is a car pooling scheme with an easy reservation system on the web and incentives for car owners to transport their neighbours.

The existing forest in the area is quite significant. There is enough wood to use for heating and also agro forestry activities are considered. Biovallée deals with renewable energy, waste treatment, recycling, education and training.

Université de l'Avenir (UA)

The idea of the UA was created around the year 2000 between the founders and core team and other valley entrepreneurs. Its goal is to support each other and to strengthen the valley's infrastructure and activities towards sustainability and to attract more projects and people. Rodolphe Balz is one of the early initiators and General Coordinator of the activities. After years of think tank work, the main activities and funding started around 5 years ago. There are plenty of projects initiated by the UA, which was created and funded partly by the same people. The UA is not yet located in a specific place and is not officially accredited. It is essentially a network of experts and projects and structurerd without hierarchy. They have introduced a fab-lab like the one created by the University of Nantes. The fab-lab is a space for creating prototypes and applications based on research that will be publically shared (like open source) and gathers long-term experiences and know-how. They are delivering services based on the applied science models or prototype machines that are generating some income as well as consulting services. The applications are used locally as well as in other locations, e.g. to repair existing tools or to generate renewable energy.

UA is a research and experimentation place for scaling up activities in other French regions. Its scope includes organic agriculture, health, local manufacturing of tools partly required for organic farming (small and medium scale) as well as education (school/higher education). They are working with the Research Institute on Organic Farming FIBL, situated in Switzerland, and with a region in Morocco to understand better organic farming under different climate conditions. Forest agriculture and permaculture will play an important part. Research is established to identify the interactions between organic farming, energy and health. The UA will develop and host a residence for elderly people.

Rodolphe Balz explained that the UA would develop and implement a holistic programme of an eco-village, which will include :

- the physical centre of UA
- a residence for elderly people
- a Medical Centre including research of the impact of organic food on health
- a library of books dealing with ecology dating from the 18th and 19th century until today, which will be digitalised and completed with new books related to ecology
- Labs e.g. for renewable energy, open pollinated seeds (just proposed), how to stock organic products…
- IT/Internet infrastructure
- organic farming
- seed breeding under discussion

Therefore they have bought around 120 ha where the different projects will be located.

For the founders of the UA it is clear that the health sector will be a main source of financing the transition to organic food production due to cost savings. Rodolphe Balz mentioned that in the US 25% of the population has severe allergies today (tendency growing). That is one reason to research the impact of organic food on human health. There is a strong believe that organic food is healthier than industrially processed food. Out of the organic sector less quantities of food will be needed to gain more ingredients for one's health.

To support transition or start-up farming a counsel of senior experts has been set-up as part of the UA. Currently a business plan is under development to setup 12 project activities.

Organic Education Project « Les Amanins »

Motivated by the history of the valley and the already existing organic projects also linked to the Colibris Movement, this project has been started by a former entrepreneur who has funded the inclusive elementary eco-school "Les Amanins" which combines agriculture, cooking, music and other cultural activities with the education of young pupils. Today this activity is run by his wife. The project also offers several additional programs for adults like "transition networks", "non-violent communication", "practice sociocratie", "increase consciousness", "create an eco-project". During holidays, training sessions on organic farming are held on the premises.

This is a selection of other successful companies in the Biovallée:

http://www.herbier-du-diois.com/en.html (founded by Ton Vink and Sjoerd Wartena founder and president of Terre de Lien)

http://www.herbarom-laboratoire.com/en/ (founded by Dominique Ardouvin - co-founder of UA)

http://www.biotop.fr/index.php/liens/english.html (specialized in the research and production of alternative solutions for the protection of plants and foodstuffs)

http://www.drome-provencale.com/produits-bio/

http://www.jaillance.fr/cuvees/les-cuvees-bio/

In addition they are several beekeepers producing organic honey

Rural/agro tourism is an additional source of revenues for farmers located in the upper part of the valley.

They can sell part of the production to visitors during the summer while offering services for lodging.

Environmental Impact

The Vallée de la Drôme strives to use renewable energy to produce around 50% of its energy demand till 2030. They are using hydro, solar, wind and biomass energy and installed a program of energy efficiency. Wood from the forests around the valley is often used to heat houses. The river Drôme delivers opportunities to implement hydropower in different places, taking ecological aspects into account like fish stairs and vortex technologies. The CPRE in London will establish a study about renewable energy for farms which could be also interesting for Vallée de la Drôme.

The other big impact is the focus on local markets in the agro-sector (produce and eat locally). This focus is extended to other sectors, e.g. by small research centres which are producing components on demand which will be used to repair tools and equipment. They are using 3D printers and renewable plastic (organic CH4 combinations).

Residences, education and health centres reduce transportation. People will be more and more served locally.

Conclusion

The Vallée de la Drôme is an exciting example of an ecological movement. To start such a movement it is often helpful to be situated in a special region with a special history of resistance. They have created a lot of new and highly qualified jobs (target till next year : 15,000). They used a network structure to generate synergies between the projects/enterprises and complementary projects and enterprises that support each other. They are fully aware that knowledge is key to develop the region and the l'Université de l'Avenir plays a central role in this respect. Till now they have successfully raised funds from local government and the European Union and realized most of their visions. They are using farming and tourism, building food networks and direct sales to increase income and fun. Seed breeding is the only week point and should be improved.

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South Hams (part of South-Devon)

Stefan Doeblin, Hannah Townsend. September 2014

Short description

Devon is the third largest county of England. It forms the major part of the south west peninsula of Great Britain, and is bounded to the west by Cornwall and to the east by Dorset and Somerset. The Bristol Channel lies to the north, the English Channel to the south.

The county of Devon has a rich diversity of scenery. The two coastlines, very different in mood (rugged to the north, more tranquil to the south) embrace an undulating landscape characterized by small farms reached by winding lanes which crouch beneath the high Devon banks and hedges with their abundant biodiversity. In North Devon, a small part of the Exmoor National Park spills into Devon from Somerset. Further south are the 368 square miles (954 square kilometres) of the magnificent Dartmoor National Park. Both the moors and the coasts are popular tourist destinations, offering spectacular walks and a huge choice of places to eat, drink and to stay. Dartmoor, with thin soil and coarse vegetation, is mostly suited to rough grazing, with also some forestland, reservoirs and an area set aside for military training. The granite 'tors'(isolated weathered rocks) which cap the highest elevations (up to 600 meters) of Dartmoor are a notable feature. Devon's main rivers rise on Dartmoor and Exmoor. Much of the remainder of Devon, being hilly, is suited mainly to dairy and sheep farming, but the soils closer to the sea in the south and eastern regions are able to support arable farming. The county's climate is generally mild, but rainfall increases dramatically from about 30 inches (760mm) on the south coast, to more than 60 inches (1,500mm) on Exmoor, and as much as 80 inches (2,000mm) on Dartmoor.

Exeter is the main administrative centre of the county and has a Norman Cathedral and a long-established, well-regarded University. Southwards, in the region known as the South Hams, around the small town of Totnes, are clustered some of the county's most notable 'alternative' initiatives, and indeed Devon is for this reason regarded as one of the forerunners in UK of alternative ideas. Totnes, an ancient Iron Age settlement on the river Dart, has around 8,500 inhabitants. In 2006, local permaculture designer, Rob Hopkins, created the idea of the **Transition Town (TT)** movement using permaculture principles and design methods. Totnes was the first Transition Town and there are now over 1200 of these TTs worldwide (400 in the UK). A Transition Town is a grassroots community project that seeks to build resilience in response to the future likelihood of economic de-stabilization due to declining oil reserves ('Peak Oil', as this has been termed), changing climate and other variables. The development of a Transition Town is based upon generating local initiatives and small-scale projects and exchanging and sharing skills and resources within the immediate community in order to foster greater economic (and energy) independence.

Close to Totnes is the parish of Dartington. In 1925 the **Dartington Hall estate** (which dates back to the 13th century) was bought by the idealistic and philanthropic Dorothy and Leonard Elmhirst. During the 1930s Dartington gained a position of international importance in the arts as well as in agricultural economics. A progressive boarding school was also born on the site. Today, whilst changes have taken place at **Dartington Hall** itself since the time of the Elmhirsts, the ethos of the old Dartington Hall seems still to inform this area, with many initiatives with ecological/social/spiritual concerns having grown up over the years. In the early 1980s, a group of highly-motivated and committed parents founded the **South Devon Steiner School** which is based at Hood Manor on the main road from the A38 into Totnes. 300 children benefit from a curriculum which places substantial importance upon offering hands-on experience of gardening, agriculture and outdoor crafts and skills within the 7 acres of biodynamic gardens and land, as well as fostering the ability of children to think for themselves (an important contribution to the social/economic/ecological problems that become an increasing challenge in our times). A second Devon Steiner School has recently opened in Exeter. **Schumacher College**, founded by Satish Kumar, John Lane

and others lies close by. Holding at its core the teachings of the economist and environmentalist, Schumacher (author of 'Small is Beautiful'), the college runs courses, talks and events based around the questions of how to live sustainably and ecologically.

In the South Hams there has been a precedent for organic and biodynamic farming and growing for many years. **Rudolf Steiner**, the initiator of the biodynamic method of farming, visited Torquay, not far from Totnes, in the 1920s. Back then, he suggested that England could take a lead in developing a new future-oriented sustainable agricultural consciousness. Many farms, gardens and small-holdings exist in Devon which are run using Steiner's guidelines with consciousness. In South Devon a regional biodynamic group supports its membership by sharing resources, meeting for talks and workshops and networking via a newsletter. Velwell Orchard, on the fringe of Dartington parish, is an established biodynamic market garden central to this group. The garden is now going through an innovative experiment in an economic foundation based upon the moto 'give what you can, take what you need'; all the food is 'free', in exchange for donations of money and labour, and the idea is proving hearteningly successful.

Governance

The Transition Town process, which began in Totnes in 2006, has been key in the years since then, in shaping South Hams' local economy. Where formerly businesses and initiatives tended to work independently of one another - sometimes even unaware of each other - there now exists a conscious, sophisticated, **community-led networking** structure. This network interfaces, importantly, with Local Government *on its own terms*. The role of South Hams District Council has not been to lead or guide the transition process, but to facilitate and support initiatives coming from the community - a 'bottom-up' principle. Six months after Transition Town Totnes was created, the Council passed a resolution endorsing the work of the TT initiative, and this support has proved invaluable in allowing the project to drive forward with enhanced credibility. The involvement of the Council in the **REconomy** forum's drafting of a **Local Economy Blueprint** (see later in text) has been significant in professionalizing the status of the TT movement in the area, and in facilitating the creation of local employment. The blueprint underlines the awareness that supporting and building upon the local, mutually-interactive, economy is the best strategy for creating resilience and sustainability in times of crisis. The organizing of different events in real life, as well as using the virtual resources of the internet, create harmonious feed-back mechanisms, and have helped to establish and promote complementary supply chain and production facilities. It is worth mentioning here, that volunteer support is a key ingredient in the TT concept, with people giving, or exchanging time and skills to support the whole process. Another important network is the food network which links the whole value chain of food producers and consumers together.

Economic structure

Devon is **less wealthy** than some parts of the UK, in particular the South East. This is because the traditional industries of Devon - like fishing, farming and mining - have all been in decline for some time. The European Union has given some help - grants, for example, to help to encourage new industries to replace the declining old ones. Manufacturing brings in the greatest revenue, closely followed by **tourism** (Devon receives around 6 million visitors per year), with Devon having twice as many businesses related to tourism as the national average. **Agriculture** still plays a significant role in the economy of Devon, with four times as much agricultural activity as in the UK on average. Small businesses are very much part of the economic landscape of Devon, with a quarter of all Devon businesses neither VAT registered, nor employing staff!

The **South Hams** suffers from high house prices (the region rates exceptionally high in 'quality of life' surveys), lower than average wages, and an **ageing population** (Totnes is, in fact, the town in the UK with the highest per capita number of people over 60 who live alone). Significant numbers of households have an income of less than £15,000 per annum. Unlike many rural towns in Britain today which have succumbed to

the ‘Clone Town’ syndrome, where High Street Chains dominate the scene, Totnes has, however, managed to retain a high proportion of small locally owned shops and businesses. This is perhaps in part explained by an unusually highly politically and environmentally -motivated public. A recent survey of shoppers in the town found that their choices were very much informed by a wish to support local agriculture and businesses, as well as by environmental concerns.

Agriculture: about 30 percentage of the working population of Devon is dependent on agriculture and related industries. It is based on livestock (supported by permanent grassland and ley), cereals (especially barley), potatoes, market gardening, horticulture, fruit, and fodder crops. About 25 percentage of the country is heath or moorland, providing rough grazing mainly on Exmoor and Dartmoor. Dairy cattle are most important in eastern, north-west, and southern Devon, and Devonshire clotted cream is still produced. Beef cattle are raised throughout, especially in the south and west. Sheep are important throughout the county, including Dartmoor and Exmoor, with the exception of eastern Devon. Between 1964 and 1980 the number of farm holdings fell by 25 percentage, but the average size increased. Soft fruit and flowers are grown in sheltered areas, but traditional cider orchards are declining in acreage, and the cider is now produced in factories.

Fishing is still important - although much reduced compared to formerly - especially at Brixham and Plymouth. Plymouth also has a naval base. **China clay** (Kaolin) from Dartmoor and ball clay from the Bovey basin are the chief mineral exports. Other small-scale local industries include **textiles** (Tiverton), **woolens** (Axminster), **lace** (Honiton), and **glass** (Torrington).

The **Local Economy Blueprint**, developed by the **REconomy** forum, in conjunction with 8 other organizations including the Local Council, looks at ways to strengthen partnership between local organizations, to create more local employment, and to professionalize the status of the Transition Town process in Totnes. This blueprint is based upon the awareness

that a local economy is key to resilience in times of crisis. Three main activities are the focus

- **Food and Drink**.... “up to £22m leaves our local food economy each year on food imports. Diverting just 10% of this existing spend within the next year or so would boost our local businesses b y over £2m. Local independent shops offer three times the number of jobs as the main supermarkets, for the same retail spend, and local food producers employ 50% more workers than larger scale farms.”

- **Making homes energy efficient**.... “retrofitting activity on homes is worth £26m (basic) - £75m (full) in total. This relates to around 70 to 700 jobs respectively across the whole supply chain, and we want to maximize our share of these. Aiming to unlock 10% of the basic spend within the next year adds up to £2.6m to our local economy.”

- **Developing renewable energy assets**... “ could generate over £6m worth of energy each year for householders and community investors. The solar PV technology alone could deliver 370 jobs across the supply chain, some of them based here. Building just 10% of this capacity adds another £600k into our economic system each year.”

(Fiona Ward, Project Manager for Local Economic Blueprint project, Transition Town Totnes, www.reconomy.org.uk)

TT Totnes and REconomy support and encourage diversity and local initiatives (local sourcing, local distribution, local consumption) in order to build resilience for businesses and people. They work too upon the key question of how to establish better practices for reducing the use of oil and transport in the case of products and services which must inevitably be imported into the area. How, for example, can local skills be developed to replace some of these oil-dependent pathways?

Food Sector

Food is a key sector for the transition process. The motto, "Food feet, not food miles", has been coined to support a new ethos. Data on retail spending indicates that in the South Hams area, around £35.8m is spent annually on food and drink. There are currently around 380 food-related businesses in the South Hams, employing just over 1,500 people. This is around 14% of the overall total of people employed. The total turnover is around £114m. The Campaign to Protect Rural England (the **CPRE**) which is a national charity devoted to protecting and enhancing rural England by encouraging the sustainable use of land and other natural resources stresses that local food outlets are particularly important as sources of employment; they support three times the number of jobs as the main supermarkets, for the same amount of retail spend. This effect continues down the supply chain, for example, producers involved in the local food economy employ on average 3.4 full-time workers compared to the regional average of 2.3 per farm. New food companies have been set up e.g. www.tidefordorganics.com. The Food initiative has connected 170 community food-growing projects. The Soil Association is supporting the same philosophy of local markets with their initiative of publishing the different price schemes of wholesale, retail and retail supermarkets to make the markets more transparent and to motivate farmers to sell directly to consumers.

In their market report of 2013 the **Soil Association** published figures to show that the overall UK organic market grew by 2.8% but the direct sales of box schemes and home delivery grew in the same time by 11% and independent retailers by 6.9%, restaurant and catering sales by 10% compared to multiple retailers by only 1.2%. Jointly with others they organised the Big Food Event including the Food Action Plan in Plymouth 10-14 June 2014 to present the theme of organic food within the context of local food, which gives a better eco-balance.

The South Hams region has a greater proportion of small and very small farms compared to England as a whole; 44.1% of landholdings in South Hams are under five acres - the second highest proportion of any district in Devon. It also has the highest area of fully organic and in-conversion land of *all* English regions. **Organic and biodynamic** farms are well established.

Riverford Farm (www.riverford.co.uk), in South Devon (Dartington / Buckfastleigh), owned by the Watson family since the 1950s, has become one of the biggest organic food producers in the UK in recent years. Their vegetable box scheme, begun in the 1980s, was one of the first in the country starting to deliver vegetable boxes locally to Guy Watson 30 friends in Devon. Today, they deliver around 47,000 boxes to households around the UK from their own regional farms (they now have farms elsewhere in addition to the original Riverford Farm in Devon) and from associated partner farms. Riverford see small-scale organic family farming as the most sustainable way of producing food in the UK. All of their suppliers look after their soil, livestock and wildlife by farming respectfully, in tune with nature, and they are certified organic by the Soil Association. In terms of logistics, Riverford acts as a central distributor for these producers, and each farm is part of a local grower group who work together to fill the boxes each week.

Devon at present lacks an organized **organic open-pollinated plant breeding** programme. Whilst seeds are exchanged between friends and neighbours, and this practice is promoted consciously and deliberately by the local biodynamic association (who have organized a number of seed-saving workshops), by the TT network, and by other organizations (such as allotment associations), there is scope to take this very much further.

In terms of organic meat production, the availability and proximity of certified abattoirs is a restricting factor. Mobile or local abattoirs need to be establish and could perhaps be used as a new business model for decentralised farming to avoid unnecessary transport of animals (which stresses the animals and reduces the quality of the meat).

Jointly with the national CPRE Totnes recently produced a report **"From the Field to Fork: Totnes – mapping the local food web"**. Its aim was to reveal the extent, nature and benefits of local food webs

around England, to increase public and policy makers' awareness of local food networks and to identify better ways to support the production, supply and sale of local produce across England. Over 160 producers from a 30-mile zone beyond the core study area supply a broad range of produce. Most produce is supplied directly by producers from within five to ten miles. The density of producers supplying Totnes is even higher than first appears, as much of the 30-mile supply zone around Totnes is sea. Local food outlets surveyed provide over 230 jobs in Totnes: 136 full-time and 101 part-time posts. The majority of staff live within five miles of their work. If extended to all food outlets identified as selling local produce in Totnes, sales of local food may support as many as 330 jobs. This is equivalent to approximately 10% of Totnes residents in work. Local producers and processors that were interviewed were found to directly employ over 55 full-time and over 30 part-time staff. Taking these figures, TT Totnes estimates that over 730 jobs across the region may be supported by businesses supplying Totnes. This compares to 40,900 employed in South Hams District.

Price competitiveness and central purchase departments are the key challenges.

TT Totnes has created a **Local Food Hub**. The Hub is a co-operative, member-owned social enterprise which is being developed, pending funding, to provide affordable local food to around 1,000 people and give an outlet to local producers. The Hub uses a website to list local produce available. Customers then browse what is on offer and put in an order, which they pick up from a central distribution point based at **St.John's School** in Bridgetown, Totnes. As Sophia Elek, a Hub volunteer, explains: 'We want to address the difficulties faced by small, local producers in marketing their produce, and provide a way for people – of all levels of income – to access good, fresh, local food. The Food Hub is a new distribution system that will meet both these needs.' (see page 17 From Field to Fork: Totnes).

An interesting association is **Wholesome Food Association** (www.wholesome-food.org) which was set up in Devon and is now active across the UK. When a group of local growers in Hartland, Devon, decided in 1999, to apply for certification so that they could put an "organic" symbol on their produce, they realised that because they were all selling only small quantities, they could not afford the fees. Then someone said: "Hey, we are only selling in our local area. Everyone round here knows we grow our stuff without harmful chemicals etc. Why don't we create our own symbol?" The Wholesome Food Association is opposed to GMOs and chemicals, and it is customers who effectively monitor the integrity of producers, through having an open invitation to visit.

A **retrofitting initiative** could also benefit the local economy, using local craftsmen, local insulation suppliers and local consulting firms to 'retrofit' homes in the region with 'basic measures' of insulation, double glazing and new boilers (where necessary). It is interesting to compare the £10m spent by Totnes house-holders on mains gas and electricity in 2010, with the estimated cost of around £26m to implement retrofitting. Encouraging this scheme could be key to diverting back into the local economy significant money which otherwise leaves. Sector specific networks, expertise and fairs have been set up and developed including financing advice. New companies have been established like www.anahatenergy.com.

The same idea leads to the **renewable energy** sector which would re-route the spending on oil and remotely-generated electricity into the local economy. There are big opportunities for local firms in construction, installation and maintenance; Totnes Renewable Energy Society (www.tresoc.co.uk) with 500 members, as well as new companies like www.ngbiogas.com, the Totnes-based New Generation Biogas which works at the forefront of Anaerobic Digestion. Open meetings, incubators and funding are key steps which TTT has developed and established. Due to the different educational institutions in the region, the base of science, research and education is well interwoven.

Business waste exchange is planned. This seeks to match the waste of one industry with another industry that uses that waste material, sometimes referred to as industrial symbiosis. Repairing old items rather than

throwing them away is looked at.

Land is crucial for agriculture and local sustainable development and Devon has organised a partnership jointly with the National Trust and different other land organisations to support people who want to give land for social and responsible developments and people who are searching land for their social and sustainable projects (http://www.landpartnerships.org). The partnerships handbook including small case studies can be downloaded.

Based on the financial crisis, the vision of local markets and more local independency, several towns in Britain have introduced a complementary local currency. In the South Hams, the **Totnes Pound** was one of the first of these nationwide.

Totnes supports independent cafés, restaurants and pubs through a marketing campaign www.totnesindependents.co.uk and the TT Totnes distributes its own newspaper (www.transitionfreepress.org).

In Totnes and the South Hams several hundreds jobs have been created in recent years. Within Devon, self-employment is higher than the national average, and in the South Hams the self-employment rate is generally higher than the Devon average, although there have been fluctuations in this over the last years. The rate for self-employment in the South Hams region today is around 12.5%, compared to 9.7% for the UK as a whole. There was a peak of 27.2% self-employment in the South Hams in 2011-12, but this has now tailed off. Employment in Devon today is around 76%, compared to 71.3% as the national figure. The South Hams has a higher figure than either of these, at 78.2%.

Environmental Impact

According to South Hams District Council nearly 60% of homes in the region fall into the three lowest energy performance ratings (EPC bands E, F, G, with corresponding SAP scores of 54 and below). The average SAP scores between 40 (old buildings) and 63 (building constructed after 1980). Only 73% of homes have central heating, compared with 89% nationally, and only a quarter of those have an efficient boiler. At least 40% lack adequate loft insulation.

Based on other data from a TT Totnes study, estimates are that to bring homes up to an average SAP rating of 76 (band C) would cost around £75m for Totnes, or £320m for the entire South Hams.

TT Totnes estimates the potential energy savings for 'basic measures' to be around £1.2m per year in Totnes (£5m for South Hams). (See page 14 Local Economy Blueprint).

The TTT study only focuses on those local renewable assets capable of providing a significant portion of our electricity and heating needs in the short term, or 3-5 years. The most abundant energy resources include wind, biomass and solar. Therefore they looked at electricity and heat production from solar photo-voltaic (PV), solar thermal, wind turbines and biomass technologies, all of which are relatively mature and proven. In total, they estimate they could produce as much as 64 GWh of usable energy per year which is worth about £6.4m at current retail electricity and gas prices in the UK.

The main impact to change the structures of agriculture into local production and distribution is not yet calculated (less transport with oil, less chemical fertiliser and pesticides). The impact of more organic farming related to the water quality is not available, but due to the fact that Devon has a tradition of small farms, the transition to organic / local non chemical farming on the **quality of water** is relatively small. According to Holly Tiffen from TTT the water company South-West Water (privately owned)have lower than ideal standards, and are prone to pollute the water with chemicals without any thinking of the environmental

impact. Currently there is no campaign to increase the quality of water in Devon.

Conclusion

South Hams in Devon is a very successful example of ecological and decentralised seeds and farming in Europe. The region has achieved a large proportion of organic and ecological farming and has created an excellent network of private initiatives with local government support to generate synergy of the different local businesses. There is a great connection between the different local value chains and complementary services like social farming, education, craftsmanship and farming. Complementary business ideas are more easy to identify and there are plenty of support mechanisms. Future strategies for ecological seed breeding are still unsolved, as in most other regions. There could be a EU initiative to fund local ecological seed breeding initiatives in these regions.

References:

Interviews and visits to TT Totnes (Holly Tiffen, Fiona Ward) REconomy Centre Totnes, South Devon Steiner School, Dartington and Schumacher College, Dartington, Riverford Farm, one organic farm and one biodynamic garden in South Hams,Tracy Lewis of the Soil Association.

Making Local Food Work www.makinglocalfoodwork.co.uk/practical_guides_toolkits.cfm Soil Association Organic Market Report http://www.soilassociation.org/farmersgrowers/market Sustainable Food Cities www.sustainablefoodcities.org TD-Local-Economic-Blueprint-final_high_res.pdf REconomy-strategy-three-year-plan.pdf from_field_to_fork_totnes.pdf

Kanton Grischun - Organic Pioneer in Switzerland

Stefan Doeblin

Short description

The Canton of Graubünden or Grisons or Grischun is the largest and easternmost canton of Switzerland. The canton shares borders with the cantons of Ticino, Uri, Glarus and St.Gallen and international borders with Italy, Austria and Lichtenstein. The name Graubünden translates as the "Grey Leagues," referring to the canton's origin in three local alliances, the League of God's House, the Grey League and the League of Ten Jurisdictions. Graubünden is also home to three of Switzerland's ethnic groups and the subsequent languages of Swiss German, Italian and Ronansh are all native to the state. It is also the only canton where the Romansh language is still spoken. Historically the Romans build transit roads from Italy to Northern Europe crossing Graubünden. These roads are modernized in the 19th and 20th centuries which enables an exchange of cultures. The beauty of the mountains, the transit and the cultural exchange had lead to touristic attractions which is an important business too.

Graubünden is by far Switzerland's largest canton at 7,105.2 square kilometres (2,743.3 sq mi). The canton is entirely mountainous, comprising the highlands of the Rhine and Inn river valleys. In its south-eastern part lies the only official Swiss National Park. In its northern part the mountains were formed as part of the thrust fault that was declared a geologic UNESCO World Heritage Site, under the name Swiss Tectonic Arena Sardona, in 2008. Another Biosphere Reserve is Biofera Val Müstair adjacent to the Swiss National Park whereas Ela Natura Park is one of the regionally supported parks. In 1367 the League of God's House (Cadi, Gottes Haus, Ca' di Dio) was founded to resist the rising power of the Bishop of Chur. This was followed by the establishment of the Grey League (Grauer Bund), sometimes called Oberbund, in 1395 in the Upper Rhine valley. The name Grey League is derived from the homespun grey clothes worn by the people and was used exclusively after 16 March 1424. The name of this league later gave its name to the canton of Graubünden. A third league was established in 1436 by the people of ten bailiwicks in the former Toggenburg countship, as the dynasty of Toggenburg had become extinct. The league was called League of the Ten Jurisdictions (Zehngerichtebund).

Governance

Each Canton in Switzerland has its own section of an organic association where members are working and which organize the national organic label and the national lobbying through the holding company BioSwiss of all section associations. BioGrischun is the section of BioSwiss in Graubünden. Around 1200 farmers are member of BioGrischun. There are just a few organic food production enterprises members too. The local work is done by BioGrischun and its members. The national political, labelling and lobbying is done by BioSwiss. The Directors of BioGrischun are influencing the BioSwiss organization and its tasks.

An inquiry has shown that 45% of the farmers are content and 31% are happy with its work of Biogrischun. Only 17% are not satisfied. The extremes are between 3-4%.

37% of the organic farmers are claiming that the requirements of the Bio-Suisse certificate are too straight, 56% are saying they are adequate.

According to Andi Schmidt, director of BioGrischun, direct sales is still quite low and the key distribution are central organizations which are working closely with COOP and Migros, the two main Swiss retailer chains. COOP was the key initiator of the organic movement in Graubünden by committing to buy organic meet and cheese. Nowadays there is slowly an increasing number of projects to sell organic food more directly to restaurants, tourists, organic local shops and local markets e.g. in form of combined agro-touristic projects.

In Chur a centre of agro-tourism is established to support combined farm and tourism projects in Graubünden.

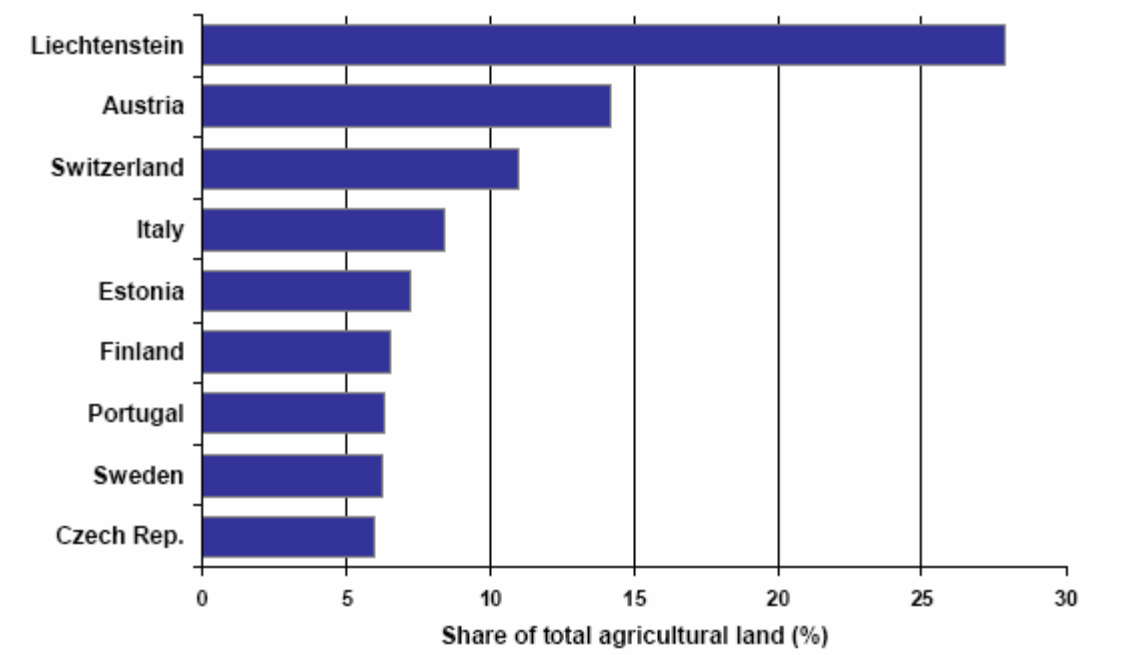
Economical structure

Agriculture is still essential to keep remote valleys inhabited and is therefore supported by subsidies by the authorities both national and regional. Eight percent of the population work in agriculture and forestry, where 50 per cent of the production is certified as organic. Agriculture includes forests and mountain pasturage in summer, particularly of cows, sheep and goats. There is wine production in the Rhine Valley north to the capital Chur. 24 per cent of the workforce are employed in industry whereas 68 per cent work in the service industry where tourism reaches a remarkable 14 per cent of the GDP. Tourism is concentrated around the towns of Davos/Arosa, Flims and St.Moritz/Pontesina.

The Chur area is also an industrial centre. In the southern valleys of Mesolcina and Poschiavo there is corn (maize) and chestnut farming.

According a study of the HTW Chur in 2008 56% of all commercial farms are organic and they are covering nearly 60% of the farmland. This leads Graubünden to the top ranking of Europe. More then 53% of the farmers responded to an inquiry are convinced that the transition towards organic has helped to improve economics. Only 13% are saying it was the opposite.

Picture 1: Organic farming in Europa



Regarding employment organic farming is very important. Around 3,500 people are working on organic farms which is around 50% of the agricultural sector. These are more people than in the Graubünden banking, insurance and chemical industry. Related to the total Graubünden economy 3,6% of all employees are working in the organic farming sector. Taking the direct related industry to the farming into account the total employees of the organic sector of Graubünden are around 7000.

58% of the organic farmers identified their belief in the organic sector why they made the transition. 37% identified financial reasons. 55% of the interviewed farmers mentioned that the operational profit has been improved after 2 years transition period from industrial towards organic.

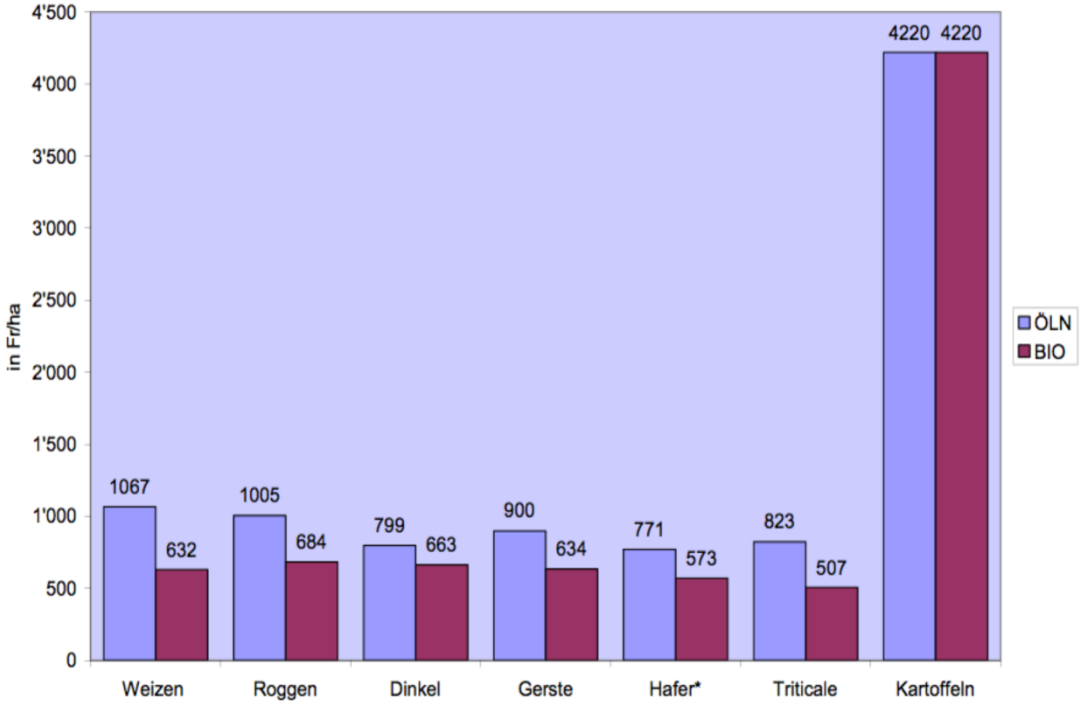
The overall value creation of the Graubünden organic operations is around CHF 24m in 2006. Due to the social activities of the organic enterprises the total value creation is estimated of around CHF 128m which is around 1.2% of total economy of Graubünden in 2005. 90% of the food enterprises using organic farm products explained that organic products are enabling them to access new distribution channels.

The economical power of organic versus non-organic is showing that organic farming of plants is more powerful than non-organic but organic farming of animals is less powerful than non-organic. The natural product results show still that non-organic farming generates a high output than the organic farming. Due to the higher prices the organic farming can take makes them more successfully. This shows that consumers accept higher prices of between 10%-50% for organic products.

Due to nearly no fertilizer and pesticide cost the total cost structure of organic farming looks better than of the non-organic sector. Picture 47 shows the direct cost of organic and non-organic farms related to different corn products.

The x-axis are the different corn products: Weizen=wheat, Roggen=rye, Dinkel=spelt, Gerste=barley,

Abbildung 47: Direktkosten von Biobetrieben und ÖLN-Betrieben nach Betriebszweigen 2006 im Vergleich (Pflanzenbau)



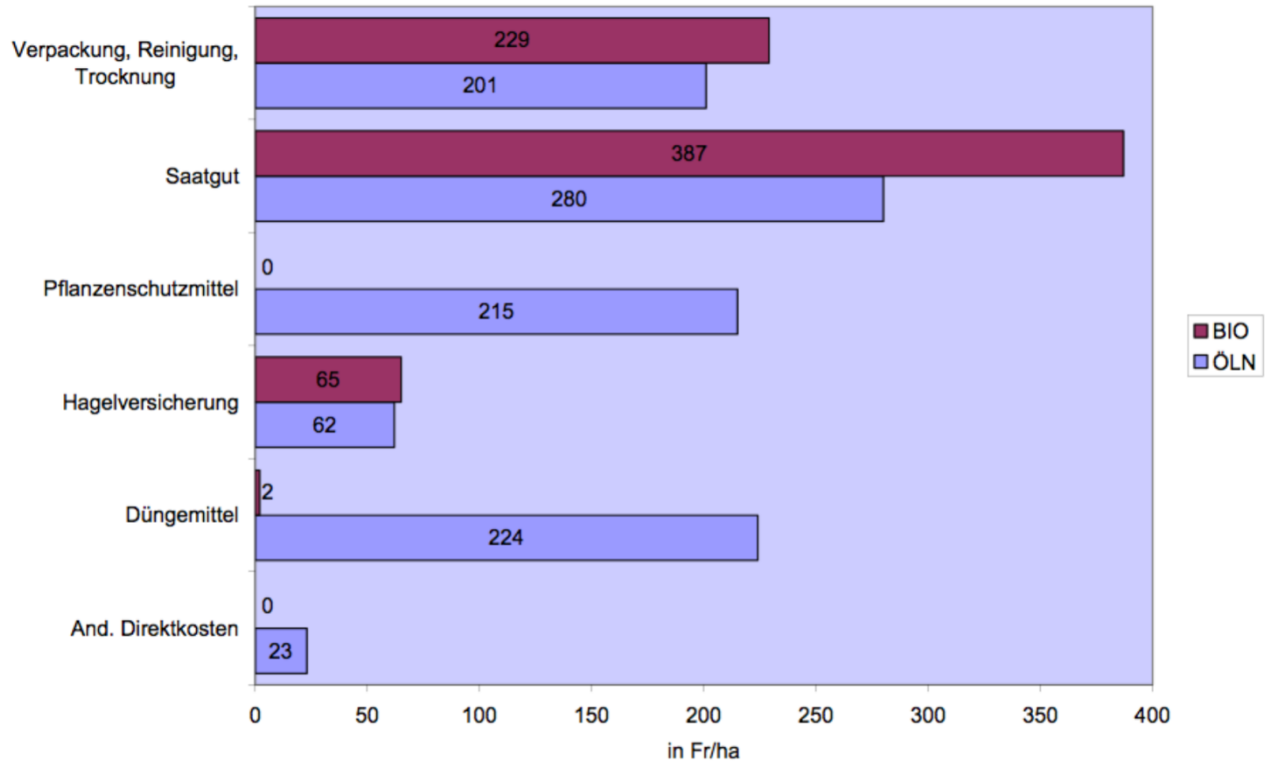
*Wert bezieht sich auf das Jahr 2005. *Quelle*: ART (2007), Tab. P.

Hafer=oat, Triticale=hybrid of wheat and rye, Kartoffeln=potatoes

The y-axis is CHF/ha

Picture 48: cost structure more specific for the rye production

Abbildung 48: Exemplarische Kostenstruktur im Pflanzenbau am Betriebszweig Roggen 2006



Quelle: ART (2007), Tab. P.

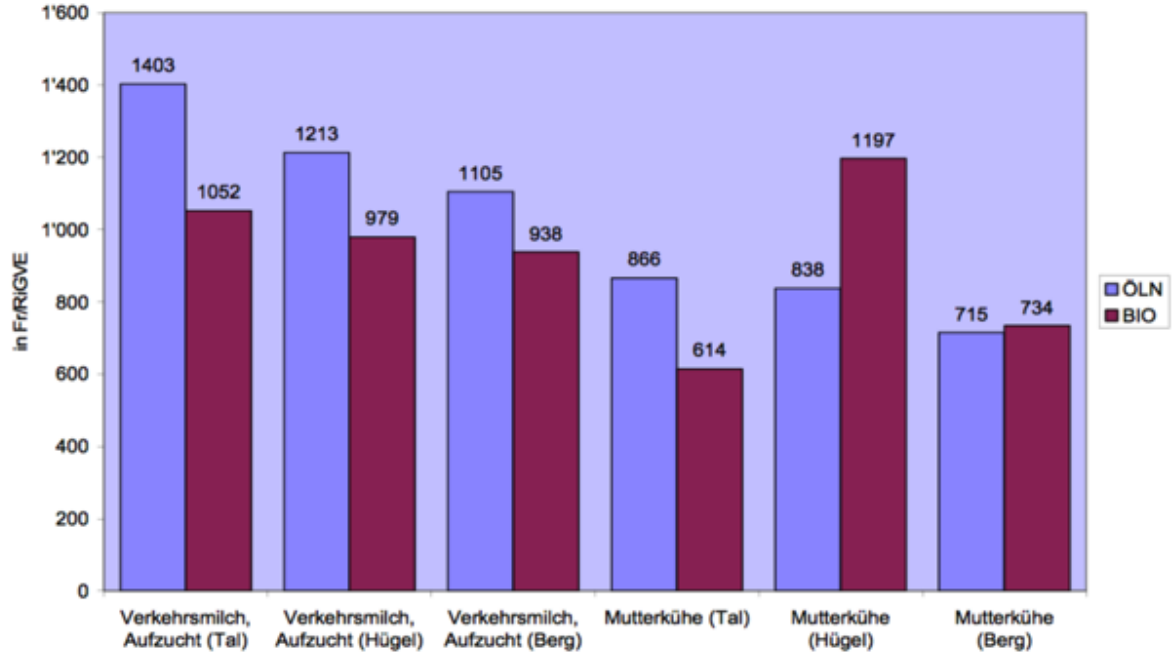
x-axis: CHF/ha

Y-axis:

- packaging, cleaning, drying
- seeds
- pesticides
- hail insurance
- fertilizer
- others

Picture 49 shows the direct cost of organic and non-organic farms of the milk production in comparison of valleys and hills (x-axis: Milk breeding valley, milk breeding hill, milk breeding mountain, milk cows valley, milk cows hill, milk cows mountain) and y-axis CHF/RGVE=CHF/big cattle unit

Abbildung 49: Direktkosten von Biobetrieben und ÖLN-Betrieben nach Betriebszweigen 2006 im Vergleich (Tierhaltung)



Quelle: ART (2007), Tab. T.

Direct costs related to animals are not so clear compared to plants. In total it looks still impressive. If one would count the lower output of organic farms the costs looks different, but organic farms achieve higher prices. But if one would take the soil erosion of chemical agriculture and water pollution into account too then organic farming will be even cheaper.

Organic Breeding is still a problem. 90% of the organic eggs are based only on 50% of organic bred chickens. Even a greater miss-match is between organic seeds and organic plants.

With 1,250 members the organic organization “Bio Grischun” of Graubünden is the largest section of “Bio Suisse”, the largest organic association of Switzerland.

The additional functions of organic farmers are healthcare, relaxation, tourism and research & education. The systematic development of co-activities is just starting. Till today it is more separated.

In total the number of agricultural enterprises has been reduced of around 2/3 since 1990. The size of the average enterprise increases from 11.5 ha Switzerland (11.8 ha Graubünden) to 17 ha Switzerland (18.3 ha in Graubünden) in 2006. Especially in the regions of mountains the reduction is higher then on the more flat part of the country. But on the other side the part of organic operated land is growing especially in mountain regions and in Graubünden it is over 56% already (compared to average of 11% in Switzerland).

Around 10% of all employees in the Swiss agricultural sector are working in the organic sector. Full time jobs are between 42% (organic sector) and 46% (non-organic sector). In Graubünden 50% of the employees of the agricultural sector are working in the organic sector (3,581 people), 40% of it are full time employed. The whole employment sector has decreased in the last 10-15 years but in the organic sector the employment has increased over the same period.

In total the organic sector in Graubünden is ecologically as well as economically important. Especially in the periphery the organic sector is one of the most important employer compared to other industries or sectors.

2/3 of all organic enterprises are selling through distribution channels. 1/3 is selling directly to consumers. The farms are delivering their products mainly to COOP and Migros via centralized collectors. There is an organic milk pool which delivers the organic milk to large cheese factories. The organic grown animals are sold to huge slaughterhouses which deliver the meet organic products mainly to Migros and COOP.

Currently export into other countries is not relevant for the organic farmers (only 12,9% of the organic farms are exporting).

90% of the organic farmers stated that the organic certification facilitates distribution and sales as more easy. They believe in additional growth and most of them wanted to concentrated more and more on organic labelling and production due to supply shortages, high demand and better prices for organic products.

Another value creation is tourism (more than CHF 1 mio/a per valley which is around > CHF 4mio/a). Estimation saying that 50% of the value creation is linked to combined touristic products (nature, landscape, culture, walking, comfort). Agro-tourism is not so easy to establish due to modern agro-technologies and weather dependency. For organic farms using less technology and more manual work or work of animals and due to the health aspects of food they are better positioned.

There are a lot of craftsmanship like the famous guitar constructors Claudio Pagelli and Marcel Bass who produces also the Tiba.

The current network of BioGrischun is very focused on farming. There is not yet an overall network in place to organize synergy between organic farming, organic food production, restaurants or ecological crafts and ecological enterprises like construction, architecture, and tourism.

Impact on the eco-system and environment

Graubünden is offering a huge variety of plants and animals. Biodiversity is huge. In the landscape one will find a lot of hedges which enables many species to locate. There is a program to support to protect and save the hedges and stonewalls by locals on a free base. The region is trying to keep old buildings and nature in harmony and they are supporting with money as well with non- paid work by freelancer's natural parks. E.g. 2009 the local organization Pro Natura bought 27 ha land to protect dry meadows which is treated carefully by selected farmers. For the tourism the beauty of the landscape and the biodiversity is high valued (according the study regions profile 2011 by the canton). In addition tourism counts the healthy village architecture and less new architecture.

Most of the power is generated by hydro. The dam is built on the side of Italy due to non-acceptance of the local population. In addition there is healing water sources in Pignia and in Andeer which was identified and used since the 16th century. Today up 100,000 guests per annum are visiting the thermal bath. Water is a very relevant source for Graubünden. The Tamina Therme AG in Bad Ragaz is visited by 250,000 guests p.a. generating a turnover of CHF 8 million in 2010.

Conclusion

Graubünden is very well developed related to organic farming. Especially its cost structure and price-earning ration are impressive. But its local production is mainly sold to centralized value added companies. The decentralized approach is limited. One reason is the low population rate in this canton but there is missing a network which generates synergy between added values and farming, like one will find on other regions like e.g. Vallée de la Drôme, France. The initiator COOP is mainly interested in organic food products and less in

education, tourism, health and local direct markets or consumer supported agriculture. In Switzerland has maybe not a similar program like the EU to support social farming.

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Region Bingenheim (Hessen, Germany)

Stefan Doeblin

Short description

The anthroposophical community project *Lebensgemeinschaft* Bingenheim www.lg-bingenheim.de was set up and founded 1952 to give handicapped children a positive home and valid place in the society as well to grow according to Rudolf Steiner biodynamic plants to feed the community. During their 60 years community life they have initiated many projects which are now operate as independent organisations but still being part of the community network exchanging ideas, experiences and resources. The following organisations are started up and founded by The Bingenheimer Lebensgemeinschaft:

- Steiner Kindergarten (Waldorfkindergarten Bingenheim),
- Steiner School (freie Waldorfschule Wetterau),
- Allerleirauh GmbH with its bookstore and play shop (Buch- und Spielladen) and an organic shop (Bio-Hofladen),
- Bingenheimer Saatgut AG the seed breeding distribution company and
- Kultursaat e.V., the association of seed breeders

The Lebensgemeinschaft Bingenheim is based on sustainability principles and wants to live an integrated community concept of farming/gardening, social and educational projects. Gardening, cheese making, bakery, farming and workshops for internal usage as well as for exporting products they all are using biodynamic methods with a strong focus on local products and value chain. The community is using 100% renewable energy delivered by the local utility company Energiewerke Schönau. Many rooftops are covered by solar panels (40 MWh/a). The buildings are insulated with natural material and some buildings are using wood burners (pellets). No oil is used at all. Education is one core element based on Steiner principles (Kindergarten, School and educational and cultural exchange with other schools worldwide). Main income is based on government and private support of social activities (healthcare and education) and in addition the sales of farm products. Due to a high internal value chain (workshops and gardening) the costs of living are very reduced.

During the 70th the Lebensgemeinschaft identified that seeds will become a major problem for organic farmers. They identified the tendency to become more and more dependent on high technology breeding and the knowledge of open pollinated seed breeding needs to be recovered. Till today even Demeter enterprises are also using too many hybrid seeds. During the 80th they understood that an independent organisation is needed therefore especially to organise quality control and improvement including cleaning and disease diagnosis. In 1985 they have set-up an initiative for biodynamic seed breeding. In 1987 Allerleirauh GmbH was created, supported by the biodynamic farmers and its association Demeter to sell and distribute biodynamic seeds. In 1994 the Kultursaat e.V. was set up to organise the biodynamic seed breeders under one umbrella organisation to support each other in the breeding process and they cover 47 new seed varieties and 14 seed savings. The following tasks are supported by the Kultursaat e.V.: Seed development, seed recovery and saving, seed breeding research and methodology, PR and support of breeding financing. In 2001 due to the high the demand for organic seeds a better organisational structure was needed. Allerleirauh GmbH was not sufficient for the seed sales and distribution. The Bingenheimer Saatgut AG (BSAG) was set up and took over the activities. Around more than 80 breeding enterprises supply the BSAG and more than 16,000 direct customers are using open pollinated seeds from Bingenheim. In addition BSAG delivers small dealer shops where private customers buy small quantities. Regular trainings are done for all shareholders, partners and clients are organised by BSAG. BSAG cooperates with Sativa Rheinau AG and with Reinsaat KG as distribution and production partnership. BSAG is part of a

network of organic seed and breeder organisations in Europe. Most organic seed breeders in Europe are very small enterprises. In total the open pollinated seed productions in Europe is very low compared to the big five chemical and biotechnology breeding companies (Monsanto, Bayer, Syngenta,…). The small none certified breeders are often only focused on seed recovery and seed saving, no research and development is done

Governance

Historically Rudolf Steiner could be mentioned as the founder and *spiritus rectus* of the whole Bingenheim projects. In the meanwhile there are no individual leaders but there are important people who improve and develop the biodynamic movement. From the beginning of Bingenheim it was a group of people based on the Lebensgemeinschaft which has integrated other biodynamic enterprises and people in the process of development one of the most prestige organic projects in Germany.

There is a strict separation between seed breeding (R&D) and seed multiplication under responsibility of the breeding operations supported by the Kultursaat eV., Saat:Gut e.V. and seed production demand, distribution and marketing under responsibility of BSAG. There is a triangle of decision processes between the breeders, the associations of the breeders and the market company BSAG. Due to cross investments and membership it is like a family business on a large scale. The separation of breeders and market distribution gives breeders more freedom and the third element of the triangle, the Kultursaat e.V. makes the communications between breeders and the company/market more efficient.

Due to seasonal efforts (huge work in winter, less work in summer) resources are exchanged between BSAG, Lebensgemeinschaft and local breeders and farmers which need resources in summer and less in winter.

In BSAG salary differences are max 3.5 times between lowest and highest.

Economical structure

There are three main projects/enterprises with all its sub-projects in this small region.

1. The **Lebensgemeinschaft Bingenheim** LG-B offers currently

- Living groups for children and adolescents (72 people)
- Living groups for adults (48 people)
- Take Care living (6 people)
- Inpatients (6 people)
- Handicap people (6 people)
- School education between 7- 21 years old (84 pupils)
- Workshops for handicapped people (57 people) including professional educations certificates (pottery, weaving, candle manufacture, carpentry, bakery, gardening, cheese, farm including seed breeding)
- Therapy and medical centre
- Organic food shop

Created 1952 the LB-G offers handicapped children and adults an appropriate social environment and a life in dignity and in respect.

The mission statement is sustainability and LG-B is based completely on renewable energy. Most people living and working on the site.

2. Bingenheimer Saatgut AG (BSAG) focuses only on seeds of vegetables, flours and herbs. No grain seeds are offered due to higher capital investment and higher capital allocation. 44 head counts with the equivalent of 36 full time employees are the current status. The founders of BSAG are Lebensgemeinschaft, Software AG Stiftung, Demeter and individual investors and biodynamic producers. The main tasks are:

- seed production
- seed distribution, marketing, lobbying, research for seed production
- breeding research & variety development is outsourced to the breeders jointly organised in the Kultursaat e.V. (biodynamic breeders) and Saat:Gut e.V. (Bioland organic breeders) which is also responsible for seed registration of a new variety, R&D funding and exchange of experiences of the members (around 80 members currently).

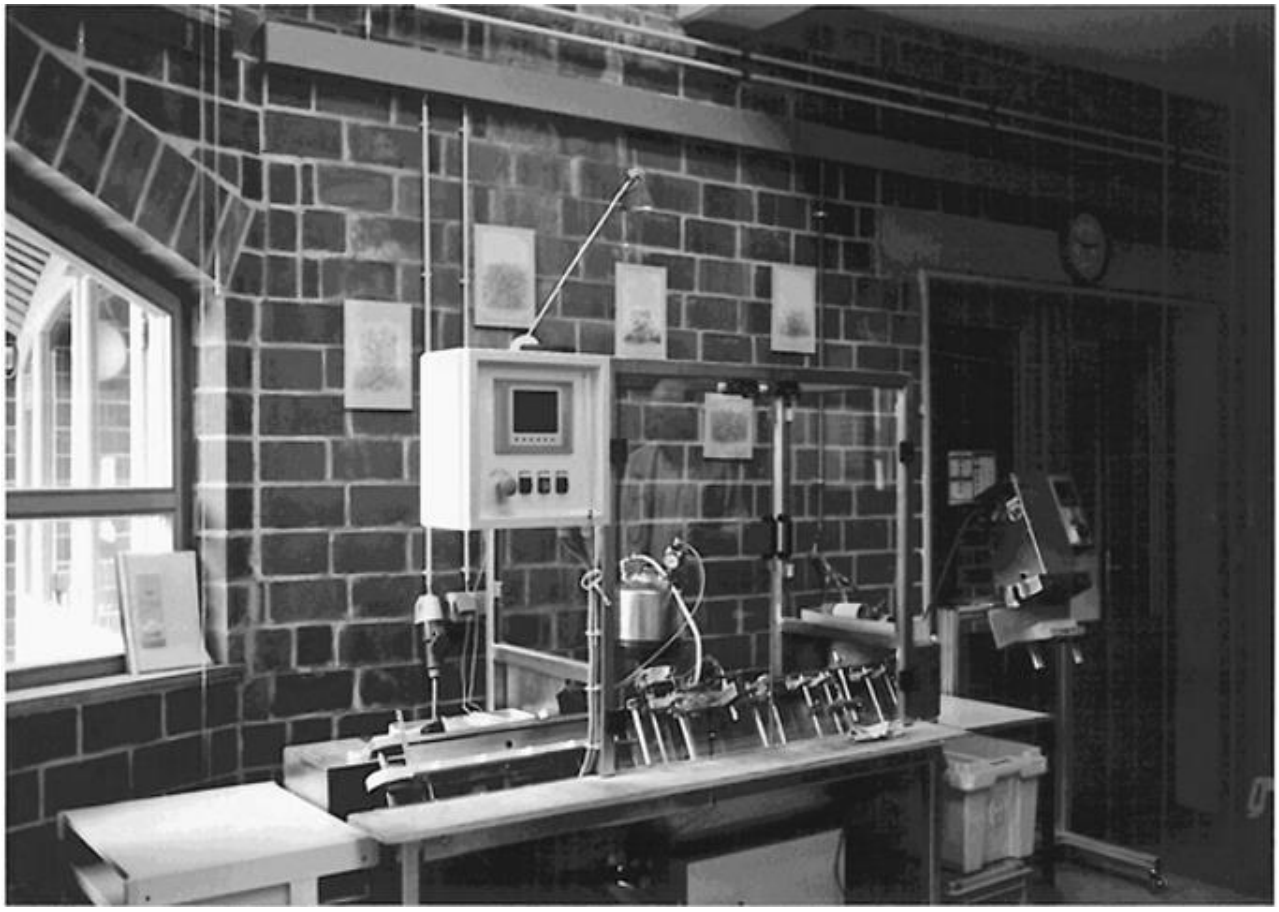
The Team of BSAG in Bingenheim, Autumn 2013

3. The **Kultursaat e.V.,** located in the same offices, is the non-profit organisation of the biodynamic breeders. The breeders want to be more free in their research and development of seeds from market constraints but to avoid to produce seeds nobody wants, the Kultursaat e.V. gathers the information of the breeders and discuss issues with the Bingenheimer Saatgut AG (profit oriented company) which multiplies and distributes the seeds to the market. The Bingenheimer Saatgut company is also the mediator between market demand and research and development and also is taking a strong lobby function for the biodynamic breeders. Similar to the biodynamic farmers the organic farmers of the Bioland organisation have established Saat:Gut eV as the organisation of the organic breeders. BSAG is member of Saat:Gut e.V. and the individual members of the Saat:Gut e.V. are shareholders of BSAG.

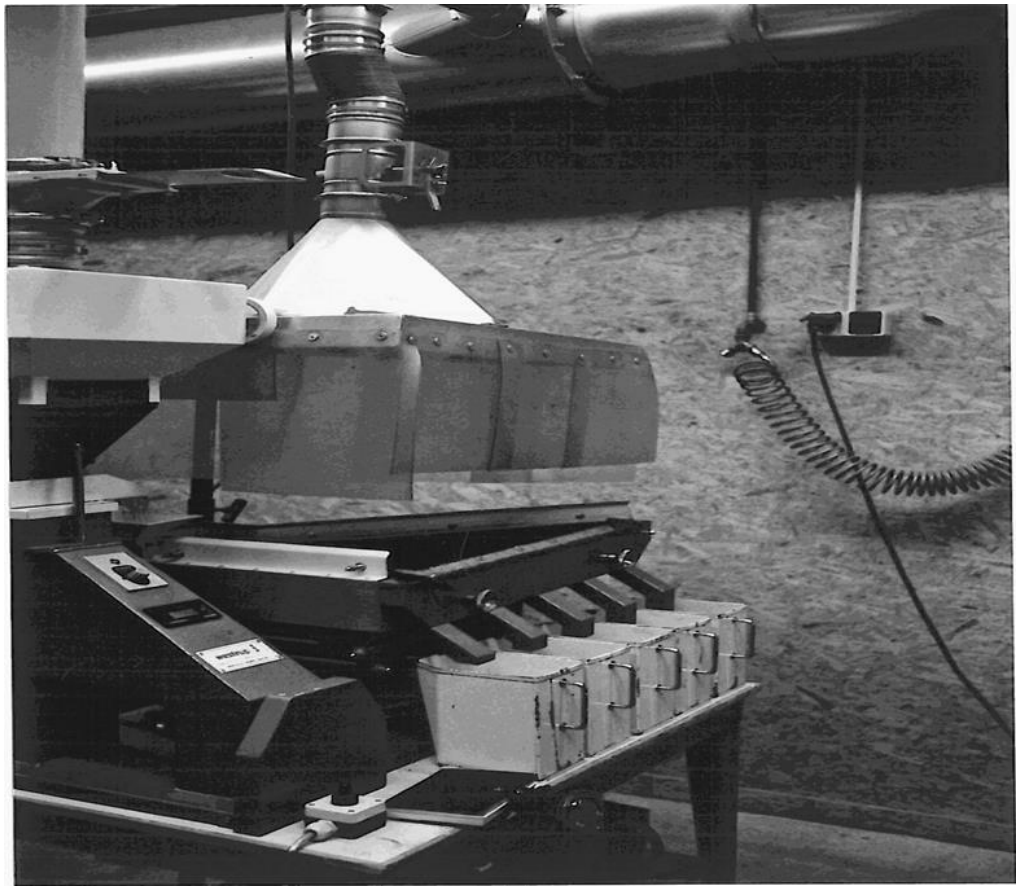
The BSAG is direct selling in Germany, Luxemburg, NL, Belgium and Denmark. In some other countries BSAG is using dealers. There is a close cooperation with Sativa, CH, Reinsaat A, Stormy Hall GB, Arcoiris I and some others.

BSAG is ordering the multiplication of the seeds by the seed producers. They get paid by the BSAG and BSAG is selling the production of seeds into the markets earning a profit.

BSAG is responsible for quality checks, seed cleaning (including fungi and mushrooms on seeds using hot water 50 degrees C– 54 degrees C, time duration of 10-40 minutes with several interims diagnosis over 2 months period), testing of the seed growing power, seed diagnosis of pathologies which reduces the risk for the clients using the products.



BSAG organises not only seed recovery but also new development. Recovery and seed saving is not enough due to climate and market changes. Insofar BSAG is part of the current commercial system in Europe. The breeders and their associations are more independent but need financing from (social) funds. BSAG operates three storages for seeds including the elite seeds which is used for new seed productions (temperature between < 15 degree C with 43% moisture and 13 degree C with 30% moisture).



BSAG is running a local producedsoftware system to collect over time all documentation and experiences putting into barcodes which will be marked on all product packages. Balance and storage information on a daily base is possible. IT costs are around €45,000/a. Examples of each sold product will be stored for two years for research in case of issues.

BSAG trains often themselves needed staff. BSAG tries to use as many as possible local labours supported by machines used for packaging, cleaning, diagnosis, administration, and storage. There is a lot of electricity consumed.

Regarding seed breeding regional conditions are crucial for the successfully plant growth (light, temperature, soil, water, climate and production qualities. E.g. seeds from the North are sold to Northern countries. Seed production could be done also in different countries. Sometimes the seed production (multiplication) is done in Italy but no seed breeding, which is a big problem for Italy.

Zucchini tasting of four different zucchini: three based on open pollinated seeds and one based on hybrid seeds. Very different taste to observe.

Especially for vegetables, herbs and flowers with high biodiversity specialisation on seed breeding makes sense because of the selection process, for examples two years breeding periods, documentation of experiences over decades and research of new varieties for new environment and market conditions.

Impact on the eco-system and environment

The LG-B's mission statement is sustainability. LG-B is using only renewable energy delivered by a local energy company. They have installed on all roofs PV systems, they heating with wood pellets and they have insulated all buildings at the latest status (no oil except cars). Most people are living and working on or near the site. They grow most of their own vegetables or using products of the region, breeding seeds and running an organic shop. They have created a local market. E.g. they growing crop, backing bread with their own crops, baking bread in the bakery and selling the bread in their own organic shop in the village. The education and health care centres enable villagers to stay in the village instead to drive to the next school and medical centres in the nearest town. They are linked to an international education program.

BSAG is using quite some power due to the cooling systems for the seeds. They operate three cooling halls but two are built in a cellar which reduces power consumption. The third hall is built over the ground and

therefore it is extra insulated. But of course this could be improved. BSAG is negotiating with LG-B to buy the old buildings they are using to renovate and insulate them. They are working with a consultant on a plan how to increase efficiency of all the elements and systems.

Power is bought from Naturstrom AG, which is selling renewable power. In addition BSAG operates solar panels producing 16 kWp linked to the grid.

Transport of the seed distribution is outsourced to different logistic enterprises including the Post AG. They try to deliver next day if the order is placed before afternoon. The employees are living very close to the company. Most of then living in the village or in a circle of less than 10 km, only some of them up to 40km.

Discussion with CEO Gebhard Rossmanith and Michael Fleck Director of Kultursaat e.V. about the implementation of 30% ecological seeds by 2030 and is needed:

1. Government requirements have to be strict and duty for all the farmers.
   Without a clear duty to use organic open pollinated seeds (breeding and production / multiplication) for organic products it will not happen. The clear duty of requirements are necessary to improve the biodiversity of seeds. This will cost money and if not obligatory farmers and consumers will mostly use cheapest solutions.

2. Educate citizens, consumers and professionals -
   why open pollinated seeds and ecological farming is necessary for biodiversity, health, variety of tastes and to combine social functions with agriculture and why local markets and local value chain delivers more local work and more sustainable jobs.
   If citizens and consumers do not understand and believe in it, they will not accept higher prices. The high prices could be compensated by less costs for oil, less charges for health due to more healthy food and less social costs due to combining agriculture with social and entertaining projects which will be definitely cheaper (agro-tourism, agro-education, agro-wellness and recovery)

3. Distribution channels have to be motivated and integrated.
   If supermarkets did not find an additional profit selling ecological products they will stick to the model what they are used to. Either there is a significant high demand of resistant consumers or a better margin they will not move. Point 1 and 2 will create a higher demand and higher margins.

4. Creating and strengthen local markets.

   Only local markets enable smaller breeding, farming and food companies to survive and to offer advantages like complementary social functions, open (public or private) sites gives citizens a chance to learn about food and to control the quality of production. Go to the farm and you know how they produce and what quality will be delivered, see their plants and animals how they are being treated. Point 2 is important for that too.

5. New model of funding of seed breeding
   Consumers and farmers needs to fund seed breeding like the 10 Euro Cent on each food product or a member fee of farmers to receive ecological seeds and new seed varieties supported by the government giving research funds (which could be refinanced via health sector reduction).

Conclusion

The region of Bingenheim has demonstrated its importance by the different Demeter projects. Through BSAG the region's impact goes beyond the Germany borders. BSAG complements the activities of Oeko-

Korn Nord e.V. which is focused on organic crop breeding. The Model of the BSAG seems to be a very efficient cooperative model to deliver enough seeds even if the organic sector is forced to use organic seeds. The model could be used and replicated for other countries and using their support it could save implementation time dramatically. The three enterprises have created more than 200 employees in this small region on the countryside. They attracted also national and international exchange of visitors and know-how.

References

The different company information, visit and interviews with Gebhard Rossmanith, CEO Bingenheimer Saatgut AG and Michael Fleck, Managing Director Kultursaat e.V.

Region Uelzen, North-East Lower-Saxony, Germany

Stefan Doeblin, supported by Eva Neuls

Short description

The region north-east Lower-Saxony has a long tradition of biodynamic farming and organic agriculture. One of the earliest enterprises are the Bauckhöfe, a biodynamic institution with 3 farms, education, research, work with handicapped, bakery, mill, pottery and others, founded 1932 already, a working and living place for more than 100 people. Another important Demeter enterprise is the fruit producer Voelkel, founded 1936. In the three districts Uelzen, Lueneburg and Luechow-Dannenberg more than 150 ecological oriented enterprises have been founded successfully. In the 1970s Luechow-Dannenberg was very well-known in Germany due to its protest against nuclear power. Local and national people tried to avoid a nuclear waste storage deep in the ground of old salt mines. Due to the long resistance and activities some people settled in the region and developed alternative projects which attracted additional projects in the region, now showing one of the highest density of it compared to other regions in Germany. Asked why so many eco-enterprises are located in the regions the interviewed founders of organic or ecological enterprises gave the following reasons:

- Anti-nuclear power movement
- Close to cities
- Characters like the Bauck Family (Demeter), organic farmer Ellenberg (fight for Linda potato), Volker Krause (Bohlsener Mill) and Family Voelkel
- Specific sales structure in Lower-Saxony (like local markets, borders to other German states)
- Subsidise for underdeveloped regions (in the past 50% of construction costs are funded by the government) which was grabbed most by eco-enterprises
- Cooperative approach to support each other (e.g. OekoRegio association and nowadays Alena-Uelzen association)

Governance

Alternative projects are supported by the following organisations:

- More then 40 enterprises with more than 100 employees have set up an association Oeke-Regio e.V. to promote the eco-region, to support marketing and to generate synergy between the enterprises of the region (www.oekoverbund.de).
- In January 2014 the Alena-Uelzen Association is founded by 22 companies and organisations (partly eco-oriented, partly conventional) to connect people with space of social living, to take care of demographical change and to develop the countryside with sustainable education, training, art, culture, energy, agriculture.
- There is the Lueneburg University which supports several local alternative projects and inspires new ideas. The have set-up a dedicated faculty of sustainability.
- Another important institution is the Eco-Competence Centre Lower-Saxony (Kompetenzzentrum Ökolandbau Niedersachsen GmbH, Visselhövede, with the director Carolin Grieshop, who is member of the support committee of these studies).
- The ministry of agriculture in Lower-Saxony supports studies, fairs and the network activities of the different projects. They wanted to increase the organic part of the agricultural sector that Lower-Saxony becomes more sustainable (Interview with Dr Dreesmann from the ministry May 2014).
- Two independent magazines are published to support ecological projects in the region: Calluna four times per year and BarftGaans every two months.

The individual enterprises and projects are networking together using the Internet and physical Organisations and Institutions. It looks like the horizontal decision process is more relevant than any hierarchy. Research capacity accompanies applied projects, partly financed by the Lower-Saxony

government.

Economical structure

The regions Uelzen (North-East Lower-Saxony) shows an intense organic activity based on organic agriculture and value added ecological services. There is a holistic ecological enterprise network, supported by self-employed, enterprises, journalists and scientists. The network covers farms, associations, and ecological enterprises.

One of the most prominent projects are the Demeter Bauck-farms founded by the pioneer Eduard Bauck 1932, when he created the first biodynamic farm in that area. Since then in its third generation the farm has expanded into three farms not far away from each other:

- Bauckhof Klein Süstedt (since 1932)
- Bauckhof Amelinghausen (since 1939)
- Bauckhof Stütensen (since1959)

Today they are qualified as social farming and complementary products and services including bakery, guesthouse, dairy, organic shops, landscape services, research, mill, organic water cleaning system using plants and internships for Waldorf schools. Several awards the Bauck farms have received in 2002 and 2008. In 1969 the ownership structure is transformed into a cooperative agriculture research foundation which owns the land and buildings of the conglomerate. 12 shareholders are involved and the foundation is securing the biodynamic principles and heritage. The research centre supports questions of biodynamic agricultural and landscape saving matters. An association with independent biodynamic researchers is under development. 1970 the Bauck farms have started a mill operations and a value added organic food production unit (Bauckhof Naturkost Rosche), where more than 100 employees are working, producing and packaging Demeter products which are delivered nationwide.

In the region one will find added value services based on agricultural or forest products with clear ethical and ecological principles. Arcana furniture (www.arcana-moebel.de), based in Stoetze, produces furniture based on wood with artisanal design, clear functionality and high quality since 25 years. Using ecological material, working with crafts like Annelie Somborn (www.handgemalte-fliesen.de), who is an artisanal tile painter and using resources of the carpenter workshop of the living cooperative Humanopolis (www.humanopolis.de). One will find another specialized crafts workshop of Wolfgang Krüger, using minerals and agate stone to produce decorative lamps and decorative inlays of furniture.

The Bohlsener Mühle (mill) www.bohlsener-muehle.de

This mill enterprise is another prominent projects in the region and declares itself as the partner of ecological farmers and supports ecological farming via different activities. They have initiated and founded the Oeko-Nord-Korn breeding and trading company (see underneath). In 1979 the managing director and owner Volker Krause has taken over the family enterprise which was commercially in a difficult situation. He decided to transform the company into ecological and organic products. Currently 180 people are employed. 200 organic farmers are supplier of the mill. The mill is producing fresh pastries, bread, cakes, fine cakes, snacks, long-life bakery products corn, specials, breakfast cereals, semi-finished food based on corn, in total over 200 products.

The mill enterprise is using sustainable technology, hydro energy and other renewable energy resources and local suppliers with a clear target to become a CO2 neutral balance. Most employees are living close by. In 2011 the total facilities covers 11,000 sqm due to an increase of 4,800 sqm. More silos for crop and pelleting of spelt husks have been installed in 2012. In 2013 the capacity of the food production is based on 3,200 pallet rack places including 1,000 block storage places and 9 stations of lading.

Baucks BioGut (organic farm) http://henning-bauck.de, Reinstorf. Visit and interview with Henning Bauck owner of the farm. Visiters or consumers are welcome to see the farm between Saturday 10am – 5pm, with their barns, storage, local shop, mobile cheese dairy and grazing land for chicken, lamas, rabbits, donkeys and sheep could be seen. Henning Bauck loves varieties of animals and he increases them constantly. Therefore he organizes each Saturday a public safari tour on his farm to present his more than 50 varieties of agricultural used animals and each animal variety is well documented with written descriptions and due to his explanations. To his yearly farm event with food and music more than 1000 people are visiting. He is educated gardener but moved after several years to produce meat covering the complete lifecycle: breeding, growing, slaughtering in his own four abattoirs close to the grazing land and selling directly to consumers. 120 cows and 350 pigs are slaughtered per year. The direct sale is organized via online services (meat boxes), festivals, weekly markets in towns in Lower Saxony and locally via his farm shop. He leases and owns around 250ha.

Each Saturday the farm invites the population to buy directly their products. There is a public lunch including self-baked cakes. Each Saturday lunches and dinner events at their farm are offered as well as workshop/trainings natural jewellery of pearls, pottery, basket weaving, cooking, producing cheese and beekeeping. Guesthouse and Kindergarten services are offered during the year.

His decision to focus on organic production was mainly driven by commercial aspects at that time (subsidisation scheme) he took over the farm nearly 20 years ago. The organic farming gives him more freedom to grow up the variety of animals which is unusual in conventional farms.

The Elbers Demeter Farm http://www.elbers-hof.de, Nettelkamp near by Uelzen.

Ulrich Elbers and Anke Hennings owner of the farm has been interviewed and they showed their farm. Also Ulrich sister (master biologist) is running the vegetable part. The farm is based in a hilly part of the region between 45m - 135m over sea-ground. He and his wife have taken over the farm 1989 and changed it towards Demeter farming. It covers around 100 ha, 20ha forest, 15 ha grassland, 60 ha agriculture (around 7-8 ha vegetables). He operates a 7 years fruit sequence (Demeter). The farm's main business is vegetables but they nearly not using glasshouses or poly-tunnels to grow vegetables because they prefer the taste of free growing plants. They have some animals (18 sheep/a, 12-14 cows/a, 15 pigs/a, 1000 gooses/a and 1000 ducks/a and Ulrich runs a hunting area. The soil quality is measured to 35 soil points which is more of the lower end (above 18 soil points it starts to become commercial and 100 soil points is very good). They are selling more than 2000 food boxes/week directly to consumers in Lower-Saxony by using their own cars and with employed drivers. To complete the offering the farm buys additional food from other organic farms because they cannot grow all themselves. They are growing more than 50 different vegetable varieties. They are only using the seeds from Bingenheimer Saatgut AG. Due to direct sales only they achieve higher product prices to compensate the lower growth output compared to conventional farming. Based on the soil organic potatoes, onions, leek and carrots are running very well commercially. The soil needs dung of around 1 Cattle and Horse Units/ha (500kg/ha). Therefore the farm buys additional cow manure from other organic farmers which are focused on animals. They slaughter 10times per year using a Demeter certified slaughter house not to far away from which they receive their own meat back in packaged form.

They operate one organic shop in Uelzen. Currently around 60 people are working on the farm (part-time, full-time, volunteers, trainees from ex Soviet Union states coming from a association where Ulrich is a member). One neighbour operates a Bioland farm which helps to enlarge a seamless area farmed organically. The software to run the boxes, buy additional products, to operate the shop and to order online was difficult to implement and expensive but in total necessary. They have worked with a specialised small software development company in Germany.

The change towards biodynamic was a decision against the parents (old farmers) and is based on ethical believes and consciousness. They have used organic consultants and but they learned most from other organic farmers. The start-up of the change was very hard commercially. There are barriers for a current farming to change towards organic, because as long as the oil price is low the yield is usually higher and less work with conventional farming. Today to transform a conventional farm into organic it will be difficult to finance, he believes. He believes to be a member of a strong association like Demeter is important even if it is expensive (around €5000/a).

They are organising regularly cultural events on their farm to attract people, customers and to have fun. Even with good relationships with neighbouring farmers it is still very difficult to share machines and equipment due to stronger dependency of the weather compared to conventional farmers.

Visit and Interview with **Martin Evers** www.seminar-evers.de and www.richgarden.de and owner of the Evers Life care Environmental Institute. Martin is an engineer and ecological expert in how to improve the quality of water, construction material and electro-smog including architectural structure of houses and apartments. He works closely with a group of medical practitioners in Hamburg, the University of Lueneburg, Ostfalia University for Applied Science, Suderberg and University of Dresden.

He is teaching and educating farmers, enterprises, and private interested people in seminars including a certification as an eco-engineering. He is advising farmers of the impact of bad water quality. His routes in water management are based on Viktor Schauberger and Memon Technology which uses Information's Polarizations Interference Chip Technology (IPICT). Martin was educated and trained by the inventor the engineer and researcher Winfried M. Dochow how set up later is own research institute for bio-energetic Analysis in Soltau. Dochow has given the patents and knowhow to Memon Umwelt-technolgie GmbH, Rosenheim, Germany with whom Martin works very closely today.

He supported the Bauck Farms to improve their water quality which has resulted in a better yield of the potato harvest, chicken growth and other products. He advised with great success the School Gusborn with difficult pupils to change their seating and to offer improved water to drink regularly which improved the pupils qualification significantly. He advised a public swimming pool to reduce chlorine, to improve water quality and to attract more clients to use it. He advises how to build ecological and healthier houses and how to change existing apartments if people feel ill. He advises enterprises if radiation leads to a reduced efficiency of the employees.

"Electromagnetic fields (EMFs) represent the greatest danger facing humanity today." Professor Yuri Grigoriev, MD, Member of the International Advisory Committee of World Health Organization (WHO) of EMFs and Health. Chairman of the Russian National Committee on Non-Ionizing Radiation Protection under the Academy of Science.

A similar ecological local activity is represented by the Kontor for construction biology in Uelzen, http://www.kontor-fuer-baubiologie.de.

This consulting company advises users of everything around ecological constructing, living and furnishing in new or old buildings. Painting colours, insulation material, floor material, clay and renovating old houses all is covered. Poisoning material, mildew and wood protection material is covered too. If wanted they organize the craftsman and specialized enterprises for each task.

Nabuko Organic wholesaler www.nabuko-biogvs.de

They deliver the complete package of organic products, vegetables, dairies, dry products, soft-drinks, meat and deep-frozen products to large food kitchens, in total 1,300 t/a. Founded 1993 and EU certified as organic food service company. They are key partner of Bioland label and organisation. Clients are schools, university, large kitchens and retailers in Lower-Saxony, Hamburg and Schleswig-Holstein. The founder Karsten Bunge created jointly the idea with the organic farmer Karsten Ellenberg (potato Linda see underneath).

Voelkel GmbH, Höhbeck, the organic and biodynamic fruit juice producer www.voelkeljuice.de was founded by the family Voelkel 1936 years ago. From the beginning they have been involved in Demeter biodynamic agriculture methodology. They believe in holistic agriculture and they published a declaration already three generations ago. They are using organic and biodynamic suppliers. 145 employees are currently working in the enterprise. They support open-pollinated seed breeding and the ecological wild orchards initiative. Today 70 members of this initiative supply 79 t of fruits. A second initiative is set up in a different area to keep the wild orchards and old fruit trees instead of planting new and more harvesting efficient ones but with less taste. In total Voelkel receives 25,000 t raw-material from different regions and countries. Voelkel tries to minimise transport and for long distance they are using ship transportation. They have installed a program to

reduce water and energy consumption continuously. The whole production process is based on the principles to save the healthy content and taste of the fruits.

They are member of 10 associations like OekoRegio e.V. , Stop Climate Change and BioFair and their suppliers have a long-term relationship to them. For orange juice they are using organic Fairtrade partners from Egypt. Voelkel supports celli concerts of a music school in Luechow-Dannenberg. They purchase the power from Naturstrom, an eco power trader in Germany.

Woltersburger Mühle www.woltersburger-muehle.de

Interview with Gerard Hinnarch, Head of the Centre (theologian, social pedagogue)

The “Woltersburger Mühle" is located close to Uelzen in the middle of a forest attached to a small river and has extended location in Uelzen including a social supermarket. Several buildings are part of the ensemble around the old mill which is fuelled with water. Today the water wheel is used to generate electricity. In the years 2008 till 2012 a different craftsman enterprises and the agency for unemployment jointly with the charity trust Woltersberger Mühle organised an education and qualification program for unemployed young people. In these years more than 100 young people of the regions have been chosen to get training for a school qualification. They young people had no qualification at all. At that time the unemployment rate in the region of Lower-Saxony was around 12.5%. More than 50 employees have been engaged during that period. Nowadays there are still 25 employees. 65% of the now qualified young people found a job mostly in the craftsman enterprises which have been engaged in the project. This success was supported by the upcoming growth of the economy in 2012/2013.

The charity trust Woltersburger-Muehle has acquired the land including ruined buildings and with the support of the craftsman enterprises and the young people the ruined building have been restored and renovated. Today it looks fantastic and idyllic. Today the following activities are located:

- Centre for qualification of young people including craftsman workshops sponsored by the agency for unemployment

- Centre for Christian Spirituality and Responsibility in Society sponsored by the protestant church, e.g. seminar on location of resistance and spirituality on the example of Bergen Belsen und Gorleben
- Centre for environmental Education and experiences of Nature supported by the NGOs NABU and BUND, expert group of forester, teacher of biology, environmental researcher, gardener, landscape architect, forest pedagogue
- Network of Culture, Art and Communications (a combination of experts and institution for art, craft, tourism, interested people in art.
- Training and Seminar Centre including a Café, Guesthouse for 35 people and seminar rooms up to 120 participants (commercial activities with 5 employees)

The following X offers to rest and to back-pedal for a moment

- 500 sqm herb garden
- Educational path of unemployment
- The room of silence
- Pavilion garden
- Fish staircase and the water wheel
- Sculptures in the garden

The Woltersburger Mühle concept is a place to combine social engagement, spirituality and ecology in one hand.

Compared to other ecological progressing regions there is a lot **seed breeding** development in Lower-Saxony but not always ecological but also partly non-ecological ones.

ÖKO-KORN-NORD e.V. http://www.oeko-korn-nord.de

Hans-Joachim von Klitzing

Wulfsoder Weg 5

21386 Betzendorf

Telefon: 04138-51060

E-Mail: v.klitzing@oeko-korn-nord.de

The Oeko-Korn Nord (eco-corn north), Betzendorf with its administration centre, is a production cooperative founded 1991 by the Bohlsener Mill and around 60 organic farmers which are suppliers of the Bohlsener Mill. Currently there are 100 members (suppliers of seeds, plant potatoes) from Lower-Saxony, Mecklenburg-Vorpommern, Saxony-Anhalt and North Rhine-Westphalia). In the meanwhile it is the largest organic corn breeder, producer and trader in Lower-Saxony and surrounded states. They have locations set up, two in the Uelzener area (Uelzen, Bad Bevensen, Beetzendorf) and one in Magdeburg in Saxony-Anhalt.

The 100 members are using the cooperative to distribute their corn and legumes products. 70% are also member of the Bioland association. In the three locations there are organic seeds and corn preparation and processing facilities, 12,000 t storage and dry systems. For the process oriented quality assurance they are using Bioland Raw Product Management System and they are certified according the GMP B3 Standard. Trading of corn and corn-seeds are the main tasks. The turnover in corn trading is around 14,000 t/a with a growing tendency after 14 years stagnation. The seeds have been growing steadily. Currently 20 employees are working full time.

The Bohlsener Mill is a long-term partner. Product security and local aspects are key. Also other mills are clients of the cooperative.

The base to multiply organic seeds is very often conventional seeds. Only the seed growing has to be organic to name the plant organic. There are organic seeds but not enough. Small producers and farmers prefer to change to organic seeds if they are available instead of going to all administrative and bureaucratic process to use conventional seeds and to produce organic plants themselves. Hybrids have the advantage to grow regularly compared to organic seeds which allows using machines for harvesting.

Larger organic farmers could create their own seeds if they set up a cleaning facility otherwise there will be to many weed and pest plants in between. Small organic farmers are better of with buying organic seeds from producers. There is controversial debate about replica-licences for organic seeds. On the one side it would help to save seed varieties and on the other side there are economical interests of the seed producers due to the high costs of seed breeding. To privatise the certification and registration is wrong due to conflict of interests.

Europlan Pflanzenzucht GmbH http://www.europlant.biz**,** Lüneburg is another conventional breeding company in Lower-Saxony with an organic division due to the high demand. In the year 2012/2013 their turnover of the company group accounted for €106,7 Million. Their focus is potato breeding and plant distribution. To breed new potato variety it is a great effort and it takes usually more than 10 years. They are using biotechnology but they produce also ecological potatoes. They have been in a dispute about the famous potato Linda which they had the licence and which is now licence via the UK. They have given up Linda but a lot of organic farmers have been interested in using Linda further and tried to relicense it. Karsten Ellenberg http://www.kartoffelvielfalt.de with his 80 ha organic farm in Barum close to Bad Bevensen, Lower-Saxony, initiated a campaign successfully to free Linda against Europlan. He used first the UK licence in 2009 to sell Linda and then in 2010 German Authorities give green light that farmers can market Linda again. Europlan wanted to get rid off Linda in favour to market their own new product Belana.

Impact on the eco-system and environment

The large number of ecological, organic projects and enterprises are all committed to reduce CO2 and they are using renewable energy via Naturstrom AG green power trader and they are mainly all following the initiatives of energy efficiency. The strong network and direct sales approaches of several farms and other enterprises has reduced transportation especially due to increasing local jobs for local people.

Conclusion

North-East Lower-Saxony is a very encouraging region with a great network of ecological and sustainable activities which covers a lot of value added services and products around ecological agriculture and seeds. Already two associations like OekeRegio and Alena-Uelzen and the Competence Centre for Ecological Farming (research and development) are signs of networking and supporting power of the region. This region is one of the two regions in Germany with an organic seed breeding enterprise. Long history of biodynamics since 1930 and resistance in the 1970s was key to establish such a variety of eco-projects and eco-enterprises. The combination of ecological interest by different universities in Lower-Saxony accelerated the ecological development. The established networks and association enabled the region to create synergy and complementary products and services. As mentioned by the Woltersburger Muehle the youth unemployment rate went down in the region over the last years due to general economical growth but also due the local ecological activities.

Reference:

- OekoRegio e.V. Eva Neuls, director
- Alena-Uelzen.de
- Interviews and visit of the different projects
- Competence centre for Ecological Farming
- Ministry for Agriculture Lower-Saxony, Hannover
- http://de.wikipedia.org/wiki/Linda_%28Kartoffel%29

Todmorden: The Incredible Edible

Ksenia Gerasimova, phd, University of Cambridge

Short Description:

Todmorden is a small historical market town, situated at the meeting point of three steep valleys on the Lancashire and Yorkshire border, 17 miles from Manchester. The name Todmorden means 'valley of the Marsh Fox'. The village existed since the 17th century, but the town was developed in the 19th century with the arrival of railways and industrialisation. The town is surrounded by much older small villages, hamlets, halls and farmhouses. The town once specialised in cotton production. Today it is the home of one of the most successful British urban gardening project – Incredible Edible Todmorden (IET).

Today it has around 6400 households and 17000 residents. By the year 2008, the year when the idea of Incredible Edible was born, according to one of the co-founders of the movement, the town was in economic decline, with little hope for economic growth.

In March 2008, 60 residents of Todmorden met at public meeting and discussed the situation with food production, 'the dissociation of food from its agricultural and geographic provenance' and the imperfections of the British diet leading to obesity. Under the leadership of local activists Pamela Walhurst and Mary Clear, the group started the project which aimed to grow vegetables locally, in the Todmorden land. They initially took an idea similar to squatting. They have called it 'a guerrilla-gardening' approach, which meant that unused public lands were cultivated for gardening without legal permission. However, soon they began approaching public and private sector landowners for permission to plant on unused grounds. This led to the creation of 40 public fruit and vegetable gardens. The idea of local gardens has started to spread beyond the Todmorden area. There are now 50 groups in the UK and groups in Canada and New Zealand, and even in Rosario, Argentina.

The success of the movement is based on good leadership and innovative grassroots approaches which revitalised local production and empowered local people.

The Incredible Edible is a voluntary initiative, which has been led by two strong-headed ladies, 'who wanted to find an inclusive way of enriching the world directly around them'. Pamela Janice Walhurst, CBE, is the current chair of the network. In past, she chaired the Forestry Commission of Great Britain. In 2005 Warhurst was appointed as a Commander of the Order of the British Empire (CBE), for services to the environment and in the same year she led Pennine Prospects, a regeneration company focusing on the South Pennine region of the United Kingdom. She is also a Fellow of the Royal Society of Arts & Manufacturing and Chair of their Yorkshire region, and is an Honorary Fellow of Landscape Institute. She was also a Labour council leader and served in the Calderdale NHS Trust.

Mary Clear is another Todmorden resident, an active grandmother of ten, who describes herself as 'a dreamer and schemer'. She enjoys cooking and often offer tours around Todmorden and speaks at public about her ideas on localising food.

Economic Structure:

The project has promoted the idea of reusing public space for growing food and introduced the novel concept of open source food – 'picking and eating something that someone else had planted'. The project started with herbal gardens in local schools, a local cemetery, and then planted trees near the fire station, health centre and the railway station. Once crops were ready to collect, the designed posters welcomed the residents and visitors to pick the crops for free. At a local elderly home garden beds were raised at wheelchair height.

Initially, as Pamela Walhurst described, people were hesitant, but soon they appreciated and started sharing meals cooked from the crops and supporting the idea.

A local woman reflected: “I’d never grown a vegetable in my life and I had absolutely no idea how to do it, but when I heard about Incredible Edible from another mum…I knew it made sense. I started in my own garden by growing vegetables. It was far easier than I’d expected it to be”.

Scaling-up and Diversifying

Started from the gardens of local activists and few occupied public sites, by now the project covers all schools in the town and expanded with the help of public and private landowners. Social landlord Pennine Housing allowed the project to work on its premises. The piece of donated land in Walsden was developed into a major resource for growing seed-bed for business opportunity and learning, and the donated land in Gorpley was used to develop hill-top farming. After the major digging the site was created in a hilltop spudarium for planting potatoes which then were used for making crisps and cooking in soups. The group has applied for the Lottery Fund, which invests awards lottery money to community groups and projects that improve health, education and the environment. The application was successful and allowed to fund the projects, including the food hub in the Tod High School, and even to pay for a project manager’s salary.

The project started with herbs, fruits and vegetable growing, but then it included diary and egg production.

The new environment favouring local production of food created new opportunities for business. In August 2009 the Pextenement Cheese Company restored a XVII’s century diary and started to produce a local cheese from local milk branded as East Lee.

Since the launch of Every Egg Matters campaign which included free pancakes, egg painting and feathery hen hard hats, the Todmorden group set a target to be self-sufficient in eggs. They educated local consumers on how to keep chickens, the safety rules and regulations and explained how to sell surplus eggs. Then the mapping exercise has produced a map of local producers which is now available online.

Another application was submitted to Calderdale Council for £1/2m to create ‘a state-of-the-art facility to grow fish and salad leaves’, which will be used to feed High School pupils and promote knowledge on local food production. The project is run by a limited company jointly run by IET, the school and the primary care trust, with help from the Green Business Network.

The local market has thrived from the increased production. Many items sold there are produced locally, and it has a banner which promotes local markets. There are one open air and one indoors market. It includes stalls from local producers, such as butchers, but also sells take away food. There is only online order and home delivery service. Trader Jeff Thomson has won “Make Your Mark in the Markets”. He sells authentic Punjabi curry dishes in Todmorden.

There are local four cafes who support IET. The Bear Café, for example works in partnership with IET and intends to source as much of its produce locally as possible. The organic milk comes from Clever Cow, the bread from Saker bakery, the ice-creams from Just Jennys, free-range eggs from Staups Lea Farm, all local producers and vegetables from the IET growing scheme when in season.

Other local food retailers, such Barearts Beer, Bridestones Brewery and Luddenden Valley wines are promoted by IET and also grow their own products. Local bakers are encouraged to sell their products.

Because of the extraordinary story of IET, the town has become a mecca for green tourism, so now the local tourism office invites **“vegetable tourists”** to follow the Green Route, created by Incredible Edible and look out for Pollination Street. Tourists from all over the world arrive there and are often toured by Mary Clear.

Stakeholders Approach and Community Work

The project started off as a grassroots initiative and has been supported by local residents through voluntary work and individual donations. Most of them give because they believe in the project and its good aim.

One of the individual donor explained his support for the project: “I want to support the planting of free food in the valley. I want to support people who have very little space to obtain the means to grow food, to experience the wonders of growing and eating stuff you have made happen. I have 9 grandchildren and I want them to enjoy a healthy planet I know that there are no pockets in shrouds and that money cannot be eaten. I believe my money will be well spent in Todmorden”.

The IET was successful in teaming up with local business who donated to it. For example, B&Q awarded IET with £5K worth of supplies. CMBC gave £2k to buy event tents and cooking gear.

The general concept behind the IET project is built on three ingredients, according to Pamela Walhurst: Learning, Community and Business. Most of the projects supported by IET is aimed to educate about the food production, food traceability, health impacts, but also having fun in local growth. Many projects are run in schools and actively engage children, as future generation, to learn how to grow and appreciate local food. Community events, such as free food tasting and food festivals encouraged local residents to grow new varieties and try new recipes and provided space for regular communication, exchange of ideas and entertainment. The links to local business, particularly farmers, made possible to run project sustainable and revitalised local economy, by creating new opportunities in a local food chain market.

Governance

The governance of IET is defined by its Constitution, stating that it aims to ‘promote and develop a culture and opportunities for growing food, cooking and sourcing local products”; “to build on Todmorden’s wealth of voluntary sector engagement to develop new links and partners concerned with the future of food and growing”; “to develop whole community skills in growing and cooking local produce”. The organisation is administered by the Management Committee. At open meeting, held once in three years, the General Meeting elects IET’s Chair, Treasurer, chairs of Community, Learning and Business. A separate member is elected to lead communications. The members of the Committee do not receive financial remuneration for their work. IET annual accounts are publicly visible.

Impact on the eco-system and environment

There will be not direct measurable results achieved but people have accepted to focus more on local value chain also for food. This will have a positive impact on transport regarding food but also regarding leisure activities. The food harvest is part on the leisure time. The additional green tourism could count against that. Maybe the learning lessons by the green tourists will have a long-term positive impact. The use of local food production will definitely lead to less food waste.

Results and conclusion

The Todmorden project is about localising food production. Despite some critique, it proves that it is possible to create local food production, to scale it up by collaborating with business and local authorities and create demand in local food. According to the survey held in 2009, 47% of respondents in Todmorden reported to have grown vegetables at home, 79% of the respondents supported the idea of the project and requested to grow more food in town. 64 % of them buy locally produced food on a regular basis. In the year 2011 the local council declined an application for a new Sainsbury’s supermarket and the local newspaper Todmorden News wrote, that any supermarket is not welcomed in the town.

The strong emphasis on education and community work provides community and local authorities' support. The fact that IET has produced 'a contagious idea' that s spread beyond the UK's borders is the best argument to support the viability of this model of decentralization of food production.

The creators of the project remain loyal to their commitment and optimistic about the future of the project. Thus, IET contributes to the development and support of the concept of localising food production: 'Through Locality, this unique knowledge base can be shared across the sector, disseminating learning from each new success and each new achievement, and encouraging communities to take control of their own futures'.

The initiative was started in economical declined environment and was based on volunteers work for free. In the meanwhile the grass-route movement is well linked with the local government which is supporting the process. The number of job creation is not yet known (except the one paid volunteer) but the local small businesses are stabilised. The job decrease could be stopped.

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