Agroecology for Europe (AE4EU)

Towards the development of agroecology in Europe

Deliverable report D1.1 – Draft report on agroecology initiatives and policies

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Agroecology for Europe

1. Introduction

Agroecology, as a holistic concept, is embracing today a diversity of interpretations, intentions and realties depending on the country considered and its context, history, stakeholders involved, and socio-political environment. Considering the aim to scale up agroecology, to document and analyse its development in different contexts is a critical and necessary step to get larger insight and knowledge about the state of art of agroecology, and for supporting its expansion and take-up at policymaker level.

Through the "mapping of agroecology" we aim at providing an overview of the situation and reality of agroecology in different European countries. This could be seen as a step on the road of building a common understanding of agroecology as well as its development at European level (Wezel et al., 2018) and in the frame of the planned creation of an European partnership in Agroecology Living Labs and Research Infrastructures[1]. The mapping did not aim to be completely exhaustive but rather illustrative, synthesizing and provide key insights, due to the dynamic nature of initiatives developments with new elements steadily added.

2. Mapping methodology

2.1. General methodology description

In the frame of the Horizon 2020 project Agroecology for Europe (AE4EU), the mapping of agroecology was carried out in different countries of Europe with a common methodology. Collection of information is organised according to three major elements commonly recognized for agroecology: a scientific discipline, a set of practice and a social movement (Wezel et al., 2009; Figure 1). To take into consideration complementary aspect and the European dynamic on the topic, also in relation the European partnership in agroecology[2], two additional elements were defined for the mapping and in this report called pillars:

- "Living lab", as recognize and spotlighted by the European Commission in its project of a Partnership in "agroecology living labs and research infrastructures"[2];

[1] https://ec.europa.eu/info/research-and-innovation/research-area/agriculture-and-forestry/ecological-approaches-and-organic-farming/partnership-agroecology_en

[2] https://ec.europa.eu/info/research-and-innovation/research-area/agriculture-forestry-and-rural-areas/partnership-agroecology_en

- "Education and training", to distinguish it from the Science pillar as many initiatives, programmes, and training are existing outside the academic and science sphere.

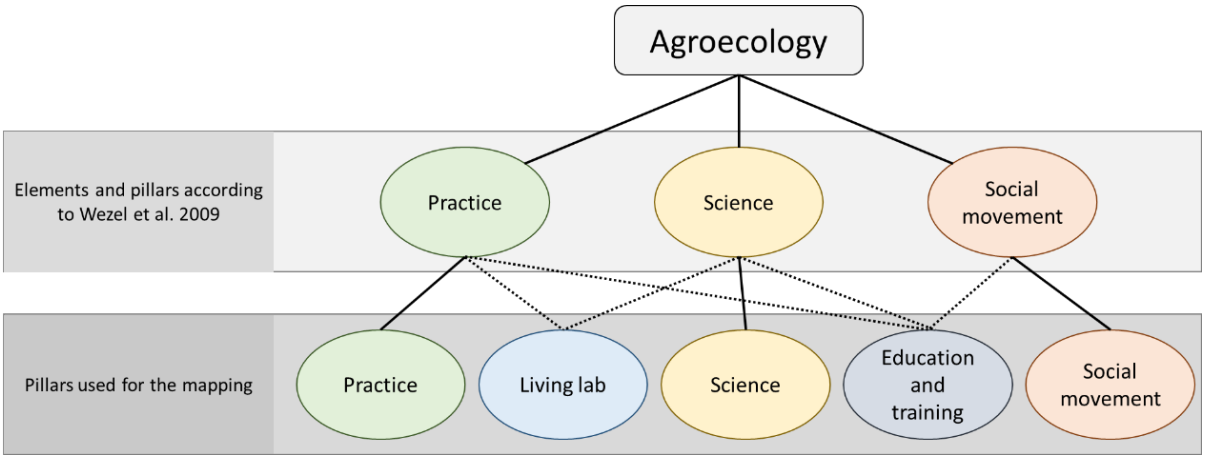


Figure 1: The three elements/pillars recognized for agroecology Wezel et al. (2009) and the five pillars used for the mapping of agroecology in European countries. The dotted lines indicate that living labs and education and training are cross linked to other pillars.

For the mapping of the five pillars different icons were used, to be illustrated in the report (Figure 2).

Pillar	Icons
Practice	
Science	
Movement	
Living lab	
Education and training	

Figure 2: Icons used for the five pillars of mapping agroecology

Apart from the recognition of the five pillars, two concepts/notions are at the centre of the mapping:

- "**Key informants**": they are experts providing information regarding one or more pillars. Their origin is quite diverse, e.g. being a researcher in a university or research institution, representative of a NGO or an organisation active in agroecology, participant of a national agroecological conference, previous mapping project.
- "**Initiatives**": recognized here as formal action led by an organisation towards agroecology. This can include a diversity of initiatives, examples or cases related to one or more of the five pillars.
    - Programmes, projects, and initiatives that put agroecology into practice (farms networks, farmers cooperatives, local markets, …);
    - Living labs;
    - Platforms/organisations that collect information about what we know about agroecology and disseminate it;
    - University programmes and courses or training and teaching courses/activities promoted by any organisation;
    - Social movements of people promoting agroecology with any meaning;
    - Research projects and programmes on agroecology, including research infrastructures.

Building on this, the mapping methodology is organised in four steps (Figure 3). The first step consists of key informant selection and interviews with them. In a second step, initiatives are selected and analysed through in depth interviews and complemented by desktop research. The third step includes analysis of data collection, complementary desktop research and analysis and evaluation per pillar. Finally, the fourth step consist on presenting results for the current state of agroecology in a country and the description and analysis of selected initiatives. In the following section, each step will be detailed further. All data collected were stored in a common database and a central server with all documents.

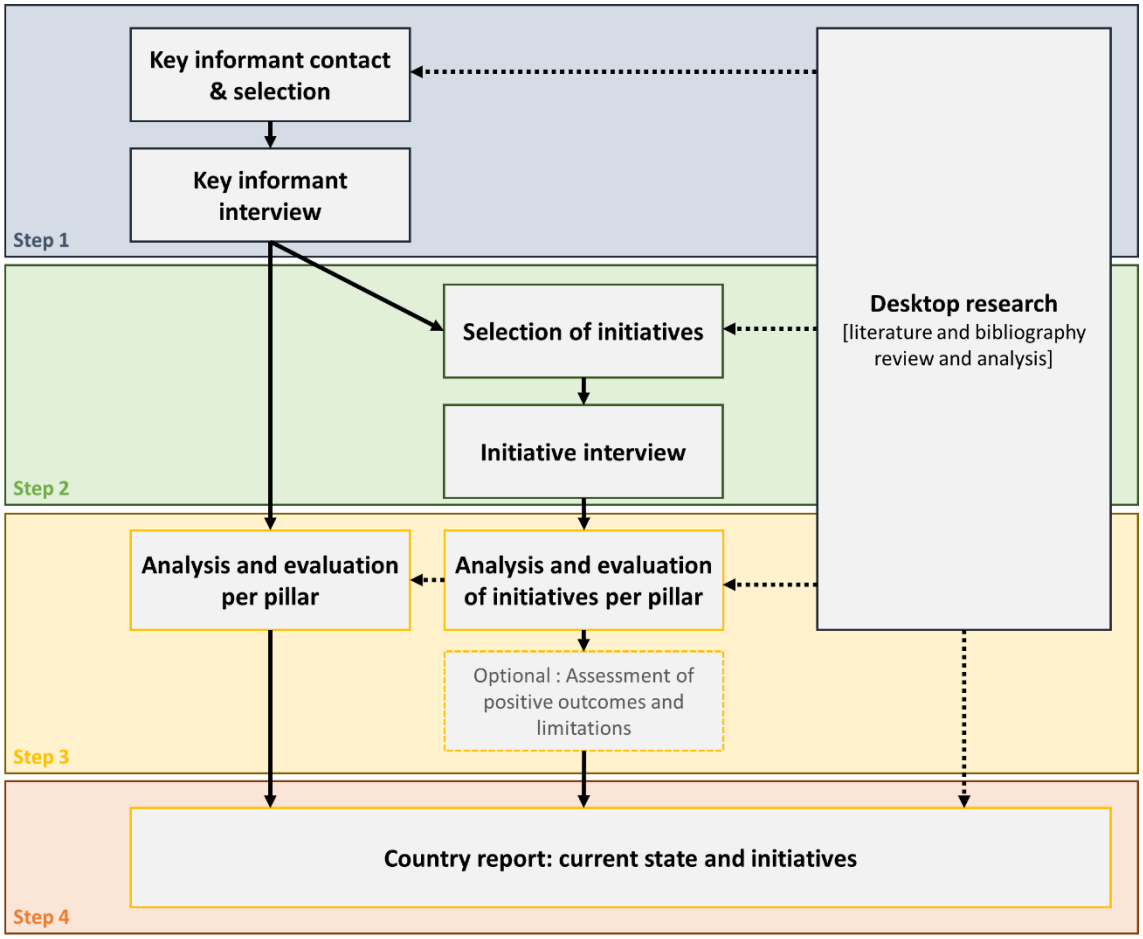


Figure 3: Schema of the four methodological step use in the mapping.

2.2. Methodological steps

2.2.1. Step 1: Key informant selection and interviews

Key informants are mainly selected according to their knowledge on one or more of the pillars. They were found through the AE4EU and Agroecology Europe network, through desktop research, SCAR Agroecology group contacts and representatives from EU member countries, and/or named by other key informants. All interviews are framed as semi structured interviews and conducted preferably in the native languages to minimize loss of information. The interview last between 30 to 60 min maximum.

The interview is organised in three main parts:

(i) A preamble aiming at understanding the knowledge and vision of the interviewee regarding agroecology. Five key areas (organic agriculture, agroecology, agroforestry, territories and food system, regenerative farming) and associated key

words are provided to the interviewee if it is necessary to clarify the understanding of agroecology.

(ii) First part of the interview gathered information regarding initiatives known by the interviewee on one or more of the five pillars. It starts with a general question on known initiatives and the following questions/exchange detailed the information per pillar.

(iii) Second part of the interview concerned agroecology in the country. Questions target the understanding and perception of the key information regarding the present state and recognition of agroecology in the country.

(iv) The interview ended on questions regarding barriers, perspective and any additional information that could be provided.

The full questionnaire for key informants can be found in Annex 1: Questionnaire grid for key informant'.

2.2.2. Step 2: Initiatives selection and interviews

Desktop research, key informant interviews and the network of AE4EU allowed to collect information about different initiatives. In order to help their selection, five criteria – but that are not seen as strict criteria – were define to help initiative sorting:

(i) Initiative existing longer than three years with an exception for initiatives that stand out notably in some aspect of interest and that are about two to three years old.

(ii) Outstanding initiative that tackle social and/or environmental and/or economic problems or difficulties in agriculture.

(iii) For initiative with agricultural production: it is economically (i.e., the initiative can give a living wage to the people involved in the project) and socially sustainable.

(iv) An initiative cited by more than one key informant or mentioned in previous mappings.

(v) Select if possible initiatives from all over the country and considering national context.

Strict criteria to assess the agroecological character of initiatives was voluntary not defined to avoid subjective bias and allow the analysis of a diversity of initiative. Single farms – except if presenting a diversity of activity and/or at the centre of a wider network – were not

selected. This was done in order to avoid further and ongoing discussion on the choice of a specific farms rather than another.

Once selected, information was gathered on each initiative according to a grid to be filled out. This grid was adapted as a questionnaire per pillar, aiming to target key points. At least one interview was to be conducted per initiative to collect most of this information, and carried out with one of the person leading the initiative. Semi-structured interviews were used. The full questionnaire are found in Annex 2: Questionnaire grid for initiative per pillar'.

In order to deepen the analysis of initiatives, the CERAI criteria were used to describe and evaluate their positive impact as well as limitations and challenges (CERAI, 2019). These criteria allowed describing on dimensions, categories and criteria of the initiative impact (Table 1). The use of the criteria and results are only presented in the country reports.

Table 1: CERAI criteria to analyse initiatives in agroecology, and dimensions and categories, and icons used.

Dimension	Category	Icons
Environmental	Natural resources and biodiversity management	
	Energy and waste management	
	Health	
Political	Cooperation	
	Governance	
Economic	Sustainable and fair economics	
	Commercialization is local, fair and/or collective	
Social	Traditional food and heritage conservation	
	Society and Equity	
	Education	

2.2.3. Steps 3 and 4: Data analysis and country reports

To ensure data reliability and uniformity a common frame is used as database. This allowed a certain uniformity of data that was then analysed. Draft country reports are written based on data collection and divided into three main parts:

- "Context", with a short description of agriculture in the country (based on the literature as well as interviews) and a state of the art of agroecology in the country (as reported from literature and interview).

- "Current situation of Agroecology" where the collected information is summarised per pillar. This part also includes a description of key dates regarding the evolution of agroecology in the country.
- "Agroecology initiatives, cases and examples" which offer a description of the different initiative analysed per pillar.

Each country report was reviewed by different people and if possible by an expert from the country to ensure the reliability of the shared information. In this draft report, a brief overview of first results and progress on 10 countries will be presented followed by a summary of results per country per pillar as well as a table summarizing the initiatives analysed.

The 10 countries presented and discussed in this report are:

- Albania
- Austria
- Bosnia and Herzegovina
- Bulgaria
- Croatia
- Germany
- Greece
- Kosovo
- Malta
- Montenegro

3. Overview of results and progress

Until beginning of 2022, 10 countries have already been mapped (Figure 4) with a total of 22 countries planned to be mapped until the end of the project.

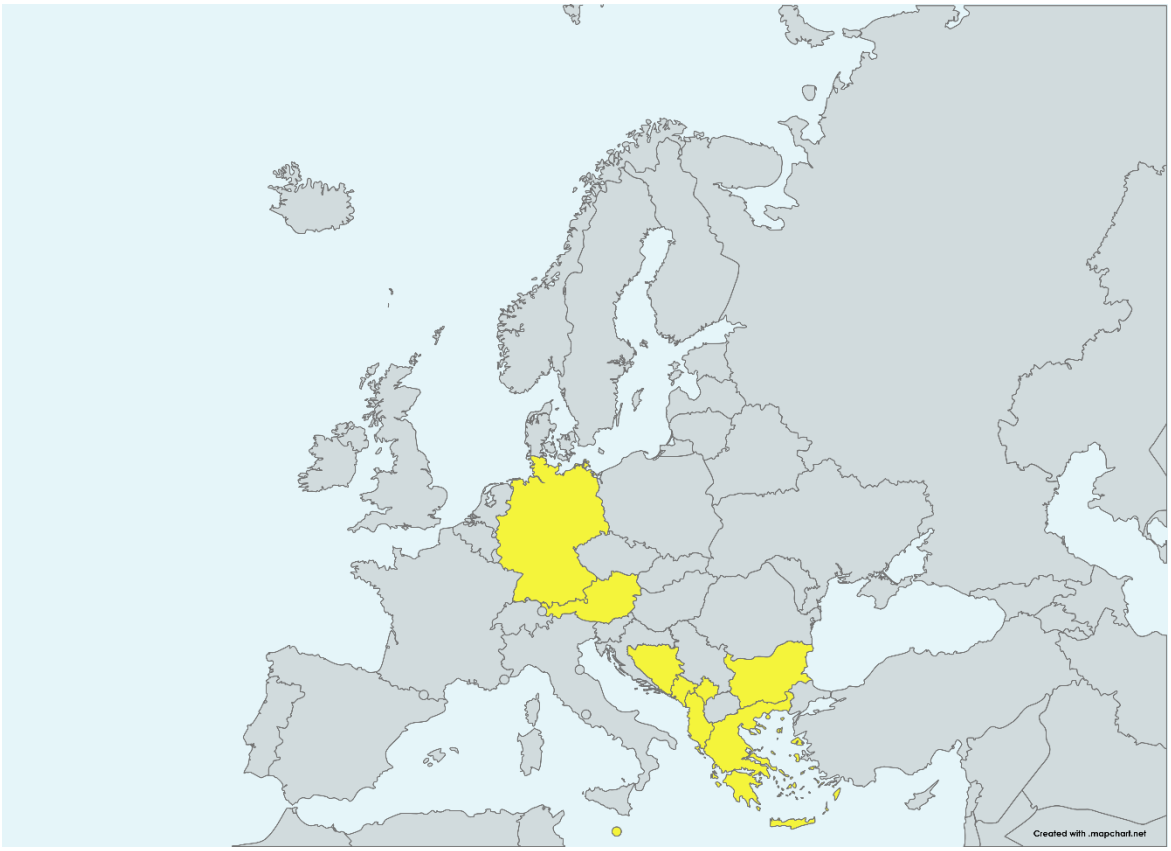


Figure 4: The 10 countries mapped (in yellow) by the AE4EU project for this report.

In the 10 countries, 80 key informants were interviewed of which 38 were female and 42 males. A similar gender ratio is observed among the 85 initiative informants contacted and interviewed with 44 males and 41 females. The expertise of key informants where categorize according to the five pillars used in the mapping. This categorization show an equal distribution among pillars except for living labs were fewer expert could be found (Figure 5). Among the 85 key informants interviewed, between 20 to 31% of them have an expertise on education and training, movement, practice and science and research infrastructure, while only 2% have a main expertise area on livings labs.

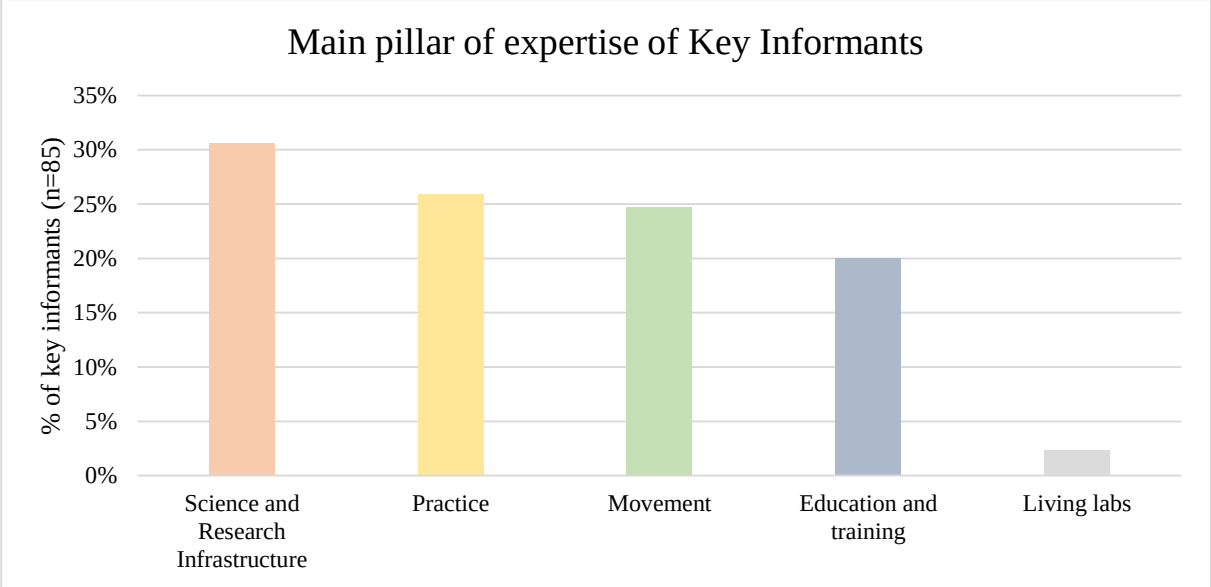


Figure 5: Main pillar of expertise of key informants. N=85 persons with 5 missing answers. One key informant could have an expertise link to different pillars.

Asked to describe the meaning of agroecology for them, key informants, mainly used word such as 'food' (cited 34 times), 'sustainable' (28), 'agriculture' (24), 'production' (22), 'ecology' (18), 'ecological' (17 times), 'science' (15), 'systems' (14), 'movement' (12) and 'approach' (12). The most frequent words cited are summarized in the word cloud in Figure 6. It may be noticed that the vocabulary used encompass the different elements of agroecology as a practice, a movement and a science (Wezel et al., 2009).

Organic agriculture and sustainable agriculture were the most cited related/linked words to agroecology by key informants respectively in 48% and 33% of their discourse (Figure 7). Regenerative agriculture (9% of answers), Permaculture (7%), Ecology (2%) and Rural development – Territorial food systems (1%) were less mentioned by most key informants.

Figure 6: Word cloud of the most frequent words used by key informant when asked to describe agroecology. Minimum of occurrence of each word is 5% of interviews.

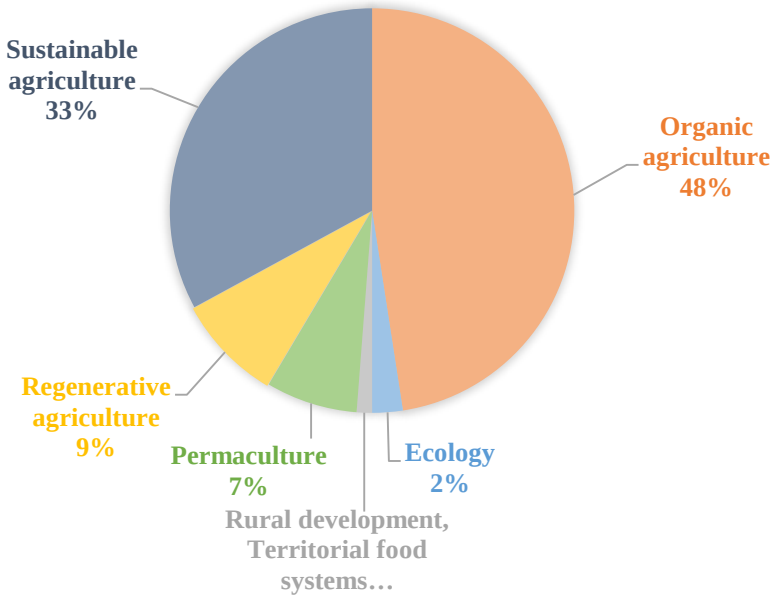


Figure 7: Most related/linked words to agroecology cited by key informants (n= key informants with 82 answers – a key informant could provide multiple answers)

3.1. Recognition of agroecology and practices

Recognition of agroecology vary among countries with generally a low level of recognition. For 76% of key informants it is not very much recognized or even not at all recognized at the country level. These results vary depending on the type of stakeholder considered as shown in Figure 8. According to key informants interview, a low recognition level of agroecology could be found among the different types of stakeholders considered with a level of recognition higher for research-university, civil society, farms and policy makers. This question of recognition per country and type of stakeholders is detailed and discussed further in the next part of the report but can already be highlighted as one of the major barrier to the development of agroecology at a larger scale.

Regarding the implementation of agroecological practices, only 5% of key informants considered them as well implemented at the national level with 21% considering them enough implemented. The majority of key informants (53%) stated that agroecological practices were not very much implemented and 9% see them as not at all implemented. Some key informant highlight that in many cases practices are not named as agroecological practices – even if they could be named as such and that the level of implementation depends strongly on the practice and the area considered.

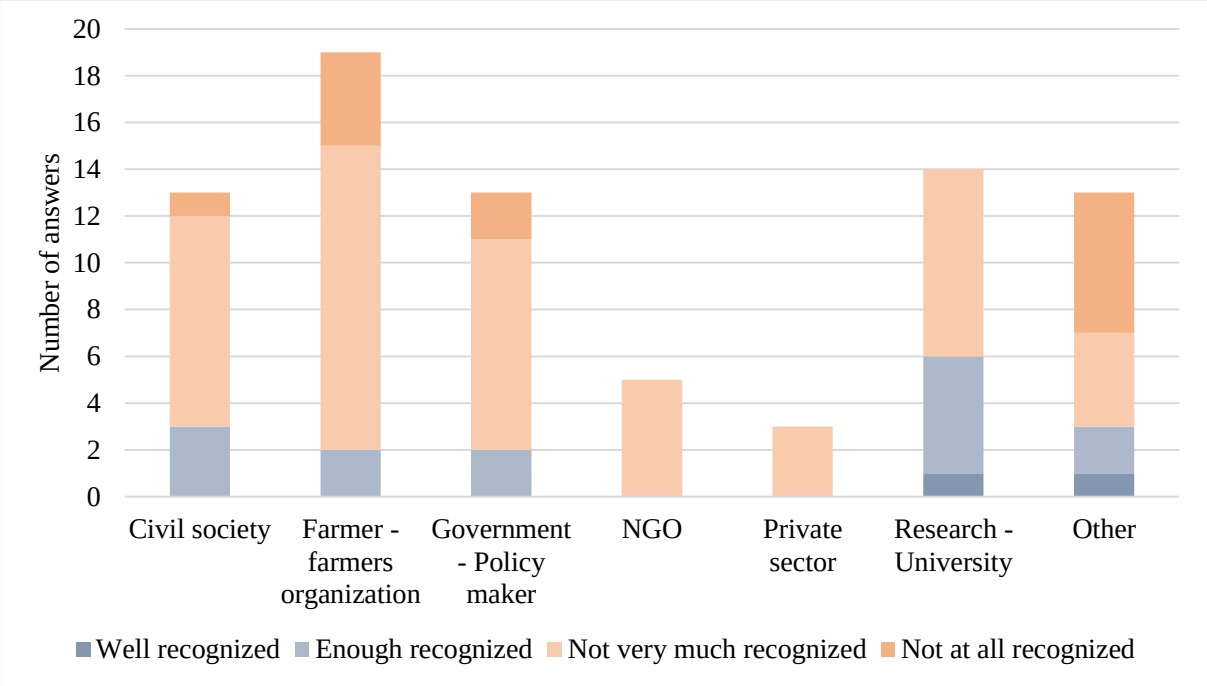


Figure 8: Recognition of agroecology per type of stakeholder according to key informants interview. Results of 10 countries based on 80 interviews.

Ask to name agroecological practices implemented in the country, key informants cited a wide diversity of supposed agroecological practices (about 56). This diversity reflects the diversity of understanding of agroecology in terms of potential practices implemented. Among the most often cited practices, crop rotation was the first (cited by 19%of key informants). Then composting (10%), flower strips and reduced to no tillage (9%), green and organic manure as well organic fertilisation (8%) and agroforestry, cover crop, drip irrigation and hedges (cited each by 4% of key informants). It is interesting to note that organic agriculture was cited by 14% of key informants even if it is more a set of practices than a practice per se as well as permaculture (5%).

3.2. Agroecology development: barriers and challenges

Main barriers and challenges to the development of agroecology cited by key informants for each country were categorized under 5 areas of action: economic, education/awareness, political framework, research and other (Table 2). Although this the results related to the respective country, different common and most cited barriers are summarized here:

- **Economic barriers** with a challenge on food prices and/or cost and the integration in this value of the environmental impact of food production and transformation. The lack of adapted funding schemes to support agroecological farming, practices and food systems was clearly highlight. Furthermore, the lack of available markets and outlets in certain countries or at least the absence of secure option for selling and distributing efficiently the food production were also mentioned.
- **Education and awareness** towards agroecology are seen to be lacking for citizens as well as different type of stakeholder (policy makers, farmers, private sectors). This was strongly highlighted by more than 17 key informants as one of the main barriers.
- The absence of clear **political support and public policies** towards agroecology, seems to constrain its development in certain countries. Unsuitable funding schemes were highlight by different key informants. The bureaucracy was also cited by several times as a clear break and area of time loose by farmers.
- The necessity to **foster knowledge and know-how** on agroecology was stressed, as well as lack of knowledge sharing among farmers and various actors of the food chain and the opportunity to develop demonstration and/or on field experiment to involve farmers and researchers.
- Finally, the lack of a clear and shared definition in the different countries of what agroecology is seems to hinder the takeover of agroecology by some stakeholder in many countries. The definition of principles was also mentioned as a potential misuse and/or confusion if not properly defined by stakeholders. According to key informants,

the cooperation among farmers, researchers, policy makers and actors of the food system appears as a clear leverage towards a stronger development of agroecology at different level.

Considering the lack of political support and framework highlight by key informants, surprisingly, 44% of them mentioned that certain policies exist in the country that can favour the implementation of agroecology. Often policies for organic agriculture was given as example for policies. Some public policy such as the ÖPUL in Austria (Austrian agri-environmental programme) were mentioned or more generally EU policy and guidelines as example of policies slightly linking with agroecology implementation.

However, on the other hand many key informants (32%) stated that existing policies do not focus at all on agroecology. From this we conclude that there are either no policies seen by actors with any focus on agroecology, or agri-environmental schemes which support certain practices are seen as the closest proxy to dedicated policies for agroecology.

It is interesting to note that organic agricultural policies, with a clear EU standard first established in regulation in 1991, and further regulation on third-party certification, are seen as the main driver to favour agroecology. They support schemes in some countries to various degrees for organic conversion or maintenance of organic production, including targeted support for rotational cropping, mixed farming, orchards and sometime mountain farming.

This is also interesting to note that organic agriculture policies often are targeting production on a plot, field and farm level and have only limited options, currently, for system integration, bio-regions and social and political movements for food sovereignty or food system re-design.

One could say “In the absence of any better policies for agroecology, the one-eyed might be the king among the blind”. But it goes further, countries with a high share of organic land use, e.g. Austria already above the EU target of 25%, also have policies mentioned for agroecology to add a plus to organic, e.g. FIAN Austria (FoodFirst Information and Action Network) with a position document on agroecology back in 2017 and urban or rural food policy councils (involve citizens in food system governance are examples for this - further details see country sections Germany and Austria for food councils in Vienna, Frankfurt, Cologne etc.).

Another development worth highlighting is rural parliaments, they may not use the word agroecology but have discussed many aspects relevant to level 4 and 5 of agroecology (Gliessman, 2015). The declaration of the Albanian rural parliament, described in this country’s section is a good example including rural development, mountainous areas, small

farmers, rural women rights and farm entry for the younger generation, all very important to the social aspects of agroecology.

There are also examples of actors promoting 'regenerative agriculture' at the policy level and this could go both ways either a deepening of agroecology if organic and regenerative are combined as a unit, or a 'lighter take' where regenerative and soil conservation is combined with pesticide and herbicide inputs, for the more conventional agriculture domain.

Another issue is that minimum standards as part of "Good agronomic practices" (GAP) or adherence to environmental standards to limit pollution like the EU Nitrate directive (NVZ – Nitrogen Vulnerable Zones) are already seen as policy achievement for agroecology. While they are useful and necessary, and important for farming to stay legal, they create little movement towards agroecology.

Finally, we find many NGOs which are campaigning for better policies promoting permaculture, small-scale farming, apposing GMO and 'factory farming'. We found the work of NGOs is often broad, including social and environmental sustainability, community gardens, school networks. Agroecology Europe is the only exclusively dedicated NGO to agroecology at the European level and could create a network of network for others like minded.

Table 2: Main barriers and challenges to the development of agroecology mentioned by key informants during their interview. In brackets, the number of key informants that cite this barrier/challenge (n=80). Only barriers and challenges that are mentioned by at least 2 key informants are listed in the table.

Economic	Education/awareness	Political framework	Research	Other
Food price/cost that does not take into account environmental impact (11)	Lack of education- awareness (17)	Lack of institutional/political support toward agroecology transition (18)	Lack of knowledge - know-how (11)	Lack of clear and shared definition of agroecology (5)
Unsuitable funding scheme including CAP (9)	Lack of capacity building (3)	Bureaucracy (6)	Lack of shared and available knowledge (2)	Artificialisation of land - land use and access - landownership (4)
Unsecured sales/lack of market and/or distribution option (6)	Consumer lack of knowledge (2)	Absence of clear support to certificate/guarantee of quality - lack of quality control (4)		Lack of cooperation among stakeholder of the value chain (4)
Lack of small farms support (3)	Necessity to make agroecology approaches accessible (2)	Lack of long-term approach/strategy (2)		Climate change (4)
Certification cost (2)	Strengthening/re-building the link between consumers and producers (2)			Aging farmers - generational renewal (3)
Dependence on subsidies for farmers (2)	Lack of society support for an agorecological transition (1)			Rural depopulation (3)
Lack of fund for farmers engaged in transition (2)				Lack of demonstration site (2) -
				Lack of cohesion among farmers (2)
				Too general principles of agroecology - could lead to confusion/misuse (2)

Regarding initiatives found and analysed through the mapping, education and training, practice and movement represent the pillars where most initiatives have their main area of action (78% of analysed initiatives in the 10 countries). Initiatives mainly related to the science pillar where found for 6 countries representing 10% of the initiatives analysed. It is interesting to notice that as area of action (Figure 10), 50% of initiatives act on education and training, 21% as movement, 17 on practices, 10% on Living Labs and only 2% on science. only 10 initiatives out of 82 have been identified has Living Labs (even without naming themselves as such for some) in 3 countries representing 12% of the total of initiatives analysed (see Figure 9).

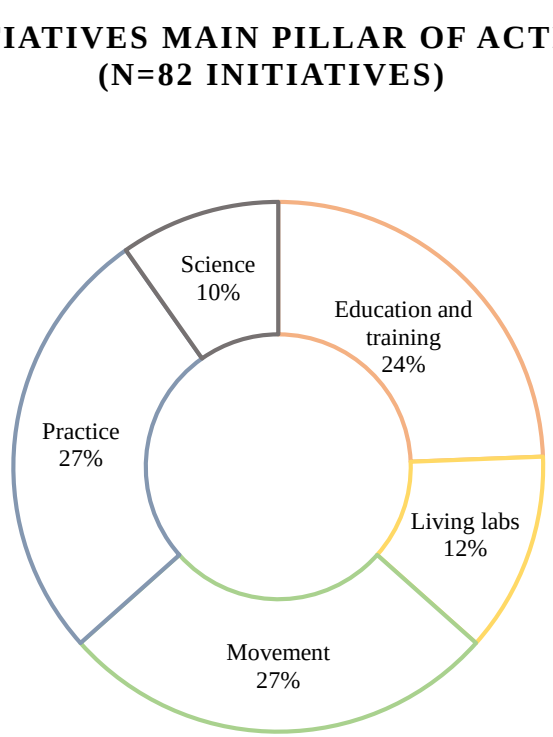


Figure 9: Main link of initiatives regarding the five pillars of agroecology analysed. Results considering 82 initiatives in 10 countries.

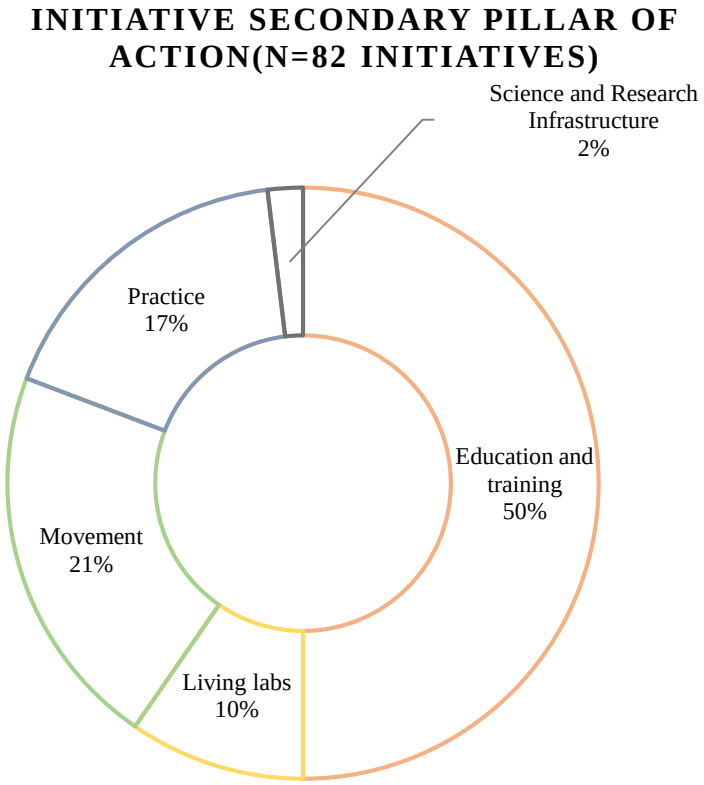
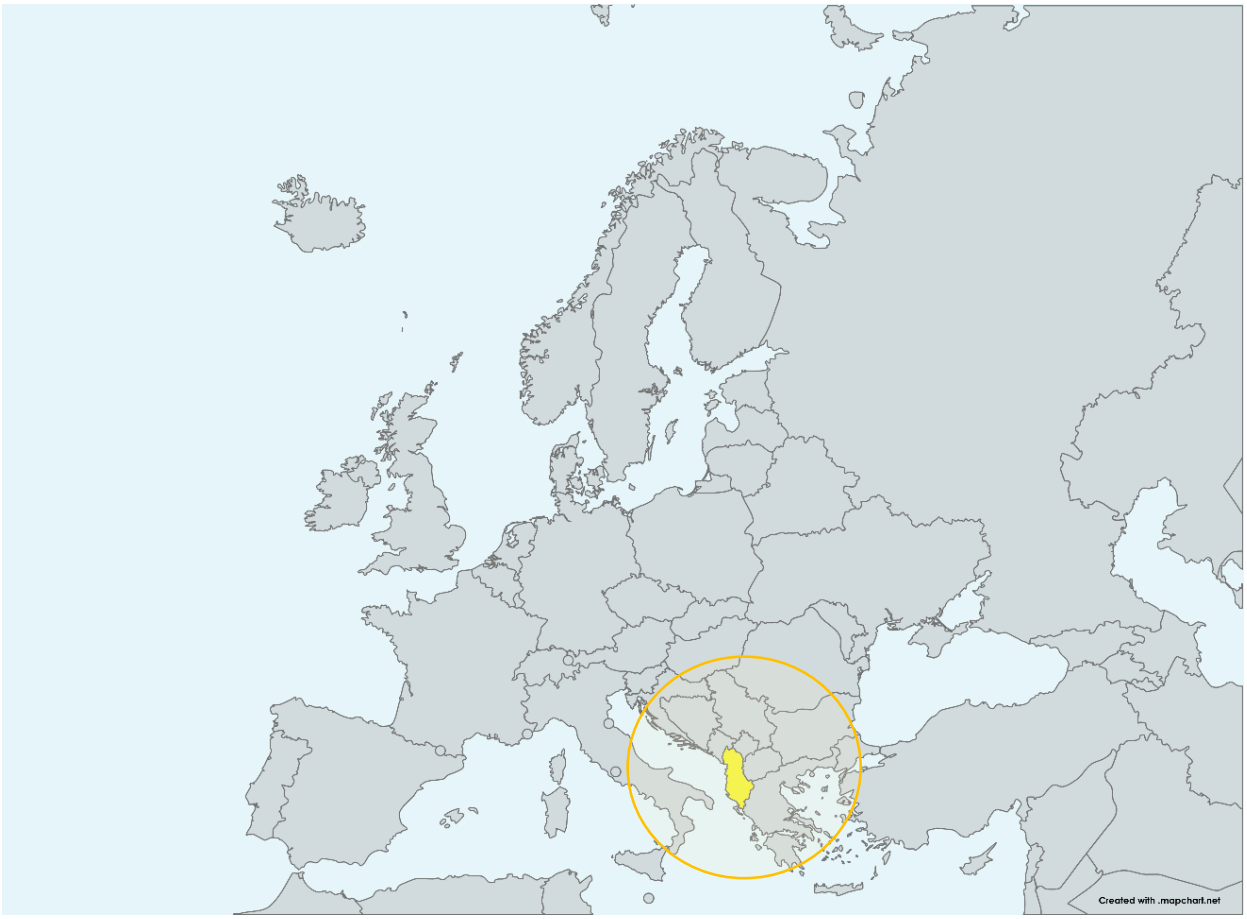


Figure 10: Secondary link of initiatives regarding pillars (n= 82 initiatives). One initiative could be linked to one or more pillars.

4. Results per country

To provide an overview of the results in the 10 countries, a summary of development of agroecology is achieved per country and per pillar below. For each country, a table summarize the name and main information regarding analysed initiatives related to agroecology.

4.1. Albania



In Albania, as described in Table 3. 6 key informants were interviewed. Based on interviews and desktop research, a summary of the development of agroecology in the country per pillar is provided in the following sections. Information about the different initiatives can be found in the respective country report to be published soon.

Table 3: List of key informants in Albania

Key informant n°	Type of organisation	Main sector of involvement	Pillar concerned
1	NGO	Food sovereignty	
2	NGO	Rural development	
3	Private Company	Organic agriculture	
4	Research Centre	Plant protection	
5	NGO	Farmers organisation	
6	Public institution	Rural development	

4.1.1. Education and training

Specific training on agroecology are so far absent in the Albanian context. NGOs mostly, such as the 'Institute of Organic Agriculture' (IBB) and the 'Albanian Network for Rural Development' (ANRD) offer trainings on agroecology-linked farming practices such as organic crop production, integrated pest management, soil fertility and agro-biodiversity. Such capacity building initiatives are usually financed by government agencies and donor organisations such as the 'German Agency for International Cooperation' (GIZ), 'Italian Agency for Development Cooperation' (AICS), 'International Visegrad Fund'. The private certification body 'Albinspekt' also organises capacity building trainings on organic agriculture regulatory framework.

'AgriNet Albania' (see Table 4), an NGO of 15 farmers' organisations, operating in Korça and Elbasan region, in the south-east of Albania, organises trainings mostly on integrated production such as integrated pest management, and other topics like the financial education for farmers, strengthening also capacity building for women in agriculture and how to increase their role in the rural farming system.

The research centre IBB from Durrës offers trainings to farmers, students and extensions/public officers, building also on the experience from experiments and researchers taken in 20 farms scattered in 5 counties (Tirana, Durrës, Valona, Skhodra, Leizha) of the country.

It is important to notice that vocational schools and adult training, almost absent in rural areas, do not include agroecology-related content in their curricula (FAO, 2019). In general, there is low awareness among farmers on the ecological impacts that agriculture has, thus resulting usually in inadequate fertilizers and pesticides utilization and other practices that could harm the environment (Kullaj et al. 2018 in Predić et al., 2018). Key informants added that a proper capacity building on farm management is also missing (KI-1 & KI-3, Table 3). Furthermore, vocational education is male-dominated, and in agricultural studies universities men form the majority of students, deepening the knowledge and skills gap between genders (FAO, 2016).

Agricultural, food and environmental sciences are present at university level at the Agricultural University of Tirana and the University of Korça "Fan S. Noli". The two universities do not develop specific studies on agroecology as a multi-pillar discipline, but they consider it as the science of environmental interactions at farm level.

4.1.2. Living lab

No evidences of Living Labs related to the field of agroecology in Albania could be stated by the interviewees. However, it should be highlighted that the project "FILA", in the framework of the program INTERREG CBC (Italy-Albania-Montenegro), promoted a Living Lab in each country of the project[3]. In 2019 a three-phase Living Lab was conducted in Korça region aiming at bringing together stakeholders of the agri-food chain (small-medium enterprise, farmers, innovation brokers and research organisations).

4.1.3. Movement

In Albania there is not a specific movement focusing on agroecology. However, different organisations are working towards sustainable agriculture, environmental protection and rural development. One of the most prominent organisation is the 'Albanian Network of Rural Development' (ANRD), an umbrella organisation which counts 20 associations. The members are national and international organisation working in Albania, and the network advocates and promotes initiatives towards the formulation and implementation of sustainable rural development policies. The most important event they promote is the 'Albanian Rural

[3] https://www.italy-albania-montenegro.eu/fila-living-labs-cooperation-and-technology-transfer-in-the-agri-food-sector

Parliament'[4], held biannually. In 2021 the 2nd one took place, organised as an online and physical event, with over 600 participants from all over Albania. Representatives of public institutions, farmers associations, civil society organisations and other stakeholders came together two days to meet, discuss and present the 'Declaration of the Second Albanian Rural Parliament', containing a call to policy makers on supporting actions towards: national supporting schemes of agriculture and rural development, remote and mountainous areas, small farmers, the youth and rural women and the implementation of the LEADER program in Albania's rural communities (ANRD, 2021). While agroecology is not mentioned, these priority fields of actions are a ground to mainstream agroecology programs in Albania.

Concerning organic agriculture associations, such as the initial 'Organic Agriculture Association' (OAA) and then 'BioAdria', despite the capacity building and financial support they received, they are still limited in terms of members and lobbying power at decision-making level.

In parallel, the development of the Slow Food movement in Albania[5] with regional groups has raised concerns of consumers towards local healthy food. A network of restaurants and so called 'presidia' farms, following certain sustainability criteria, based on the concepts of "good, clean and fair". The agri-tourism sector has witnessed a huge increase in the last years, sustained by donor funds and local foundations too, such as 'Gijorokastra Foundation'[6] (KI-1 & KI-6, Table 3). Even if they do not define themselves as agroecological per se, the sector is deemed active and crucial to revitalize local foods culture from mostly family farming systems.

4.1.4. Practice

Albania is characterized by two pedoclimatic zones: the continental, internal, one and the Mediterranean coastal area. This divides the country in three main agroecological areas: lowlands where intensive agriculture is practiced, the hill area where arable crops and fruit trees are mainly cultivated and the mountainous one with mainly grasslands, fruit crops and some cereal (Kullaj et al. 2018 in Predić et al., 2018)

In mountainous and hilly areas, small-scale farms with average 1.5 ha are predominant, with diversified crops and livestock present on the farm (Jani and Kume, 2018). Farming products

[4] https://anrd.al/second-rural-parliament/

[5] https://www.slowfood.com/nazioni-condotte/albania/

[6] https://gjirokastra.org/food-tours/

are mostly for family self-consumption, and excess products go into the market channels. In small-scale farms a higher use of local cultivated varieties is observed, as farmers tend to conserve specific crops adapted to the local soil and climatic conditions. Usually they tend to use organic fertilization with manure, composting, and crops rotation. However, lack of information on best farming practices and inadequate farming techniques, misuse of pesticides and fertilizers, and negative impact on the environment such as overgrazing and burning crop residues are frequently observed (Kullaj et al. 2018 in Predić et al., 2018).

One close link with agroecology is organic agriculture. The farming approach might be close to traditional smallholders' practices but the actual organic certified agricultural land in Albania is still very low (0,08% of agricultural land in Albania) and the consciousness about organic agriculture is very low among farmers (KI-2, Table 3).

Actions are taken toward the conservation of local food traditions, with projects aiming at doing research and conservation of cultivated agrobiodiversity and local livestock breeds. As an illustration, the 'Institute for Organic Agriculture' (IBB) is doing experimental research with few traditional horticultural varieties in collaboration with the 'Institute of Plant Genetic Resources'. Other approaches such as agroforestry[7] have been promoted in few projects, and in 2018 a conference on agroforestry took place. However, there is no evidence of specific initiatives currently working on this topic.

4.1.5. Science

The 'Agricultural University of Tirana' (AUT) and the 'University of Korça' "Fan S. Noli", are the only universities, both public, offering degrees in agricultural, food and environmental sciences. AUT, one of the largest academic institutions in the Western Balkans, offers courses in a wide range of subjects. In the Department of Agriculture and the Agri-Environment organic crop production is addressed but does not constitute a single course. Agronomy students can also attend integrated rural development, marketing, rural sociology and finance courses but it is not compulsory to integrate them in the curriculum. But overall, no specific mention of agroecology as a multi-pillars discipline can be stated.

Regarding the other academic institutions, researchers at the 'University of Korça' have collaborated in creating Integrated Pest Management and soil organic fertilization training

[7] https://twitter.com/AgrofMM?fbclid=IwAR3gL2K2ERYOEsqqFVTQv-OZ2JqFk5OPuo3eq9MUIb_n2DNWfCUZ1ED1vaQ

booklets, in partnership with AgriNet Albania. But no other work regarding organic agriculture is available so far.

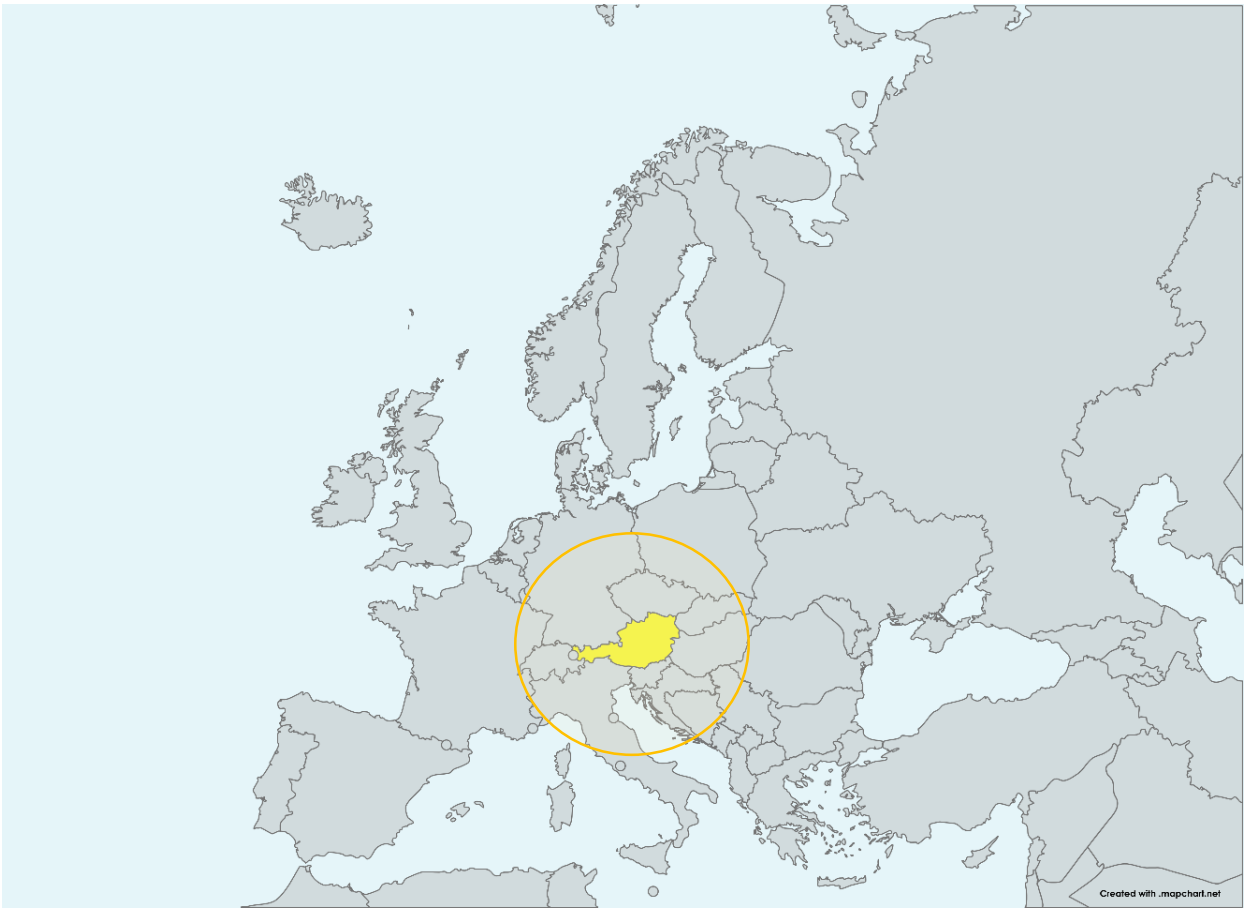
Research in agriculture is also channelled in 'Agricultural Technology Transfer Centres' (ATTCs) which are public bodies managed by the 'Ministry of Agriculture and Rural Development' (MARD), scattered in Albanian regions focusing in a particular agricultural and food-processing sector, with a mission of technology transfer. Nevertheless, ATTCs have low resources and do not focus on agroecological practices.

The 'Institute of Organic Agriculture' (IBB) in Durrës is a private scientific research institute, founded in 2010 as an NGO, focusing on promotion of organic agriculture. It performs field research mainly on biological pest control as well as on fertilization and crop protection. The Institute collaborates with the public extension office, AUT and the Institute of Agro meteorology providing capacity building in the topic. They also developed different farmer trainings courses on organic crop production.

Table 4: An overview about initiatives analysed in Albania.

Initiative n°	Initiative name	Scale	Type of structure	Aim	Pillars				
					Education and training	Living lab	Movement	Practice	Science
1	IBB - Institute of Organic Agriculture	National	NGO	Promotion of organic agriculture					
2	ANRD - Albanian Network for Rural Development	National	NGO	Sustainable rural development, policies and instruments					
3	AgriNet Albania	Regional	NGO	Capacity building					
4	Agropuka	Local	Farmers association	Rural development of Puka					

4.2. Austria



In Austria, as described in Table 5. 8 key informants were interviewed. Based on interviews and desktop research, a summary of the development of agroecology in the country per pillar is provided in the following sections. Information about the different initiatives can be found in the respective country report.

Table 5: List of key informants in Austria.

Key informant n°	Type of organisation	Main sector of involvement	Pillar concerned
1	Chamber of agriculture	Soil and water protection	
2	Chamber of agriculture	Organic agriculture – arable farming and viticulture	
3	Chamber of agriculture	Plants	
4	Research infrastructure	Soil ecology	
5	Chamber of agriculture	Agricultural and regional policy	
6	NGO	Agroforestry, regenerative farming	
7	University	Organic agriculture, agroecology	
8	Ministry of agriculture	ÖPUL, mountain farmers and less-favoured areas, organic farming	

4.2.1. Education and training

Education in the broad field of agroecology is fragmented in Austria and rarely exists under that name. A major focus remains on organic agriculture, which can be explained by its historical development in the country. Key informants mentioned courses and trainings related to agroecology from different organisations, movements, schools and universities:

- The 'Bioschule Schlägl' (organic school 'Schlägl'; see Table 6) provides education on organic farming to 14–17-year-olds students and adults.
- The 'Ländliches Fortbildungsinstitut Rural Education Institute' (LFI – Rural Education Institute) regroups all education opportunities for adults in rural Austria, trainings on organic farming and biodiversity and direct marketing can be found.
- The 'Permakultur Akademie im Alpenraum' (permaculture academy; see Table 6) provides education on permaculture.

- The 'University of Life Science' (BOKU) in Vienna offers many courses related to the topic of agroecology and a masters' degree on Organic Agricultural Systems and Agroecology.
- Agricultural and regional sociology are taught at the 'University of Innsbruck'.

Finally, different associations offer educational courses, BioAustria has trainings for farmers on many topics[8] including nature conservation, low input dairy farming, and soil fertility. The 'Bodenpraktiker' course focuses on soil health teaching how to create fertile soils, by covering topics such as soil formation and structure, nutrient mobilisation, cover crops, weed control and composting. (see previous mapping project: (Agroecology Europe, 2020). The network of farmers and advisors called the 'Humus Bewegung' also offers courses on regenerative farming[9].

4.2.2. Living lab

According to interviewees (KI-6 & KI-7, Table 5), living labs in agriculture seems to be a recent concept still little used in Austria. In fact, most key informants could not name any, and most of agroecological living labs are often recent initiatives. Two living labs mentioned were the 'Grand Farm' (demonstration activity started in 2018, see Table 6), and the long-term ecological research experiments (see Table 6) of the AGES (Austrian Agency for Health and Food Safety). Representatives from the two living labs stated that they link farmers to researchers, putting research experiments in a real-world context permitting innovation. Another aspect is sharing of knowledge; many initiatives but especially living labs aim to co-create knowledge and transmit it to other practitioners.

4.2.3. Movement

The concept of agroecology has been used by different movements in Austria, even if the term itself is not always explicitly used. Most movements link agroecology to socially fair and sustainable production. The ÖBV-via Campesina Austria[10], nyéléni Austria[11] focus on food sovereignty (see Table 6) and community supported agriculture (CSA, 'Solidarische

[8] https://www.bio-austria.at/bio-bauern/beratung/bildungsangebote/

[9] https://www.humusbewegung.at/veranstaltungen/bodenkurs-im-gr%C3%BCnen

[10] https://www.viacampesina.at/

[11] http://www.ernährungssouveränität.at/

Landwirtschaft' – solidarity farming). Over 40 initiatives of CSA have been listed in Austria[12]. FIAN Austria (FoodFirst Information and Action Network) has created a document on agroecology (FIAN Österreich, 2017) for decision-makers and Austrian stakeholders who help shaping processes in food and agricultural policy.

Another association mentioned by key informants was the 'Boden.Leben' association (soil.life), promoting practice-oriented research and farmer-to-farmer knowledge exchange mainly on soil protection. The association 'Sezioneri' (seasonal workers) advocating for the rights of agricultural workers in Austria is also an example of an initiative that could be considered as agroecological.

A further type of movement is the emergence of food policy councils aiming to involve citizen in decision processes in food systems (Sieveking, 2019), creating a new appreciation for food and its producers, promoting local, sustainable and fair food supply. A map of different food councils in Austria and other European countries has been established[13]. Food councils follow many agroecological principles such as recycling (food waste), co-creation of knowledge, social values and diets, connectivity and participation (for principles see: HLPE, 2019; Wezel et al., 2020). Their work is based on volunteers and their actions are limited by the lack of recognition and financial support by governments.

Different associations like BioAustria (representing two thirds of all organic farmers in Austria), Demeter and Bioland established guidelines going beyond the EU organic farming regulations (KI-1, KI-2, KI-6 & KI-7, Table 5). For example, all different productions of a farm need to be organic to have the BioAustria label, other major differences to the EU guidelines are on animal welfare requirements. There are also requirements for packaging, horticultural production and communication and education that are not mentioned in the EU regulations. These guidelines are adapted regularly with the involvement of farmers, advisors and experts (proposal, discussions, final vote). While these additional guidelines do not use the term agroecology, organic farming is understood as its inventors had, in a systems approach, meaning that the values and ideas behind it are completely compatible with agroecology.

[12] https://www.ochsenherz.at/solidarische-landwirtschaft-in-oesterreich-2/

[13] https://ernaehrungsraete.org/

4.2.4. Practice

In Austria, certain associations like BioAustria, Demeter, Bioland, and Boden. Leben actively promote exchanges on practices, linking farmers and offering courses on specific practices. Different agroecological practices are implemented in Austria according to key informants: crop rotation, organic farming, flower meadows, flower strips, traditional old species and adapted cultivars, intercropping, agroforestry, drip irrigation, direct seeding, cover crops, and reduced or no tillage. While some of these are identified agroecological practices (Wezel et al., 2014), a few like organic farming refer to a production system including a series of different practices. Others like flower strips are linked to an agri-environmental measure, which, in case it is used to support ecosystem services, is an agroecological practice.

Summarizing and assessing the main practices at the country level has not yet been carried out. Nevertheless, regional differences can already be mentioned. Two regions in Austria are labelled organic model regions: the 'Ökoregion Kaindorf' (case study in the UNISECO project[14]) and the 'BioRegion Mühlviertel'[15]. These regions have a high percentage of organic farms and aim to develop sustainable practices throughout the territory linking different stakeholders, creating regional value chains and raising awareness of inhabitants through events and workshops.

4.2.5. Science

The scientific aspect of agroecology encompasses a multitude of subjects and is often fragmented in different research areas in Austria. Key informants named three universities: 'Universität für Bodenkultur' (BOKU), 'Universität Innsbruck' and 'Universität Wien' researching on agroecology related topics. The BOKU has a department on sustainable agricultural systems with a specific division on organic farming (IFÖL). The 'Universität Innsbruck' has a research group called 'Agrar- und Regionalsoziologie' (agricultural and regional sociology) in the institute of sociology, working in the field of rural development and on food systems. At the 'Universität Wien', the division of terrestrial ecosystem research (TER[16]) as well as the department of Botany and Biodiversity research at the 'Universität

[14] https://uniseco-project.eu/el/case-study/austria

[15] https://www.bioregion-muehlviertel.at

[16] http://ter.csb.univie.ac.at/

Wien' are doing relevant research regarding environmental issues such as land-use change, soil role in food security.

Four research infrastructures were identified: 'Bioforschung Austria'[17], HBLFA Raumberg-Grumpenstein[18] (Higher Federal Teaching and Research Institute for Agriculture), AGES[19] (Austrian Agency for Health and Food Safety) and FiBL[20] (Research Institute of Organic Agriculture). The research done by the 'Bioforschung Austria' and the FiBL focuses on organic farming. The HBLFA has a research institute on organic farming and livestock biodiversity. The AGES mainly deals with the research topics of sustainable plant production, agroecology and biodiversity, pathogens and allergens in and on plants and plant products, animal nutrition and feed as well as foodborne diseases, zoonoses and bee protection.

[17] https://www.bioforschung.at/

[18] https://raumberg-gumpenstein.at

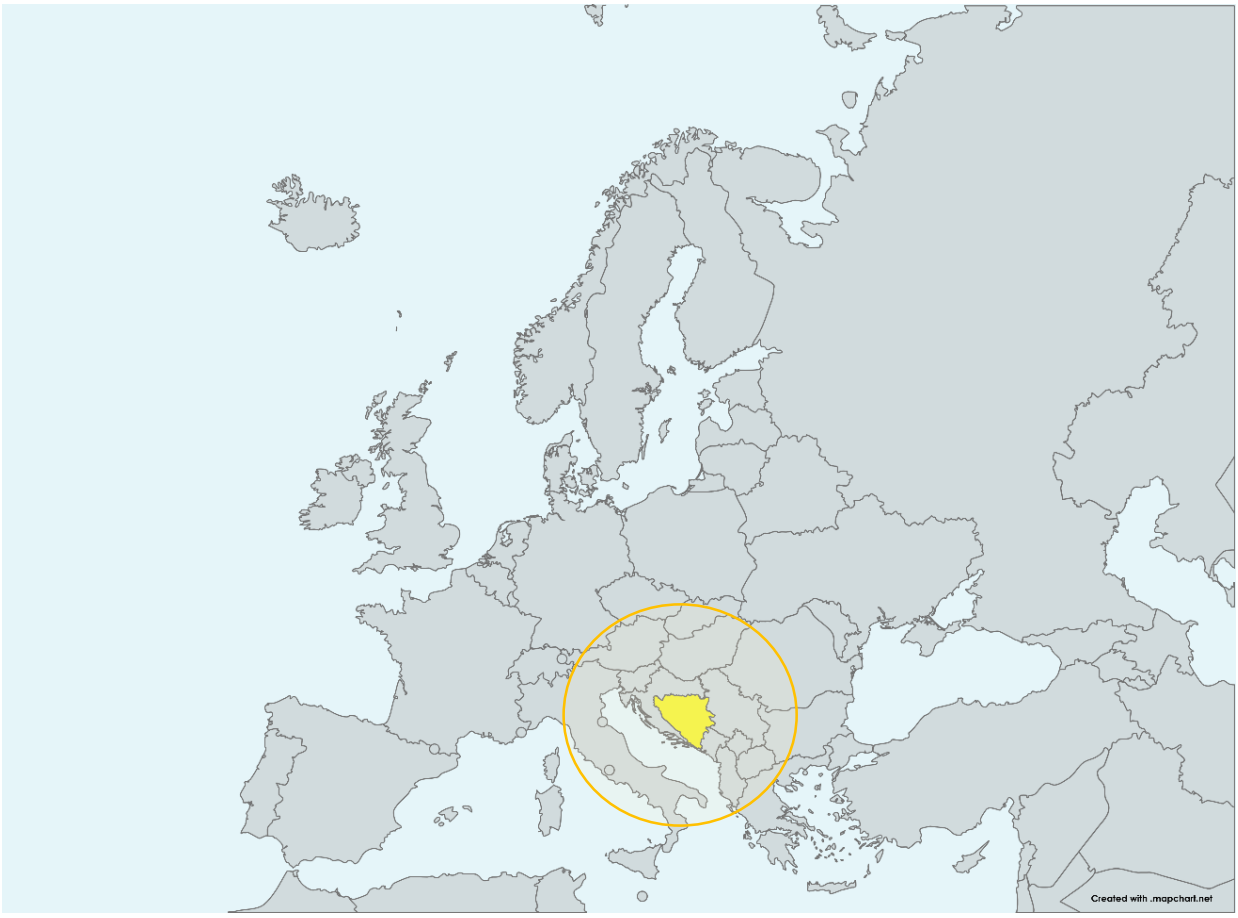
[19] https://www.ages.at/themen/landwirtschaft/

[20] https://www.fibl.org/de/standorte/oesterreich

Table 6: Overview about initiatives analysed in Austria.

Initiative n°	Initiative name	Scale	Type of structure	Aim	Pillars				
					Education and training	Living lab	Movement	Practice	Science
1	Permaculture academy	National	Association	Teaching permaculture					
2	Biodiversity monitoring with farmers	National	Association	Farmers monitoring biodiversity in agricultural landscapes, changing practices to promote biodiversity					
3	Organic school Schlägl	Local	School	Organic agricultural high school					
4	Grand Farm	Local	Farm	Innovations along three themes: soil health, agroforestry, market gardening					
5	LTER – long term field experiments	National	Research infrastructure	Long term ecological research plots					
6	field - association of the use of unused	Local	Association	Reducing food waste by transforming unsold food					
7	Arche Noah	International	NGO	Preservation and development of the diversity of cultivated plants					
8	Vienna Food Policy Council	Local/National	NGO	Relocating food system and decision making processes in Vienna					
9	Result-oriented nature conservation planning	National	-	Result based nature conservation planning					

4.3.Bosnia and Herzegovina



In Bosnia and Herzegovina, as described in Table 7. 3 key informants were interviewed. Based on interviews and desktop research, a summary of the development of agroecology in the country per pillar is provided in the following sections. Information about the different initiatives can be found in the respective country report.

Table 8: List of key informants in Bosnia and Herzegovina.

Key informant n°	Type of organisation	Main sector of involvement	Pillar concerned
1	NGO	Sustainable rural development	
2	NGO	Permaculture design, education, and community-building	
3	Agriculture Ministry	Agricultural governance	

4.3.1. Education and training

Despite the existence of vocational high schools dedicated to agronomy, along with long-standing research and teaching at universities, agroecology is only weakly presented in these contexts. In the curriculum of the vocational high-school in 'Republika Srpska', the term agroecology is not used (II-9, Table 10). However, topics related to it are taught, either as self-standing courses in ecological agronomy, or as a part of larger curricula in other broader courses.

In vocational high school courses used for training agricultural technicians in 'Republika Srpska', the closest classes to agroecology are called '*ekološka poljoprivreda*'[21] ("ecological agriculture"; II-9, Table 10). In one vocational school in the 'Federation of Bosnia and Herzegovina' (FBiH) however, the word "agroecology" is directly mentioned in the curriculum for agricultural technicians as a part of "plant production" classes which take place during the first year of the course, as one of four teaching modules, under the title "agroecology and pedology" (Department of secondary vocational education FBiH 2009[22]).

In vocational high schools, there is often resistance to ecological agriculture from students due to a lack of trust that this type of agriculture is practicable and/or profitable (II-9, Table 10). Since many of the students come from traditional farming families, the resistance may be deeply ingrained. In these contexts, agroecological tools and approaches in the curriculum would likely be introduced only by more forward-looking, motivated teachers (II-9, Table 10).

Informal agricultural education is mostly performed either by dedicated farmers' associations, and/or NGOs – both domestic as well as international (such as UNDP, USAID, World Vision, EkoDizajn; II-10, Table 10). Despite limited reference and use, the concept of agroecology and some of its principles are implied through a growing number of initiatives with an emphasis on sustainability and the environment, as well as social diversity to some degree (II-2, II-7 & II-10, Table 10). One initiative, for example – 'EkoJasmina' – has trained at least 70 producers for ecological vegetable and fruit production (II-7, Table 10), and another one – 'Košnica' – regularly trains youth, the disabled, and offers opportunities for international knowledge exchange (KI-2, Table 8).

[21] https://www.rpz-rs.org

[22] http://www.vetbih.org/portal/index.php?option=com_content&view=article&id=100&Itemid=370&lang=en

In terms of applied learning, farmers' acceptance of principles intersecting with agroecology is low, the main obstacle being a lack of trust that sustainable approaches are financially feasible. Interviewees have concluded that this can be best counteracted via real-life examples, which illustrate the financially and practically successful application of such approaches (II-6 & II-10, Table 10). Education was also recognized as one of the main tools preventing the use of illegal and harmful substances in agriculture, even if at the same time, due to corruption, inspections and sanctions fail to hold those who are breaking laws and agreements accountable. Finally, rural outmigration and ageing are also considered to be a heavily restricting factor in terms of building sustainable informal education and training networks.

4.3.2. Living lab

Living labs are not yet identified as such in Bosnia and Herzegovina. However, through informant interviews two examples of initiatives, which include aspects of living labs can be, mentioned (KI-1 & 2, Table 8). The first is 'EkoDizajn' in Mostar, which is a socially responsible company that operates as a multi-functional resource centre and community-influencer. Its focus is on offering ecological farming and permaculture education, ecological design consultation, and opportunities to grow organic food in community with others. Revenue is reinvested in employment opportunities for young people. The second example is 'Factory of Joy' in Čelinac which maintains a crowd-sourced heirloom seed bank and seed library, engages in community outreach and education on the importance of seed collection and preservation as well as permaculture, and creates networks between local producers and consumers. Both examples represent innovative work that cross-cuts sectors and inspires action and the replication of agroecological ideas in the community.

4.3.3. Movement

Native, locally-grown agroecology initiatives which could be characterized under the movement pillar were not identified during this research. This may give a good indication about the situation of agroecology as well as of grassroots movements in the country. Nevertheless, some of the examples of practical initiatives found had some movement-like qualities, with 'Factory of Joy' taking on the role of articulating the need to preserve indigenous seed varieties and engaging the community in the work, and 'EkoJasmina' aiming to create the first village in the country which is based on 100% ecological farming (KI-2, Table 8; II-7, Table 10).

In place of movements which are rooted in grassroots mobilization (either local, regional or transnational) and articulate a social conflict, NGOs, especially international ones, may be considered to be partially filling the role of movements. They often do the work of developing, promoting and implementing mission-driven work at a national scale, and work with policymakers to get their buy-in of policy frameworks and other tools which could lead to long-term, systemic change. This may be considered a legacy of the post-war period (i.e., 1995 and beyond) in which international NGOs have played a strong role in the peace-building process and other aspects of societal reconstruction. However, their role in post war-BiH has been criticized by being limited by provisional, short-term project-specific funding and the overall context in which they do their work, namely a fragmented political system (Carey and Richmond, 2003).

Today, international NGOs could arguably be viewed as playing a major role. For example, UNDP is a key player in agricultural development in Bosnia and Herzegovina, and its activities are focused in four fields: circularity, competitiveness of the agriculture sector, sustainability of the agriculture sector, and finally the strengthening and diversification of the rural economy (II-4, Table 10). They also currently play a leading role when it comes to the development of strategic frameworks and policies related to the EU Green Deal, and can be considered to be an actor promoting regenerative agriculture at the policy level. While UNDP rarely uses the term “agroecology”, the work they undertake encompasses some of the principles behind it, such as biodiversity protection, renewable energy sources, short value chains, and social issues such as gender in the agriculture sphere (II-4, Table 10).

4.3.4. Practice

Most producers and farmers in the country seem to operate independently, outside the frame of any formal association or cooperative, though one example, ‘EkoDizajn’, which has the structure of a local NGO, having as well community education goals (KI-2, Table 8) can be mentioned here. Other examples such as ‘Košnica’ and ‘EkoJasmina’, although they are not acting formally as a cooperative or as part of an established network, are doing work that furthers the cooperative, community elements of agroecology, such as knowledge exchange (II-6, Table 10).

The examples of agroecology in practice found are mostly small-scale undertakings. The production is largely oriented toward local markets, often selling directly to customers, and often starting and operating via social networks, which seem to play a central role as means of advertising in small-scale production, alongside word of mouth (II-6, Table 10). The

communities in which the practices are embedded are not necessarily formally registered or recognized bodies, but rather operate as informal, tightly-knit groups (KI-2, Table 8; II-6, Table 10). The products are usually of local character, relating in personal ways to the communities of which they are a part, and they operate in what they consider to be a more cooperative, transparent and fair way compared with the commercial norm (II-7 & II-10, Table 10).

Agroecology seems to be not a term often used by farmers (KI-1, Table 8), but some initiatives such as 'EkoJasmina', 'Žabac Povrće' and 'Košnica d.o.o' (see Table 10) use approaches and practices related to agroecological principles, especially around safeguarding soil and water quality, biodiversity conservation, the use of organic fertilizers and pesticides (including hand-removal, nets, and plant-based formulas for pests), community-building, and concern about fair labour relations (II-6, II-7 & II-10, Table 10).

Government support for farming seems to be mostly reserved for larger producers who work in classical ways, for example in the form of subsidies, such as those for fuel (II-6, Table 10). This, as well as large amounts of imported produce, makes small ecological-oriented farmers feel that they are less competitive in the market. However, international NGOs, such as UNDP, USAID, and Caritas, provide support on some occasions, either through the organisation of workshops and seminars, programmes for employment, or through financial support for infrastructure and machines (II-6 & II-10, Table 10). Another major issue is brain drain, which impacts farms insofar as it causes labour shortages and interrupts community-building (II-6, II-09 & II-10, Table 10). Alongside financial issues for farmers, another obstacle is the complicated legislative scenery, which makes it challenging to obtain certain inputs, which are in line with ecological farming (II-6, Table 10). It also makes finding sales channels difficult at times, and the high taxes for small producers seem to take a large sum of earnings which could otherwise be reinvested in the business and local community. Due to these financial challenges, many farmers have another job on the side, which further constraints the creation and exchange of agroecological knowledge, practices and the development of networks such as producer associations and cooperatives (II-7, II-6, II-9 & II-10, Table 10).

4.3.5. Science

Academia has a considerable share in shaping future developments in Bosnia and Herzegovina related to agroecology. Previous study by Seremesic et al. (2021) have provided an overview of higher education related to agroecology.

Table 9: Agroecology courses and curricula in Bosnia and Herzegovina (data adapted from Seremesic et al., 2021)

Universities with agroecology related courses	Agroecology courses total	Agroecology curricula		
		BSc	MSc	PhD
6	3	4	3	3

There is very little literature available regarding agroecology as a science in Bosnia and Herzegovina. Also, according to key informants, agroecology seems still not be perceived as a notable topic in the sphere of science and university education in the country, even if the subject of ecology has a place in agricultural departments at universities. At the Faculty of Agriculture in Banja Luka[23], the term "ecological efficiency" is used in research activities (II-8, Table 10), and at the 'Agro-Mediterranean Faculty' in Mostar, courses exist in ecology and environmental management, nature protection, urban agriculture, water and waste management, among other topics – all of which theoretically link up with agroecology to different degrees, but do not refer specifically to agroecology (II-5, Table 10).

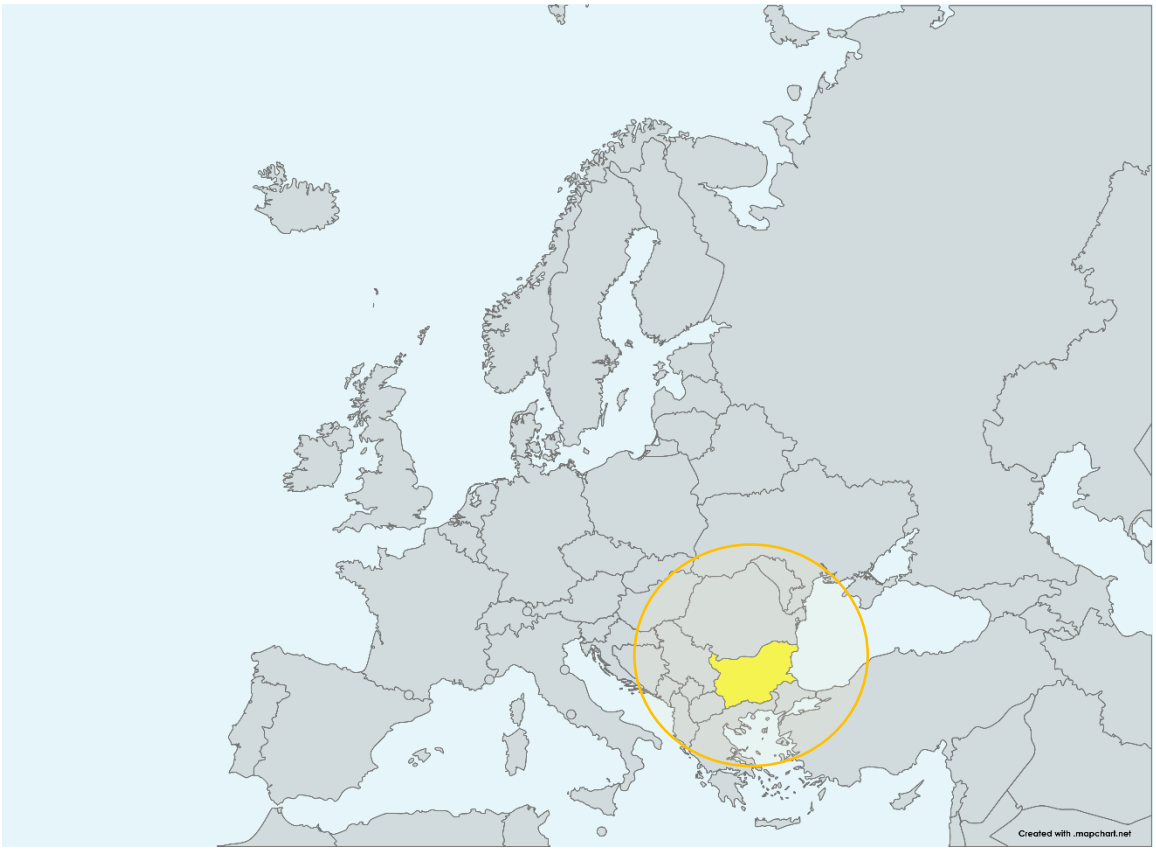
In recent years, the Agro-Mediterranean Faculty in Mostar has developed cross-sector cooperation, offering practical training opportunities in urban agriculture development, participated in environmental protection campaigns, and cooperating with NGOs and other institutions to raise awareness about the environment and the green economy (II-5, Table 10). Others, such as the aforementioned 'Faculty of Agriculture' in Banja Luka, joined international research consortiums in order to develop technology, which would lower the environmental impact of farming, such as water and pesticide use (II-8, Table 10).

[23] http://agro.unibl.org/en/

Table 10: An overview about initiatives in Bosnia and Herzegovina

Initiative n°	Initiative name	Scale	Type of structure	Aim	Pillars				
					Education and training	Living lab	Movement	Practice	Science
1	'Gradiška Vocational high School'	Local to regional	Public high school	Educating the future workforce as well as experts in several fields, including agriculture, animal husbandry, veterinary sciences					
2	'Košnica d.o.o'	Local to international	Private company	Providing expert education and guidance in order to promote healthy and sustainable beekeeping practices					
3	UNDP Bosnia and Herzegovina	National	UN organisation/ Intergovernmental organisation	Mission-driven work at a national scale mostly focused on economic circularity, increasing the competitiveness of the agriculture sector by improving its sustainability, and strengthening and diversifying the rural economy					
4	'EkoJasmina'	Local	Small-scale cooperative business	Production of organically farmed vegetables and fruits, as well as education through practice					
5	'Žabac Povrće'	Local	Small-scale organic farm	Organic farming for minimum-impact, environmentally responsible farming and a healthy and nutritious product.					
6	'Smart Water'	National and international	An international research consortium,	Promoting smart agricultural water management in BiH while raising the capacities of universities and of scientific workers in the field					

4.4.Bulgaria



In Bulgaria, as described in Table 11. 3 key informants were interviewed. Based on interviews and desktop research, a summary of the development of agroecology in the country per pillar is provided in the following sections. Information about the different initiatives can be found in the respective country report.

Table 11: List of key informants in Bulgaria.

Key informant n°	Type of organisation	Main sector of involvement	Pillar concerned
1	NGO / Research - university	Rural development	
2	NGO	Organic agriculture	
3	Research - university	Agroecology	

4.4.1. Education and training

Under previous socialist regime, Bulgaria's agricultural education and science were actively supported by the state and focused on modernization. Today, agriculture-related institutes and

schools remain, but the curricula of many is outdated. For example, teaching are still provided on agricultural machineries which are no longer in use and sustainable agriculture is still poorly discussed (KI-2, Table 11). Despite this historical heritage, educational and training activities in agroecology exist in formal academic institutions, through vocational training centres and in other organisations.

The 'Agricultural University' in Plovdiv was the first university where courses connected to agroecology were offered as part of bachelor and master degree programmes (Moudrý et al., 2018). The 'Agroecological Centre' at the university[24] was established in 1987 in order to carry out research, training activities and to work with researchers, farmers, and consumers to help the development of organic agriculture and agroecology in Bulgaria. The Faculty of Agronomy at the University of Forestry in Sofia (west of Bulgaria) includes agroecology in the 'General agriculture' course, which is included in the 'Agronomy' and 'Plant Protection' bachelor programmes[25], and there is even a 'Special agroecology' course[26]. Other institutions include agroecology in their general agriculture courses or offer agroecology training in their centres for continued education, which are supporting units of the universities or centres for professional education (Moudrý et al., 2018). For example, in 2019, the Agricultural Academy offered a course in agroecology at its Vocational Training Centre (Ministry of Agriculture Food and Forestry, 2020). The Agricultural Academy also runs demonstrations sites and carries out workshops in the field of agroecology (Ministry of Agriculture Food and Forestry, 2020).

Apart from public institutions, the foundation BIOSELENA (see Table 12), which works on the development of organic agriculture in Bulgaria, has a Centre for Professional Training (licensed by the 'National Agency for Vocational Education and Training') that includes courses in agroecology and organic agriculture. There are also other centres for vocational training which offer qualifications in agroecology (e.g. Harmonia[27]).

[24] https://www.au-plovdiv.bg/en/

[25] https://ltu.bg/en/faculty-of-agronomy/departments/agriculture-and-herbology/classes/3479-%D1%BB-general-agriculture-a,-pp

[26] https://ltu.bg/en/faculty-of-agronomy/departments/agriculture-and-herbology/classes/3500-%D1%BB-special-agroecology-cp

[27] Harmonia, n.d. Licensed Specialties - https://www.harmonia1.com/en/article/licensed-specialties

4.4.2. Living lab

The concept of Living Labs is novel in Bulgaria, which is why there are currently no active agricultural or Agroecological Living Labs. However, the concept is gaining popularity and the creation of a Living Lab is currently being discussed at the 'Agricultural University' of Plovdiv. Moreover, the 'Agroecological Centre' at the university has elements of a Living Lab, although they do not identify as one. Besides being part of a research institution and offering training for students and farmers, the Centre also accommodates field trials for companies to test new biological fertilisers, bio-pesticides, and new crop varieties better adapted to climate change. These results are then showcased to farmers as part of the Centre's goal of being a demonstration, education, practice, and research site. Therefore, the Centre's work is transdisciplinary and increasingly engaging with stakeholders. However, it currently remains more a demonstration and education site than a Living Lab.

4.4.3. Movement

In Bulgaria, agroecology – as it is largely understood as a set of practices at the farm level – is intertwined with movements which deal with environmental protection or extensive agriculture (KI-1 & KI-3, Table 11). Therefore, while there are individual farmers and producers who rely on agroecological production principles, they are usually not organised in networks nor part of movements.

On the other hand, organisations that represent movements which are not directly in the agri-food sector have worked to promote agroecology in various ways. For example, the 'Bulgarian Society for the Protection of Birds' are involved in raising awareness about, and supporting producers with, agri-environmental measures, as well as conservation of high value nature areas. Another example is the 'Bulgarian Biodiversity Foundation' who works on biodiversity conservation, with producers and farmer markets.

Up until the turn of the century, there was still no legislative support for organic agriculture, so the pioneering work of a few NGOs played a key role in the sector's development. Those ADDIN CSL_CITATION {"citationItems":[{"id":"ITEM-1","itemData":{"abstract":"Асоциация по екологично земеделие \"Екофарм\"-Пловдив Association for organic agriculture ,\"Ecofarm\"-Plovdiv Abstract The ECOFARM Association for Organic Agriculture was founded in 1996. It is one of the first non-governmental organisations which popularize the principles of sustainable agriculture and development of Bulgarian organic farming. In contrast to most European countries, for a long time, until the turn of the century, there was no government policy and support for organic agriculture in Bulgaria. The difficult pioneer activity for laying its foundations and initial development was realized mainly by the Agroecological Centre at the Agricultural University in Plovdiv, the ECOFARM Association for Organic Agriculture, the BIOSELENA Foundation, the AGROLINK Association and other non-governmental organizations. On the

The movements whose activities cover the entire food system and illustrate agroecological principles usually have a different focus or use different terms, such as organic agriculture, fairness and connectivity between producer and consumer, extensive agriculture, or biodiversity protection. BIOSELENA, for example, is a foundation which aims to contribute

to the development of organic and sustainable agriculture through advocacy and training, covering a wide array of topics relevant for agroecology. Their work, and that of other movements, has included actions related to food systems such as recurring weekly farmer markets, promoting interconnectivity between different stakeholders, and aiming to create a network. Therefore, these movements have been promoting agroecology at the scale of the whole food system, even though not necessarily using the term.

4.4.4. Practice

Agroecology is practiced mostly by smaller producers, usually individual or family farms (KI-1 & KI-2, Table 11). Studies show that a tradition of small-scale gardening has played, and still plays, an important role to ensure sufficient food supply and security. This type of subsistence farming has actually increased with the transition to a market economy (Di Falco et al., 2010). However, national policies, privatization laws, and economic crises have been removing social safety nets from farmers and decreasing their flexibility to engage in such activities (Di Falco et al., 2010).

Current subsidies are considered by many? inadequate for new farmers who want to test and implement agroecological practices, which involve a period of trial and error and require a level of economic safety. The state generally does not grant public procurement contracts to produce made in non-conventional ways, such as through organic agriculture (KI-2, Table 11). Although some smaller producers who follow agroecological principles have been able to continue their activities, many have done so by targeting market niches and focusing on specialized products (KI-2, Table 11). Thus, agroecological practices are currently not popular and seen as a niche among the general public, as well as by producers.

When it comes to farmer organisations and consumer-producer relations, initiatives such as community-supported agriculture (CSA) and cooperatives have not been successful and are not widespread (KI-1, Table 11). For the latter, the idea of cooperatives have a strong state character due to their existence during the years of socialism, and are understood as something that came from the 'Union of Soviet Socialist Republics' (USSR; (Marinova and Nenovsky, 2020). This understanding may still be present, leading to the rejection of cooperatives in the post-communist period (Marinova and Nenovsky, 2020).

Many agroecological initiatives are civil-society-led and informal, and often lack structure, coordination, and movement towards a common goal[28]. When it comes to agroecological practices beyond the farm level, they also face challenges as local governments lack the understanding of the importance and positive impacts of agroecological initiatives (KI-2, Table 11). Thus, support for initiatives such as farmer markets is limited, and their support with one administration may change with the next one.

Among practitioners, agroecology is mainly seen as a set of farming practices and linked to agri-environmental measures coming from EU legislation (KI-1 & KI-3, Table 11). However, there are initiatives which do not employ the term but support agroecological practices and principles at various parts of the food system.

4.4.5. Science

Thus far, research programmes related to agroecology in Bulgaria have been mostly part of European projects, with mainly case studies and only a very limited number conducted analyses at the whole country scale (KI-3, Table 11). Further, agroecological research has addressed mostly environmental issues and practices at the farm level.

There are a few primary institutions which conduct relevant research: the 'Institute of Soil Science', 'Agrotechnologies and Plant Protection' (ISSAPP) 'Nikola Pushkarov' (under the Agricultural Academy), the 'Agricultural University of Plovdiv' and the 'University of Forestry' in Sofia (Moudrý et al., 2018).

Overall, there are few larger research projects targeting agroecology in the country (Moudrý et al., 2018). The project 'Sustaining agricultural change through ecological engineering' (STACCATO, 2014-2018) is a significant recent example which included regional level analyses (KI-3, Table 11). Moreover, there is the national research programme 'Healthy Foods for a Strong Bio-economy and Quality of Life' from the Ministry of Education and Science[29].

In terms of research communication, there are two main conferences linked with agroecology: 'Ecological Problems of Agriculture' Conference, (AGROECO'93) which was held every two years until 2009, and published in different proceedings (Moudrý et al., 2018); and ISSAPP

[28] For example, a key informant cited a Facebook group on no-till agriculture where people exchange experience and information. However, upon inspecting the group, it was not very active: engagement over the past year seemed negligible with the exception of a few irrelevant posts and advertisements.

[29] http://www.nnp-food.au-plovdiv.bg/en/

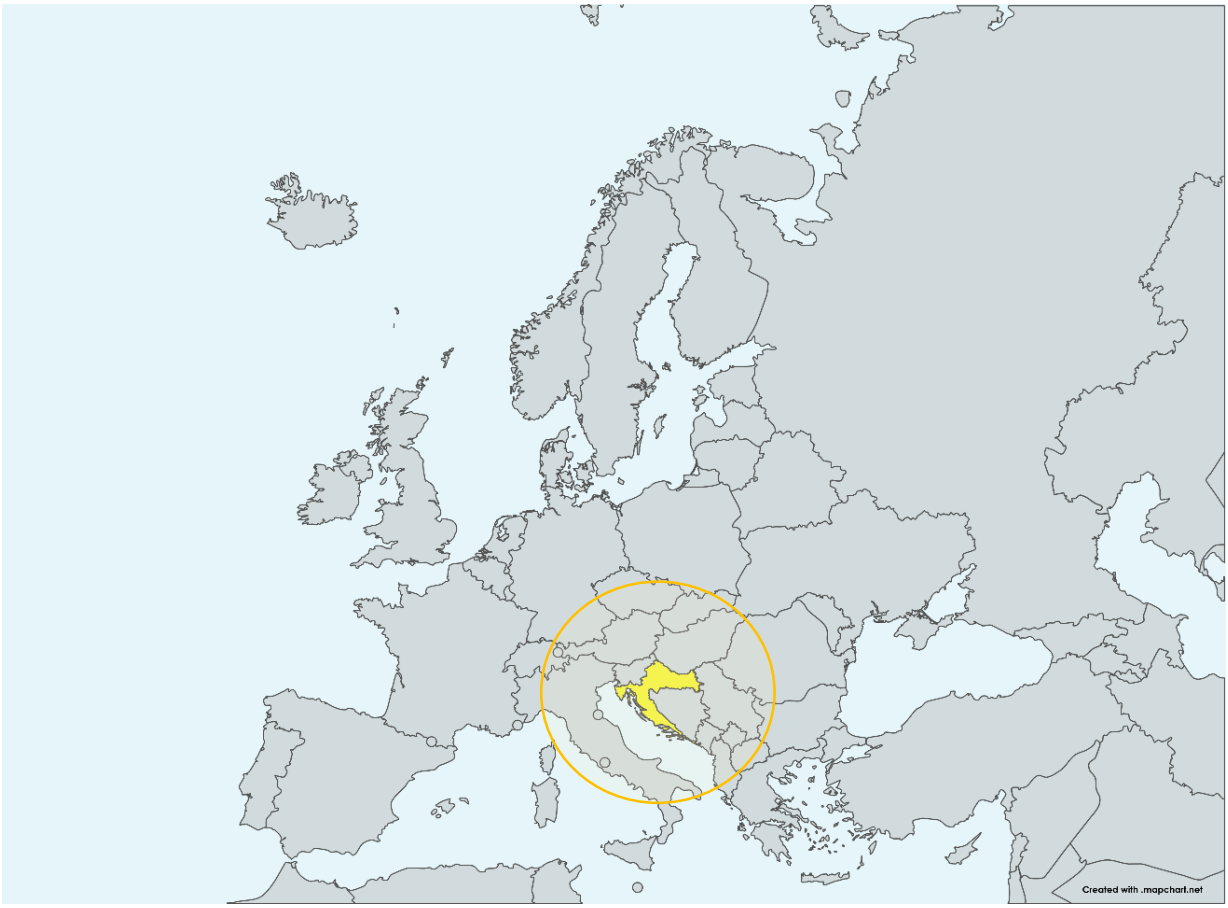
holds the annual international conference 'Ecology and Agrotechnologies - Fundamental Science and Practical Implementation', which discusses relevant content and also publishes proceedings, although they both never explicitly refer to agroecology.

Table 12: An overview about initiatives analysed in Bulgaria

Initiative n°	Initiative name	Scale	Type of structure	Aim	Pillars				
					Education and training	Living lab	Movement	Practice	Science
1	Agroecological Centre, Agricultural University, Plovdiv	National	University - demonstration fields	Implementing field research and training in agroecology					
2	SOFERA	National	Association	Promoting social inclusion through social farming					
3	Foundation for Organic Agriculture 'BIOSELENA'	National	Foundation	Supporting sustainable and organic agriculture, and environmental protection					
4	HRANKOOP	Local and national	Cooperative	Promoting local sustainable food systems					
5	'Kurtovo Konare Fest'	Regional	Civil society – community centre	Preserving and promoting traditional crops and crafts					
6	Seeds Festival	Local and national	Civil society	Preserving and increasing the use of traditional crop varieties					
7	Balkan Ecology Project	Local and national	Family farm	Promoting healthy foods grown in regenerative landscapes					
8	ISSAPP[30] "Nikola Poushkarov"	National	University – Research Centre	Conducting research and development in soil science					
9	Agricultural University, Plovdiv	National	University	Conducting research and providing education on agriculture					

[30] Institute of Soil Science, Agrotechnologies and Plant Protection

4.5.Croatia



In Croatia, as described in Table 13. 4 key informants were interviewed. Based on interviews and desktop research, a summary of the development of agroecology in the country per pillar is provided in the following sections. Information about the different initiatives can be found in the respective country report.

Table 13: List of key informants in Croatia.

Key informant n°	Type of organisation	Main sector of involvement	Pillar concerned
1	University	Agroecological practices	
2	NGO/ University	Livestock	
3	Private entity, company	Transition towards agroecology	
4	University	Transition towards agroecology	

4.5.1. Education and training

Croatian initiatives offering education and training are often related to other pillars of agroecology, such as movement or research. Formal education in agronomy is widespread throughout the country and is implemented by vocational schools and faculties, including study programmes of agroecology (University of Zagreb), of organic agriculture (University of Zagreb, University of Osijek), and applied ecology in agriculture (University of Zadar). University of Zagreb division of agroecology consists of the Department of Plant Nutrition, Department of Land Reclamation, Department of General Plant Production, Department of Pedology, Department of Microbiology and Department of Chemistry.

Mandatory education is provided for any farmer who applies to the integrated administrative control system ("*Integrirani Administrativni Kontrolni Sustav*" - IAKS), which was part of the country's Rural Development Programme for the 2014-2020 period. Measures related to this system include information on agroecology. For example, Measure 10 – 'Agriculture, Environment and Climate Change', Measure 11 – 'Organic Production', Measure 13 – 'Payments to Areas with Natural or Other Special Restrictions', and Measure 14 – 'Animal Welfare'[31]. Such education though, is provided by advisory services that are not familiar with agroecology (KI-1, Table 13) and efforts are currently being made towards filling this knowledge gap (II-6, Table 14).

Certain initiatives by NGOs that give training on agroecology also exist. 'ZMAG initiative' (see Table 14) is an NGO that represents one of civil society educational centre for topics connected to agroecology. Other NGOs that are involved in agroecology are 'Vestigium', 'Eko Pan' and 'Permakultura Dalmacija' (see Table 14). They all include knowledge sharing as a common practice and most of them have some sort of public education programs, such as workshops on gardening. Permaculture Design courses are also conducted by a few NGOs which provide certificates of attendance.

4.5.2. Living lab

Living Labs seem to not be present in Croatia, or at least are not using this terminology. Only one of the key informants who participated in this research knew the term.

[31] Advisory Portal (*Savjetodavni* portal). 2021. - Uprava za stručnu podršku razvoju poljoprivrede i ribarstva 2021. https://www.savjetodavna.hr/ (Accessed 19 Jul 2021)

4.5.3. Movement

Movement seem to be the most widespread pillar of agroecology in Croatia. Most of these activities are carried out in various forms by civil society initiatives, including through the dissemination of information, education, and gathering farmers in NGOs, GSR (Groups of solidary exchange – 'Grupe Solidarne Razmjene'), SEG (Solider ecological groups – 'Solidarne Ekološke Grupe'), or other associations or forms of short supply chain initiatives. Namely, there are 2,231 associations that are listed with sustainable development as an area of their activity, and 1,520 with rural development according to the Register of Associations of the Republic of Croatia. Few focus on agroecology as their main area of interest and action. Nevertheless, some initiatives with an interest in broad ecological issues, contain agroecology as a small part of their programmes.

Civil associations in Croatia are mostly dependent on funding coming from projects; however, the number of projects they can apply to are limited since agroecology is still not recognized by the government. Philanthropy, as a form of financing, is underdeveloped in Croatia[32] which affects the ability of NGOs to work towards their missions and goals.

4.5.4. Practice

Since Croatia entered the European Union (EU) in 2013, many of the practices applied by farmers have become more environmentally friendly, especially due to the Common Agriculture Policy (CAP) and to measures from the Rural Development Programme for the Period 2014-2020 (RDP). Many farmers are now abiding by recommended practice protocols such as the "Good agronomic practices" (GAP) or the FAO's principles for developing sustainable agriculture (KI-1, Table 13). Farmers are also implementing different integrated plant and water protection practices in association with the EU Nitrate directive for restricting the use of nitrogen. Still, while the situation may have improved in the last few years, most farmers only comply with the minimum requirements and laws which creates little momentum for the implementation or development of agroecology (KI-1, Table 13).

Organic agriculture in Croatia includes different aspects of agroecology but for most farmers with organic certifications, practice only an augmented version of conventional farming. For example, many of them use the same practices as in conventional farming, like monocultures and different chemical formulas that are permitted for organic production. This could be seen as a transitional phase to agroecology, as it is giving some attention to problems of agriculture-

[32] https://ceraneo.hr/objavljen-indeks-odrzivosti-ocd-a-u-hrvatskoj-za-2019-godinu/ (Accessed 21 Jul 2021)

related to impact on the environment (II-1, Table 14). Additionally, the county of Zagreb has developed an action plan with experts on organic agriculture to achieve 100 % organic agriculture by 2030 which could expand the presence of agroecology in the country (Karoglan Todorovic and Znaor, 2020).

Within the last few years, more initiatives are found that bring agroecology beyond organic farming and consider practices that are beneficial and regenerative to the environment, not just reductive or neutral in harm (II-6, Table 14). They may still be few, but this still gives an indication that agroecology is moving forward in Croatia.

4.5.5. Science

The inception of scientific research associated with agroecology in Croatia was mainly found on topics of soil science such as those related to rational fertilization and the effects of tillage (Seremesic et al., 2021). Some important research on agroecology was done by M. Gračanin (1901–1981), succeeded by V. Mihalić, A. Butorac, and F. Bašić at the Faculty of Agronomy, University of Zagreb. The most recognized scientists on the topic are from the University of Osijek -Z. Mađarić and I. Mušac.

The biggest institution that conducts research and education in the field of agronomy is the Faculty of Agriculture in Zagreb[33]. There, agroecology research is conducted mainly through soil science, soil biology, soil management, agroclimatology, plant nutrition, and general plant production departments (Seremesic et al., 2021). Agroecology research is also conducted at the 'University of Osijek', in the Faculty of Agro Biotechnical Sciences through organic production topics, and at the University of Zadar where they are currently working on different topics related to theory such as agroecosystem resilience under climate change through pollination and beekeeping. Nevertheless, none of these institutions recognize agroecology as a separate discipline.

Croatia has a formal institution that is in charge of research in the field of agronomy called the 'Croatian Agency for Agriculture and Food' (HAPIH, Znaor and Landau 2014). It is organised in centres that focus on different fields of agronomy but to date, has no recognition of agroecology or mention of organic agriculture. In the past, there was a Council for research in agriculture (VIP) but their program were substituted by the European Innovation

[33] The biggest institution that conducts research and education in the field of agronomy is the Faculty of Agriculture in Zagreb - AKIS. 2020. https://poljoprivreda2020.hr/wp-content/uploads/2020/06/Sustav-znanja-i-inovacija-u-poljoprivredi-AKIS.pdf

Partnership projects in 2018[34]. In their report of granted research projects from 2016 there are several topics related to agroecology such as "Sustainable soil management measures in organic agriculture for climatic conditions of Mediterranean Croatia" and "Increasing the competitiveness of sugar beet production by introducing alternative and non-pesticide methods of pest control".

The Croatian Foundation for Science supports a project called ACTIVE soil that is creating an assessment of conservation soil tillage as an advanced method for crop production and prevention of soil degradation.

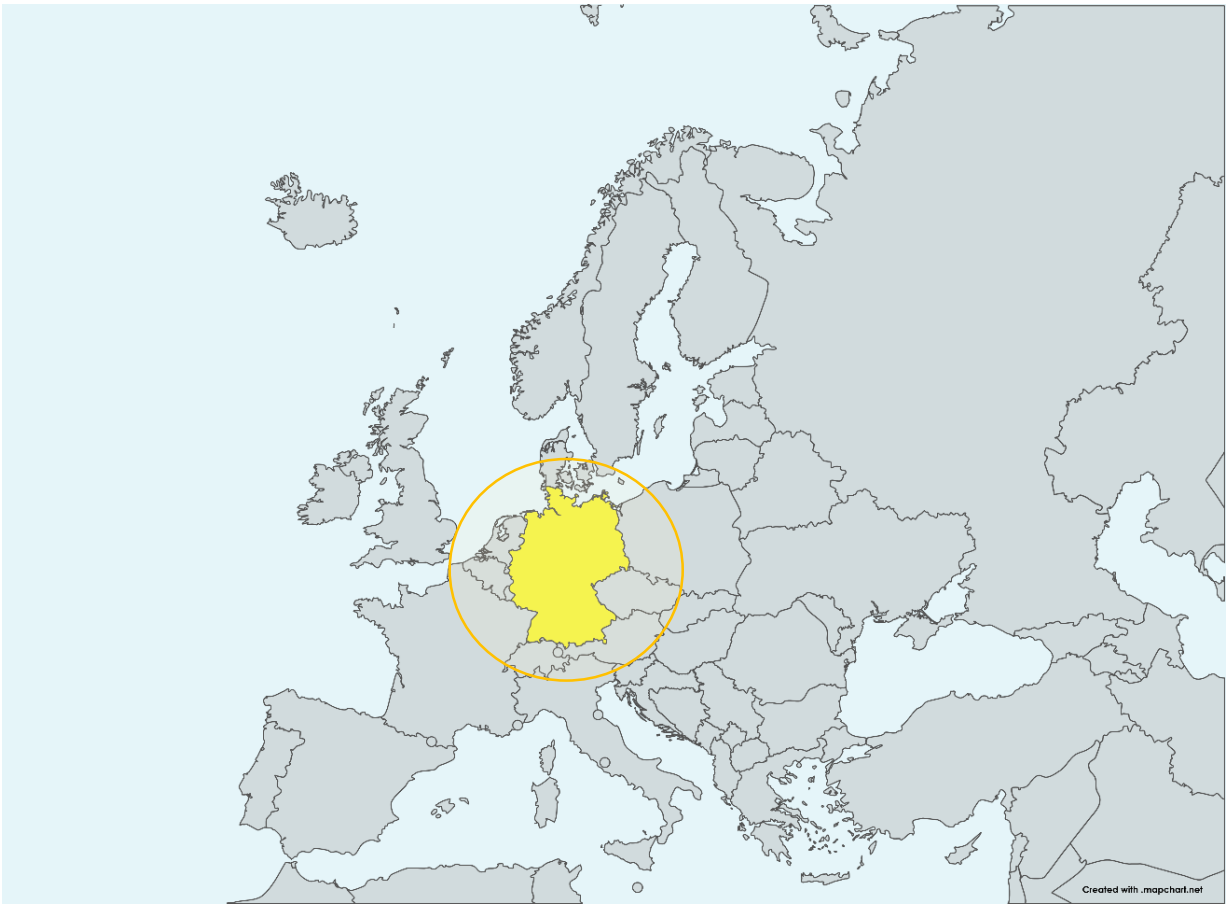
Apart from universities, some private businesses are also conducting research to develop environmental sustainability. For example, OIKON Ltd. – Institute of Applied Ecology, has subjects in agronomy and has led a few projects to develop sustainable agriculture. Moreover, the 'Ruđer Bošković Institute', Division for Marine and Environmental Research, researched and catalogued traditional Croatian varieties of agricultural crops and breeds of domestic animals, which contributes to agroeocology related research.

[34] AKIS. 2020. https://poljoprivreda2020.hr/wp-content/uploads/2020/06/Sustav-znanja-i-inovacija-u-poljoprivredi-AKIS.pdf

Table 14: An overview about initiatives analysed in Croatia.

Initiative n°	Initiative name	Scale	Type of structure	Aim	Pillars				
					Education and training	Living lab	Movement	Practice	Science
1	Permaculture Dalmatia	Regional	NGO	Contribute to a healthy and supportive society based on equitable economics and social connections					
2	Satellite and Compost and Context	National	Civil society	Educating the general public on ecology, permaculture and regenerative agriculture					
3	Croatian Alliance of Associations of Organic Producers (HSEP)	National	NGO	Promote sustainable development of organic production, to help implement just ecological policies and to take care of national natural resources					
4	Green Network of Activist Groups (ZMAG)	National	NGO	Spread eco-social awareness through examples and education					
5	Istrian Eco Product	Regional	NGO	Organise a market with products exclusively from organic agriculture					
6	Regenerators	National	Unofficial cluster	Analysis, design and education for the implementation of regenerative agriculture					
7	Faculty of Agriculture in Zagreb	National	University	Research and education institution					

4.6.Germany



In Germany, as described in Table 15. 13 key informants were interviewed. Based on interviews and desktop research, a summary of the development of agroecology in the country per pillar is provided in the following sections. Information about the different initiatives can be found in the respective country report.

Table 15: List of key informants in Germany.

Key informant n°	Type of organisation	Main sector of involvement	Pillar concerned
1	Research infrastructure	Ecosystem services for sustainable agricultural systems	
2	University	Organic agriculture, agroecology	
3	NGO	World nutrition and global agriculture	
4	University	Organic agriculture, agroecology	
5	Research infrastructure	Experimental and applied ecology pollinators, biodiversity	
6	University	Sustainable use of natural resources	
7	Ministry of agriculture	Research and innovation, Coordination of the Research area	
8	Ministry of agriculture	Research and innovation, Coordination of the Research area	
9	University	Zoological Biodiversity	
10	Research infrastructure	Farm economics	
11	Chamber of agriculture	Rural development	
12	Research infrastructure	Biodiversity in agricultural landscapes, botanic	
13	Chamber of agriculture/ Research infrastructure	Plant production	

4.6.1. Education and training

Education plays a central role in agroecology. In Germany key informants describe the field as being very fragmented (KI-1 & KI-3). Different German universities offer courses and programmes in the field of agroecology. We have identified 9 universities that proposes course

or programme link to agroecology: The University of Göttingen, Hohenheim, Kassel – Witzenhausen, Gliessen, München-Weihenstephan, Humboldt – Berlin, Greifswald, Münster and Bonn. Only few of the courses use specifically the term agroecology. Some have courses or programmes in organic agriculture, or about agroecological aspects related to landscape ecology and environmental sciences. The university of Göttingen has several courses in the Bachelor degree of agricultural sciences[35] that are related to agroecology and was mentioned by the majority of key informants. The University of Kassel was the first university to introduce a degree course in organic agriculture in 1995.

In addition, different organisations provide trainings, for example the 'Demeter Akademie'[36] proposes courses on biodynamic agriculture. The 'Vilm Nature Protection Academy' (see initiative Table 16) organises a yearly conference series called "nature conservation and agriculture in dialogue" to improve cooperation among stakeholders.

4.6.2. Living Lab

As Living Labs are not well known and just emerging, key informants had difficulties to name some. Some could nevertheless be found in the DG-AGRI survey[37]: 'patchCROP' and the model biodiversity farms in the federal state of North-Rhine Westphalia (see Table 16). 'patchCROP' is an on farm experiment studying temporal and spatial crop diversification. The model biodiversity farms test and implement biodiversity favouring measures. The other initiatives that were considered as Living Labs here involve many different stakeholders who cooperate (and sometimes co-designed the projects) to transform the food system. These networks (grassland biotope network, network for animal well-being and network for stock protection) develop practices, that get tested by farmers with close scientific monitoring.

Other potential Living Labs are linked to insect protection like FINKA[38] ('**F**örderung von **In**se**k**ten im **A**ckerbau', promotion of insects in arable farming), DINA[39] ('Diversity of Insects in Nature protected Areas'), FInAL[40] ('Facilitating Insects in Agricultural Landscapes

[35] https://uni-goettingen.de/de/597675.html

[36] https://www.demeter.de/akademie

[37] https://ec.europa.eu/eusurvey/runner/FirstScreeningAELLRI2020

[38] https://finka-projekt.de/

[39] https://www.dina-insektenforschung.de/konfliktmanagement-isoe

[40] https://www.final-projekt.de

through renewable resources'), BROMMI[41] ('Biosphärenreservate als Modelllandschaften für Insektenschutz', biosphere reserves as model landscapes for insect protection).

Other initiatives, in the practice pillar especially, also have living lab characteristics. Indeed, the model eco-region in Bavaria and the demonstration network pea/bean both have the aim to link farmers and consumers and have established close long-lasting cooperation's between the different stakeholders.

4.6.3. Movement

Many movements were mentioned by key informants, a lot of organisations exist and advocate for a paradigm shift in agriculture. The majority of them refer to organic farming and rarely use the concept of agroecology.

The 'save the bees' initiative is a good example of a successful grassroots movement that started in Bavaria[42] and spread in other German regions. The petition for the referendum 'Artenvielfalt & Naturschöhnheit in Bayern' (biodiversity and beauty of Bavarian nature) known by its motto 'rettet die Bienen' (save the bees) led to the most successful referendum in Bavarian history in terms of participation[43]. In 2019, the 'Bavarian Nature Conservation Act' was modified to ensure the development of biodiversity in flora and fauna on a permanent basis and to maintain and improve the existing habitats. In Baden-Württemberg a law regarding biodiversity conservation was changed in 2020.

Since 2011, the 'wir haben es satt' (we are fed up,- satt also in the sense of "we are full and cannot eat anymore") movement[44] uniting 50 different organisation has focused on agriculture, environmental, animal and consumer protection, and organises demonstrations all over Germany every year asking for a paradigm shift in agriculture. The "AbL" ('Arbeitsgemeinschaft bäuerliche Landwirtschaft') is an association of rural farmers advocating for sustainable, socially and environmentally compatible agriculture.

Food policy councils (FPCs; see Table 16), starting in 2016 with Berlin and Cologne, are aiming to involve citizen in decision processes in food systems (Sieveking, 2019), creating a

[41] https://brommi.org/

[42] https://volksbegehren-artenvielfalt.de/

[43] https://volksbegehren-artenvielfalt.de/2019/03/14/jetzt-ist-es-offiziell-rettet-die-bienen-ist-das-erfolgreichste-volksbegehren-in-der-bayerischen-geschichte/

[44] https://wir-haben-es-satt.de/

new appreciation for food and its producers, promoting local, sustainable and fair food supply. FPCs are gaining in recognition in German cities.

'Solidarische Landwirtschaft' (solidary agriculture) is a further movement that has gained recognition, and the association of CSAs in Germany ('Netzwerk Solidarische Landwirtschaft e.V.') created in 2011 lists over 362 CSA schemes[45].

4.6.4. Practice

Key informants mentioned mainly five practices that they consider as implemented and as agroecological practices: flower strips, organic farming, agroforestry, reduced or no tillage, and intercropping. One informant specified that while flowering strips are very commonly used since the last years, they probably only represent maximum 1% of agricultural surfaces (KI-11, Table 15). Furthermore, flower strips can be established for different purposes, e.g. supporting natural enemies to reduce the application of insecticides can be considered as an agroecological practice. Organic farming was often mentioned by key informants (KI-1, KI-2, KI-4, KI-8, KI-10 & KI-11, Table 15). However, it is formally not an agroecological practice (Migliorini and Wezel, 2017; Wezel et al., 2014) but a set of practices, under the regulation of organic certification and currently covering 10% of agricultural surfaces in Germany (Bundesministerium für Ernährung und Landwirtschaft, 2021). The practices mentioned by key informants are being implemented by farmers, but it is not possible to easily identify at the country level how many use them. Moreover, they are not necessarily labelled in Germany as being agroecological.

In Germany different federal states are actively promoting organic farming at regional or territorial scale with the aim to increase surfaces farmed organically and provide higher amounts of regionally produced organic products: the "Öko-Modelregionen" (eco-model region) in Bavaria (see Table 16) and Hesse, the "Öko-Musterregionen" (eco-exemplary region) in Baden Württemberg, the "Bio-Regio-Modellregionen" (bio-regional model region) in Lower Saxony. North-Rhine-Westphalia is just starting to develop such initiatives.

4.6.5. Science

In Germany, many universities have research groups working on agroecology related themes. Key informants named several research institutions (listed in below). These research

[45] https://www.solidarische-landwirtschaft.org/solawis-finden/karte#/

institutions and organisations are involved in many different research projects. Main research topics related to agroecology are: (conservation) biological control, non-chemical plant protection, organic farming practices, agroecological practices, biodiversity conservation, agriculture under climate change, evaluation of agro-environment schemes, land use conflicts, alternative supply chains and food systems. Several institutions carry out specific work with research infrastructures such as the Biodiversity Exploratories.

Research institution named by key informants:

- FiBL Germany[46]: Research Institute of Organic Agriculture, Frankfurt
- Thünen Institute[47]: Federal Research Institute for Rural Areas, Forestry and Fisheries, Braunschweig
- Julius Kühn Institute (JKI)[48]: Federal Research Center for Cultivated Plants, Quedlinburg
- Helmholtz-Zentrum für Umweltforschung (UFZ)[49]: Center for Environmental Research, Leipzig/Halle and Magdeburg
- 'Leibniz-Zentrum für Agrarlandschaftsforschung ZALF e.V'.[50]: Leibniz Centre for Agricultural Landscape Research, Müncheberg
- Institut für Agrarökologie und Biodiversität(IFAB)[51]: Institute for Agro-ecology and Biodiversity, Mannheim

[46] https://www.fibl.org/de/standorte/deutschland

[47] https://www.thuenen.de/en/

[48] https://www.julius-kuehn.de/en/

[49] https://www.ufz.de/index.php?en=33573if

[50] https://www.zalf.de/en/Pages/ZALF.aspxfib

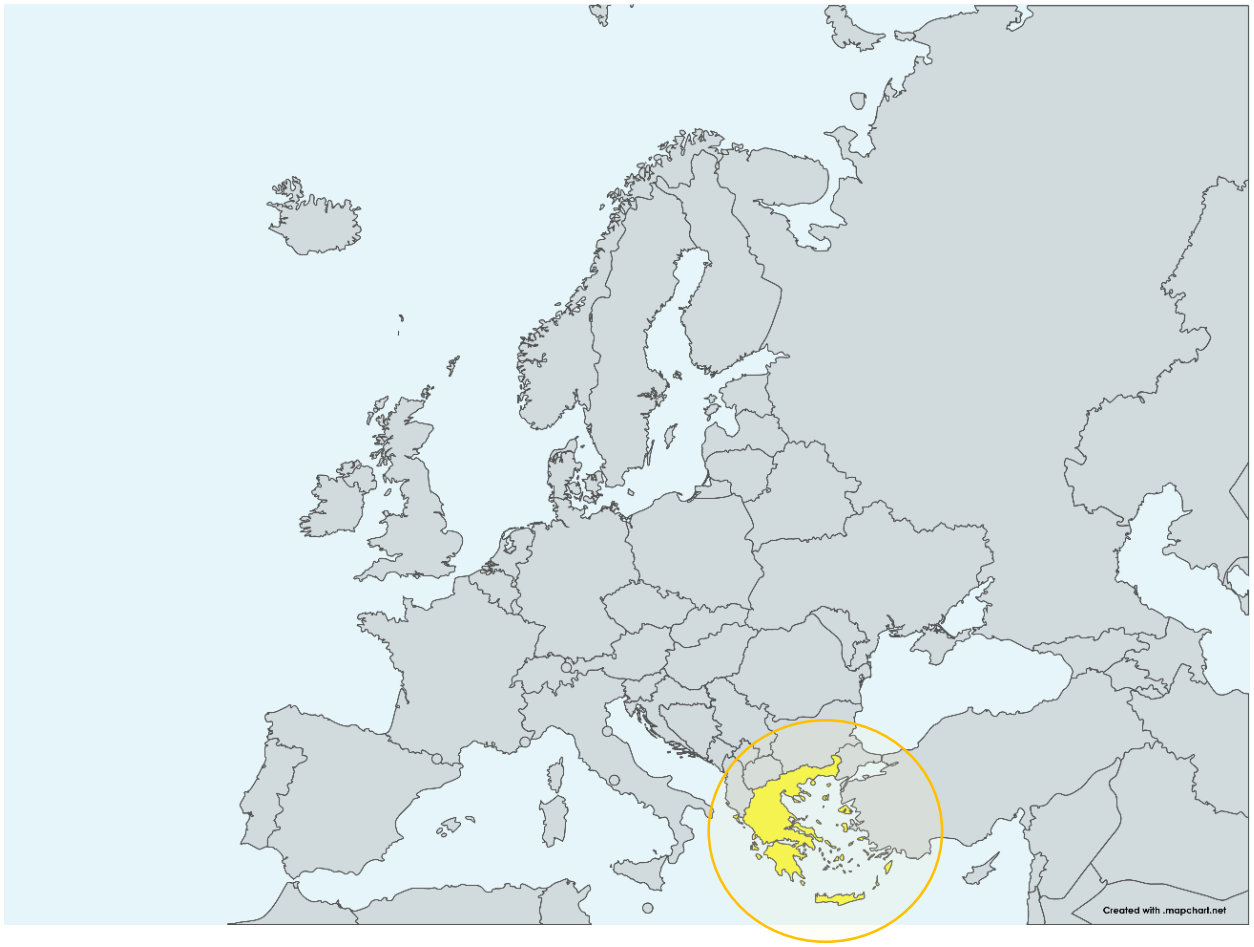
[51] https://www.ifab-mannheim.de

Table 16: An overview about initiatives analysed in Germany.

Initiative n°	Initiative name	Scale	Type of structure	Aim	Pillars				
					Education and training	Living lab	Movement	Practice	Science
1	Agriculture management and Biodiversity	National	State academy	Master level course to teach advisors on biodiversity management					
2	Bridging generations in agroecology	International	University (and associations)	Develop methods of knowledge transmission in agroecology					
3	Field – vegetable academy	International	Association	Strengthening awareness of the importance of nature and the appreciation of food					
4	patchCROP	Regional	Farm, University	Increase agricultural diversification by temporal and spatial approaches at the landscape level					
5	Network for animal welfare	National	Farms, Chambers of agriculture, Association, Research institute	Animal welfare, environmentally friendly and sustainable livestock farming					
6	Grassland biotope network	Regional	Farms, University, Research institute	Create and maintain biotopes in grasslands					
7	VSnet, Network for stock protection	National	BLE (central German implementation authority for	Sustainable post-harvest protection					

			agriculture and food)						
8	Biodiversity model farms in North-Rhine Westphalia	Regional	Farms, Chamber of agriculture	Implementation and adaptation of agri-environmental measures					
9	Aktion Agrar	National	NGO	Actions for agricultural turnaround					
10	DeFAF (German Association for Agroforestry)	National	NGO	German network of agroforestry					
11	Food policy council Frankfurt	Local / National	NGO	Promote regional, fair and ecological food supply					
12	Model eco-regions Bavaria	Regional	Farms, Businesses, local decision-makers	Increase organic production, create regional value chain					
13	Demonstration network pea/beans	National	Farms, Universities	Support the cultivation and processing of Peas and broad bean and bring together demand and supply					
14	Biodiversity Exploratories	Regional/ National	Research infrastructure, farms	Fundamental research on ecology					
15	F.R.A.N.Z.	National	Research institutes, farms	Implementing effective biodiversity promoting measures					

4.7.Greece



In Greece, as described in Table 17, 12 key informants were interviewed. Based on interviews and desktop research, a summary of the development of agroecology in the country per pillar is provided in the following sections. Information about the different initiatives can be found in the respective country report.

Table 17: List of key informants in Greece.

Key informant n°	Type of organisation	Main sector of involvement	Pillar concerned
1	University and research	Permanent crops and forestry	
2	Freelancer technical consultancy	Organic farming	
3	University and research	Organic farming / Agroecology	
4	University and research	Agricultural economics	
5	Local farmer cooperative and movement	Organic horticulture	
6	International and national food system organisation	Organic farming	
7	Freelancer technical consultancy	Organic farming	
8	Local farmer cooperative and movement	Organic farming	
9	Local farmer cooperative and living lab	Regenerative farming	
10	University and research	Agroecology	
11	Freelancer technical consultancy	Organic farming	
12	Science and Research	Agricultural sustainability	

4.7.1. Education and training

Following the global trend in agricultural academia, development of bachelor and MSc curricula on the topics of “organic farming” and “sustainable agriculture” were previously prioritised by the main Greek agricultural universities, faculties, and technological education institutes. Nevertheless, in Greece agroecology was never conceptualised as a sole studies curriculum (Migliorini et al., 2018).

A notable exception to the above, was the "Applied agroecology[52]" inter-institutional study programme by the 'University of Ioannina' (Northern-West Greece), running from 1998 to 2007. The study programme was formulated as a 4-years Bachelor degree curriculum, equivalent to the other study programmes of the university and recognised by the Greek state. It had as an objective to educate students at university level conceiving agroecology as applied ecology, aiming to protect agricultural ecosystems for production of high quality agricultural and animal products (KI-1, Table 17).

Currently, agroecology is also included, as individual course, in the curricula of several universities, such as the Hellenic Mediterranean University (Crete), University of Peloponnese (Southern Greece) and Ionian University (Western Greece) (KI-1, Table 17), as well as in post-graduate programmes, like in the Mediterranean Agronomic Institute of Chania (CIHEAM – IAMC) (Table 19). In a broader research context, a stated focus on agroecology is made by Hellenic Agricultural organisation (ELGO—Dimitra), formerly known as National Agricultural Research Foundation (NAGREF; Migliorini et al., 2018), as well as the Sustainable Agriculture department of the Mediterranean Agronomic Institute of Chania (CIHEAM – IAMC; KI-1, Table 17).

Table 18: List of courses at Bachelor and Master level related to agroecology in Greece.

University	Location	Degree	Course or curriculum title
Hellenic Mediterranean University	Heraklion, Crete	Bachelor degree's curriculum	Agroecology course (5 ects, 1 academic semester)
University of Ioannina	Arta	Bachelor degree's curriculum	Agroecology course (4 ECTS, 1 academic semester)
University of Peloponnese	Kalamata	Bachelor degree's curriculum	Agroecology course (4 ects, 1 academic semester)
Mediterranean Agronomic institute of Chania (CIHEAM-MAICh)	Chania, Crete	Master's degree in Sustainable Agriculture	Sustainable Agriculture MSc degree (2 years)

Besides the educational initiatives at academic level, agroecology-related training by farm schools can be encountered. Notably, a volunteer, free of charge, farm school on "ecological agriculture" is organised in previous years by organic farmers in the region of Attiki (East of

[52] http://old.uoi.gr/services/epeaek/agroeco/

Greece), with courses provided by farmers themselves, university professors, and NGO representatives (KI-2, Table 17).

4.7.2. Living lab

Currently the concept of living labs is not familiar to stakeholders, related or not to agroecology, with the exception of certain academic members and groups, involved in EU-level projects and processes (KI-2 & KI-4, Table 17. Even though, there are certain examples of agroecological initiatives identified, which largely fulfil the description of a living lab as promoting synergies, co-creation of knowledge and co-design as well as transdisciplinary activities and real-life implementation of results. These include mainly the work of entities like the Social Cooperative "Melitakes", located in Crete and the NGO "Southern Lights" (Peloponnese; see Table 19).

4.7.3. Movement

As described in the context part, early traces of agroecology can be identified in the several initiatives of ecological/organic farming since the 1980's and others regarding agricultural biodiversity conservation including the NGOs 'Aegilops' and 'Peliti' or alternative networks of food production and supply, but without direct verbal references to agroecology, neither becoming officially affiliated to corresponding international movements, f.i to 'Via Campesina'. Some other past collective actions considered to be related to the agroecological approach included initiatives opposing the use of genetically modified organisms in agriculture, organised by Greenpeace, the Greek Green Party and organic farmers since 1999 and during the 2000's, as well as a permanent representation of groups and organisations working on agricultural biodiversity and organic farming in a consultative group on plant genetic resources of the Greek Ministry of Agriculture, active from 2010 to 2015 (Migliorini et al., 2018). A clear shift towards the adaptation of the agroecological terminology and framework appeared with the foundation of the "Agroecological Network of Greece" (Agroecology Greece), in 2016 (KI-1, Table 17). Regarding the network, its aim has been to promote agroecology as a science, practice, and movement in Greece by connecting primarily agricultural scientists and trainers. Its main goal is to exchange information, knowledge, and research that will familiarize stakeholders with the principles and framework of agroecology and promote the transition of food production systems towards a truly sustainable form. For these purposes 'Agroecology Greece 'delivers frequent technical reports on agroecological

topics; organises events promoting the agroecological concept, while its members participate through private SMEs, NGOs as well as research and academic institutes in research and training projects related to agroecology. Additionally it co-hosted the 2nd Agroecology Europe Forum, held in Heraklion, Crete, in September 2019, estimated to have significantly boosting the promotion of agroecology in Greece (KI-1, Table 17).

4.7.4. Practice

Greek farmers and relevant stakeholders describe agroecological practices as "ecological farming" practices, when asked (KI-1 & KI-2, Table 17). These include for example soil management, plant protection, fertilization and use of agrobiodiversity, namely minimal soil disturbance, use of non-synthetic pesticides, use of green and animal manure, and use of traditional and local varieties.

There are no official data on the extent of application regarding the above practices, however there are applied by the majority of "ecological" farming producers (a very small fragment of active farmers at national level) as well as by commercial organic farmers, as required by organic legislation (KI-1 & KI-7, Table 17). However, this compliance with the official organic regulations does not strictly implies that farming practices are conducted within the agroecological framework, as many commercial organic farmers perform only a substitution of synthetic inputs with organic ones (i.e. commercial organic fertilizers instead of mineral ones).

It should be also noted, that there are several committed initiatives, working on conservation of agricultural biodiversity (use of traditional/locally adapted varieties practices of agroforestry, permaculture etc.) which are pioneers on experimenting and applying agroecological practices. In this case, they are also not declared to be "agroecological", but instead "ecological", "agroforestry", "permaculture", or "natural farming", also by adapting agroecological approaches in terms of socio-economic aspects (CSA networks, horizontal transfer of knowledge and innovation between farmers; KI-2, KI-2 & KI-4, Table 17).

4.7.5. Science

Agroecological research is considered rather basic in Greece (KI-1, KI-2 & KI-4, Table 17). Research institutes, as well as universities, started focusing on research projects, and educational programmes, related mostly to organic farming and environment-friendly practices over the last two decades, following the global trends in agricultural academia

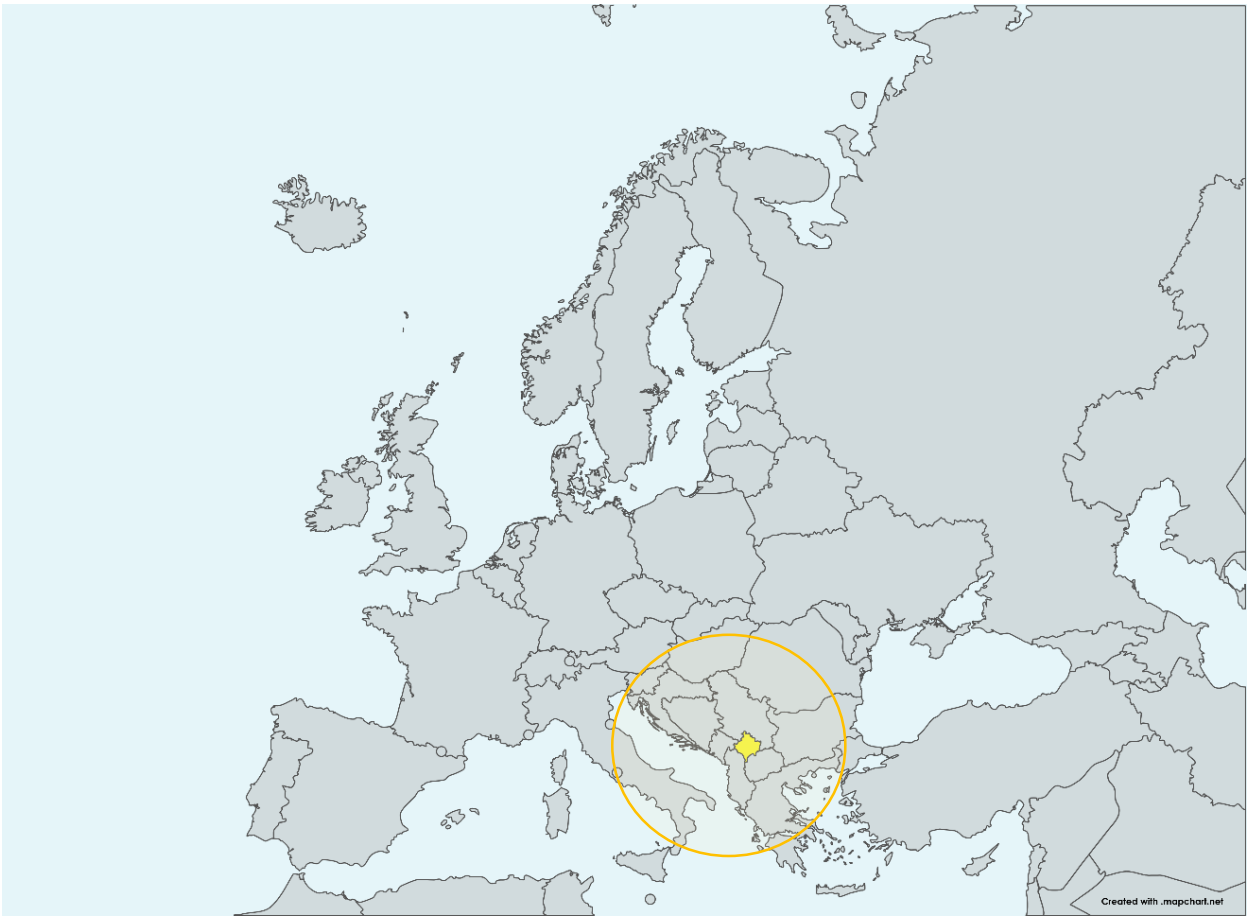
(Migliorini et al., 2018; KI-4, Table 17). As in the case of other pillars analysed, the concept of agroecology is broadly not well known or well defined in the Greek scientific community, with the exception of certain pioneer researchers and academics having returned from research groups abroad, especially from the USA (KI-1 & KI-10, Table 17). Research projects on agroecology are mainly coordinated by entities from other countries with sole participation of Greek institutes. Additionally, no department of an academic or research institute is completely devoted to agroecology or even organic farming, with the exception of the 'Mediterranean Agronomic Institute of Chania' (MAICh), Crete, part of an intergovernmental entity ('International Center for Advanced Mediterranean Agronomic Studies', CIHEAM) (KI-1, Table 17). A shift towards becoming more recognizable was achieved with the initiative of the Greek Agroecological Network and the co-organisation and hosting of the 2nd Agroecology Europe Forum (2019), in Crete (KI-1 & KI-2, Table 17). A main obstacle recognized is the multidimensional and still under development concept of agroecology in Greece (KI-3, Table 17).

Table 19: An overview about initiatives analysed in Greece.

Initiative n°	Initiative name	Scale	Type of structure	Aim	Pillars				
					Education and training	Living lab	Movement	Practice	Science
1	CIHEAM-MAICh / Sustainable Agriculture dpt	International	Intergovernmental organisation	Research and education (MSc) in sustainable agriculture					
2	Perottis College	National	Private college	Professional training					
3	Organisation Earth	National	Civil society	Promotion of Sustainable Development concept					
4	Culinary sanctuaries	Regional	Private company	Training and consultancy on culture, nature and cuisine					
5	The Southern Lights	National	Non-profit organisation	Promotion of regenerative farming					
6	Melitakes	Regional	Social coop of farmers and scientists	Farming, research and innovation on agroecology					
7	Agroecology Greece	National	Network of scientists and farmers	Promotion of Agroecology as science, practice and movement, in Greek					
8	Aegilops	National	NGO	Conservation of heritage varieties, agricultural knowledge, reintroduction of these varieties and promotion of ecological farming.					
9	Organic Farmers' Association of Northern Greece	Regional / national	Farmers association	Promotion of organic farming in Greece, implementation of conferences, seminars, workshops					

10	Hellenic Agricultural Organisation (ELGO) DIMITRA	National	Governmental Foundation	Research on sustainability of olive oil sector/ sustainable solution in management practices					

4.8.Kosovo



In Kosovo, as described in Table 20, 8 key informants were interviewed. Based on interviews and desktop research, a summary of the development of agroecology in the country per pillar is provided in the following sections. Information about the different initiatives can be found in the respective country report.

Table 20: List of key informants in Kosovo.

Key informant n°	Type of organisation	Main sector of involvement	Pillar concerned
1	Company	Medicinal and aromatic plants	
2	Infrastructure	Agricultural development	
3	University	Agroecology	
4	NGO	Permaculture and regenerative agriculture	
5	NGO	Organic production	
6	NGO	Food sovereignty	
7	Company	Composting	
8	NGO	Supporting women in agriculture	

4.8.1. Education and training

Although agroecology is in its initial phase in Kosovo, there are certain universities that offer study courses or classes related to agroecology. For example, the Faculty of Agribusiness at University 'Haxhi Zeka', Peja/Peć, offers the study programme "Agro-environment and Agro-ecology", and the International Business College Mitrovica offers a study programme on "Environmental and Agriculture Management". In other faculties related to agriculture, there are only few classes that touch on the topic of environment, sustainability (in any manner) and consequently agroecology. Nevertheless, even when courses are directly linked to agroecology, the topic is approached in a narrow way, without including aspects of agroecological practices, having as a scope of knowledge focusing on level of science which investigates and analyses agroecosystems. Moreover, the students attending the previously mentioned faculties, do not have practical experience in sustainable production, and are not equipped to become producers after their education.

Other universities offer study courses or classes related to agroecology; namely, the University of Prishtina/Priština, with its Faculty of Agriculture and Veterinary, as well as the Faculty of Agribusiness at University Haxhi Zeka in Peja/Peć offer agroecology related

classes to their students. Some other universities offer related classes too, but in a smaller number. Nevertheless, the curricula are considered to offer a very narrow agroecological understanding as the students do not gain enough knowledge relevant for production using agroecological techniques nor does it involve political, economic or cultural aspects of agroecology.

Most young people that are aspiring in pursuing agriculture professionally prefer to study abroad, and often do not return to Kosovo, as the level of understanding the science and practice is not on a satisfying level. Several Universities have connections with institutions abroad, but it is mostly with the intention to strengthen the capacities of the staff, and not enough is being offered for the students.

Also, it has been recognized that there are not enough experts in Kosovo (Ramadani and Bytyqi, 2018), and that they are insufficiently equipped with knowledge for any kind of sustainable agricultural production. The staff of universities and organisations that work in the education and training are urging for more expertise in the field, also in seeing the potential of agroecology for Kosovo. (KI-2, Table 20).

The NGOs that exist and are considered to be connected to agroecology provide education and training on various agricultural topics, with the biggest focus on the agricultural practices and their influence to the environment and regional development. These programmes are targeting students of agricultural sciences, farmers and business owners, as well as the larger public, in order to raise awareness on agroecology. The NGOs sector is quite strong in Kosovo, there are many working directly with farmers, providing short- and long-term training in agriculture, and especially in organic agriculture (Halimi et al., 2018). A good example for youth education is the NGO “Initiative for Agricultural Development of Kosovo” which provides internship positions for students to learn about agriculture in practice and through field work with producers.

There are also organisations that deal with environmental issues and bring forward the topics of sustainability, food waste, permaculture, food sovereignty, etc. One example is ‘GAIA Kosovo’ that provides permaculture education in the form of events, workshops and trainings to people from Kosovo and abroad, tackling environmental and social issues through topics of permaculture, inclusion, gender equality, regenerative agriculture, and much more.

4.8.2. Living lab

Currently, there are no initiatives recognised as living labs related to agroecology in Kosovo that can be named.

4.8.3. Movement

Although there is no organisation or cooperative dedicated directly to agroecology, the movement pillar is developing in Kosovo. A number of NGOs is working on promotion of sustainability, aiming to improve agricultural practices and providing additional learning for farmers and the public (Madžarić et al. 2019).

There are several grassroots organisations, gathering a large number of youth and challenging their perspectives, by creating urban gardens and bringing the topic of food production back into the cities. There are several NGOs that also work on policy making and lobbying for "greener" laws related to agriculture and environment, and they cooperate with the decision-makers. As an example, NGOs 'Fondacioni Jeshil' and 'GAIA Kosovo' both work toward promoting permaculture approaches and creating local solutions for global problems. The work of such initiatives is rather broad, as they focus on environmental as well as social sustainability, being a part of all of their actions and activities. These organisations develop pilot projects on permaculture gardens across Kosovo, in urban, sub-urban and rural areas, functioning as examples of community gardens for training purposes. They work with schools, universities, farmers, youngsters, etc.; some work directly with farmers supporting them to become certified organic, while others put their efforts into presenting topics such as food sovereignty and composting to the public.

Another NGO that is connected to agriculture, but more on the social aspect is "EcoKosWomen" working towards gender equality, and supporting a number of female farmers of all ages in gaining knowledge on suitable agricultural practices, as well as business management.

4.8.4. Practice

As the term agroecology is not very known in Kosovo, most farmers do not use it when describing their work. Agroecology is mostly recognised through the sector of organic agriculture developing importantly at national level, though there is still a very small percentage of organic producers. Specifically, since 2017, the certified organic production

almost tripled in ha of cultivated and collecting capacities, mainly for medical and aromatic plants, as well as non-wood forest produce (Halimi et al., 2018). Among registered farmers and businesses, there are multiple examples of organic production. The organic production, however, is orientated towards commercialization of organic products, and the great majority of organically produced products are being exported to the European and North American markets. The existing companies are producing medicinal and aromatic plants (both collecting it from the wild and cultivating) and non-wood forest produce (collecting mushroom, berries, etc.), as these can easily be preserved and sold abroad at a satisfying price as a semi-finalized product. The local market is only starting to gain interest, so in the coming years the organic production for local market might increase, however, the low GDP of the country is the main limiting factor for the proliferation of local consumption of organic produce.

Despite the above, the agroecological practice in Kosovo could be visible, when it is considered the traditional knowledge existing at country level, having small-scale farming practices and farmer's polyculture gardens, organic and homemade prepared fertilisation, integrated pest and disease agricultural management, as well as seed saving practices. However, some traditional practices also involve certain soil degrading practices, such as deep ploughing tillage or burning field residues post-harvest.

The certification for organic agriculture in Kosovo is heavily centralized, as is managed by only two inspection agencies, which are foreign private enterprises ("Albinspekt" from Albania and "Q-check P.C." from Greece)(Halimi et al., 2018). This circumstance makes the certification more complicated for the farmers, and it brings a financial burden, which is not easy to handle for small producers. There is however an intention by the Ministry of Agriculture, Forestry and Rural Development to establish a Kosovo certification body in the coming years.

According to a key informant, the advisory service in agriculture is very poor, and its staff does not have a lot of capacity, thus one advisor usually has several hundreds of farmers in their responsibilities. On the other side, unfortunately, most farmers are not interested in increasing their capacities, both in knowledge and production, as their main interest is usually only financial. Most businesses that incorporated the agroecological practices in their work are founded by young people that are also aware of the environmental issues, and usually with grants (e.g., start-up grant or a project by foreign donor). There are no 'Community Supported Agriculture' examples that operate, nor cooperation that connect small farmers and place their produce to the market together. Besides organised initiatives (businesses and producers,

NGOs) there is a small number of individuals that practice permaculture, regenerative agriculture, biodynamics, and other types of sustainable agricultural practices, but all on a very small-scale.

4.8.5. Science

There are some new research and mapping being conducted by professionals in the field, but it is not directly related to agroecology. The agricultural practice and research in Kosovo is largely supported by international grants, and several relevant projects were implemented through international projects, with bigger stakeholders such as 'USAID', 'Swiss Caritas' or 'GIZ' in Kosovo. Another example of such larger and successful project is KOSAGRI, which took place from 2010 until 2017, and it was realized in partnerships with C.I.H.E.A.M. - Mediterranean Agronomic Institute of Bari, Italy, which assisted to the Ministry of Agriculture, Forestry and Rural Development. (Madžarić et al., 2019). There is still a significant lack of knowledge and infrastructure, such as agricultural research, financial services, information services, education novelties, missing for the further development of agroecology.

Table 21: An overview about initiatives analysed in Kosovo.

Initiative n°	Initiative name	Scale	Type of structure	Aim	Pillars				
					Education and training	Living lab	Movement	Practice	Science
1	Organika	National	Civil society – NGO	Support and promote organic agriculture					
2	Initiative for Agricultural Development of Kosovo (IADK)	National	Civil society - NGO	Promotion of good agricultural practices and rural development					
3	GAIA	Local / National	Civil society - NGO	Promotion of regenerative agro-environmental practices					
4	Fondacioni Jeshil	National	Civil society - NGO	Raising awareness on sustainable practice and reducing food waste					
5	Botanic	Local/national	Business	Supports local farmers and provides organic produce for Kosovo market					
6	Kompostopia	Local	Business	Increase organic production, local value chain					

4.9.Malta

In Malta, as described in Table 22Table 3, 8 key informants were interviewed. Based on interviews and desktop research, a summary of the development of agroecology in the country per pillar is provided in the following sections. Information about the different initiatives can be found in the respective country report.

Table 22: List of key informants in Malta.

Key informant n°	Type of organisation	Main sector of involvement	Pillar concerned
1	Academic	Education on integrated agricultural systems	
2	NGO	Mainly horticultural crops	
3	Foundation	Represents young farmers and livestock keepers	
4	NGO	Represents organic farmers	
5	Small/medium enterprise	Marketing of organic products	
6	Individual farmer	Mainly horticultural crops	
7	Individual farmer	Mainly horticultural crops	
8	Research Centre	Research on agroecology and ecosystem services in agroecosystems	

4.9.1. Education and training

In Malta, the 'University of Malta' (UoM) and the Malta Centre for Applied Sciences and Technology (MCAST) are the two research institutions offering training in agriculture, with courses ranging from BSc diplomas to PhDs. The 'Centre for Environmental Education & Research' (an institute within UoM – see Table 23) is the only institution (public or private) that provides formal training with a specific focus on agroecology. It offers a Master's in Education for Sustainable Development, which gives a broad perspective on sustainable development issues with an approach that is coherent with the agroecological approach. Informal education is also carried out by the centre, especially in their multipurpose 'Centre for Research and Practice in Education for Sustainable Development' (ESD) located in Fawwara, in the Siġġiewi council.

The University of Malta, which is overseen by the Maltese government, has a department called the Institute of Earth Systems[53] which offers training in rural sciences, including environmental management and agriculture. Although there is a single case of an academic working hand-in-hand with the 'Malta Organic Agriculture Movement' (MOAM) to develop pesticides from non-synthetic produce (KI-4, Table 22), there are no programmes dedicated specifically to organic farming or agroecology, even though students have explored these areas in their dissertations and lecturers have done so in some publications.

The Malta Centre for Applied Sciences and Technology (see Table 23) is a separate institution also run by the government, with a focus on hands-on learning. It offers individual courses geared towards specific industries, such as rabbit-rearing and includes one on organic farming[54], which are brief and of an introductory nature. On the other hand, their other agricultural courses do range from these introductory courses to PhD programmes. Organic farming is included in the BSc degree on Horticulture but only its regulatory structure and basic principles[55]).

The Permaculture Research Foundation of Malta[56] has organised in the past non-academic, irregular events and courses on aspects related to agroecology, including permaculture for the city, forest gardens, composting, permaculture design, and other related subjects.

4.9.2. Living lab

No living labs were identified in Malta in this study. However, some movements, in particular 'The Veg Box' (see Table 23), could in the future evolve and achieve the status of living labs. 'The Veg Box'[57] is clearly oriented toward the creation of a network of stakeholders that includes farmers, citizens and other actors, as is the NGO and business 'Biome Munch'. These organisations have the space, desire to experiment with new techniques, and interest to work with others. KI-5 (Table 22) stated that they are trying to expand their network of farmers and consumers, and operate countrywide.

[53] https://www.um.edu.mt/ies

[54] https://shortcourses.mcast.edu.mt/course/160

[55] https://www.mcast.edu.mt/courses/ag3-03-21/

[56] https://www.bahrijaoasis.com/permaculture-malta

[57] https://thevegbox.com.mt/

4.9.3. Movement

Social movements in Malta are relatively small and usually linked to the initiative of one or a few specific activists. Of all the movements featured in this study, only Malta Organic Agriculture Movement (MOAM)has a committee of more than three people. Nevertheless, even small movements play an important role in the promotion of agroecology and related issues.

One common feature found in these movements is the mission to raise awareness on the importance of local and organic food, as well as traditional agricultural practices. Each movements focuses on these goals in different ways. For example, the 'Malta Organic Agriculture Movement' regularly hosts talks to explain the benefits and the opportunities of organic agriculture (KI-4, Table 22). The 'Malta Youth in Agriculture Foundation' (MaYA) has the broader scope of representing the interests of young farmers, including a growing number of such young people who have made the switch to organic practices.

Many of those interviewed had a more personal stake in the sector, often blurring the line between marketing and activism, particularly in the case of the 'Veg Box' and 'Biome Munch', who are both NGOs and businesses. Both seek to create sustainable communities, as well as advocate for healthier lifestyles and a more ecologically-sensitive society. Similarly, all of the farmers in the study saw themselves as environmental stewards and were in some way or another involved in environmental issues, whether in proactive projects or in opposition to development projects which were impinging on the countryside (KI-3, Table 22). Almost all of the farmers in the study saw the buyers of their food products as potential partners, rather than as simple "consumers". Nevertheless, it seems that these partnerships remain weak, seeing as many were unwilling or unable to set up more structured forms of collaboration, such as 'Community Supported Agriculture' schemes.

When talking about 'awareness' and consumer perception, almost all farmers (particularly KI-4 & KI-6, Table 22) saw high prices, not just the environmental and health benefits, as a crucial part of the discussion and of the process of convincing consumers to appreciate their products more.

4.9.4. Practice

Agroecological practices in Malta are mainly implemented by organic farmers and by non-certified farmers that are able to market their products through direct contact with buyers. Most organic farms in Malta are very small in size, sometimes less than 1 ha.

The farmers interviewed were not familiar with the term "agroecology" but they knew, and to some extent, have adopted some agroecological practices. For example, one farmer practiced agriculture rooted in the maintenance of a healthy soil biome - without the use of any synthetic pesticides and by maintaining areas of biodiversity around the farm. A recurring theme for all of the farmers interviewed was a concern for increasing pests, which has been affecting the viability of many crops all across Malta.

All of the organic farmers interviewed claimed that organic certification fees represent a burden for small farmers that is unjust when one considers the environmental benefits of their practices. This, compounded with a perception of the conversion process as strict, complex, and long, might be serving as a barrier to further experimentation with organic farming, or at least to the official registration of such activities. Some farmers are known to grow organically, but their small scale and part-time nature dissuades them from applying for the certification. Others mentioned that they felt that their current system, based entirely on communication and mutual trust with their consumers, worked well enough already.

Some interviewees (KI-2, KI-4 & KI-6, Table 22) drew a distinction between 'organic from abroad' and 'organic in Malta'. They also extended this distinction to conventional agriculture, which they consider to be more environmentally sensitive in Malta simply by virtue of its size and relatively traditional nature. One interviewee revealed that despite being the primary local and organic shop in all of Malta, they had too much supply and were constantly looking to grow the demand. This however might have reflected the aforementioned issues of high prices or of competition from imported produce, as well as the location of her shop, which is not in a central area.

4.9.5. Science

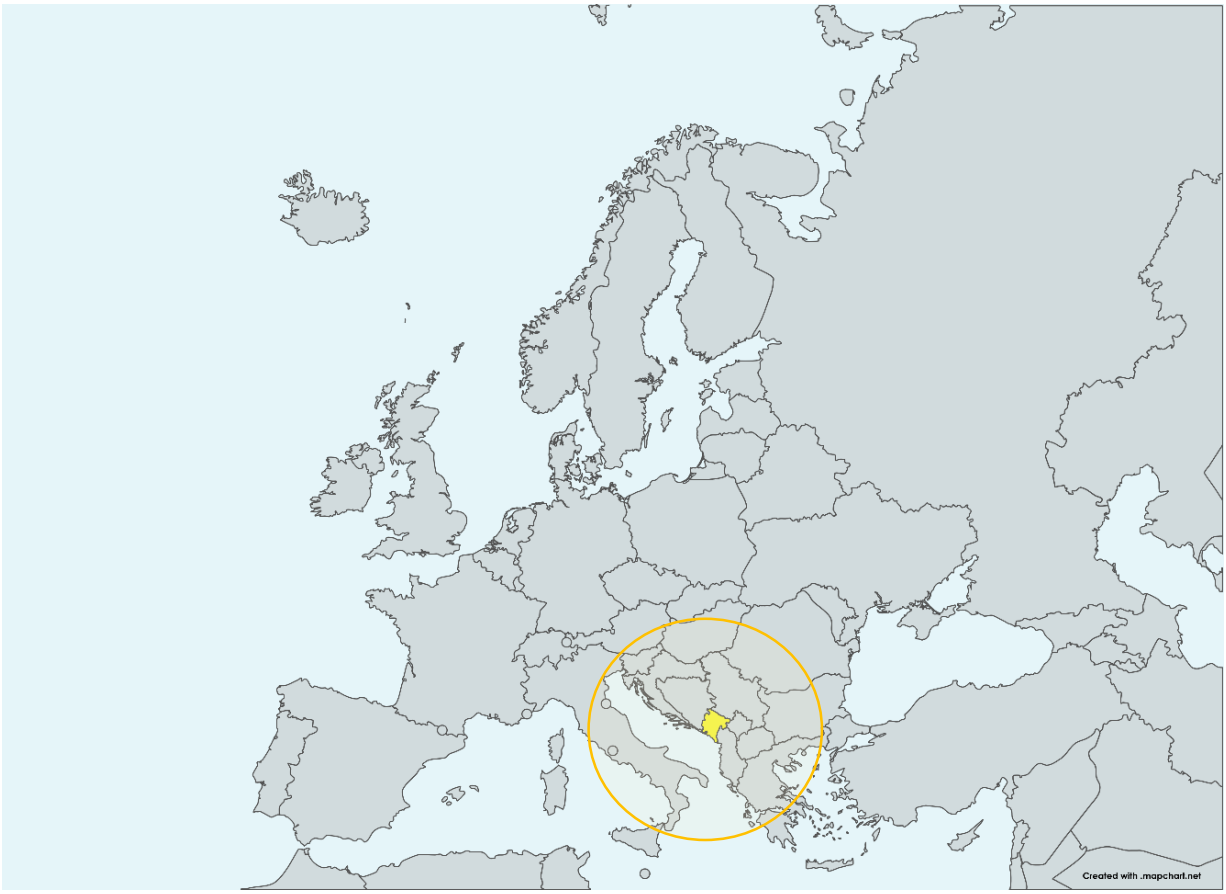
The 'Institute of Applied Sciences' at Malta College of Arts, Science and Technology (MCAST) is the main research institution in Malta on themes related to agroecology. They carry out research on a wide array of issues ranging from ecosystem services to climate change and pollinators ecology. Their main area of investigation is the Maltese archipelago but they have good links with research networks from other EU countries.

MCAST's research group focusing on agriculture, aquatics and animal sciences, as well as the agricultural research department of the University of Malta seem to not be specifically adopting an agroecological approach in their research.

Table 23: Overview about initiatives, cases and examples described and analysed in Malta.

Initiative n°	Initiative name	Scale	Type of structure	Aim	Pillars				
					Education and training	Living lab	Movement	Practice	Science
1	Centre for Environment Education & Research, University of Malta	National	Academic	Promote environmental education and research in the Euro-Med region by seeking to catalyse change towards a sustainable society.					
2	Biome Munch	Local	NGO	Provide the community with produce grown with ethical and organic practices. Educate the community on growing their own food, living simply, nutrition, and living sustainably.					
3	Malta Youth in Agriculture Foundation	National	Foundation	Build bridges between young farmers, government entities and the general public.					
4	Maltese Movement of Organic Agriculture	National	NGO	Endorse any initiatives on a national scale in-favour the use of natural products to grow crops without any chemical residues.					
5	The Veg Box	Local	Small/medium enterprise	Provide healthy local produce to the local consumers.					
6	Malta College of Arts, Science and Technology (MCAST). Institute of Applied Sciences	National	Research Centre	Provide universally accessible vocational and professional education and training with an international dimension.					

4.10. Montenegro



In Montenegro, as described in Table 24Table 3, 6 key informants were interviewed. Based on interviews and desktop research, a summary of the development of agroecology in the country per pillar is provided in the following sections. Information about the different initiatives can be found in the respective country report.

Table 24: List of key informants in Montenegro.

Key informant n°	Type of organisation	Main sector of involvement	Pillar concerned
1	Private sector, farmer	Livestock management, organic production, mixed faming systems	
2	NGO	Permaculture	
3	Private sector, farmer	Livestock management, organic production	
4	Research – University	Food sovereignty	
5	Farmer – farmers organisation	Livestock	
6	Private sector, farmer	Organic production, crop selection	

4.10.1. Education and training

After establishing independence, Montenegro transformed their education system and established the 'Biotechnical Faculty' at the 'University of Montenegro' in 2008 and in 2012 the 'Faculty for Food Technology, Food Safety and Ecology' at the University of Donja Gorica (UDG) (Seremesic et al., 2021). These curriculums offer many courses related to organic farming, sustainable agriculture, as well as practices of agroecology. Nevertheless, education and training of agroecology in Montenegro is not currently very developed.

Thus far, agroecology related education and training in Montenegro is organised primarily by non-governmental organisations such as 'Seljak.me' and 'Paradigma' (see Table 25) who maintain education and training as a secondary goal in their mission statements. The number of agroecology initiatives, which could be used to develop training, seems to limit their development. Further, various organisations provide education and training for farmers, mostly free of charge.

For example, the 'Seljak.me' initiative, which organises educational trainings for farmers related primarily to agroforestry and organic farming, but also on the type of tillage systems best suited to different types of soil. Similarly, 'Paradigma' provides most education and

training on permaculture and on the principles of organic production, as well as on home gardening, urban gardening, and agroforestry.

4.10.2. Living lab

Currently, there are no initiatives in Montenegro that are identified as living labs. To the author's knowledge, there is currently no clear entity that is being used as an incubator for the development and networking of knowledge, technology, and science for either the private or public sector who would work together towards a common goal.

However, certain initiatives such as 'FoodHub - Centre of Excellence' at the University of Donja Gorica (UDG – see Table 25) have the potential to become such Living Labs by connecting farmers, public, and private actors to provide resources to develop agroecology in Montenegro through innovative solutions and agroecology related research.

4.10.3. Movement

Considering the small size of Montenegro, there are a respectable number of NGOs and movements operating in the field of rural development that could relate to agroecology, although they may not explicitly refer to this concept. These entities are primarily actively involved in environmental protection, the promotion of cultural and historical heritage, education and solving various social problems (Seremesic et al., 2021). For instance, 'Paradigma' NGO focuses on permaculture and urban gardens by offering many educational programmes related to agriculture and ecology. Another example is the NGO 'Sjeverna Zemlja' ('Northern Country') which is leading a regional scale movement in the northern part of Montenegro. Their main goals are the improvement and development of ecology and environmental protection, as well as training in agriculture, organic food production, and rural development. They are also work on promoting and developing education, culture, and tourism. Lastly, 'Udružena seoska domaćinstva Crne Gore' ('United rural households of Montenegro') aims to promote rural development and environmentalism, connecting Montenegrin farmers towards a common goal - the development of agriculture in Montenegro.

An increasing number of movements, founded mainly by young people, are aiming to transform the agricultural system by using resources sustainably as well creating easier and more frequent avenues to access funding and institutional support. While competitions or

completion? for young farmers to access these funds are available with various NGOs, few projects are supported or adopted (KI-2, Table 24).

4.10.4. Practice

Agroecological practices in Montenegro, although increasing in number and areas applied, are still not present on the large scale, nor in an organised or coordinated way. Most agroecological practices in fact, appear as isolated initiatives developed by young or highly educated individuals with degrees in agriculture or ecology. These individuals are the forerunners in implementing sustainable and organic models in agriculture and act as ambassadors for the promotion of such practices among other, less informed farmers and consumers (KI-1 & KI-3, Table 24).

As mentioned above, the approaches of agroecology found in Montenegro are those relating to crop rotation, fertilizers of animal origin, compost, locally adapted crops and animal breeds, combined planting, reduced tillage, mixed farming systems (Seremesic et al., 2021), and recycling of nutrients and biomass. The initiative 'Seljak.me' also promotes mixed farming systems where local farmers apply integrated farming methods and sell their products on an online platform. The use of organic fertilisation is widespread thanks to the country's traditional legacy in agriculture. Moreover, farms are increasingly practicing composting and implementing more efficient waste management systems.

Sustainable agriculture in Montenegro is directly contributing to the increasing biodiversity on agricultural land with food production in Montenegro still dominated by small-scale production. Thus, sustainable production relies on regional and national genetic resources, and cereal production, for example, is strongly based on the use of these resources (Seremesic et al., 2021).

4.10.5. Science

The scientific community in Montenegro is not using the term agroecology in its current studies and developments. Scientists, at the time of writing, seem to be focusing on topics such as the preservation of traditional products, microbiological food safety, food sovereignty, and by connecting scientific institutions and farmers.

The 'FoodHub-Centre of Excellence' at the University of Donja Gorica is the most prominent example for this topic, with a mission to create innovations in the food sector through

research, knowledge transfer, the development and improvement of autochthonous and traditional food and agricultural products, and resource use. This centre uses laboratories and technologies that focus on research in food microbiology and safety in every step of the food production process, from seeds to consumer's food.

Table 25: An overview about initiatives analysed in Montenegro.

Initiative n°	Initiative name	Scale	Type of structure	Aim	Pillars				
					Education and training	Living lab	Movement	Practice	Science
1	Paradigma	National	NGO	Promoting permaculture and organic food supply.					
2	Seljak.me	National	Farm network – farmers organisation	For farmers to cooperate at the national level. Education and support for farmers.					
3	Farma Magaraca - Martinići	National	Farm	Increase organic production. Promote rural tourism and save endangered animals.					
4	FoodHub - Centre of excellence	National	Science and research infrastructure	Research and promotion of food sovereignty, as well as the valorisation of traditional products.					

5. First conclusion and next steps

This first part of the mapping on agroecology development highlight clearly differences of development and recognition of agroecology among countries in Europe. While the concept is still being in its infancy in certain countries, there were many initiatives with a link either direct or indirect to agroecology and some of its principles. Clear educational programs are lacking in different countries despite many initiatives formal or informal in this area. Dedicated research units, programs and project seems to be also lacking in most countries, allowing knowledge generation and sharing.

Gathering a unique number of initiatives link to agroecology this work is an opportunity to pave its way in Europe. As stressed in other study (Gallardo-López et al., 2018) the coexistence of different vision, definition and use of the concept of agroecology is clearly highlighted. The mapping of agroecology in parallel in different European countries allow to compare – to a certain extent – the development of agroecology in those countries and more importantly allow to summarize the main barriers and perspectives in order to enlarge its development.

Within the realm of the project, more countries are under way to be mapped and will add to the 10 countries shortly presented in this report. This will allow to broaden the analysis and provide insight to increase the development of agroecology.

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6. Annex 1: Questionnaire grid for key informant

Interview – Preamble

1. Do you know the term "agroecology" – and do you currently use it in your activity? (very often/often/rarely/never)

If yes,

2. How do you define or describe agroecology in your own words? (if needed: Can you give 1/2 examples to illustrate your thinking)

If no,

please mention related and linked words (see below) - if needed only, you can explain our understanding and definition of agroecology. Nevertheless, you shall avoid starting by this in order not to narrow the perception and speech of the interviewee.

- Area: Organic

Keywords: Organic Farming, Organic Horticulture, Organic Livestock, Biodynamic

- Area: Agroecology

Keywords: Agroecology, Agroecological Farming, Agro-ecology, ecological farming, peasant/traditional agriculture, (Ecology)

- Area: Agroforestry

Keywords: Agroforestry, Silvopasture, Silvoarable

- Area: Territories and food system

Keywords: Food Systems, Territorial Food Systems, Food Sovereignty, Rural Development, Supply chain/value chain, Food Justice

- Area: Regenerative Farming

Keywords: Permaculture, Regenerative Farming, Regenerative Agriculture

Interview - Part 1. Initiatives in the country

You should try to gather information on initiatives in the pillars: Practice, Science, Movement, Living labs, and Education and training.

You shall use the following questions:

1. Could you first indicate different initiatives in agroecology in your country?

2. Are there some initiatives which include Living Labs and/or practical implementation of agroecological practices?

3. Are there involved research institutions and research programmes related to agroecology?

4. Are there any agroecological education and training programmes in agroecology or strongly related to agroecology in your country?

5. Are there other agroecology related examples/cases/initiatives not mentioned yet, for example, movements for food sovereignty, bottom-up initiatives such as CSA (community agriculture systems) or farmer's markets, collaboration between farmers and researchers?

6. And finally, among the examples and initiatives you provided, are there some with transnational/international cooperation (in which are involved more than one European country)?

Interview - Part 2. Agroecology in the country

1. How would you describe the present state of agroecology in your country?

2. How much do you think agroecology is known and recognized in your country (well recognized/ enough recognized/ not very much recognized/ not at all recognized) and by which stakeholder? Why?

3. How much do you think agroecology is known and recognized in your country at the decision making level? (well recognized/ enough recognized/ not very much recognized/ not at all recognized) Why? Could you name the decision making stakeholders?

4. In terms of practice would you say that agroecological practices are well implemented in your country (well implemented/ enough implemented/ not very much implemented/ not at all implemented)? Could you provide examples of the 2-3 main agroecological practices implemented? [nota bene for the interviewer: have in mind the difference between an approach (i.e.: permaculture, regenerative agriculture etc.) and the agroecological practices (i.e.: no tillage, organic fertilization etc.), but do not discuss with the interviewee]

5. Are there any policies in your country that help the implementation of agroecology? Are they specifically focus on agroecology? At which level (local/national/regional…)? Can you provide examples?

6. Are there some regions in your country in which more agroecological initiatives have arisen? If yes, have you an explanation for this?

7. What are the barriers for agroecology development in your country, in your opinion?

8. What do you think are the future perspectives and opportunities of agroecology in your country?

9. Last question: do you have other point/aspect you want to mention?

7. Annex 2: Questionnaire grid for initiative per pillar

Pillar – Living labs

1. Could you describe your initiative or living lab in a few words?

2. What are the main objectives of your initiative?

3. How many people are involved? And which organisations/stakeholders?

4. What is the type of organisation or stakeholder supporting the governance and the development of the initiative? (none, association, NGO, supply chain stakeholder group, ...?)

[nota bene for the interviewer: "support the governance refer here to organisation that help for the management/coordination of action in the living lab]

5. How is the initiative funded? Do you have institutional support?

6. Is the initiative part of a network of exchange of experience, or expertise?
    - If yes is it local, national, European, international?

☐ Local
☐ National
☐ European
☐ International

    - If yes, what do you expect from such a network?

7. Agroecology elements: how does the initiative support the development and/or adoption of agroecological practices?

[nota bene for the interviewee **if asked about elements**: agroecology elements refers to the 13 principles of Agroecology defined by the *HLPE report on agroecology*. Relevant agroecology elements here: co-creation of knowledge, synergy, participation, connectivity, soil health, animal health, recycling, input reduction, recycling, biodiversity]

8. In what ways is your initiative innovative? Which type of innovations were developed or are under development?

9. Does the initiative take place in one country or several countries? - If several, please specify country name.

10. What are the type of actors involved (more detail than previously – you can tick several)?

☐ Scientists
☐ Farmers
☐ Advisors
☐ Farmers cooperatives
☐ Chambers of agriculture/farmers organisations
☐ Upstream industry (biocontrol, fertilisers, plant protection)
☐ Downstream industry (food, bio-based)
☐ Retailers
☐ Consumers organisations
☐ Environmental organisations
☐ Citizens
☐ Public authorities
☐ Others (please precise)

11. If you ticked public authorities, please specify which level(s)

☐ National
☐ Regional
☐ Local (municipality, town, village)

12. Specific topic of the living lab/initiative

☐ Agroecological practices and production
☐ Cooperation among farmers
☐ Cooperation between farmers and supply chain stakeholder
☐ Development and Marketing of local and/or traditional food products
☐ Food sovereignty
☐ Traditional crop varieties or animal breeds
☐ Other (please specify)

13. Which farming sectors or types of products does the initiative work on? (you can tick several options)

☐ Arable crops
☐ Livestock/permanent grasslands
☐ Horticulture - vegetables - fruits
☐ Permanent crops (fruit trees, short rotation coppice to produce bioenergy)
☐ Forestry
☐ Others (please specify)

14. Beyond farming, does the initiative cover some of the following aspects? (you can tick several choices)

☐ Upstream (seeds, machinery, biocontrol, fertilizers etc.)
☐ Food processing
☐ Marketing and retail
☐ Labelling
☐ Consumption
☐ Local development
☐ Other (please precise)

15. Last question: do you have other point/aspect you want to mention?

Pillar - Practice

1. Description of the initiative - Precise the number of people/organisation involved as well as the origin (what made it possible?).

2. Objectives of the initiative

3. Which agroecological practices are concerned?

4. Does the initiative have financial and/or institutional and/or stakeholder support?

5. Does the initiative take place in one country or several countries? - If several, please precise country name.

6. Which farming sectors or types of products does the initiative work on?

☐ Arable crops
☐ Livestock
☐ Horticulture - vegetables
☐ Permanent crops [fruit trees, etc.]
☐ Forestry
☐ Others – please specify

7. Does the initiative involve exchange between farmer and/or with other stakeholder/network?

[note bene for interviewer: we are looking for example of a group of farmers exchanging about their practices and/or collaboration. Avoid single farmer cases]

8. Last question: do you have other point/aspect you want to mention?

Pillar - Movement

1. Description of the initiative - type of legal entity (formal/non-formal; public/private) - Who are the members (private/institutional/farmers etc.) – Who is leading (a person/a group of persons)

2. Objectives of the initiative

3. Agroecology elements: in which way does the initiative support the development and/or adoption of agroecological practices or the development of sustainable food systems?

4. Organisation type

☐ NGOs
☐ Environment and food related organisation
☐ Farmers association
☐ Civil society organisation
☐ Food sector organisation
☐ Small and medium-size enterprise

☐ Other (please specify)

5. Does the initiative take place in one country or several countries? - If several, please precise country name

6. Which farming sectors or types of products does the initiative work on?

☐ Arable crops
☐ Livestock
☐ Horticulture – vegetables - fruits
☐ Permanent crops – Trees
☐ Not any specific sector - diversified system
☐ Others – please precise

7. Target (you can tick several choices)

☐ Community development
☐ Farming development
☐ New way of farming
☐ Food sovereignty
☐ Producer – consumer linkage
☐ Lobbying
☐ Policy making
☐ Nature, landscape, environment conservation
☐ Education
☐ Training
☐ Awareness building
☐ Other (please specify)

8. Geographical scope

☐ Local
☐ Regional
☐ National
☐ International

9. Networking

☐ Relationship with other organisations (if yes, with which ones?)

☐ Partnership with other stakeholders (if yes, with which ones?)

☐ Other (please precise)

10. Last question: do you have other point/aspect you want to mention?

Pillar - Science

1. Description of the programme or project - Specify the number of people/organisations involved as well as the origin (what made it possible?). Please specify the name of project and of the programme.

[nota bene for the interviewer: a project has a defined start and endpoint, it has specific objectives and it is funded in the frame of programme. A programme, is defined as a group of related projects managed by a funder or governing institution]

2. Objectives of the programme/project.

3. Name of the leading organisation/institution and (if applicable) research unit

4. Funding body of the project/programme

5. Organisation type

☐ University

☐ Research centre/institution

☐ Environment related organisation

☐ Food related organisation

☐ Farmers associations

☐ Small and medium-size enterprise

☐ Other (please precise)

6. Does the programme/project take place in one country or several countries? - If several, please precise country name

7. Cooperation or involvement with other type of actors?

☐ Farmers

☐ Farmers organisation
☐ Small and medium size enterprise
☐ NGO
☐ Civil society
☐ Government - Policy maker
☐ Other – please precise

8. Does the initiative involve different types of scientific discipline? If yes, specify.

☐ Agronomy
☐ Ecology
☐ Animal science
☐ Plant science
☐ Social science
☐ Political science
☐ Economics
☐ Other (please specify)

9. Main topics of programme/project

☐ Agroecological practices
☐ Arable crops
☐ Livestock
☐ Horticulture - vegetables
☐ Permanent crops – Trees
☐ Sustainable food systems
☐ Fairer supply chains
☐ Rural development
☐ Farmer – consumer cooperation or link
☐ Food products and marketing
☐ Transition towards agroecology
☐ Other

10. Research infrastructures elements: which are the types of services or tools that the programme/project provides or develops?

11. How does the programme/project support the development and/or adoption of agroecological practices or development of sustainable food systems? Is participatory approach used?

12. Geographical scope

☐ Local
☐ Regional
☐ National
☐ International

13. Last question: do you have other point/aspect you want to mention?

Pillar - Education and training

1. Description of the initiative or programme - type of legal entity (formal/non-formal; public/private) - Who are the members (private/institutional/farmers etc.)

2. Objectives of the initiative

3. Type of Education and training

☐ Workshops and activities of promotion of agroecology
☐ BSc or MSc programme in agroecology
☐ Training of farmers
☐ Training and advice to cooperatives or farmer's organisations
☐ Training and accompaniment to agri-food enterprises
☐ Advice to and/or accompaniment of public institutions
☐ Other – please precise

4. What is the major orientation of the training or education programme?

☐ Knowledge focus
☐ Competence focus
☐ Dialogue, reflection focus
☐ Action/experiential learning

☐ Other

5. Lead actor carrying out the training or education programme

☐ Farmer organisation
☐ University
☐ School - secondary education
☐ Training centre
☐ Private entity, company
☐ NGO
☐ Civil society organisation
☐ Other – please precise

6. Does the initiative take place in one country or several countries? - If several, please precise country name

7. Main topics of training or education programme

☐ Agroecological practices
☐ Arable crops
☐ Livestock
☐ Horticulture - vegetables
☐ Permanent crops – Trees - Fruits
☐ Sustainable food systems
☐ Food products and marketing
☐ Transition towards agroecology
☐ Other

8. Duration of training or education programme

☐ 1 day
☐ Several days
☐ 1 week
☐ Several weeks
☐ 1 year
☐ 2 years
☐ 3 years

9. Last question: do you have other point/aspect you want to mention?