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Agroecology for Our Future

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Abstract The article presents agroecology as a way to a more sustainable society. It is based on agroecological farming, healthy food, supporting biodiversity and the environment with sustainable technologies and on participation of people with different practical activities. The main difference between sustainable development and agroecology is that sustainable development was not based on active practical approaches, but rather on economical, social and environmental aspects, which often existed only on paper. And that is the reason why our planet has still not experienced any visible sustainable changes after more than 20 years. Today, agroecology with practical approaches is becoming more and more important. Practical approaches advocate boot up and integrate lifestyle changes into people's lives. The contribution shows the analysis of selected areas and different agroecological approaches that show new lifestyle trends. Young people are especially susceptible to more responsible ways of living, which include residence (sustainable buildings), reuse and a responsible way of eating (veganism). All of the listed approaches actually lower negative environmental effects, improve people's health and bring new job possibilites. They also encourage young people to develop their free time activities into their permanent jobs. All of this shows that there will be major changes in society in the next few years.

Keywords Agroecology, Sustainability, Outdoor learning, Education

1. Introduction

The term agroecology is known worldwide as an integrated system from the food production on traditional basis to alternative forms of food production and processing. Agroecology is a response to the paradox, which we have been experiencing in the recent decades. Conventional agriculture produces massive amounts of food on the expense of negative environmental impacts, nevertheless there are more and more hungry people in the world. Today's famine in the world is not the result of food under-production, but its wrong distribution. One billion people are hungry, but just as many are overweight and consequently have health problems. As the number of population is increasing, the decisive question is how to produce more food, either with chemistry or in a natural, sustainable way and thus reduce the negative impact of livestock farming on climate change in particular. Especially in poor countries poverty is still rising and the most significant climate changes are predicted to happen just there. Classical economic development will no longer be possible. The future of agriculture is in biodiversity, in agroecological farming practices, which include social, economic and environmental objectives as well as natural food production and processing (Gliessman, 2006). The modern trends of teaching agroecology are based on a systemic approach that enables observation and analysis of complex situations in agriculture and food systems. The research and teaching of agroecology stems from sustainable agriculture, which deals with biodiversity protection, concern for fresh pure water, limited natural resources, the availability of agricultural land, food security, social justice and adapting to climate change, among others, which increasingly and drastically affect the production of the quality food. With innovative pedagogical approaches and alternative research methods, the experts in the field of agriculture and food production systems deal with more extensive systemic issues in order to achieve efficient use of renewable resources, food security in modern society, and the resilience of production systems to adverse conditions (Francis et al., 2011).

Numerous research and experiences in modern teachings of agroecology have shown that pupils learn most from various practical and research activities, which include case studies and collaboration with different stakeholders in the local environment, e.g. teachers, parents, experts, local farmers, etc. This makes it easier for them to understand the complexity of systems that include the environmental, social and economic dimension. It also gives them a sense of responsibility when executing and completing their projects. Learning agroecology is based on the so-called experiential learning in real-life situations, the key approach being "learning by doing" as justified by John Dewey (Francis et al, 2011). This approach enables young people to develop critical thinking skills and the ability to make

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independent decisions on finding solutions and taking measures to solve real problems in their everyday life and the local environment. While the teacher takes up the role of a mentor, mediator and observer through the learning process, he also encourages and directs students to find a solution for themselves (Leiblein at all. 2012).

On the website www.agroecology.org.we can find the interesting representation of agroecology in the world. We find that agroecology today appears in response to emerging conflicts in nature and society, and as a different - alternative way of farming. Agroecological methods should activate traditional practices and link them with innovations, knowledge and new skills as well as people's attitude towards food with emphasis on healthy and locally produced food. The approaches in agroecology are the most developed in France, which is the leading country in planning, education and implementation of such activities in practice. In the French Action Plan, the Ministry of Agriculture noted the importance of agroecology as an all-encompassing process until 2020, when France becomes the leading country in this field and will integrate farmers into the agroecological farming (Loi d'Avenir, 2014). The implementation of agroecology was based on farmers' education, activation of the research and acquired knowledge transfer into practice. They are developing agroecological subsistence systems, including the public and monitoring the effects of agroecology in practice (monitoring and evaluation). They devote a lot of attention to education, especially in the field of professional qualifications. In Italy, in 2016, agroecological approaches were classified as mandatory in the organic food production and agroecology was enacted by regulations. The main emphasis now is on the awareness that farms must function as holistic ecosystems. As science, agroecology is part of ecology or landscape ecology, which deals with ecological conditions and processes in agro-ecosystems and with agricultural ecosystems as whole. It does not apply only to agricultural use, meadows and fields for example, but also deals with forests, swamps and processes of degradation, erosion and the outflow of water (Vovk Korže, pp. 6, 2016).

The definitions of the term agroecology differ greatly in terms of specificity which defines the term 'ecology'. According to this definition agroecologists can study the state of soil health, water and air quality, meso- and micro-fauna, local plants, toxic substances and other natural contents. A more common definition of the term can be found with authors who see agroecology as a study of interactions between plants, animals, people and the environment in agricultural systems (Loi d'Avenir, 2014). Therefore, agroecology itself is a multidisciplinary science including factors from agronomy, ecology, sociology and economy. Agroecology is also differently defined depending on the geographical location. This approach is the result of understanding the ecosystems as elaborated by Eugene Odum (Odum, 1983). His approach is based on the assumption that natural systems with their stability and resistance are the best model for imitation in agricultural ecosystems. Usually the ecosystems of agroecology are not actively involved in social sciences; however, this school is based primarily on the belief that large-scale farming with massive use of chemicals is detrimental to society. The basic approach of agroecology is derived from agronomy including traditional agricultural practice, which is considered as the heritage of the area (Vovk Korže, pp. 7, 2016).

The concept of agroecology appears to be replacing the concept of sustainable development, which has not brought about any significant changes in the recent decades. In agroecology the focus is on using sustainable practices for food production (organic farming). Agroecology is therefore the type of farming that supports nature and does not reduce its ecosystemic benefits and services. It includes ecology also in its products and uses a holistic approach from cultivation to processing. It links ecology with culture, economy and society with the aim of creating a healthy society (http://www.moreandbetter.org/en/news/a-viable-food-future). Such systems are a characteristic of agricultural areas in African and Asian countries, where they provide themselves with food and energy completely. The use of agroecology increases the soil fertility; the soil becomes more resistant to drought and climate changes, the communities are more connected and positively affect the entire ecosystem (water is retained by vegetation and not by using artificial irrigation and pesticides) (Vovk Korže, pp. 7, 2016).

Agriculture and food production are the basis of life and have multifaceted effects on society. They have an important influence on prosperity and hunger, on climate changes and the environment. They both involve women workforce and offer a variety of jobs. Agroecological production involves the local environment and seeks solutions on the local level (Vovk Korže, pp. 7, 2016).

The concept of agroecology may seem complicated, but in reality it is clearly based on skills and knowledge, efficient use of resources to the maximum, problem solving and reducing the costs (http://www.moreandbetter.org/en/news/a-viable-food-future). This requires constant adaptability and innovations. The transition to green agriculture is beneficial to all and allows local communities to plan and create their own development. The quality of food depends on the way how it is produced and directly affects the health of all living beings (Vovk Korže, pp. 8, 2016).

In order to apply the principles of agroecology it is important to know the holistic sustainable production system based on traditional knowledge and local experiences, which needs to be upgraded with modern ecological, social and agronomic knowledge. The purpose of this approach is also to preserve and improve agricultural production, to ensure a healthy, natural and living environment and to provide quality food as well as maintaining self-sufficiency of local communities (Vovk Korže, pp. 9, 2016).

The agroecological system can operate on various levels, either on the field, garden or farm level, local community or

in the entire region or state. The essential agroecological strategy of creating a stable system is based on the integration of diversity in the agricultural land and the local landscape. The diversity on the field level or farm level is understood as species diversity, crop rotation, polyculture instead of monoculture, forestry, a combination of agriculture and livestock farming, the use of green manure plants and drapes. On the landscape level it is the establishment and maintenance of a system of green infrastructures, which is co-shaped by borders, wind-barriers, ponds, grass belts, bypass and water corridors. These stable and varied agroecological systems boost the improvement of soil quality, resistance to disease and higher productivity of crops as well as preserve the nutrients.

With the help of agroecological arrangements on the micro-level, i.e. in the garden, field or the entire farm, we adapt to the natural factors as much as possible and use natural local renewable sources. We use natural resources such as solar energy for heating water and electricity, we collect and reuse water sources such as spring water or rainwater and use the energy of soil to store seeds and crops. This reduces the need for external energy inputs and reduces the operating costs of farming. (Vovk Korže, pp. 9, 2016).

We use the excess biomass for composting purposes and return it to beds after a year. Compost will additionally retain moisture and consequently we will improve the quality of the soil. To cover the field surfaces, use hay or straw mulch, which prevents the growth of weeds, keeps moisture and improves the soil, therefore no earth-working machines are required. As for simple garden arrangements, such as shaft beams and other supporting garden elements, recycled natural materials can be used. We can also include useful organisms in the farming system, which are attracted by properly regulated housing and food sources. With such agroecological approaches we will conclude a series of natural processes in the garden or in the field and strengthen the natural system to remain self-sufficient and resistant to external negative factors such as weather disturbances, pests and diseases. The nature will reward us with the abundance of quality crops that will help us live healthily (Vovk Korže, p. 10, 2016).

At macro level, agroecology is becoming more and more established as a way of living and functioning of the community, and as a responsible management of natural resources (Vovk Korže, p. 10, 2016).

Agroecology is based on scientific and traditional knowledge. It is a science that bridges ecological and socio-economic aspects. It can work at various levels – farm, community, national, regional, etc. Biological processes are enhanced using agroecological principles and these principles can be shared via farmer-to-farmer exchanges. Agroecology needs to be built from the bottom up, especially through social movements in rural areas (https://agroeco.org/wp-content/uploads/2015/11/Agroecology-training-manual-TWN-SOCLA.pdf).

Agroecologists often see the addition or the umbrella of agroecology to organic agriculture as a possibility to further guide the current organic system by including additional agroecological principles. Because of agroecology's distance from institutionalization to the extent of organic with standards, regulation, certification, and political agendas, it is also seen as a possibility to circumvent some of the economic and institutional interests and to replace resulting hindrances with possibilities that come from a less manipulative form of sustainable agriculture (Altieri & amp; Nicholls, 2003). Agroecology is seen by some as a possibility to rescue organic farming from the risks of conventionalization.

Climate change, altered global water, cycle, human migration, population growth, urbanization, food production and food security, energy and natural resource management are interconnected and intertwined and therefore they cannot be addressed separately. Policies are essential instruments for promoting the sustainability of landscapes, agriculture, cities and rural development.

In this article we have collected, synthesized and summarized the identified best-case case studies of agroecological innovations within the selected EU countries.

2. Methodology

We used the methods of synthesis and comparison of the different definitions of agroecology, and the cases in terms of assessment of the case studies through:

- level of impact
- type of innovation and
- implications for teaching tools

We used different resources about the agroecology and the resources from the project Erasmus+ Teaching agro-ecology in transitory period and its Consequences for the Agricultural Knowledge Systems. The main sources are Output 1 http://www.euroeducates.eu/medias/files/oep-o1-synthesis-of-national-reports-en-17-03-22.pdf and Output 2 http://www.ff.um.si/dotAsset/69535.pdf.

The goal was to understand the process of agroecology in Europe. All of the causes are sustainable and showed the practical orientation and results on the local, regional and global level. We compared agroecology in France, Slovenia, Austria, Lithuania and Italy.

3. Results and Discussion

Agroecology in France

In France, the approach towards agroecology is strongly influenced by the public policy project "Agroecology, a new production paradigm" to mainstream agroecological practices into the overwhelming intensive production of the agricultural sector. The public policy project is accompanied by a second action plan the "Teaching agroecology, a new production paradigm".

AE was defined as farm autonomy and the improvement of their competitiveness by lessening the consumption of energy, water, fertilizers, phytopharmaceutical products and veterinary medicines. It comes to integrating the ecological dimension as a competitiveness factor. Agroecology is defined as technical, pedagogical, and organizational as it is in the context of the French action plan to implement agroecology at a national level.

The presented agroecological innovations in **Case study 1 (Management of wine-growing landscape)** are seen on the one hand in the creation of a group of different stakeholders from the region, which is developing a wine-growing landscapes management method (incl. tools to support and guide this development). This process raises awareness among the group about certain agroecological practices (and their impacts on the ecosystem services, but also on the level of heritage conservation) implemented in a defined region and on the other hand in the development of a landscape and environmental charter promoting these AE practices seeking to influence public policies to promote them.

Case study 2 (Organic producers from Beaumont in Périgord) present sharing the risks of changing the (production) techniques (introduction of Organic farming principles) leading to a more resilient farm in both the economic perspective and environmentally by enhancing grassland diversity).

The **Case study 3 (An experimental platform in Agroecology for training and development in Midi-Pyrénées)** lays in the institutionalization of Co-creation and testing of adapted agroecological practices with students, teachers and farmers in the training requirements books of "Brevet de technicien supérieur" (BTS) Agronomie Productions Végétales (APV) whereas all stakeholders are put into a case study learning situation at farms to examine agroecological practices and the implementation of derived initiatives (such as the Casdar Pollinis´acteur) increasing functional (habitat) biodiversity (bees).

In **Case study 4 – the instructional sequence to accompany the agroecological transition** – is seen in the implementation of a "constructivist pedagogy" to enable critical thinking in students to become expert learners by elaborating different trajectories towards applied AE on different levels and in professional situations.

Table 1. Agroecological cases in France (source: Output 2)

Cases	Level of Impact	Type of Innovation	Implication for Teaching Tools
Management of wine-growing landscape	Multi-Regional (local political, farm-level, actors)	SOC/ENV: Development of a wine growing landscape management method creates a group of different stakeholders and raise awareness SOC/ENV: Development of a landscape and environmental charter	- Field practice - Case comparison - Role play (actors) - Discussion/ negotiation
Organic producers in Beaumont in Périgord	Regional (reg. organic) and farm-level (indiv. farmers)	SOC/ENV: Sharing risks while introducing organic methods leading to a more resilient farm	- Animations to promote Organic - Farm visits - Expert exchange
Midi-Pyrénées: experimental platform	National (governmental level), local (teaching staff)	SOC: Co-creation and testing of AE with students & teachers ENV: Increased functional (habitat) biodiversity (bees)	- Teaching teams - Reflection sessions - Student group work - Habitat creation
Instructional sequence	Local level (individual school level)	SOC/EDU: Implementation of "constructivist pedagogy" - AE critical thinking / expert learners	- Identifying/analyzing an appropriate AE pathways

Agroecology is in the described cases perceived as means to modernise agricultural sustainably and thus to enable economic competiveness for French agricultural sector. However, the definition of agroecology presented is much broader as it might be both the promotion and application of principles (case 2), the introduction of a "constructivist pedagogy" entailing systemic thinking (case 4), but it also might be a range of other different interventions into the agricultural system, such as a focus on the landscape level with an absence of specific references of the environmental sustainability of the suggested interventions (linked more towards an agricultural production system defined as integrated production).

Agroecology in Slovenia

In Slovenia is agroecology defined (as a working definition as there is no official definition from policies) as the "use of sustainable practices based on traditional and local farmers´ knowledge, consistent with the characteristics of local environment and conservation of the biodiversity and cultural landscape". This mode of thinking and operating of agroecology principles is actually implemented by many non-governmental and non-state institutions and especially on regional level by small family farms that are present in the selected cases – even if is not called or defined as agroecology.

Innovation in agroecology is defined as "an approach that goes beyond the classical farming and includes all dimensions of sustainability", which could be utilized for rural development. Within the Slovenian case studies the four dimensions of sustainability are:

- ecosystemic dimension
- integrity dimension
- prosperity dimension
- and the dimension of self-sufficient supply and active public involvement

Case study 1 (The Educational Polygon Dole) is presenting innovations on the one hand through a hands-on self-sufficiency learning pedagogy to transfer scientific knowledge into practical skills enabling individuals to experience the concept of self-sufficiency and on the other hand in the research and practice of different agroecological and ecoremediation techniques, which are also partly transdisciplinary in its nature by including different sociestakeholders and cooperation with local community.

Case study 2 (The Nature Development Centre) is a pioneering institution for regional development with an emphasis on nature conservation in Slovenia. It is located in a Natura 2000 protected area, supports Organic Farming and plays an important role in the local economy (facilitates product development and local markets) and society (educational aspects, awareness rising about sustainability and self-sufficiency).

Case study 3 (The village Rogatec) located in one of the least developed areas of Slovenia has created its own innovative way to promote local development in linking local traditions and knowledge (open-air museum, cultural practices, etc.) with modern activities (such as tourism, marketing, etc.). Different stakeholders are linked together promoting different AE practices.

Table 2. Agroecological cases in Slovenia

Cases	Level of impact	Type of Innovation	Implication for teaching tools
Polygon Dole	Farm-level (open for all)	SOC: Hands-on self-sufficiency learning pedagogy TECH: Research and practice of different AE and ecoremediation techniques SOC: Inclusion of different stakeholders and cooperation with local community	- Applied knowledge in practices (Modules in curr.) - Visits, tours, … - Spatial arrangements
Nature Development Center	Regional (local stakeholders)	SOC/ENV: Regional development with an emphasis on nature conservation	- Visits, tours, field visits, excursions
Rogatec Open-air Museum	Regional (local stakeholders)	SOC/TECH: Linking local traditions and knowledge with modern activities (tourism, marketing, etc.)	- Visits and workshops (practical and educational)

The definitions of agroecology used for the Slovenian case studies are closely linked to the concept of sustainability and sustainable development as the Slovenian cases mainly focus on the local and regional levels of AE practices to enable rural development. The national and international perspective and policy level is visible to a much lesser extent or missing completely. The concepts of knowledge transfer, self-sufficiency and ecoremediation are highlighted in the Slovenian cases. For case 1 it is the transfer of scientific knowledge into practice, the elaboration of new AE production techniques entailing ecoremediation and the exploration of self-sufficiency, whereas the second case focuses on the inclusion of local stakeholders and environmental preservation and the third case focuses on the elements in regional traditions to utilize it for sustainable development.

Agroecology in Lithuania

In Lithuania agroecology as a practice, science or movement is not widely known. Although the branch of ecology is more actively discussed, analysed and applied into practice, agroecology is a relatively new term. The definition of agroecology is not approved in legislation of the Republic of Lithuania, as there is no particular law established on agroecology so far. Nevertheless, a definition of agroecology can be found through the amalgamation of limited research: Agroecology (syn. Ecologic Agriculture) – is a branch of ecological science, which studies relations of crops biogenesis and external conditions of those linkages. As agroecology is a rather new concept, agroecological innovation can take many basic forms. Innovation does have a very distinct definition in Lithuania, defined by the Lithuanian Innovation Strategy for the years 2010-2020. Innovation is a long-term strategic planning document, which sets vision, objectives, goals and results to be achieved in the field of Lithuanian Innovation up to 2020. The purpose of this Strategy is to mobilize and manage state resources effectively: to create competitive knowledge economy based on the latest technologies and qualified human resources.

The Lithuanian partners defined innovation in agroecology as "the process by means of which social and economic needs are met with new ideas and new products, services or business and organizational models are created; they are successfully introduced into existing markets or are capable of creating new markets" (output 1).

Thus, economic innovations connecting to environmental sustainability are generally viewed as agroecology innovations. The chosen Lithuanian case studies illustrate these different approaches of agroecology.

Case study 1 (**Ecovillage)** as an agroecological innovation. In Lithuania, the ecovillage movement arrived at the beginning of the 21st century. The case study of ecovillages was chosen, as this movement is linked with the agroecology through several aspects: socio-cultural aspect, as it builds the healthy communities; economical aspect, as it secures long-term sustainability; ecological aspects, as it promotes the ecological and sustainable way of living, including farming; technical aspect, as eco-settlement practice applies environmentally friendly technologies. These aspects influence ecovillages as tools for developing communities targeted towards ecological and agroecological aspects dealing with food production, renewable resource use in the building of homes and infrastructure, the protection of biodiversity, fostering ecological business principles, continued assessment of life cycles, the use of appropriate energy and waste management and protecting wilderness areas.

Case study 2 (Aleksandras Stulginskis University) integrates scientific pedagogy. The university has connected to various agroecological topics. One example was through participatory projects with communities and their environments and in connecting and cooperating together, rural community and science developed a method for assuring incomes through traditional production industrialization. In another example, stakeholders in forestry and organic farmers used waste products for production. In cooperating together they have contributed to impact of the waste reduction, and because waste is transformed into organic fertilizers it helps organic farmers to improve (take care) of the quality of soil.

Case study 3 (mobile farmers' market) with agroecological approach. In drawing upon connections of agroecology and organic farming and on social dimensions and innovations the mobile farmers' market encompasses Lithuania's definition of innovation in that it is of economic nature. The farmers market was created by farmers and involves over 250 members. Lithuanian project members connect the farmers' market more specifically to agroecology through the logic of: movement of mobile markets can be applied to Agroecology as a fair way for distributing value in value chains among producers and customers. This is seen predominantly because of its nature of a short value chain or so called direct marketing.

Table 3. Agroecological cases in Lithuania

Cases	Level of impact	Type of Innovation	Implication for Teaching Tools
Ecovillages	Regional & national (stakeholders inside and its surroundings)	SOC: Ecovillages as a tool/laboratory for progress & change to sustainable development	- AgroEcoVillage computer game
Aleksandras Stulginskis University	Local/national (within the university, with nation-wide impacts)	ENV: Industrial waste recycling SOC/ECON: Medical herbs drying/marketing	- Training material - Puzzle, quiz (ecological cycles) - Movie (value chain)
Mobile Farmer's Market	Local/regional (farmer and consumer levels)	SOC/ECON: Establishment of a farmer cooperative for direct marketing leading to increased farm autonomy	- Quiz - Webpage - Strategy game (Monopoly)

Agroecology being a relatively new field in Lithuania is reflected both in its definition of agroecology and the case studies representing agroecological innovations. The definition is incredibly based off of the science of ecology, although acknowledging the social perspective. The three case studies all reflect largely social aspects. Environmental and ecological viewpoints are embedded in these social aspects but seem almost secondary. They also all relate back to the economic interpretation of Lithuania's definition of innovation.

Agroecology in Austria

Agroecology has been acknowledged and practiced in Austria as a science for decades now, yet more recent interpretations of agroecology have begun to spur debates of the possibility and necessity of including the social into agroecological definitions.

This has contributed to a more contemporary perspective of agroecology as a movement, yet when aiming to understand the role agroecology plays on Austria's landscape, the understanding of its relationship to Organic Farming and the organic movement is essential. For several decades Austria has achieved widespread public and political support of the organic agenda therefore heavily influencing its ecological and agricultural landscapes. The necessity of understanding the relationship among and between these two ways of production and movements is also a very prescient topic. Through institutionalization and "conventionalization" of organic farming and marketing, many groups and organizations are questioning the ethics and their role in the organic food system.

Case study 1 (Arche Noah) is an organization primarily focusing on loss of biodiversity in seeds. They mitigate this loss of biodiversity in influencing policy at the national and

international level, work with farmers and gardeners to create a living seed bank, and partake in a wide variety of educational activities. Arche Noah illustrates the educational, political and technical levels. It was chosen as a case study for agroecological innovation because it exemplifies all three of these levels and because it shows agroecology as a movement in combining these levels in working collectively towards diversified seed bank and overall biodiversity through collective action, policy work and education.

In **Case study 2 (Via Campesina)** an international organization that through policy work and awareness raising aims to support marginalized farming communities through sustainable farming and food sovereignty was chosen. The Austrian context, through the ÖBV (Austrian small and mountain farmer organization), predominantly focuses on small and family farm support and awareness while occasionally highlighting specific special interest issues such as milk prices, etc. Via Campesina illustrates the educational, political and technical levels. It was chosen as a case study for agroecological innovation because it exemplifies all three of these levels and because it shows agroecology as a movement in combining these levels in working collectively towards small farmer support and food sovereignty in Austria through collective action, policy work and education.

Case study 3 (The BOKU-Community garden) was chosen as it is a very place-based case study providing space for students to learn and practically apply agroecological principles by utilizing, organizing and running the BOKU-community garden. They tackle issues from polyculture diversity at their plot level and communal space sharing, to (university) politics in keeping the space available for them. The BOKU-Community garden illustrates the educational, political and technical levels. It was chosen as a case study for agroecological innovation because it exemplifies all three of these levels and because it shows agroecology as a movement in combining these levels in working collectively towards a hands-on combined environmental and agricultural understanding through individual and collective action and education.

Table 4. Agroecological cases in Austria

Cases	Level of impact	Type of Innovation	Implication for Teaching Tools
Arche Noah	International, national and regional (open for all)	SOC/ENV/ECON/TECH: Seed policy advocacy, training, collective networking, awareness raising and funding scheme	- Seed bank/system game (cooperation and biodiversity) - On-side biodiversity. plot
Via Campesina	International, national and regional (farmers/ activists)	SOC/ENV/ECON: Advocacy of policies in favor of small-scaled farms, education, collective networking, awareness raising and promotion of food sovereignty	- Systems game - Expert exchange with students
BOKU-Community Garden	Very localized (local stakeholders)	SOC: Political socialization through appropriation and self-organization MIXED: Applied systemic thinking SOC: Individual experience of "nature" and personal development SOC/ENV/TECH: Group-learning & hands-on learning	- Land tenure game (Monopoly) - Systems illustrations - Observation of wilderness

The selected cases of innovations in agroecology in Austria highlighted in this report aim to understand the social dimensions of agroecology as one has to consider the already institutionalized organic sector in Austria in which most biophysical agroecological examples are no longer innovative or only in specific settings. Therefore innovations within the cases were selected to be either a combination of the three dimensions of agroecology (movement, practice and science) apparent in one case study or in the dimension of movement in the form of social innovation. The three cases differ in their dimension of outreach and therefore diffusion of its innovations into Austria's society. They illustrate mainly social innovations, which might contribute towards a more sustainable and justice food system in Austria. In particular the institutionalized Organic sector in Austria could benefit from these innovations by integrating (and respectively strengthening) them into and within their policies and outreach activities.

Agroecology in Italy

Agroecology is defined as the application of the ecological science and principles to agricultural systems. It involves various approaches and dimensions, such as environmental, economic, ethical and social aspects. It is considered today a transdisciplinary field of enquiry that is capable of changing our common vision of both agriculture and society.

The case studies illustrate how agroecology can change our common vision of both agriculture and society.

Case study 1 (Cilento Bio-district) highlights on how with the development of the about 400 farmers have changed their approach to the farming and the community life, entering into an agreement with public authorities, citizens,

tourist operators, associations, for the sustainable management of local resources, aiming at the fulfilment of the economic and socio - cultural potential of the territory. The different actors are involved for shared purposes: the improvement of the life quality, the employment of local population and the reduction of population's decrease in rural areas, the employment increase of young people and women, and of the quality of agro-food productions and of local livestock premises. Also to ensure the consumers safety, a traceable and healthy food, the increasing and seasonal regulation of tourist flows, through a multiple eco-tourism and local culture supply, biodiversity protection, enhance landscape and natural resources.

Case study 2 (International Study Centre Angelo Vassallo) demonstrating that healthy food is not always a matter of personal choice. The case study proposed aims to educate young generation about the healthy lifestyle, to enhance the biodiversity of landscapes, to preserve cultural heritage of rural areas.

Case study 3 (Gardens of Sala) aims to create a community that works together for the self-production of food, to enhance the agrobiodiversity of the territory and to preserve cultural heritage. Preserving traditional plant breeds and their uses, the farmer of the Sala's Gardens is not only striving to achieve biodiversity but also show the importance of cultural traditions, history and the use of techniques from the past as solutions to current challenges.

Table 5. Agroecological cases in Italy

Cases	Level of impact	Type of Innovation	Implication for Teaching Tools
Bio-District Cilento	Regional (stakeholders within the eco region)	SOC/ENV/ECON/TECH: Multilevel governance (different stakeholders) to facilitate sustainable mgt. of local resources based on OF & short chains	- Field visits - Expert exchange - Collaborative discussions
Mediter-ranean Diet International Study Center	Regional/international (regional participants with an international reach)	SOC/ENV/ECON/TECH: Fosters the multilevel skills, knowledge, practices and traditions that constitute the Mediterranean Diet	- Field visits - MD Field-to-fork cookbook - MD skills workshop
Gardens of Sala	Regional (specific to that region)	SOC/ENV/TECH: Recovery of the AE traditions of the ancient gardens of Sala Consilina (South Italy)	- Field visits - Garden planning game

The Italian case studies illustrate how agroecology can change our common vision of both agriculture and society. Therefore, innovations within the cases were selected to represent the different levels of impact at macro (international with Mediterranean Diet), meso (Regional with Bio-districts) and micro (gardens of Sala) level.

The three cases have a large focus on tradition and biodiversity, following the sustainable development approach. The case 1 focuses on the alliance of farmers, consumers and public administrators for the sustainable management of local resources. The case 2 focuses on healthy diet/lifestyle, to enhance the biodiversity of landscapes and to preserve cultural heritage of rural areas. The case 3 focuses on the exploration of self-sufficiency of a community that works together for the self-production of healthy food.

Comparisons of type and amount of innovation in agroecology

In Table 6 is an overview of the types of innovations found in all the country cases. It helps to illustrate that the majority of innovations identified by the individual countries were social in nature, followed by environmental. Interesting enough, the French definition of innovation focused on the technical sides, however there were no technical innovations identified in their case studies. Also important to note here was that France had 4 case studies in total where the other countries only had 3. And finally Austria identified the most innovations within their case studies.

Table 6. Innovation in agroecology

Country	Social	Environmental	Economic	Technical
France	15	4	0	0
Slovenia	6	1	0	2
Lithuania	4	2	2	0
Austria	21	8	5	1
Italy	3	3	2	3
TOTAL	49	18	9	6

4. Conclusions

Climate change, altered global water cycle, human migration, population growth, urbanization, food production and food security, energy and natural resource management are interconnected and intertwined and therefore they cannot be addressed separately. Policies are essential instruments for promoting the sustainability of landscapes, agriculture, cities and rural development. Agroecology is as a way for sustainability with practical results.

In France, agroecology is central in public policies (at central and local level), there are specific national programs and action plans. The public policy project "Agroecology, a new production paradigm" aims to promote the evolution of French agriculture into agroecology (the agroecological transition) and the development of practices and innovative systems to achieve the triple performance (environmental, economic and social). This project is accompanied by a second action plan "Teaching agroecology, a new production paradigm". In order to standardize the range of meanings relating to agroecology, an official definition was written. As in Austria and Italy, there is a significant experience of Eco (Bio)-Region, BioVallèe, in the Drôme Valley. The ambition is strong but the "weight" of conventional sector can be an obstacle to the generalization of the organic.

In Slovenia, the agroecology as a sustainable agriculture concept is not officially applied in the strategic policy, but some sustainable principles linked with agroecology are already carried out, especially at local and regional level, mostly due to the preserved traditional agricultural management and knowledge of small family farms. Organic farming is gaining increasing importance in the Slovenian agricultural area. Alternative sustainable agriculture practices, such as biodynamics and permaculture, have gained a big support mostly among the general public and local farmers.

In Lithuania, the agroecology is not a priority area of the national policies, however the sustainable agriculture and sustainable rural development are defined as a priority. The organic farming has a history of 25 years in the country. The number of organic farms increases due to support by the European Agriculture Fund for Rural Development, mainly. The Lithuanian Institute of Agrarian Economics implemented a project on the ecovillages. The aim of the project is to collect experiences and good practices in the Baltic Sea area and foster the development of ecovillages as a more sustainable way of living in the region.

In Italy, agroecology is considered today a transdisciplinary field of enquiry that is capable of changing our common vision of both agriculture and society (Caporali). There isn't a national program. The Agroecological transition (in particular with organic farming) started from the farmers, without public support, rather to respond to consumer's demand. The organic sector shows concrete agroecological solutions for agriculture and food systems. The Bio-districts experience, originated in the year 2004 by AIAB Campania in Cilento area (Province of Salerno), is today spreading across the country (15 Bio-districts in 10 regions).

In Austria, agroecology is at a crossroad (from science to movement). It is inherently connected to the organic farming (as in Italy, Lithuania and Slovenia) and there is a significant experience of organic territorial approach in the province of Upper Austria (Bioregion Mühlviertel). The model of Eco (Bio)-region is very popular in Italy, too. An important level for the development is represented by the "Bio-Aktionsprogramm 2015-2020". The Agri-environmental Program allowance for less-favored areas, a "biobonus". Furthermore, agroecology may benefit from the popularity and acceptance of the Organic movement. However, the distance of agroecology as a science to agroecology as a movement must be bridged in order to have a successful future.

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