Agriculture and Foodscapes

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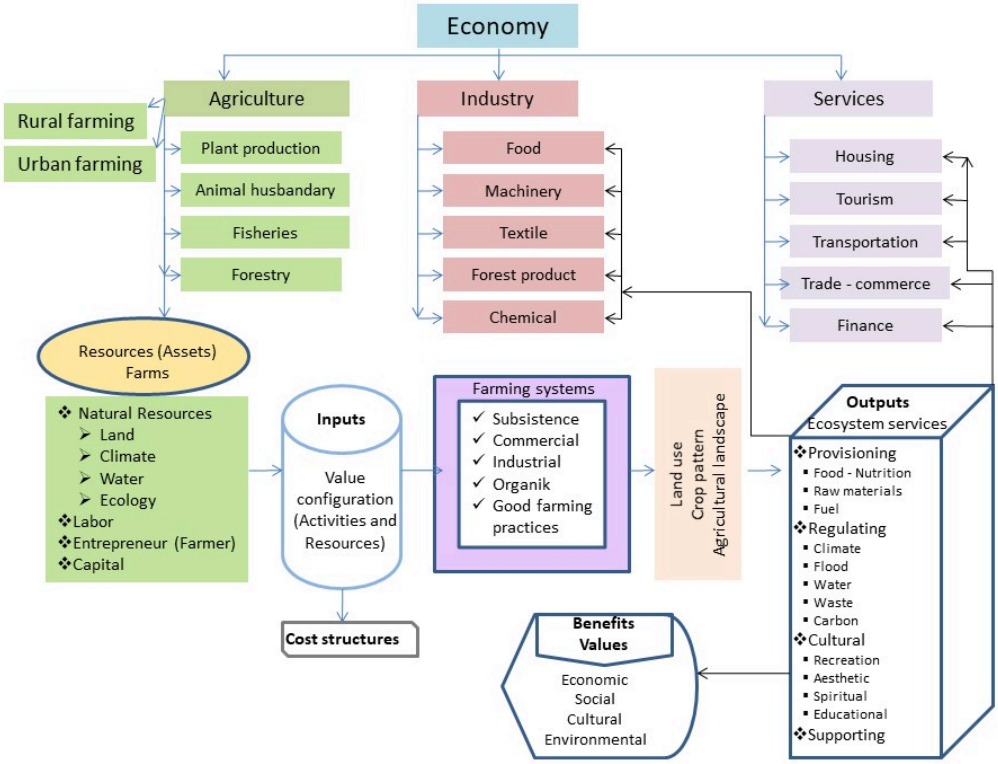
Setting the scene: What is driving the sector?

Agriculture encompasses a wide range of methods for cultivating plants and animals, including crop cultivation, domestication, horticulture, arboriculture, market gardening, animal husbandry, and fisheries. This sector generally involves a complex production process that transforms various inputs into outputs (Figure below). Agricultural systems rely heavily on natural resources such as land, climate, water, and biodiversity, as well as on capital, labour, and entrepreneurship in various combinations. These resources interact to produce the final goods.
At the end of this production process are crop and livestock products, as well as biomass, which are sold in agricultural markets for purposes such as food consumption, bioenergy production, and ornamental use. Agriculture also shapes diverse productive landscapes that provide valuable ecosystem services, including water retention, biodiversity support, and spaces for leisure and recreation.

Historically, agriculture evolved from labour-intensive production on small farms to a more market-oriented, internationally integrated sector. Today, it is largely dominated by agribusiness, marked by extensive mechanisation and the use of chemicals and fertilisers.



Agricultural concept map and agricultural systems components, *diagram elaborated by I. Yilmaz, 2024*

The large corporations focus on profit, cost efficiency, and have a global orientation. Authorities influence the sector in a segmented manner, lacking an integrated approach for social, environmental, and economic factors. The agriculture sector's development, sustainability, and productivity are driven by several factors, varying across regions and countries.

I. Economic Factors

1. Market Demands and Agricultural Markets:
Consumer preferences for diverse, high-quality products drive the sector. Farmers adjust production methods and crop choices based on market signals to increase profit (Grunert and Bredahl, 2004). From the 1950s to the 1980s, agricultural production grew significantly due to government support and market drivers, leading to higher self-sufficiency rates in European countries. However, farmers' share of consumer prices declined as the retail sector gained power. Consequently, many farmers pursued economies of scale or left the sector. Currently incentives are in place to encourage young farmers (Morris et al., 2005).

2. Research and Development,
Advances in crop science, biotechnology, and sustainable practices help farmers to increase profitability and adapt to changing conditions. Innovations like modified crops, precision farming, and advanced machinery enhance efficiency and yields (Nicolia et al, 2014; Lowenberg-De Boer, 2017) have contributed significantly to global food output growth since the mid-1960s.

*3. Global Trade and Market Integratio*n
International markets, trade agreements, and globalisation influence the competitiveness of agricultural products and the sector's overall structure (Anderson and Martin, 2019). Since 1995, agricultural trade has more than doubled.

4. Government Policies
Agricultural policies, subsidies, and regulations significantly impact production decisions. Policies related to trade, land use, and environmental conservation shape agriculture's direction and structure (Swinnen and Squicciarini, 2012). Environmental protection policies have increased since the late 1980s (Morris et al., 2005).

5. Access to Finance and Inputs
Adequate access to credit, seeds, fertilisers, and other inputs is crucial for adopting modern technologies and enhancing productivity. This depends on farmers' characteristics, organizational structure, financing costs, and risk factors. Many farmers are greatly depending on loans.

6. Agricultural Infrastructure
In underdeveloped and developing countries, agricultural infrastructure development is vital. Availability of irrigation infrastructure and sustainable water management practices in arid regions significantly affects production.

II. Environmental Factors

1. Climate and Environmental Conditions
Weather, climate change and environmental conditions impact agricultural practices. Farmers must adapt to changing climate patterns and environmental regulations.

2. Soil Structures and Topography
Soil structure and topography influence water retention, root development and nutrient availability, affecting agricultural production. There is a growing concern on the negative impact of current farming practices on soil quality.

3. Consumer Awareness and Sustainability
Growing awareness of environmental issues and sustainable farming practices leads to changes in consumer behaviour, driving a shift towards environmentally friendly approaches.

III. Social Factors

1. Demographic Changes
Population growth, urbanisation, and demographic shifts impact food demand, requiring increased productivity and sustainability in agriculture.

2. Cultural and Social Factors
Local traditions, cultural practices, and social norms influence agricultural practices. Farmers' knowledge and characteristics also play a role.

3. Food Security and Safety
Ensuring access to safe, nutritious food is essential for health and nutrition. Food safety is addressed by a farm-to-fork approach focusing on prevention and risk management (Uyttendaelea et al., 2016).

4. Animal Welfare: Society increasingly values animal welfare, prompting changes in infrastructure and practices to improve the well-being of farm animals (Fernandes et al., 2021).

Balancing these dynamic factors while considering local conditions and global trends is crucial for successful agriculture.

Which sustainability conflicts is agriculture facing and co-creating? Which major tradeoffs are prevalent?

The agriculture sector faces several sustainability conflicts, reflecting the complex challenges arising from the need to balance food production with environmental conservation, social equity, and economic viability. Tradeoff refers to the idea that achieving one desirable outcome may require sacrificing another. Agricultural decisions involve balancing multiple factors, and optimizing one aspect may come at the expense of another.

Key sustainability conflicts in agriculture include:

- *Land Use Conflict:* Competition for land among agriculture, urbanization, and natural ecosystems can lead to deforestation, loss of biodiversity, and habitat fragmentation. Expanding agricultural land into forests or wetlands contributes to these issues.
- *Water Scarcity and Pollution*: Agriculture consumes significant water resources. Inefficient use and pollution from pesticides, fertilisers, and other contaminants can deplete water supplies and degrade ecosystems. Over-extraction of groundwater for irrigation can also negatively impact both agriculture and ecosystems.
- *Chemical Inputs and Environmental Impacts:* Pesticides and fertilisers can cause water pollution, soil degradation, and harm to biodiversity and human health. Runoff with excess nutrients leads to eutrophication in water bodies, while intensive farming practices, including heavy chemical use, have detrimental environmental effects.
- *Biodiversity Loss and Monoculture:* Intensive farming often relies on monoculture, which reduces biodiversity and resilience to environmental changes. Increasing crop biodiversity and practicing crop rotation can enhance soil health and ecosystem stability by improving soil organic matter and reducing pest and weed pressures.
- *Climate Change Impact:* Agriculture contributes to greenhouse gas emissions through activities like livestock farming and deforestation. Climate change affects productivity and food security, potentially disrupting crop cycles and yields. However, it might also benefit some crops in certain regions, such as in Northern Europe lengthening the growing season.
- *Social Equity and Food Security*: Inequitable distribution of resources and land tenure issues can lead to social conflicts and threaten food security. Land grabbing for large-scale agriculture can displace local communities, causing unrest and poverty.
- *Technology and Resource Access:* Limited access to modern agricultural technologies and resources can exacerbate inequality, especially among small-scale farmers. While genetically modified seeds and mechanised farming can increase efficiency, they also raise ethical, environmental and employment concerns.
- *Land Degradation and Soil Erosion:* Unsustainable practices like overgrazing and improper irrigation cause soil erosion and degradation. Techniques such as terracing and reduced tillage can mitigate these effects.
- *Over-Extraction of Aquatic Resources:* Aquaculture and fisheries may lead to overfishing, habitat destruction, and contamination, threatening marine biodiversity and coastal communities' livelihoods.
- *Global Trade and Market Pressures*: International trade dynamics can drive unsustainable practices, such as deforestation for new agricultural land driven by commodity demands. Speculation on agricultural products can threaten food security.

Addressing these conflicts requires integrated approaches considering environmental, social, and economic dimensions. Sustainable practices, conservation efforts, and policy interventions are crucial for balancing food needs with ecosystem protection.

The neo-liberal approach has led to open markets with huge flows of import and export, which often resulted in a worse economic position of farmers.

In many countries the productive land and facilities are owned by large companies. The current production methods resulted in large scale landscapes that are suitable for mechanisation. Society boosts industrial production at the cost of the natural capital, people's health and fair incomes for farmers. Consumers, who have no clear understanding of how the system works, prefer cheap and diverse offers of food, and that results in hidden costs for the environment and society. Recently, the approach to agriculture has shifted from a sectoral into a more integral approach that considers healthy food and preserving the natural and social capital. By developing agriculture in a sustainable way, it can contribute to climate resilience and landscape values.

In 2019, IPES-Food (International Panel of Experts on Sustainable Food Systems) clearly defined the main challenges of the current food production system:

- Environmental impacts such as loss of soil, unprecedented impacts on plant and insect life, by pesticides and nitrogen fertilisers, loss of environmental services pollination.
- Policy impacts such as subsidies of the CAP
- Globally, agriculture contributes up to 30% of greenhouse gas emissions, while huge imports of meat and fodder result in deforestation, evictions of local people, pesticide poisoning in the global south.
- Health impacts such as air pollution by ammonia emissions, surface and drinking water pollution by pesticides and fertilisers, antimicrobial resistance and exposure to endocrine disrupting chemicals via foods, food packaging.
- Change in diets by industrial processing and marketing result in overweight and obesity, especially for the poorer population groups.

Socio-economic impacts consist of poor working conditions and livelihood pressures for farmers by power imbalances. For instance, 70% of the global agrochemical industry and seed production is in the hands of only four companies, and up to 90% of the global grain trade is controlled by four multinationals.

The erosion of traditional food cultures and the emergence of urban lifestyles has disconnecting people from how food is produced and from concepts such as the seasonality of fruits and vegetables. The main challenges are shown below:

Food security
Farmers experience insufficient access to land, big corporations buy agricultural land for export production (land grabbing), local and regional authorities pay hardly any attention on the preservation of arable land. At global and national levels there is a loss of arable land due to urban sprawl, climate change and land grabbing. A growing ppopulation requires a larger supply of food. This might be partly addressed by reducing food waste at local, regional and national level. Seeing food as a commodity with speculation on global and national markets results in less food security. Approximately, 30% of the word's population lacked access to adequate food in 2020 and into 2021 (World Bank, 2021).
Failure to put sustainable farming first
Ensuring access to land, water and healthy soils. This results in loss of biodoversity and insufficient resilience to climate change effects such as flooding, draught salination and heat stress. The main stream agricultural system does not support the development of healthy soils and results in release of carbon and less water retention. Competition with other land-use types, such as urban development, infrastructure and biomass production have a negative impact of the availability of productive land in particular in metropolitan and peri-urban areas.
Techno-Fixes that sideline the real situation
It is essential to rebuild climate-resilient, healthy agro-ecosystems, making use of the principles of agroecology. Many of the techno-fixes that are currently developed require high investments, making the farmes more dependent on financial institutions and larger corporations. These solutions might mitigate negative impacts, but they do not change the system in a sustainable way. Patents on varieties and seed cause dependence of farmers on large companies and result in higher costs for the farmers.
The hidden costs pf cheap food and fair income for sustainable farming
Consumers have not enough insight in health effects and the negative impact of cheap food on the environment, producers, processors and the local retail. There is a need for promoting sufficient, healthy and sustainable diets for all. Public procurement should integrate quality standards for healthy and regional food that provides a fair income for producers.
The untapped potential of alternative food system initiatives
There is an urgent need for fairer, shorter and cleaner supply chains. However, there is insufficient support by financial institutions and government regulation to invest and develop this. This calls for a stronger bottom-up movement to enable transformation of the system.
Export orientation and race to the bottom
Putting trade in the service of sustainable development. The dominance of larger corporations regarding the inputs in agriculture (fodder, chemical fertilizers, pesticides, seeds), processing, trade and retail in the food chain results in unfair income for farmers and producers, an overload of processed (less healthy) food.

What consumers ultimately choose to eat and drink directly impacts productive landscapes and the environment. By making informed dietary choices and considering how food is produced when they purchase it, consumers can help foster sustainable landscapes and fair incomes for producers.

However, consumer choices are still largely shaped by the industrial food system, which provides easy access to globally produced and processed foods. This highlights the need to shift the narrative to increase awareness among consumers and producers, while supporting multi-level governance changes to promote a more sustainable food system.

Offer of processed food in supermarkets
(image: wenzday01, flickr.com, creative commons)

Eating locally produced food supports local farmers, reduces climate impact and loss of biodiversity *(image J. de Vries)*

Advocating for a Positive Transition Pathway

The current public debate highlights the urgent need to transform the food system to improve food security, food justice, food democracy, and fair income for producers. At the same time, there is a pressing need to reduce food waste, minimize environmental impact, and adapt to climate change. However, progress in this transition remains slow. International and national policies continue to be fragmented, often influenced by corporate lobbying, and local initiatives are isolated.

To address this, IPES-Food has proposed a *Long Food Movement*, which empowers niche initiatives to drive transformation (IPES-Food, 2021). A key area for this transformation is at the local level, particularly within city regions. Cities have independent strategies and often control the use of public land, allowing them to connect local producers and consumers while potentially implementing integrated social, environmental, and economic policies. Within city governments, sectoral silos can be more easily dismantled, especially when food policies are linked with climate action.

In its 2023 report, From Plate to Planet, IPES-Food states that local governments are leading efforts to reduce greenhouse gas emissions. The report identifies seven ways that local governments are leveraging food system transformation to combat climate change, including supporting sustainable farming, promoting short-supply chains, and ensuring that healthy, sustainable diets are available, accessible, and appealing.

Transforming the food system requires embedding these changes within broader social change. This calls for *food democracy*, where diverse actors reclaim democratic control over the food system to enable sustainable transformation. Working based on agroecological principles makes this shift inherently political, as it challenges and aims to transform existing power structures in society. To create a truly

sustainable food system, society must entrust control of seeds, biodiversity, land, territories, waters, knowledge, culture, and communal resources to the people who nourish the world.

It goes without saying that the pathway to transformation is different for different regions, the situation in Turkey varies a lot from the situation in France or the Netherlands.

In the following, we present three cases to show the possible process of change in France, in Turkey and in the Netherlands.

Case study of the Drôme valley, France
The Drôme Valley is a rural area of 2,200 km² in the Rhône-Alpes region in the South-East of France. Hemmed in by the Drôme river's watershed and surrounding mountains, it is populated by 54,000 inhabitants and comprises 102 small towns and villages. The agricultural landscape is highly diverse due to differences in natural growing conditions, with cereals, poultry, fruit, and seed production in the lower valley, extensive livestock rearing in the mountains, and wine, cereals, and fruit production on the hillsides (Bui, 2015).

Organic production in the Valley emerged as early as the 1970s, driven by peer-to-peer knowledge sharing networks, alternative extension agents promoting organic inputs, and the arrival of migrants from urban areas seeking to reconnect with the land and pursue organic practices. In the early 1990s, a network of cooperatives in the upper valley (supplying cereals, aromatic and medicinal plants, and wine) established a program to develop organic supply chains with a view to accessing higher-value markets.

Changing production practices initially proved challenging. In the lower valley, many continued to question the economic viability of organic agriculture; low availability of organic inputs, lacking extension services, and limited supply chain opportunities for organic products also proved major obstacles. It was not until new modes of inter-sectoral collaboration were introduced that alternative practices and new supply chain infrastructures truly began to emerge.

In the 2000s, the value-creating potential of organic farming was brought to the attention of local institutions, with inter-municipal coordination helping to create the conditions for transition. It culminated in establishing an ambitious sustainable development project for the whole valley: the 'Biovallée project'. The initiative (https://biovallee.net/) aims to establish the Drôme valley as a regional leader in the management and valuation of natural resources.

Its objectives of 2009 are as follows:

TRANSFORMATIONAL

LEVEL 5
Build a new global food system based on participation, localness, fairness and justice

LEVEL 4
Reconnect consumers and producers through the development of alternative food networks

LEVEL 3
Redesign agroecosystems

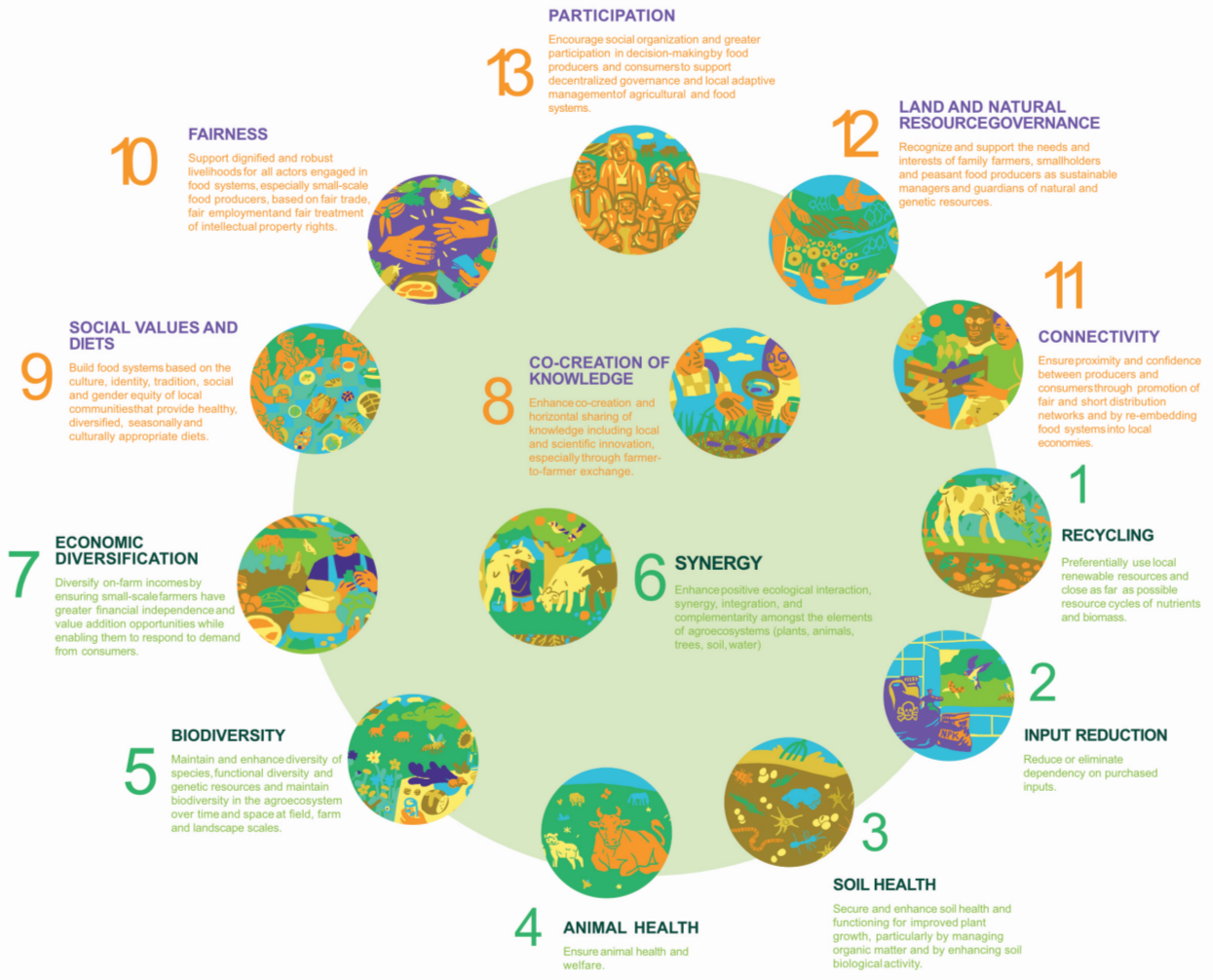
INCREMENTAL

LEVEL2
Substitute conventional inputs and practices with agroecological alternatives

LEVEL 1
Increase efficiency of input use and reduce use of costly, scarce or environmentally damaging inputs

FOOD SYSTEM

AGROECOSYSTEM



SOURCE: HLPE (2019) FIVE LEVELS OF TRANSITION TOWARDS SUSTAINABLE FOOD SYSTEMS AND RELATED PRINCIPLES OF AGROECOLOGY

ILLUSTRATIONS: DOROTTYA PÓR

AGROECOLOGY EUROPE

- Develop high-level training opportunities in the field of sustainable development.
- Reduce the territory's energy consumption by 20% in 2020 and by more than 50% by 2040
- Convert 50% of farmers and agricultural surface area to organic agriculture by 2020.
- Supply 80% of the procurement of institutional catering using organic or regional products.
- Supply 25% of energy consumption through locally generated renewable energy by 2020, and 100% by 2040.
- Change urban planning guidelines such that after 2020 no more agricultural land will be diverted to urbanisation.
- Halve the amount of waste brought to waste treatment plans by 2020.
- Develop education and research linked to sustainable development (10 partnerships in 2012, aim of 25 partnerships in 2020).
- Create 2,500 jobs in the eco-sectors between 2010 and 2020.

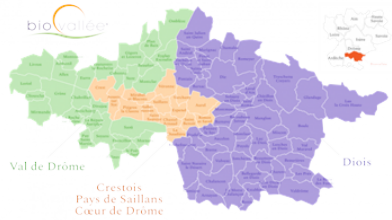
In 2018, the Association of Biovallée Actors (Association des Acteurs de Biovallée®) had 160 members who have committed to contributing to reaching the Biovallée objectives. According to the Biovallée charter, the use of the Biovallée branding is restricted to those members that achieve enough points counting towards the objective. The Association also includes several working groups, such as a working group on an Investment Plan for the Future, allowing local participants to further align their actions.

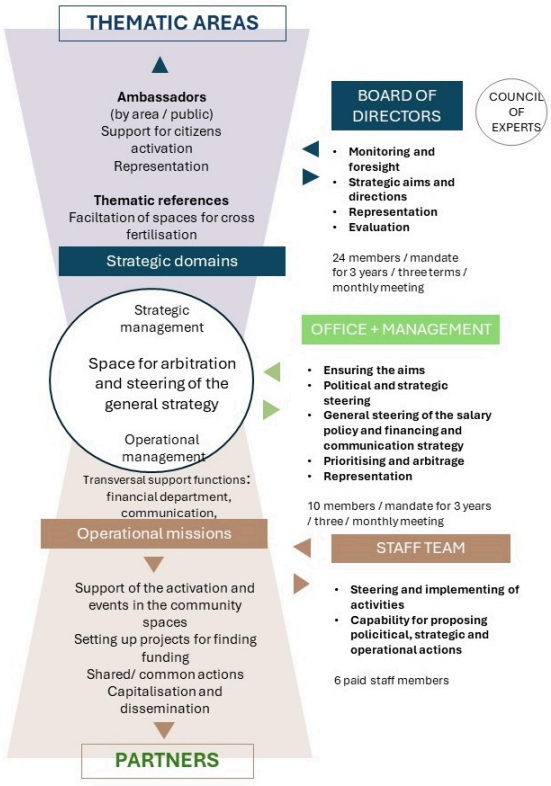
While the plan's initial goals are yet to be met, some 40% of farmers in the Drôme now use organic practices, the highest share of any French department; country-wide, around 15 % of farmers are certified organic (Agence Bio, 2018). Major challenges have been encountered along the way. Initial plans to build large-scale processing facilities to support public procurement of organic products had to be shelved as major players pulled out. This marked a turning point in the project, with local authorities turning to smaller scale, more 'radical' actors and initiatives for implementing the plan.

The Drôme Valley's transition provides insights into how norms can be shifted over time. Ongoing interaction between mainstream and alternative actors has allowed for rapid upscaling, access to resources, and legitimization of the transition process. The transition has also been advanced through various forms of institutionalisation and a well-planned governance process. Main bodies are the general assembly of members of the association, which validates the strategic goals and starting renewals; the advisory board, which manages the strategy, the outlook and the activities of the network; and the office and direction, which presents the association, and supports activities; and last but not least the working party, consisting of six paid employees, who organises activities and prepares the strategic, tactic and operational activities and policies.

In 2022 the organisation celebrated its 10th anniversary. The transition is still in progress with activities for educating farmers, helping the to make the change to agroecology, engaging civil society and the public at large and carrying out research. The Biovallée organises projects that relate to sustainable development such as circular economy.

Top: Location of the Valley in France
Bottom: Areas connected to the Biovallée





Organisational scheme of the Biovallée de Val de Drome

The Case of the Agricultural Development Cooperative ELMISKO in Antalya, Turkey

The Elmalı district is located on a plateau on the folds of the Taurus Mountains, which cover Southern Anatolia in the Western Mediterranean Region. The height of the district centre above sea level varies between 1050-1150 meters. The district has an economic structure based on agriculture: 36.4% (59,335 ha) is agricultural land and 51.3% (83,572 ha) is non-agricultural land. Of the other areas, 9.2% (15,000 ha) consists of common meadows and pastures and 3.1% (5,093 ha) consists of forest and aromatic crops. Fruit production and animal husbandry are the prominent agricultural activities. According to 2023 data, Elmalı ranks first in Antalya with its share of 83.50% and 374.087 tons of apple production. According to 2019 data, 28,690 tons of milk is produced in Elmalı. It ranks fourth among the districts with a share of 10.30% in milk production (TÜİK, 2024).

Farmers organisations

Farmer and producer organisations are important institutions that provide services and information to their members, facilitate their access to markets and empower smallholder farmers to participate in policymaking. They have an important role to play in achieving inclusive and sustainable rural transformation at local, national and international levels (Source: www.ifad.org). Many farmers work on relatively small family farms (95.2% in the EU) that operate independently of each other. In contrast, there is a much higher concentration of both processors and retailers. This asymmetry in bargaining power makes it difficult for farmers to defend their interests when negotiating with other actors in the supply chain. In this context, the organization of farmers into cooperatives is crucial. The main functions of agricultural cooperatives include supplying inputs to their members under favourable conditions, marketing their members' products, creating added value, providing technical information support to their members, and contributing to local and regional sustainable development.

Cooperatives play a critical role in ensuring that the supply chain of agricultural and food products works efficiently, that farmers receive a fair income, and that producers receive a higher share of the price paid by consumers. In 1972, an Agricultural Development Cooperative was established in the Elmalı district of Antalya. It was set up by a board of founders, including the former mayor, with the participation of some tradesmen and farmers in the district. In 1990, the name of the cooperative was changed into ELMISKO (Elmalı and Surroundings Agricultural Development Cooperative) in accordance with the Cooperatives Law.

In the years of its establishment, it was stated that the primary purpose of the cooperative was to build a cold storage warehouse in Elmalı district, which has an annual apple production of 30 thousand tons and

has problems in storing apples. However, it is also stated that the cooperative started with the procurement of goods needed by the people in the region during the recruitment and strengthening phase. In this period, like a consumer cooperative, the cooperative started by supplying necessities such as detergent, margarine, sugar and pasta, which were difficult to find in the 1970s. In the following phases, the cooperative was involved in the supply of inputs such as tractors and equipment, pesticides and fertilisers that farmers needed. Thus, the cooperative contributed to increasing the efficiency and quality of production. In subsequent periods, the cooperative's activities have diversified, and the various investments utilised in the provision of these activities are discussed in the following.

Common infrastructure for farmers and producers
Later, the construction of the cold storage was started with the contributions of the partners, whose number reached 1500. The first part of the 10 thousand tons/year capacity ELMISKO Cold Storage with a capacity of 5 thousand tons/year was completed in 1984. It is stated that the remaining 5 thousand tons/year capacity part is gradually being put into service. In this facility, where the capacity utilization rate is 100%, a total of 5 people, 1 technician and 4 workers, are employed. This facility also serves to regulate storage prices in the region.

After the completion of the cold storage, to support the sale of the products produced by the producers, a shop was provided in the Antalya Fresh Vegetable and Fruit Market in the section where the brokers are located and the wholesale of the products of the producers was started through the cooperative. One person is permanently employed here. However, this activity could not be sustained due to the inability to compete with brokers and to conduct safe trade with one employee. In addition, to meet the energy needs of the cold storage and other facilities, it was decided to invest in a solar power plant application. The shop was transferred in 2020 to create resources for this.

In 2003, a fruit packaging facility with a capacity of 3000 tons/year was established to improve fruit quality and facilitate exports from Elmalı. This facility enhanced apple quality and contributed significantly to the marketing process, supplying products to domestic supermarkets.

In the 2000s, the cooperative acquired additional properties, including a 6,000 m² building. To boost members' income and regional farmers' value, a dairy factory with a 25,000 tons/day capacity was established in 2006. The factory produces pasteurised milk, curd cheese, feta cheese, cheddar cheese, cream, butter, yogurt, and buttermilk, employing 16 people. Dairy products are produced and distributed adhering to safe food production principles.

In 2020, the cooperative invested in a solar power plant, meeting 70% of its electricity needs, enhancing

energy sustainability and reducing costs. The cooperative adopted a direct-to-consumer sales approach, establishing 26 retail outlets across Antalya, including Elmalı, Finike, Kumluca, Demre, and Kaş. While the Elmalı outlets are operated by the cooperative, others function through a franchising system.

In 2001, the cooperative purchased a 3-hectare field near the cold storage and planted 1540 semi-dwarf apple saplings in 2011, starting exemplary horticultural activities. To address packaging supply issues, a plastic crate factory was established in 2016 on 2.2 hectares, producing apple, mushroom, and other fruit and vegetable crates. This factory regulated crate prices and prevented opportunism, employing 15 people.

The cooperative's investments were primarily financed through its resources, except for a 50% grant-supported loan for the initial cold storage construction and a bank loan for its 2009 rehabilitation. Plans for a fruit and vegetable drying and packaging facility were abandoned. The cooperative's gross sales revenue in 2023 was 72.89 million TRY (2.77 million Euros). Under the ELMISKO name and logo, the cooperative continues to contribute to its members, currently numbering 517, and to the regional economy. A total of 35 people are permanently employed in the cooperative, 15 in the dairy, 15 in the crate factory and 5 in the cold storage. Two of the employees work as managers and one as an accountant.

Overall, it can be said that ELMISKO, which is 50 years old, is the main cooperative that continues to operate successfully in Antalya. Unfortunately, it is not possible to quantify the impact of the cooperative on a regional scale. However, it can be argued that it has made significant contributions to sustainability, particularly in economic and social terms, and to a lesser extent in environmental terms. The cooperative can play an important role in the use and dissemination of environmentally compatible agricultural methods in the region.

There is a need to support the cooperative in this respect. A survey of 50 members conducted by an undergraduate student in the Department of Agricultural Economics, Akdeniz University, showed that cooperative members were largely satisfied with the services provided by the cooperative and its management.

It is clear from this example that management is the key factor in the success of the cooperative. In addition, while similar cooperatives in Turkey are established on a village basis, ELMISKO, unlike its counterparts, is established in the district centre and covers almost all villages with potential as members, which is seen as an important factor that increases success and sustainability. This has also enabled tradesmen who farm in the district to become partners of the cooperative. This structure is thus considered to have helped the cooperative develop its commercial skills.

The Case study Markemodel in the Province of Gelderland, Region Achterhoek, The Netherlands

Agriculture in the Netherlands faces major challenges because of biodiversity loss, high nitrogen and CO2 emissions, and water pollution. The national government started to implement strict regulations, such as the policy programme for the Law on Nitrogen Reduction and Nature Improvement, which in July 2021 came into force.

Lobby by the agribusiness and protests by farmers influenced the political parties to lower their aims, although this results in impacting nature, people's health, and prosperity of agriculture in the long run. Although several farmers are willing to adapt their business model or transform their production methods, many feel that they are overruled by manyfold different and often changing regulations. The rules do not consider the diversity of types of farms, they prescribe the methods and not the results, and are externally controlled.

The current management model places the farmer in a problematic split between the discipline of the free market on the one hand and social demands and requirements on the other. Due to these shortcomings of the current management model, progress is difficult to make, even though governments and chain parties promote nature-inclusive agriculture. Goals are achieved, too late, too slowly, or not at all.

The Markemodel is a pilot in the framework of the Common Agricultural Policy (CAP), and it not only focuses on the quality of agricultural nature and landscapes, but also on soil, water and air. It intends to be an answer to the shortcomings of the current economic and social model.

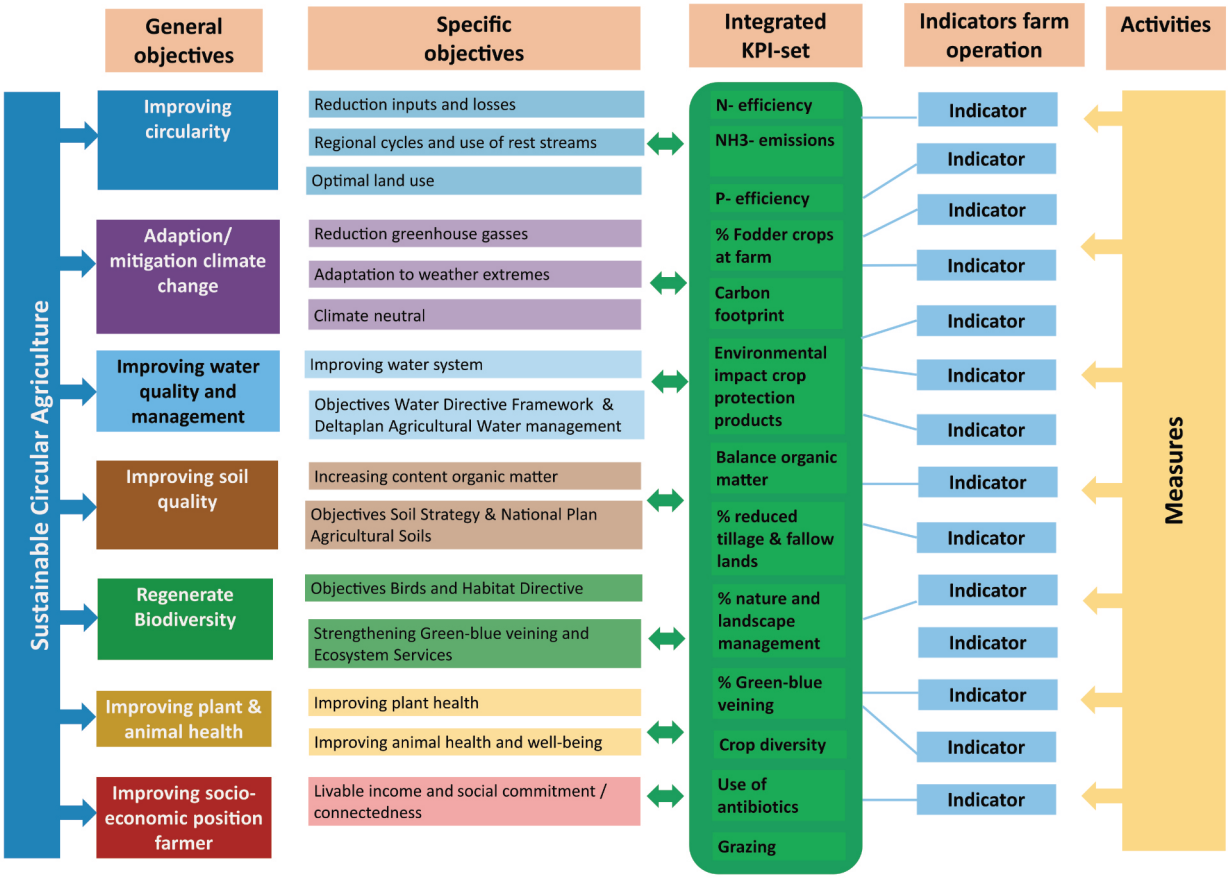
Area, location and characteristics
A group of 35 farmers in Winterswijk and 't Klooster near Zelhem are collaborating within the framework of the so called Markemodel. They are in the east part of the Netherlands, the province of Gelderland, in the region 'de Achterhoek'. The Markemodel has been initiated by a farmers' knowledge community for circular agriculture (VKA) and a farmers' collective for the management and development of cultural agriculture landscapes (VALA). The Markemodel is an approach in which farmers and steering parties jointly arrive at a regional, integral set of quality goals and the associated rewards for future-proof agriculture.

Challenges
The pilot project investigated how the rules of the European goals (Nitrate Directive, Water Framework Directive, Climate Agreement) and goals in the field of nature, landscape and biodiversity fit into a bottom-up governance model. It focuses on quality objectives and the development of an effective remuneration model for farmers. The pilot further aimed at gaining insight into organisational and technical obstacles, as well as obstructive regulations. It aims to reducing implementation costs (control, etc.) and increasing

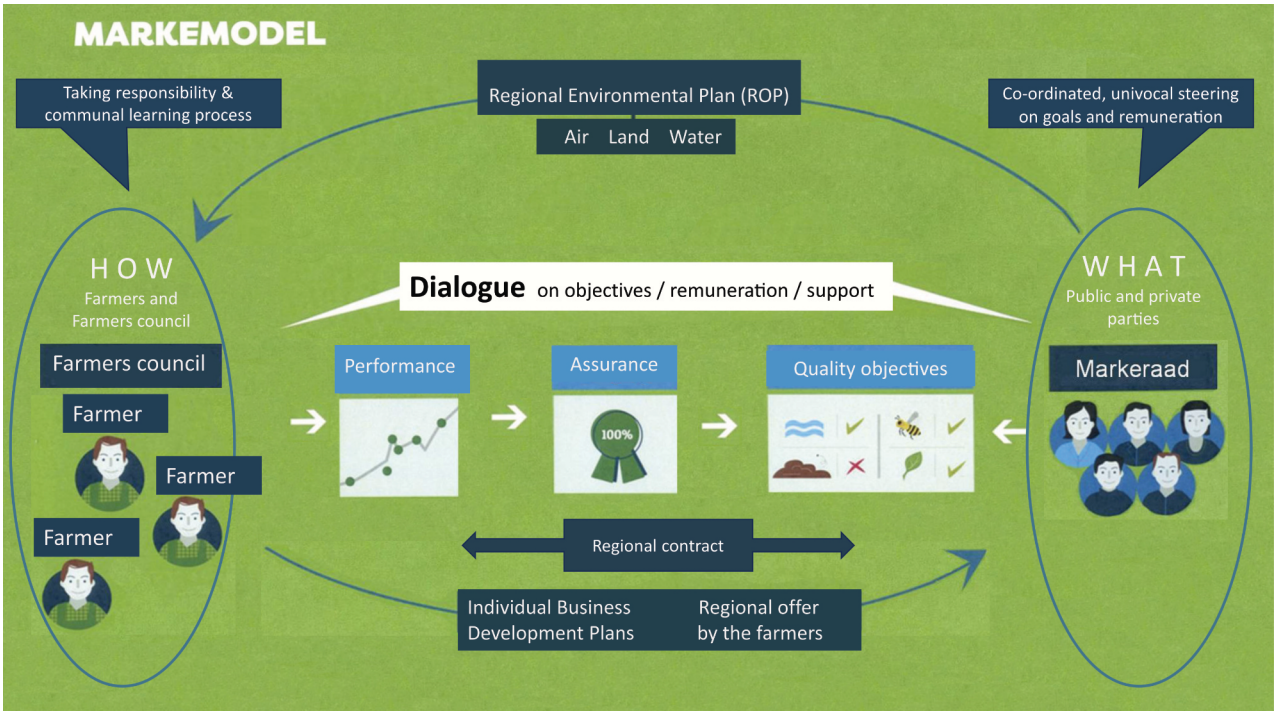
the effectiveness of achieving goals for integrated environmental quality. It should help to build motivation, a sense of responsibility for sustainable development and to further the business interests of the farmers for achieving the quality objectives.

Governance

In the Markemodel, the farmers work together regionally, in a horizontal network model and with chain parties and governments, for fewer operational rules and more control over goals. They will then receive more appreciation/rewards and influence on planning for their region. The system is founded on shared interests, shared responsibilities and a dialogue between the farmers and steering parties in the area. The governance model is based on the following paradigms: (1) integrated, unambiguous network governance, (2) quality objectives on a system level, (3) steering adapted to the characteristics of the sector, region and farmer, (4) stacking of rewards and appreciation, (5) bottom-up control aimed at self-regulation and capacity building, and (6) collaboration within the region with dialogue, empathy and learning process. The governance model consists of two councils: the 'Markeraad' and the 'Boerenraad'. The first with representants of the province of Gelderland, the Waterboard 'Rijn en IJssel', a cooperative bank and a cooperative national dairy company. The second, 'Farmers council' consists of several farmers who do not formally represent an organisation. In December 2022, 10 goals for the management of nature, environment and landscape were established in dialogue between Markeraad and Boerenraad.



Conceptual framework of the KPI-systematic for circular agriculture: relation between general and specific objectives, KPIs and actions, *translated by author from: Van Doorn et al., 2021*



Organisation model and approach of the Markemodel (adapted from van Doorn et al 2021)

Policies, aims, strategy

The goals are derived from critical performance indicators (KPIs) developed by Wageningen Environmental Research (van Doorn et al., 2021). As a farmer realises those goals, there will be a reward. A budget was made available for 2023 and 2024, which allows for a remuneration of some 3,000 and 4,000 euros per participant, depending on performance. The farmers have been working on their goals according to their Business Development Plans. The results of the goals for 2023, recorded in KPIs (Key Performance Indicator), have been collected at farm level and integrated at a regional level.

Development of the area

The results show that the farmers perform above average and are ahead of the target values. As far as biodiverse areas and green-blue veining are concerned, they have already met the 2030 targets. In 't Klooster the average score was 3.74 and in Winterswijk 3.82 on a scale between 1 and 5, where the score 3 represents the target in that year. Much progress has been made on the KPIs that control water quality. During the dialogue, the farmers argued that, in addition to financial compensation, more policy space also has a higher reward value for them, for example for receiving permits or for application of fertilisers. Appreciation and the social learning process between farmers are also important. But finances are the main incentive for progress for which continuity over a longer term is essential.
Currently the model is focused on the business units of the farms. Participants intend to explore how to better integrate it into the processes for the whole area. The participants collaborate with the Ministry of Agriculture, Nature, and Food quality for a uniform system of KPIs for assessing the performance of circular agriculture.

Reflection

The strength of the Markemodel approach is its inclusiveness for various types of farms and farmers. Moreover, it develops common aims and values in dialogue. This empowers the farmers, builds capacity, and fosters collaboration. Working with KPIs simplifies their administration and helps them to track environmental targets. A weakness is the small amount of financial remuneration. In the approach consumers, local retail and food processing industry are not included. Integrating these could help to build a sustainable local food system. Because the partnership consists of individual farms, the area is not sufficiently covered, which is important for integral environmental in the region. Main threats are the ever-changing national laws and regulations and the insecurity of long-term funding. However, the motivation of the partners could help to develop the model further into a regional approach, with additional elements such as branding of products and finding a variety of benefits, including financial support.

The governance behind agriculture and food systems

The European Union has developed a series of policies such as *farm4fork*, the new Common Agricultural Policy objectives (CAP), and recently the food system framework. The production system is steered by a series of subsidies of the CAP. However, the transformation needed goes too slow. This is because policy makers and executors are strongly influenced by lobbies of the corporate businesses. There are still silos between the different policy departments and different perspectives of the various political parties. Therefore, there is now a focus on the governance by city-region networks, supported by the Milan Urban Food Policy Pact Monitoring Framework (MUFPP) and several strategies of metropolitan areas, city-regions and regions.
In city-regions, networks of producer organizations can be established with a focus on solidarity, shared facilities, and capacity building. Consumers and consumer organizations work to raise awareness of the health impacts associated with cheap food, while NGOs focus on improving environmental quality, supporting short supply chains, promoting access to land, and enhancing farmers' skills.

Under the bottom line: Why does the system work?

The new EU CAP proposes nine goals for sustainable agriculture which are supported by the *farm to fork* (F2F) strategy and the New Green Deal. Globally, FAO promotes the transition to sustainable and climate-resilient agricultural policies and governance mechanisms, working with countries on reviewing their policies and investment strategies and helping them align their policies and programmes in support of implementing the 2030 Agenda for Sustainable Development. FAO envisions a sustainable food and agriculture system where food is nutritious and accessible for everyone and where natural resources are managed in a way that maintain ecosystem functions to support current as well as future human needs.

IPES-Food envisions a 'Long Food Movement' where the initiative is reclaimed by civil society and social movements: from grassroots organizations to international NGOs, from farmers' and fishers' groups to cooperatives and unions. This calls for thinking decades ahead, collaborating across sectors, scales, and strategic differences, working with governments and pressuring them to act, and transforming financial flows, governance structures, and food systems from the ground up. IPES-Food has identified a set of key principles to guide the urgently needed transition to sustainable food systems, such as holistic & systemic, power-sensitive, critically engaged, diverse & resilient, democratic & empowering, and socially & technologically innovative.

How do we measure which sustainable performance for agriculture?

Measuring sustainable performance in agriculture involves assessing various environmental, social, and

economic factors to determine the overall impact of agricultural practices. The development of agriculture that support sustainable transitions in the landscape can be assessed through spatial, legal, economic, social, and environmental indicators. The framework of the MUFPP (Carey, 2021; FAO, 2019) is focused on the performance of urban food systems.

The Milan Urban Food Policy Pact Monitoring Framework

The purpose of the Monitoring Framework is to serve as an instrument for cities and urban food stakeholders to identify food-related policy and programme priorities. It also serves to illustrate to what extent "desired changes" are happening and/ or how impactful such changes are. If measured periodically, the framework can be used to evaluate gaps in policy advancement and resource mobilization as well as reveal overall urban food systems improvement. The forty-four indicators relate to governance, sustainable diets and nutrition, social and economic equity, food production including urban-rural linkages, food supply and distribution, and food waste.

The City Region Food System Framework of RUAF

The City Region Food System (CRFS) indicator framework is a practical assessment and planning tool designed to help cities to:(1) Assess the current status and performance of a city region food system following a whole-system approach, (2) Identify priority areas for action with clear desired outcomes and ways of measuring change, (3) Help with planning strategy and action to achieving the desired outcomes, and (4) Establish baselines and monitor changes resulting from (future) policy and programme implementation.

Taking a 'whole food system' approach, the indicators are based on a matrix of food system dimensions: the sustainability areas that reflect the multifunctional nature of the food system; and the components of the whole food system (from production through to waste, and food system policy and planning). It measures social sustainability and equity (improve health and well-being), economic sustainability (increase local economic growth and decent jobs), environmental sustainability (improve stewardship of environmental resources), urban-rural integration (improve city region food supply), food governance (improve governance for sustainable food systems) and reduce vulnerability and increase resilience.

Since there a so many indicators, each city region needs to prioritise. It is important to focus on what is most relevant locally, and what can be defined by a multi-stakeholder identification of key issues. From this a selection can be made for issues which are most potential for change and for which data is available or can be generated.

Performance measurement can be taken from "Strengthen the city region food production and

supply system" which has indicators for (a) City region food production capacity is optimised, (b) Efficient and diverse agricultural supply and value chains connecting the city with food producers in the city region and providing access to a wide range of market opportunities, and (c) Flows of food, nutrients, energy and other resources and services connect across urban and rural areas. The presentation of all 210 CRFS indicators goes too far for this chapter. But all of, these can be viewed in the CRFS report (Carey & Dubbeling, 2017).

Which indicators are relevant for the landscape economy?

New indicators of progress must be developed to capture the benefits of equitable, resilient, diverse, nutrient-rich food systems in ways that productivity growth, net calorie availability and other existing measures do not. Efforts and initiatives to improve the sustainability of food systems should be assessed with a view to seeing continuous improvement; accountability must be clearly assigned to enable actors to monitor to which degree they achieve their objectives.

A selection of the MUFPP and CRFS indicators results in the following set of main indicators for the landscape economy:

- **Spatial**: % of access to land for farmers, access to land for recreation, and connectivity of the land affected by communal regulations and use.
- **Legal framework and policies:** Degree of implementation of the new goals of the CAP and the F2F strategy, regulations of land ownership and agricultural land reserve, establishment of a food strategy for city region.
- **Economic:** % of the farmers who receive a fair income, % of land use by community supported agriculture (CSA), economic activity developed within communal structures (social economy, cooperatives, etcetera) and value of the products that are regulated and managed in a communal way.
- **Social:** % people benefiting or participating in social aspects of food production (urban agriculture, community gardens, care farms, allotment gardens), % of people who have access to healthy food (not living in food deserts).
- **Environmental:** Contribution of agriculture and the farmers to the preservation and improvement of environmental values and assets (carbon sequestration, water retention, ecological connectivity, biodiversity, etcetera, % of land use surface for organic farming; % of land use by circular or nature inclusive farming.

It goes without saying that the indicators that are selected based on the strategy, aims and local context that has to be monitored. A full set of indicators and measurement modes can be found in the publications.

Research and analysis tasks for learners

The landscape economy aspects of agriculture and foodscapes offer a broad selection of subjects and research questions. Learners first need to explore the problem field and then define possible tasks for analysis and/or research based on their field of study and additional expertise, the amount of time that is available for the task and the current challenges that arise from the local landscape and its communities.

- **Exploring the interconnections between global trade and local food systems**: Examine the trade-offs between participating in global markets and maintaining local food sovereignty, with a focus on economic, social, and environmental outcomes. Including mapping the local food system.
- **Investigating food waste reduction strategies**: Study the effectiveness of various strategies to reduce food waste at different stages of the supply chain (production, distribution, consumption).
- **Exploring the ethics of land use in agriculture:** Analyse the ethical considerations of land use in agriculture, focusing on issues like land grabbing, indigenous land rights, and the environmental impact of land conversion for agricultural purposes. Assess how ethical frameworks can inform better land use policies. Inquiring on the available public land and of access to land for farmers. Evaluating the way local people are benefiting or participating in social aspects of food production (urban agriculture, community gardens, care farms, allotment gardens).
- **Analysing the impact of urbanisation on rural agricultural practices**: Research how the expansion of urban areas affects rural agricultural practices, land availability, and food production. Explore strategies for balancing urban development with the preservation of agricultural land and rural livelihoods.
- **Examining the impact of climate change on local food systems**: Research how climate change is affecting local food systems, including changes in crop yields, water availability, and pest pressures. Explore adaptive strategies that local communities and farmers can implement to mitigate these impact, such as the contribution of agriculture and the farmers to the preservation and improvement of environmental values and assets (such as carbon sequestration, water retention, ecological connectivity, and biodiversity).
- Setting up draft elements of a **food strategy for city region** or analysing the implementation of existing strategies.

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