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Teaching agro-ecology in the transitory period Agricultural Knowledge Systems

O2 – INNOVATIONS AND CHANGES WHICH AGROECOLOGY IMPLIES

CASE STUDY REPORT SUMMARY

AUSTRIA – FRANCE – ITALY – LITHUANIA - SLOVENIA

Realized by

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Erasmus+

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SCOPE

This document summarizes the case study report summary of Agro-ecological innovations in all partner countries

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ACRONYMS AND DEFINITIONS

ACRONYMS	DEFINITION
AE	Agroecology
BOKU	University of Natural Resources and Life Sciences, Vienna *Universität für Bodenkultur Wien*
EU	European Union
EU-APPB	Agricultural Policy Perspectives Brief of the European Union
Euro-EducATES	Agricultural Alliance for Competence and Skills based Training
OF	Organic Farming
ACSE	Agriculture: Arable Crop Management/ Farm Livestock Production (Analyse et Conduite des Systèmes d'Exploitation)
Anabiotec	Agricultural Science (Analyses agricoles, biologiques et biotechnologiques)
APV	Agriculture and Agronomy: Crop Production (Agronomie : Production Végétale)
BTS	Diploma of agricultural technician, level 5 in the European qualifications framework (Brevet de Technicien Supérieur)
CGEA	Farm management (Conduite et Gestion de l'Exploitation Agricole)
Cosyca	Advice in Agroecology (Conseil en Systèmes de Culture Agro-écologique)
CRDA	Regional Committee of agricultural development (Comité Régional de Développement Agricole)
EEIG	Economic and Environmental Interest Group
EIE	Part of a teaching at the school initiative (Enseignement à l'Initiative de l'Etablissement)
ESR	Efficiency – Substitution – Redesign
IFV	French Institute of vine and wine (Institut Français de la Vigne et du vin)
INRA	National Institute of Agronomic Research (Institut National de la Recherche Agronomique)
LP	Level 6 degree in European qualification framework (Licence professionnelle)
ERM	Ecoremediation
PDO	Protected Designation Origin
UM	University of Maribor
PLZMMC	Centre for Programme LEADER and Agricultural Training Methodology
R&D	Research and Development

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INTRODUCTION

In this report we have collected, synthesized and summarized the output 2 for the Erasmus+ innovations and changes which agroecology implies. Output 2's goals were to collect identified best-case case studies of agroecological innovations within the partner countries (at least 3 cases) and elaborate through an exposé of each of the cases, analyze them and include this in a report.

These elaborations were conducted through a structure that was roughly created by the entire group and then organized and provided by the Austrian partners. Also decided together was the necessity of each partner country to define their own group´s definition of innovation (referring to the prior defined concept of AE used by each group) as it was an essential part of the case studies themselves and because each country is coming from a different developmental stage in agroecology and has different perspectives (see output 1 compiled by OEP).

This report is divided in the collection of the individual country reports and then an analysis through the synthesis and comparison of the different definitions of innovation, and the cases in terms of assessment of the case studies through:

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

This last point, implications for teaching tools exists to aid the achievement of the following 03-05 output of the overall project.

Finally the report compares and contrasts the different case studies and innovations among the countries and ends with some overall conclusions.

INDICATOR LIST

Here is the compiled list of indicators from all partners used in each indicator section of each case study. This list was created collectively and used to understand what types of innovations were presented within the differing case studies.

Main Indicator	**Sub-Indicator**
Social	Community
	Communication
	Education
	Transition / Transformation
	Tradition
	Political

	Social Justice (intergenerational thinking, worker rights, gender aspects, etc)
	Values and Ethics
	Autonomy-food sovereignty
Environmental	Biodiversity
	Soil health
	Landscape (spatial dimension)
	Climate
	Climate Change
	Animal Health
	Plant Health
	Ecosystem Services (clean water, air, etc)
	Ecoremediation
Economic	Tourism
	Marketing
	Membership
	Green jobs
	E-marketing
	Autonomy (e.g. less inputs, less costs, etc.)
Technical	Digital technology
	New tools

FRENCH CASE STUDIES

In this section the best-case case studies of agroecological innovations within France are elaborate through a presentation of each of the cases, an analyses and concluding remarks. Written and compiled by CEZ: Coordinated by Amandine Menet (CEZ) and the Authors Cécile Furmanik (EPL d'Auzeville, Case study 3), Isabelle Gaborieau (CEZ, Case study 4), Catherine Herbin (ITV, Case study 1), , Sophie Quentin (CA de Dordogne, Case study 2), Jacques Tournade (CA de Dordogne, Case study 2). All translated from French to English by Khachiche Mounia

INTRODUCTION: CASE STUDY SELECTION AND REASONING

In France, agroecology can be approached in different ways. It is in the heart of the public policy project "Agroecology, a new production paradigm". It aims to promote, at the national level, the evolution of French agriculture into agroecology (the agroecological transition) and the development of practices and innovative systems to achieve the triple performance (environmental, economic and social). This project is accompanied by a second action plan "Teaching agroecology, a new production paradigm". Thus, emphasis is on ways to teach agroecology and evolution of teaching methods. Many basic research projects and applied research projects focus on the development of practices and agroecological systems. The case studies we have chosen illustrate these different approaches of agroecology.

First, the study of projects from wine-growing landscapes laboratories and the Organization "Organisme de Défense et de Gestion (ODG) Costières de Nîmes" for Defence and Management in Nîmes (South of France) focuses on the management of wine-growing landscapes. A group of actors in the wine industry settled on the territory in order to develop the implementation of a management approach on wine-growing landscapes. Landscape management is closely linked to the agroecology. It impacts the ecosystem services on a territory level and shows its importance on social grounds, in particular with regard to the heritage conservation. The objectives of the project are to promote agroecological practices which positively influence the landscape, and that the latter should be taken into account in public policies. A group dynamic at a territory level makes the development of projects easier.

This aspect is found in the second case study about the analysis of a territory group of farmers working on autonomy regarding the performance of farms. In the public policy project "Agroecology, a new production paradigm", one of the levers of the agroecological transition is the establishment of economic and environmental interest group (EEIG). In the second case study, organic producers have created such a group. Their main goal is to experiment with new practices in order to achieve food self-reliance of the herds across the territory. That has both economic advantages (stability, resilience) and environmental (keeping of the grassland). This group dynamic promotes the development of innovative projects and enables to share the risks taken by experimenting.

A farm must be successful economically in order to allow the farmer to live. However, the development and testing of new practices can present significant risks for one and only farmer. It is therefore easier to experiment and develop new references in a group. The third case study presents an experimental platform in Agroecology for training and development. The technical school of agriculture of Toulouse (South of France) has developed this pedagogical and technical support to bring together learners and local farmers around experimentation with new agroecological practices that improve the quality of the waters and take into account the evolution of the bio-aggressors in the territory. Technical references are created thanks to this platform and territorial issues are placed at the heart of education. Teaching methods related to the approach of Agroecology represent an important feature even in the transition.

The last case study enables to illustrate the importance of these methods. The project "Teaching Agroecology, a new production paradigm" helped reflect on different pedagogical approaches to teach Agroecology. This

case study presents the study of an educational course leading to make learners think about the different agroecological transition paths. This shows the importance of formalizing what Agroecology is. In addition, one of the important elements is to involve students in the reflection and make them face professional situations.

DEFINITION OF INNOVATION

Innovation is a broad concept. In the Oslo manual, it is "*the implementation of a product (good or service) or a process (of production) new or significantly improved, a new method of marketing or a new organisational method in a business, the Organization of the workplace practices or external relations.*" (Martin A., 2013). There are therefore different types of innovation: technical, pedagogical, organizational... In Agroecology, there can be various examples such as experimentation with practices that respect the environment, or the development of direct selling.

Currently, in France, the "Agroecology, a new production paradigm" action plan is aimed to change French agriculture into Agroecology. This project highlights and promotes the development of innovative practices that improve the triple (environmental, economic and social) performance of farms (Alim'agri, 2016). Innovation is central in the plan. It is necessary not to freeze the systems and practices but to resort to agronomic or organizational innovation.

This implies the implementation of techniques offering alternatives to those developed during the intensification of agriculture (products plant, chemical fertilizers, grubbing-up of hedges...) and allowing the good functioning of agro-ecosystems. Researchers and farmers are experimenting and imagining new systems based on agricultural innovations such as the use of bio-controls, the search for autonomy...

The plan "Agroecology, a new production paradigm" also helped implement organizational innovations including the EEIG. These are collectives of farmers recognized by the State which implement changes in the modes of production projects to improve environmental, economic and social performance farms (MAAF, 2016). Collective work is an important lever to encourage technical innovations. It facilitates the communication and sharing of knowledge.

The term innovation is widely associated with science and technology. So far it has also a social dimension which innovation in education is part of. For Norbert Alter, sociologist of organizations, "*innovation is not a good idea but the social and collective ability to make the good idea*" (Alter N., 2014). He thus distinguished innovation, as an assimilation of an object, of the invention, and points out innovation as a process of change by the setting in motion of a collective. Françoise Cros, Member of the national expert Committee of educational innovation in agricultural education, defined pedagogical innovation as a *'process that is intended to change and has as a means of action the introduction of an element or a system in an already secured context'* (Pollen).

This can result in the transition of pedagogical situations where the transmission of knowledge is downward (the teacher, holder of the knowledge, passes it to the learner) to situations where learners, confronted to professional situations, take an active part in the reflection.

CASE STUDY 1: WINE-GROWING LABORITORIES AND ODG COSTIÈRES DE NÎMES – MANAGEMENT OF WINE-GROWING LANDSCAPE

The landscape is a cross-cutting theme closely related to Agroecology. It is an important element in the management of biodiversity, water quality, soil and which must be taken into account in the development of perennial crops such as agroforestry or viticulture.

An important need for support is recognized by local wine actors on how to proceed with the implementation of a consistent wine landscape quality approach. The 'Wine-growing landscapes Labs' project led by the French

Institute of vine and wine (IFV) and financially supported by FranceAgriMer, has mobilized four major French wine regions engaged in landscape steps to meet this need for management of wine-growing landscapes across the territories. One of the laboratories is the organisation of defence and management (ODG) of Costières in Nîmes (ODG Costières de Nîmes et Territoires & Paysages, 2006). It was at the forefront of landscape management approaches by creating a landscape and environment guideline, pillar of the strategy of the Protected Designation Origin (PDO) Costières de Nîmes.

This case study enables to approach Agroecology both by the political and technical way. Indeed, different territory actors (winemakers, actors in the sector, local elected officials) are engaged in the dynamics of development of wine landscape management. This shows the importance of group dynamics on the evolution of local policies. In addition, this results in the implementation of a landscape management method emphasizing on working methods, specific practices...

After having described the projects, we will point out the importance of such a group project and the innovations developed for the establishment of a wine-growing landscape management plan.

CASE DESCRIPTION

The landscape and environment guideline of the PDO Costières de Nîmes (ODG Costières de Nîmes et Territoires & Paysages, 2006)
It represents the first step towards the progress of the development of landscape management. In 2007, it was signed by twenty partners and has been the starting point of the implementation of the agricultural territory project.
A landscape and environmental map for potentials was conducted at the territory scale. It serves as a support of consultation for the consideration of the PDO Costières de Nîmes in the General guidelines of organization and urban development.
From a wine-growing perspective, several actions are already carried out including the suggestion guideline on farm buildings, the drafting of an annex to the PDO bill of specifications on the good practices in "Sustainable Viticulture", the definition of a vegetable signature for the PDO, the participation in the project European LIFE + Biodivine (planting of hedges, grassing of the vineyards and plots at rest, measure of biodiversity) ...
In 2009, the territory of the Costières de Nîmes was labelled by the International Network for vineyard landscapes and the designation noted this adherence to its specifications. This first step of recognition of the wine-growing heritage has allowed the land settlement projects to federate, harmonize and resume a logic of territory.
The Union of the winemakers of Costières de Nîmes reaffirms the landscaping and environmental commitment of the PDO and its commitment to sustainable development – already taken by some vineyards (repository of Sustainable Viticulture-Champagne, VIVRE Charter-Beaumes-de Venise...) - and expected at the national level (Avenir Law with self-diagnosis of agroecological farms...).
In addition, the Union undertakes to strengthen ownership of the Charter by the PDO winemakers and raise the overall environmental and landscape performance. It develops the Charter to the scale of farms and offers its spreading using an assessment tool.

The Wine-growing landscape Laboratories project
One of the objectives is to create a transferable method of wine-growing landscape management at the national level. The construction of this methodology was experienced for 18 months on four laboratories in different situations and enriched by the different situations among them, with a double simultaneous objective for evaluation of this methodology on current approaches and self-assessment of the initial projects of each laboratory.
The IFV has collaborated with the 'Territories & landscapes' engineering and with an operational office in the region in each of the following laboratories: Bureau Interprofessionnel des Vins de Bourgogne (Intraprofessional Office of Bourgogne wines), Syndicat Général des Vignerons Réunis des Côtes du Rhône (General Union of the gathered winemakers on the Côtes du Rhône), Union des Vignerons du Beaujolais (Union

of winemakers of Beaujolais), Organisme de Défense et de Gestion des Costières de Nîmes (Organization of defence and management of Costières de Nimes).
The procedures were classified qualitatively according to their position in a process of management, adapted from the work of the European Council (Busquets Fabregas J. and Cortina Amos A., 2000), in addition to interviews. They are made according to a somehow directive grid, destined for each elected president, each Director and each project manager. The aim was to evaluate each lab projects and accompany them in their approach as well as evaluate the building methodology on all current procedures simultaneously; and finally to produce a self-diagnosis tool of landscape management.
Ahead of a goal or a particular outcome, the interviews showed the need to develop the landscape vision of the Organization over the long term, and to choose the medium-term direction and to develop the original project, consistently with the vision and direction defined. The interviews also enabled to insist on the territorial nature of the process and the necessary participation -as upstream of the project as possible- of the landscape actors of other concerned sectors; the challenge being to succeed in making the project on the process operational and realistic, over the considered period.

A methodological guide (fig 1a) and a self-diagnosis tool for landscapes management (fig 1b) were built from:

- the landscape management methodology described in the "Landscape and territory, landscape management process" report from the 6th conference of the Council of Europe on the European Landscape Convention (Busquets Fabregas J. et Cortina Amos A., 2000),
- exchanges and returns of each laboratory experiments transcribed to illustrate concretely the steps of implementation of wine landscapes process,
- specific landscape and agriculture tools – project called “APPORT”: courses, farm and landscape project, quality of landscapes, products and lifestyle, representation and interpretation of the landscape, tools to observe, analyse, enhance, field visit, the landscape as a place of experience, legal framework, tools and skills for the landscape in agriculture, mediation tool, urbanisation and agricultural project, what expression mode of the agricultural landscape in the territorial projects (Collectif Apport, 2009),
- and experiences and the framing of territories joining the International vineyard landscapes network named "De Fontevraud Charter" (Collectif, 2012).

The landscape management self-diagnosis tool is an online tool that allows self-evaluation of landscapes procedures. The principle of assessment of landscape processes relies on a guiding questionnaire, coming from the interviews questionnaire and which analysis evaluates the progress of the process around the 4 identified stages. Each stage comes with the standard advice and recommendations are developed in the complementary methodological guide. The management process of wine-growing landscapes methodological guideline provides -across the territories- the theoretical and practical response elements to organizations wishing to initiate or develop a wine-growing landscape management approach. It revolves around the feasibility, the coordination/animation and the implementation of the landscape process. It is illustrated by testimonies, exchanges and feedback from the four wine regions, committed in this national research program.

Figure 1: Methodological guide for the management of wine-growing landscapes for the territories (a) and self-diagnosis tool for landscapes management across the territories (b)

CASE OBJECTIVES

The case study proposed here aims to point out different points. First, the implementation of a group dynamic at a territory level presents important stakes for the development of the agroecology and the evolution of systems. In these processes of reflection and action, it is important to involve a variety of actors (growers, actors in the sector, local elected officials) to look over numerous points of view and optimize the exchange of knowledge. This can lead to more or less important changes in public policies at different scales and to the creation and implementation of local action plans.
In addition, this case study enables to highlight the progress made in the management of wine-growing landscapes. It is a sector heritage development which stake is sustainable development of the territories as one should "maintain the landscape to guide and harmonize the transformations brought about by social, economic and environmental developments" (European Landscape Convention (CEP-CDPATEP, 2011)).
If the landscape quality objectives and the reflection around these goals belong to each wine-growing region, the framing, the method and associated tools were not formalised and each succeeded, tried or struggled in the conduct of a wine landscape approach of quality, on the implementation and the realization of concrete actions that can be recognized by the International Vineyard Landscapes Network called Charter of Fontevraud (Collectif, 2012). The label of the International vineyard landscapes Network signs the quality of voluntary procedures of groups of wine terroirs. All the actors of the territory (local authorities, the union(s) of producers, economic cultural and tourism operators, universities and laboratories) are committed - from a landscape diagnosis - on an action plan and its conduct. It combines wine production optimization and the landscape and environmental management, linked to innovative cultural and touristic offers in a sustainable approach.

HOW OBJECTIVES ARE CHOSEN

In the Vineyard Landscapes Laboratory Project, one of the major wishes is establishing the vineyard landscape as an axis for sustainable development of the sector based on the heritage value of the French wine-growing landscapes.

Moreover, one of the objectives is to position and to integrate the wine landscape in national and international efforts. This project helps support local dynamics and the dynamics of territorial wine landscapes in articulating their policy with local policies.

Finally, the various actors of the group work together to create and experiment a generalizable management methodology, transferable to the industry to energize management, valuation and recognition of the national wine-growing landscapes, and which could lead to the labelling by the International vineyard landscapes Network called "Charter of Fontevraud". Interviews helped to conceptualize a typology of landscape approach, articulated around 4 progressive stages identified in the landscapes management process and set up by each laboratory.

These stages are the translation of the operational reality of the laboratories and the observed dynamics of the landscape process:

- « initiation » stage, before the process, this stage corresponds to the first exchanges and reflections leading the project manager to position their wine landscape approach and to formalise through an inventory, an internal audit of actions and existing actors.

- « starting » stage, this stage illustrates the launch of the approach by the project manager, materialized by the implementation of dedicated resources, the realization of the preliminary studies necessary for the knowledge of wine landscapes (landscape diagnosis, definition of landscape quality objectives and action plans), first meetings to exchange views, and communication.

- « spreading » stage, on the basis of previously completed studies, this stage is the development of the approach by the project manager and all of their associated partners. It is most often illustrated by the implementation of actions, the contracting of the process- including by the means of landscape-environment Charter and recognition of the approach by the certification to the International vineyard landscapes Network called Charter of Fontevraud.

- « confirmation » stage, this last stage is equivalent to the appropriation of the process all over the territory and to a closer scale, on the farm. This translation is based on the acquisition of mobilised knowledge and skills, essential for the respect of the landscape quality objectives. This stage is precisely represented by the ODG Costières de Nîmes.

Concerning the actions at the level of the Costières de Nîmes, the challenge is to continue the implementation of actions in the field involving the actors of the landscape, who are PDO producers as part of the landscape and environmental Charter. Winemakers, as well as politicians, have reinvested their landscape for sharing and managing this heritage, from an action plan oriented on:

- the preservation of natural resources and biodiversity;
- the handling of agricultural and rural identity of the territory;
- the valorisation of agricultural activity by tourism and communication.

Reflections on prospecting on the major stakes of viticulture: development of the territory, prioritization of the PDO, evolution of the profession of winemaker, sustainable development, good wine-making practices, wine tourism, land control, urban planning, farm transmission, climate change, environment, appropriation of the landscape by the whole population, construction of national and international networks... allow to consolidate gains by reframing the landscape strategy.

It was essentially about:

- refining the strategy: assessment and prospects of the landscape and environment charter, specific landscape and environmental criteria for the designation and hierarchizing – by the means of a preliminary interview and a strategic advising meeting,
- setting up a working group specific to landscape winemakers/farmers to define an evaluation grid, tools, their test, follow-up and animation.
- synthesizing and implementing the strategy and finally validate it.

CAPITALIZATION

INNOVATION RUBRIC

Type of innovation (from the list)	**Description**	**Science, Practice, or Movement?**	**How does it apply to agroecology?**	**How can it be turned into an educational tool?**
Social Innovation (community, tradition) and environmental innovation (landscape)	Development of a wine-growing landscape management method which is an important issue. The project enabled to create tools to support and guide this management. It has collectively been built with the various concerned actors. A methodological guide and an online decision support tool have then been created.	Practice	The development of this methodology enabled to gather different actors of the territory, make them work together and raise awareness about the importance of landscape management (conservation of heritage, impact on biodiversity...).	This innovation allows to present the broad outlines of the wine-growing landscape management. It may be interesting to provide the methodology to the students and then to make them practice on the field. A time to compare different cases should be considered. Another idea would be to hold a role play where each actor of landscape management would be represented. The objective would be to discuss the implementation of the landscape management with the different points of view and 10 issues of the decision support tool.
Social Innovation (community, tradition) and environmental(landscape) (landscape, ecosystem services)	Establishment of a landscape and environmental Charter across the farm. The Charter allowed to gather and raise awareness among different stakeholders around the theme of landscape. The conservation of the heritage is an important point. This Charter presents aspects related to practices about to water, soil and vegetation.	Movement	This Charter enables to position the level of landscaping and environmental commitment of the farm. In addition, it encourages the development of sustainable practices for the preservation of water and soil quality through the establishment and maintenance of landscape elements.	The presentation of this element may start the debate on the usefulness of the implementation of Charters and signs of quality. From this example and others, students can work in groups to identify issues related to these tools.

CHANGES

The valuation of the Charter at the level of farms will affect different changes. It covers the themes of landscape and environment, expressed for the latter around the water, ground vegetation of the vineyard triptych. Other practices related to the environment will be integrated once this first dynamic initiated (effluent in the cellars, phytosanitary products management…).
Three levels are given, with, for each, a series of obligatory and optional criteria:

- Level 1 - Start: maintenance/general cleanliness of the farm;
- Level 2 - Deployment: development of sustainable farming practices on a part of the wine-growing surface, maintenance of landscape features;
- Level 3 - Confirmation: sustainable farming practices implemented on the entire wine-growing surface, valuation and landscape communication, dynamic action for the environment and the landscape.

A prior 0 level recalls the main regulatory obligations related to the theme of landscape / environment. This level is not a pre-requisite to access levels 1, 2 and 3 but allows to inform and raise awareness, among operators, of current and future regulation particularly aiming to a control of the farm.

CASE CONCLUSION

Landscape management is an important element of Agroecology at different degrees. At the territorial level, it includes environmental issues (water, soil, biodiversity...) but also a strong issue of heritage conservation. As a result, a management approach is essential. As part of the case study above, the group work then led to the formation of tools enabling to accompany the management of wine-growing landscape. One of the important points is that the methodology is transferable. The development and enhancement of the landscape Charter illustrate the most advanced phase of the vineyard landscape management methodology. This phase corresponds to a first step towards other certifications (Terra Vitis, Haute Valeur Environnementale (high environmental value) ...) and encourages performance by advice, a repository, trainings... In the end, the deployment of the Charter to the scale of farms should result in:

- financial support of operators for the application of the criteria and progression in levels (mounting a collective European grant ...)
- a valuation of the approach of consumers by a labelling, materialized by a logo to include on the communication and promotion media.

This huge project is ambitious and innovative by the research of operational transcription and self-assessment of the principle of territory landscapes management, while interacting with the examples steps. It was led thanks to a strong involvement of the wine profession and a quality support of the research unit and of the Management Committee.

CASE STUDY 2: ORGANIC PRODUCTEURS IN BEAUMONT IN PÉRIGORD: AUTONOMY AND AGRONOMY WORKING FOR AGRICULTURAL FARMS' PERFORMANCE

Intellectual output n ° 1 has highlighted the fact that Agroecology is at the heart of the project "Agroecology, a new production paradigm". This public policy project aims to extend Agroecology and the current national innovations. One of the levers to get there is the promotion of the economic and environmental interest grouping (EEIG), grouping of farmers working together to develop their systems and practices.

The Beaumont (South of the Dordogne) organic producers EEIG, includes 23 farms, partially or totally conducted in organic farming. Most are farmers who own additional production workshops such as viticulture, cereal or fruit. The main objective of the EEIG is to improve food self-sufficiency of the herd.
The latter passes by an optimization of the pasture, by the quality of the harvested forage and protein production on the farm thanks to legume, protein and meslin (grain or forage) crops. Optimization of rotations (longer and including legumes), implantation of covered soybean, the repurposing of manure and compost, as

well as a grouping of purchases of organic manure are part of other planned actions. Autonomy will be improved both at the farm level as well as the territory level -by enlisting organic grain farmers and breeders making cash crop.

This case was chosen for various reasons. First, it allows the highlight one of the key elements of Agroecology development through public policy: develop and maintain collective projects. In addition, it addresses a current issue: food self-reliance of the herd. After describing the projects, we will highlight the need of such a group and the developed technical innovations.

CASE DESCRIPTION

A dozen years ago, a pioneering group of farmers decided to work together on technical issues related to the conversion to organic farming. In June 2015, the EEIG was officially created with 14 farmers-members. It is supported by the association of the Regional Committee of agricultural development (CRDA) of the Chamber of agriculture of Dordogne. Since 2016 a new wave of farmers has joined the Group and it is therefore 28 farmers who today carry the various projects of the EEIG.

Several concrete projects developed below, are simultaneously conducted to aim food self-reliance of the herd: dynamic rotational grazing, spring cropping trials, common purchase of a fertilizer spreader, the value of soybeans by extrusion and implantation of multispecies pasture.

1) Intensive rotational grazing:
The first goal is to reach forage autonomy based on pasture management. The project is accompanied by a private firm: Paturesens. Training is offered over several days, including field visits. The goal is to have 'a botanical approach, which focuses on the pasture of the plants at the most nutritious stage in their growth cycle, while allowing the vegetation to renew those energy reserves by providing a time of rest between grazing cycles' (http://paturesens.com). Optimization of grass surfaces is (according to the company) "the most effective way to increase animal production per hectare, while optimizing its pastoral resources".

2) Implantation of multispecies pasture
Still about pasture management, further training is offered by the Chamber of Agriculture with the intervention of Vladimir Goutiers (National Institute of agronomic research (INRA), Toulouse). The concept is this: sow grassland with several different varieties (a dozen) adapted to the technical route, soil, and climate.
This experimental phase can then supply the software Capflore (tool for decision support for the choice of species and varieties for implantation of multispecies pasture). Several departments of the Southwest are involved in research. Eventually one of the envisaged objectives is to regroup and to jointly buy seeds.

3) Development of associated crop trials
The objective is to test a technical route with two innovations (cereals hoeing, combined crops) with the follow-up of an association of crops: barley/soy. Barley was sown in double rows to allow the hoeing of the intra-row. Then the soybean sowing is done in this intra-row. Soybeans developed in the intra-row, and after the barley harvest and straw distribution, it was driven without hoeing.

4) Implementation of a toaster
The idea is to optimize the autonomy in protein. The toaster is a machine that allows to increase the digestibility of seeds (in particular soy) by treating with heat for a short period. The unit is mobile and the goal is to bring "the small factory" to the farm rather than carry big fixed unit productions. Several territories are already equipped with this type of unit. A visit has been made and it would be possible to deal with something else (especially faba beans) soybeans. This project is not only for members of the EEIG since it requires big volumes to be optimized.

5) Use of a spreader with spreader table

The objective is to buy in bulk fertilizers rather than granules (high price in organic). However, it is necessary to invest in equipment suitable for spreading. A first meeting of the producers concerned to see different expectations for usage (orchards, field crops). The difficulty is to find the equipment that best match the wishes of the group.

CASE OBJECTIVES

Case study proposed here aims to show the development of EEIG for agroecological transition issues. In addition, this study allows highlighting the actions implemented collectively to develop food self-reliance of the herd, important in the agroecological transition.

The development of Agroecology implies an evolution of practices and systems themselves. It is essential to consider a comprehensive approach in order to identify all the issues and gaps and to best balance the system by studying among other things the functioning of the ecosystem. To do this, changes must be made: changing in practices, in the mode of production... It is necessary to analyse these changes, to learn and to test different ways.
But these changes are not always easy to perform for a single farmer for various reasons: significant risk taking economically, lack of technical knowledge... That's why collective work, exchanges and experience sharing are essential elements of the agroecological transition. The project " Agroecology, a new production paradigm " public policy on Agroecology encourages farmers in the form of EEIG grouping, creating then groups recognized by the State reflecting on the improvement of the environmental performance (preserve the ecosystem...), economic (competitiveness...) and social (improve working conditions...) of territory systems. These groups therefore include farmers and actors of associated sectors, as partners enabling cohesion at the level of the territory.

The EEIG are interested in different topics. In our case, it is the food self-sufficiency of the herd at the level of the territory that is at the heart of the reflections. Develop this aspect allows farms to be more resilient and more self-sufficient financially. The goal is to rely as little as possible on the fluctuation of the prices of the food market. It also has environmental benefits: development and enhancement of the grassland, mastery of the mode of production of concentrates, ... We will now see how this case study meets these objectives.

HOW OBJECTIVES ARE CHOSEN

One of the objectives is therefore to support a group to secure farms and to realize projects that could not emerge individually. It is then necessary to take part in a new cooperative approach to improve the triple performance. For this, two levers are highlighted. First of all, it is necessary to keep the group open as a place of reflection and exchange. The number of members and of new members enable to analyse this lever. Thus on the 18 original members, 3 have gone and 10 were added to the group. One of the main actions is the change of the main organism of the EEIG as an independent association. In addition, each person of the EEIG has the list of members, which facilitates exchanges.
The other lever is the collective investment in unifying projects for self-reliance. Currently, the group is considering the likely purchase of a spreader with spreader table. The goal is to be involved in at least two unifying projects within 5 years. For this, different actions are carried out: innovations night, collecting the members, animation of working groups.

Another major goal is to improve food self-sufficiency of the farms herds (economic and environmental performance). Various elements are developed. First of all, two important points are to ensure feed autonomy at a lower cost and production of concentrates at the local level. This comes to purchasing forage and concentrates locally. Training on pasture management and forage productions are organized. Collaboration is developed to produce forage seeds locally. Finally, the production potential is assessed.

Two other important points are improving the independence of cereal inputs and the reduction of production costs for members- through the practices promoted by the EEIG. For this, members share, collaborate, and are trained to techniques allowing reducing inputs.

CAPITALIZATION

INNOVATION RUBRIC

Type of innovation (from the list)	**Description**	**Science, Practice, or Movement?**	**How does it apply to Agroecology?**	**How can it be turned into an educational tool?**
Environmental and social innovation (community, communication)	Organic Farming Promoting	Movement	Organic farming is a mode of production that finds originality in the use of farming practices and livestock concerned with respect for the balance of nature. Thus, it excludes the use of synthetic chemicals, GMOs and restricts the use of inputs. The benefits for society are multiple in terms of activities and jobs creation, preservation of the quality of the soils, biodiversity, air and water. This mode of production allows to experience life-size innovative environmental practices and which are likely to be developed more widely in agriculture. Its modes of processing focus on the development of the natural characteristics of the products.	Organic farming can be transformed into a teaching tool in several forms: - Animation with uninformed public, - Farms visits, information to professionals through open houses. It might be interesting to compare the approach presented here with the students' approach in order to reflect on this topic.
Environmental, economic (autonomy) and social (community, communication) Innovation	Improve food self-reliance of the herd by the optimization of pasture, by the quality of the harvested forage and protein on the farm production.	Practice	The autonomy of farms is a double challenge: from an economic point of view but also from an environmental point of view. Limit inputs and external purchases to reduce the economic cost to the farmer but also the environmental cost (transport). Sourcing locally also responds to this issue.	Through this point, it is possible to address various technical innovations, but also the collective aspect of the development of food self-reliance in a territory. We could imagine a deck of cards. Each card would represent a technique to improve food self-sufficiency. For example, they may consist of the title of the practice, of the scale to which it applies, of technical description, of the influence on the ecosystem, of the various actors of the territory involved. Again, the confrontation with representations of students and other similar field cases would be interesting.

OVERLAPPING BOUNDARIES

In both cases, innovations are environmental, economic and social. At the environmental level, practices are developed in order to preserve the ecosystem, biodiversity, the quality of the soil...

Regarding food self-reliance of the herd, innovation is related to the economy indicator and the sub-indicator autonomy. Indeed, the development of food self-reliance of the herd allows to stabilise the economy of the farm and reduce inputs. Instead of importing food and so to be very dependent on the market price, the farmers of this group promote a local supply. In addition, this allows to better understand the mode of production and origin.

At the social level, the fact that these innovations are developed in the context of an EEIG justifies the link with the social indicator and the sub-indicators community and communication.

CASE CONCLUSION

The agroecological transition means more or less important changes in practices and systems. But these changes should be thought and tested. There is often a real risk to embark on an uncharted path. Collective work thus brings an interesting solution for the progress in the research of new systems. The scale of thinking should not be limited to the farm but must extend to the territory in order to create a global coherence. Once new practices and systems tested, and knowledge developed, it is necessary to communicate to the greatest number, in order to promote agroecological transition.
The EEIG aims therefore to promote sustainable and transferable farms through collective action. The EEIG is therefore take part in two large axes that are:

- Being a collective that allows to secure farms and projects that could not emerge individually.
- Improve the autonomy of farms (economic, environmental and social performance).

To make farms more resilient facing economic and climate crises, it is important that they develop their autonomy. This can be reflected across the territory. This territory autonomy means a reduction in inputs. One of the important points is the food self-sufficiency of the herd that can be promoted through various techniques implemented within the EEIG (grazing management, production and purchase of local foods, training of different actors...).

These objectives are supported by values of openness, tolerance, responsibility and action. A great number of projects which started more than a year ago, continue today and others appear with the ability to integrate more farmers- newly converted to organic farming.

CASE STUDY 3: AN EXPERIMENTAL PLATFORM IN AGROECOLOGY FOR TRAINING AND DEVELOPMENT IN MIDI-PYRÉNÉES

Agroecology can specifically be characterized by a set of practices. The agroecological transition goes through the development of innovative practices. One of the important levers to develop these practices is to encourage their test in areas bringing together different actors and can thus be used as teaching support and display as the experimental platform discussed in this case study.
Around 2010, several factors were gathered on the technical school of agriculture of Toulouse to gradually give birth to a platform in Agroecology. The sparks were first the impetus at the national level of the Ecophyto plan, regionally thanks to several partners, and then the impetus of the teaching staff at the local level. The teaching team has been tackling the reform of the diploma “Brevet de technicien supérieur” (BTS) Agronomie

Productions Végétales (APV)[1]. Different partners in the region wanted the technical collaboration of the farm and the trainers to help changes in practice on their territory.
Supported by the school management, a team composed of trainers working around the school farm and reinforced by an advice office and by a teacher who benefited from a time-off dedicated to the project, built a partnership interface through this 'platform', among learners, the agricultural profession, technical institutes and research. All the actors rallied to accompany the changes in agricultural practices- solicited by the craft development in Agroecology.
The platform then enters first on a pedagogical and technical approach. However, the results reached in certain territories led to make the local regulatory framework evolve, regarding practices impacting the quality of the water.
Through these few lines, we will try to report of the interest for this work entity and for cooperation in Agroecology, to explain the place that agricultural education takes on the territory through this platform and some results of the partnerships in the territory.

CASE DESCRIPTION

Agroecology allows to integrate the role of the different living communities while taking into account the specificity of territories. Taking advantage of the Grenelle effect, the Toulouse team has carried its reflection on the development of efficient agriculture in inputs since 2009.
This reflection based on the 2018 Ecophyto actions results in the project of a regional agroecological platform which main goal is to accompany students and professionals to use innovative practices linked to the territory. It relies on a strong professional network and a partnership with the Chamber of Agriculture of the Department and the INRA.
The school offers to test and evaluate systems co-created with farmers, and implemented by the BTS students. This results into an experimental platform accessible to farmers. In general, the project is in direct link with pedagogy, the aim being to put learners at the heart of the actions of the platform: the school offers to test and evaluate systems which are co-created with farmers and settled by the students of BTS APV. This results into an experimental platform made available to farmers. In general, the project is in direct link with pedagogy, the aim being to put learners at the heart of the platform actions:

- At school:
    - BTS APV: implementation, follow-up of the trials, communication with professionals. Professional situations to develop initiative, autonomy and links with professionals.
    - BTS Analyse et Conduite des Systèmes d'Exploitation (ACSE)[2] : participation to visits and debates days, creation of practical surveys on the areas of specimen processing issues,
    - BTS Analyses agricoles, biologiques et biotechnologiques (Anabiotec)[3] : creation and analyse of lab results,
    - BTEC grades : initiation to agroecology of « seconde »[4] classes, observation and partial interpretation of Bac « Sciences et Technologie de l'Agronomie et du Vivant »[5] and «Scientifiques» [6] classes,
- On other training or apprenticeship (partnership with Toulouse I university):
    - BTS Aménagement Paysager[7]: inventory, development and management of parcel borders, establishment of agroecological infrastructure,

[1] Deals with Agriculture and Agronomy (Crop Production), level 5 in the European qualifications framework

[2] Deals with Agriculture (Arable Crop Management/ Farm Livestock Production)

[3] Deals with Agricultural Science

[4] Level 4 in the European qualifications framework

[5] Deals with biology and geology, level 4 in the European qualifications framework

[6] Deals with sciences, level 4 in the European qualifications framework

[7] Deals with landscape management

- Licence professionnelle Conseil en Systèmes de Culture Agro-écologique (Cosyca)[8]: follow-up and enhancement of specimen processing tests for farmers of stakes areas.

In practice, on a group of farmers belonging to the cooperative Qualisol, a scholar project with Cosyca students enabled to assess how to develop farmers' best practices through the "Haute Valeur Environnementale en Grandes Cultures" label (high environmental value in general crops).

Locally, the territory in which fits the platform, Lauragais, is faced with environmental issues (water quality, erosion), agronomic issues (lower efficiency of chemistry, new bio attackers), socio-economic issues (consumer expectations, restructuring of agricultural professional organizations).
In this situation, it is necessary to encourage innovative practices taking into account the constraints of farmers while promoting the mechanisms of natural bio-regulation (eco-systemic services). It is essential to turn to agroecological farming.

To meet this, the school of Toulouse must train future professionals who will be able to understand these issues, but also to be a major player in the accompaniment of the evolution of agricultural land, through the establishment of a platform in Agroecology. Today, this school is a major player in the development of alternative practices. For example, 5 trial visits at farmers' and technicians' are planned for different partners (Chambers of agriculture and cooperative). The project includes in total 32 partners from research and development. The school is also integrated actors in the research and actors on the field, working on innovative cropping systems and the management of the weed flora (technical and scientific expertise, results transfer). In addition, the school participates in a project of applied research studying the importance of pollinators to improve the agroecological potential of the farm: project "casdar Pollinis'acteur".

In terms of communication, four days of animation were implemented for a school project on 4 territories in the South of France. Two days of trial visits and results restitution for learners and professionals were also conducted as part of open house days "Agroecology, a new production paradigm with ecophyto". Today, several communication media are displayed: Posters, website, reports.

CASE OBJECTIVES

The case study under development here allows highlighting different elements necessary to the agroecological transition over a territory through the objectives of the implementation of the platform.
Thus, the project comes around 3 main work lines:

- Create technical references meeting the needs of the territory, by using the platform and a network of outsourced testing for farmers from areas in difficulty,
- Replace the territorial issues at the heart of agricultural education. Rethink pedagogy through a role-playing of learners and develop research and development training links,
- Inform and train actors and future actors of the territory.

One of the key points in the agroecological transition is the experimentation and the development of alternative and innovative practices. This allows to create technical references on which farmers-wishing to make their system evolve- will be able to rely on.
Thus, improve the water quality, taking into account the evolution of the bio-aggressors on the territory passes through the creation of a pole of expertise around alternative techniques and by optimizing the use of bio-controls. However, their implementation at the farm may constitute a significant financial risk. This is why the creation of a space for experimenting with farmers is an important issue.
In addition, the only implementation of tests is not enough to bring about change, it is important to assist farmers in this process.
Finally, the integration of learners in the implementation and follow-up of experiments and in direct work with farmers is an essential element in the process of changing teaching practices. This allows to put them in real professional situations, but also to raise awareness of Agroecology and territory issues. This education of

[8] Deals with agroecology, level 6 degree in European qualification framework

future local actors, through exchanges with current actors, enables to foster the future development of Agroecology in the region.

HOW OBJECTIVES ARE CHOSEN

The agroecological project is completely integrated in the school project and is concentrated in two main directions:

1. Develop the learners/professionals link and transfer to the territory:
    - Develop trials: innovative practices, new inputs,
    - Organise farmers/learners workshop days about the trials,
    - Animate groups of farmers, support them in change: training sessions are at the heart of these actions (BTS APV, LP Cosyca). There are technical skills and expertise, recognized in the school.
2. Rethink the pedagogy:
    - Introduce teaching Agroecology, contribute to its development by involving the school trainings,
    - Formalize, conceptualize these teaching practices with the support of the Bergerie Nationale of Rambouillet, the school of higher education in agriculture of Montpellier and the research and technical linking network, working on innovative cropping systems.

Agroecology is a transverse axis of the school project.
Thanks to the experience acquired in the territory of Lauragais, the actions implemented by the platform are available according to the same scheme on different areas. The school relies on implementing demonstrations which were co-created with leader farmers and learners in order to meet the territories problems. This also allows to create local technical references, passed (or not) by a partner organization to territory farmers. According to transfer areas, more or less complex operation relies on:

- Actions in direct link with learners and territory actors:
    - Intervention of BTS APV and LP Cosyca in the settlement and management of trials on the outsourced site,
    - Organisation of visit and exchanging days for school audiences and professionals,
- The transfer of these experiences in different territories by promoting exchanges:
    - Standardized follow-up protocols,
    - An animation by the territory animation structures in each zone related to the LP Cosyca learners,
    - Exchanges between territories via the platform.

CAPITALIZATION

INNOVATION RUBRIC

Type of innovation (from the list)	Description	Science, Practice, or Movement?	How does it apply to Agroecology?	How can it be turned into an educational tool?
Social Innovation (education)	Pedagogy of project 'Agroecology' introduced in the training requirements book of BTS APV through different courses. School project for LP Cosyca. This allows to put learners in a professional situation and to involve them in the implementation of innovative practices.	Practice	Alternative practices that are co-created and tested with students rely on Agroecology by working on 4 main themes: Alternative weed control with the introduction of mechanical weeding and spraying (wheat, sunflower, corn) optimization, Protection and plant nutrition (place of stimulators of the defences of plants with bio stimulants in the biotic and abiotic stress management strategies), Integration of the plant covers in cropping systems.	This case study and more particularly the involvement of learners could be introduced to teaching teams. This example and its analysis can be reinvested in the training of teachers.
Social innovation (transition)	Accompaniment to practice change on the territories through the follow-up of outsourced trials at leader farmers in different territories.	Movement		This element allows to highlight the importance of the accompaniment in the agroecological transition of territory farmers. After presentation of the case study, it can be interesting to make the students think about concrete examples of their territory: issues, to develop practices, major points of support.

Environmental innovation (ecosystem services)	Project Casdar Pollinis'acteurs. Maximise the farm ecosystem services through the organisation of agroecological infrastructures and the development of alternative practices, respecting the functional biodiversity of the bee.	Science	The two objectives of the projects are: - searching to reduce by 50 % the use of pesticides (complementarity or even substitution of plant protection products by bio-controls). - highlighting of economic, environmental and social performance with a multi-criteria analysis. Transfer of these practices among farmers in 2016 or 2017 at Qualisol (1000 Ha of the total cultivated area).	The presentation and analysis of this innovation can lead to a process of identifying the interests of preservation of functional biodiversity and ecosystem services. Students could work in groups to create records for each service by identifying the roles of functional biodiversity.

CHANGES

The participation to the Casdar Polllinis'acteur enabled the development of the functional biodiversity analysis. Little by little, we can see a completion of behavioural references about the local species composing the agroecological infrastructure on our territory and their attractiveness on the entomofauna. In addition, the follow-up of various elements of the site biodiversity is carried out and the school contributes to several participatory science networks.

- Follow-up of local species integrated into the planting of hedges by the providers of the Department (County Council, Arbre et Paysage 31 association),
- Follow-up of flowery bands (Barenbrug, Caussade, Jouffray Driau),
- Follow-up of pollen to assess the influence of agroecological infrastructures and environments of the plots.

Currently, 21 trials are or were conducted on site and 60 were outsourced on 4 geographical areas of the region Midi-Pyrénées.

- *Ariège* – The goal is to work the land cover with the insertion of 'pesticides low volumes' for two partner farms: implementation of a corn plot + cover without use of chloroacetamide. At the same time, the school continues to work the 'biocontroles' on Taupin, this was regarded as a priority by the farmers of Dephy farm network.
- *Haute Garonne* – In the Lauragais, the school works with a more or less formalized group via the EEIG with 4-5 leader farmers. The Group of farmers wanted to work on the quality of the durum wheat: approach of fertilization management combining precision agriculture and land cover in partnership with CESBIO (biomass maps).
- *Tarn et Garonne* – It is a widening work of the advice approach with the members of Qualisol and insertion of new sectors (dried pulse) that is achieved.
- *Gers* – Three partnerships are under development: Val de Gascogne, Gersycoop (EEIG), and Vivadour. On all of the Gersycoop group, the team takes care of the covers follow-up and advice on corn fertilization. Regarding Vivadour, the team was trained on the agro-environmental measures. There is a work project on the agricultural part of the new territorial action plan, along with a professional training (5 days)
- *Tarn* – Follow-up of trials and support of local actors in the field are implemented.

CASE CONCLUSION

The development of alternative practices and the acquisition of technical references to the level of a territory are strong issues for the agroecological transition. Toulouse agroecological platform allows to make experiments while facilitating exchanges between the actors of the territory and while training professionals and learners. This makes it an important tool.

The Agroecology school project led to revitalize the school project, to develop transverse educational projects, to involve the learners by putting them in professional situations, to expand, to strengthen partnerships with the territory, to recognize the internal skills.

A team was formed around this project, and needs, today, to be perpetuated by a legal recognition (no framework corresponds to the system today). And it needs to be developed through human means, essential to the functioning of the platform, to the strengthening and the development of partnerships, to the editing of the platform folder and grant applications. The teacher whose part of work time is dedicated to this project, allows to strengthen the human resources made available by the school until the end of the platform building. Her precise mission is to ensure the influence of the work in agroecology on all trainings and centres trainers. The analysis of teaching practices and the collection of experiences will be reinvested in the training of trainers.

CASE STUDY 4: INSTRUCTIONAL SEQUENCE TO ACCOMPANY THE AGROECOLOGICAL TRANSITION

In intellectual production n° 1, the analysis of the way in which French agricultural education has integrated Agroecology highlighted both the momentum generated by the "Teaching Agroecology, a new production paradigm" plan[9] and the questions it generates on what to teach and how to do it. It thus placed emphasis on the need for a minimum culture in science education and a focus on learning (Hattie, 2012) to face the challenge of the support of the agro-ecological transition. That's why it seemed interesting to propose a teaching lesson as a case study.

[9] See http://www.chlorofil.fr/enseigner-a-produire-autrement/le-plan-enseigner-a-produire-autrement.html

The lesson under study was built as part of a teaching at the school initiative (Enseignement à l'Initiative de l'Etablissement-EIE). It concerns students of 1ère Bac pro CGEA (Conduite et Gestion de l'Exploitation Agricole, Farm management)10 option SDE (Système à dominante élevage/dominant breeding system) of the agricultural high school of Chaumont. The EIE is called "sustainable and autonomous mixed-farming/livestock systems". The lesson is the pivotal point of the sequence, it allows to build with the youth a reading tool about the ways of the agroecological transition, which must be reinvested later.

After having described this lesson, we propose to analyse it in terms of assistance to the agro-ecological transition and pedagogical innovation. These terms will be explained before analysis. Finally, after having capitalized on that experience, we will show the changes that the lesson under study has led among students.

CASE DESCRIPTION

In between two times[11] of the EIE, the lesson leads to build, with the pupils, the Efficiency – Substitution – Redesign (ESR) model, from former living experiences (Hill, 1985; Hill & MacRae, 1995) as possible ways of agro-ecological transition, before they reinvest it.

It lasts about 3 hours. The first half hour is dedicated to a work on the pupils' idea of Agroecology. These are brought to remobilize their experiences and to identify in pairs on sticky notes agroecological practices encountered in the first quarter. The notes are then classified by groups of practices (agroecological infrastructures for example) on the board, under potato shapes. The teachers then suggest a group exploration of practices and point out the consequences, in particular thinking about time-space scale. To this point, the students, from their first ideas, built a first exploratory model: plot practices vs landscape/territory, practices in the short term vs long term.

Then begins the construction of the ESR grid from 4 part-imaginative cases the farm Director would have studied around the introduction of alfalfa in his system. Case in reality built by teachers (fig.2).

[10] Deals with farm management, level4 in the European Qualifications Framework

[11] A 1st time is spent on visits to farms, an explanation of the practices, but without what they characterized, a 2nd time is then dedicated to the reinvestment of the reading grid built the observed lesson.

Case 1: To avoid a bare soil during winter, for a rapeseed crop and a spring barley crop, the farmer wants to introduce alfalfa mixed with rapeseed. Alfalfa will be crushed in the spring for the implantation of the barley. He adds manure during spring, and notes it in the application book.

Case 2: The farmer wants to improve the overall productivity of the plot. For this, he combines an alfalfa crop and a rapeseed crop during sowing. Rapeseed will be harvested grain and sold to the cooperative. Alfalfa will be mown or grazed in late summer. The production of each crop will be lower than if it were sown alone but the total production of the parcel will be greater. At the same time, he decided to compost manure to improve the use of nitrogen by the culture.

Case 3: Aware of the cost and the environmental problems caused by the spreading of mineral nitrogen in large quantities, the farmer wishes to settle the alfalfa mixture or in rotation head. Alfalfa by symbiotic fixation of nitrogen from the air will provide the nitrogen supply to the current culture and the next crop. Thus, he will be able to reduce by half the use of mineral nitrogen on the farm. Nitrogen by alfalfa will save compost that can be used to fertilize another crop that was fertilized with mineral nitrogen so far.

Case 4: The farmer wants to increase the autonomy of his/her farm. For this, he decides to plant alfalfa. This culture will reduce the purchase of nitrogen. The implanted surface is the surface that cannot be fertilized by compost produced on the farm. At the same time, alfalfa will bring proteins in the animals feed. The intake of protein being greater than the needs of the herd, a part will be sown in a mixture of cereals or grasses to bring energy to the rations. Different varieties will be used to adapt to the modes of culture (pasture, mowing) and to have a production over the year allowing to maximize the use of pasture. With this new feed system, the farm will be able to fatten more lambs. A raise of 20 ewes in the sheep flock is made to enhance the extra produced food. As the production of alfalfa is little sensitive to weather conditions, the farmer was able to engage in the farmer drive, which requests steadier and heavier lambs. His lambs are on the whole better valued and the sale price is more regular.

Figure 2: the 4 cases presented and given to the pupils

Students are then asked to get in groups of 3-4 and complete a grid to dissect the four cases according to fourcriteria: the impacts of the introduction of alfalfa, the impacted perimeter (in number of workshops), complexity (flows involved) and the underlying objective of the farmer. The teachers move from group to group to help the students, review the instructions, help thinking. In the end, the groups present their work to the others and one of the teacher summarises the results in the initially blank grid, projected on the board (fig. 3).

Characterise the change	Case 1	Case 2	Case 3	Case 4
Describe what brings the introduction of alfalfa	Nitrogen input for rapeseed. Input of organic matter Soil Cover in winter	Nitrogen input for the following crops to produce more forage	Alfalfa in head rotation, its lengthening Reduction in the supply of mineral and organic nitrogen SIE grant	Quality of the ration Increase in livestock
How many workshops are concerned?	1 vegetal workshop	3: bovine, ovine workshop, cultures	General crops Bovine and ovine	3 workshops. Impacts several workshops
How many internal flows are affected by this change?	1 nitrogen flow It doesn't help because it does not take into account flows	Nitrogen Forage	Nitrogen / Organic matter? forage?	Nitrogen, proteins, energy, forage, meat?
What is the expected objective during this change?	Regulatory compliance: not bare ground in winter	Improve the performance of the plot Same inputs	Costs reduction Limit environmental problems	Reduce costs, Autonomy. Increase production.

		Forage autonomy	Replace nitrogen brought by fixation nitrogen	Farmer drive

Figure 3: Collective synthesis of the work done in groups

Teachers seek then to qualify the four cases with the students through a quiz. After taking over what is happening in the different proposals (lines 2 and 3 of the fig.5), they name the different paths of transition (line 1).

Criteria	Regulatory compliance => not of Agroecology	E = efficiency	S = substitution	R = re-conception
Examples for alfalfa		The uses alfalfa to increase the production on the plot with the same means	The farmer replaces part of mineral nitrogen by symbiotic fixation	The farmer rethinks his/her system by integrating the alfalfa
Position of the farmer		The farmer aims to increase the efficiency of used means	The farmer replaces the usual means by alternative methods	The farmer reviews his/her production system to make it less dependent on the inputs
Examples for the pest management				

Figure 4: The ESR analytical framework for characterizing the agroecological practices

Finally, to ensure the understanding of students of the built model, they ask them, in pairs, to reinvest this grid on another case. In this case, pest management: the moat (line 4).

CASE OBJECTIVES

Case study proposed here aims to show if this educational lesson refers or not to the agroecological transition support, on the one hand, and innovation on the other hand. The word innovation, here in education, has already been defined at the beginning of this document, but before going further, it seems necessary to recall what is meant by the agroecological transition support.

If some learners in agriculture are really convinced of the need to take into account environmental issues, particularly outside a family background, it still true that for many of them, working on these issues is not done without difficulty and many obstacles - psycho-emotional. An activist approach may accentuate these releases, in response to the stigma of agricultural practices and facing some numerous standards. That's why it is necessary to begin with the youth experience, to note and work on the images which stand in the way of acquiring new skills. On the other hand, as well as for sustainability (low / high), different meanings of the term Agroecology coexist, between an economically oriented Agroecology under environmental constraints -and a food-systems oriented Agroecology. But these different images are often implicit and are rarely formalized. However, locate the observed realities and characterize them is already giving the power of interpretation and so action to learners. Finally, the very concept of transition has several meanings, some think of a linear and progressive process, a translation (Pean, 2015) made of incremental innovations, even of 'good practice', others see radical transformations (Viveret, 2014), breaking innovations to be considered. However, as it is for teachers to accompany the agroecological transition, the question to deal with young people is also: towards what is the 'go beyond' in Trans-ire –and compared to what. Identify the possible directions for these changes, their nature, what they entail in terms of practices change, representations of knowledge (of transition, robust) but also allow students to think of the possible paths (individual and collective), at their respective rhythms. After these few clarifications, it is about to see how the proposed lesson responds or not to these objectives in support of the agroecological transition and educational innovation.

HOW OBJECTIVES ARE CHOSEN

To what extent does the lesson refer to agro-ecological transition support?

The lesson under study integrates several crossing points to the support of the agroecological transition. During the first half-hour, the work proposed by the teachers is intended to identify and then work the youth conceptions of agro-ecological practices. Some note "leave forests to protect the wild species", "hoeing to destroy weeds", "putting sheep in a rapeseed to avoid a shortener", "make 6 years' rotations to limit weeds and diseases"... Representations thus result in productive or ecological logic or even combining the two, mobilizing various space-time scales. Other representations such as 'extensive agriculture' or 'sustainable agriculture' show confusions which need to be clarified.

Beyond that, the knowledge at stake: the ESR model, is also part of the agroecological transition support. Indeed, this model is more and more used for transitions analysis at different rupture levels (Bennett, 2013). It is generally used in the assessment of agricultural practices claiming to be sustainable and particularly the phytoprotection (Estevez et al., 2000) and it allows to analyse the degree of change in a system and to describe the changes in agricultural practices.

Three levels of transition can be distinguished:

- the Efficiency, which corresponds to changes aiming at reducing consumption and wastes of rare and expensive resource, the objective being to optimise the system functioning (Bidaud, 2013);

- the Substitution that assumes that certain components should be replaced by others having a lower environmental impact, the goal is not to change the system but to override certain components;

- the Redesign which is of a different nature since in this last phase, the problem causes are known, and then can be prevented and resolved within the system. This is its functioning which is redesigned. This phase is logically more complex and requires long time. Redesign indeed implies new agronomic practices, but also taking into account integrative interactions between food, social and productive systems. This model has the advantage to be able to be used to analyse and accompany transitions and to guide the thinking of actors by offering other possibilities in order to "have a better knowledge of the reality, glimpse the ways of a possible improvement, be encouraged to follow these ways" (Hajji, 2012). It allows to read the composite reality of Agroecology and agricultural families that refer to it and to choose the way(s) of the transition(s) best appropriate to the farmer action system, which the teachers chose to build with their students. The lesson aims to develop awareness among students helping them to identify the range of possibilities and related margins.

By building this model with their students and asking them to reinvest it on a close but different case (that of pest management), teachers really come out of inculcation pedagogy (a problem = a unique and definitive solution) to tend towards a pedagogy of the formation of the judgment. They value conceptual, operational knowledge that give the power of interpretation and action for youth to consider changes of practices and then innovate in terms of education.

To what extent is the lesson innovative?

If Agroecology implies that work situations with the living change, new space-time scales are being organised (Mayen, 2014), the relation human/nature being itself questioned- then it means it is no more possible to teach

to “produce differently” as it was taught before with a “production-driven agriculture”. However, these cultural changes are not yet operated and the epistemology of trades and disciplines remains in question in order to get out of the "technocratic" and positivist dominating model (Bergerie Nationale, 2016). Of course, epistemological and pedagogical constructivism is not new, especially in English-speaking and Spanish-speaking countries, but "France is the only country not having done its constructivist revolution" (Vosniadou in Fleury, 2010).

The work teachers did before the lesson- what knowledge the youth should have to imagine more agroecological change in practices- and their reflexion on the educational conception of their teaching in a constructivist perspective, show they have assimilated this “new object” to implement in their own practices. Moreover, this innovation refers to the will of two teachers, related to their colleagues, to daily improve their practices. It is focused on the learners ‘success.

It is not carried by two isolated teachers, but by an analysis group in teaching practices - being itself supported by an institutional structure12, it was the topic of an analysis allowing their peers to question themselves, to imagine other possibilities and then to begin a new changing process.

Emerging, this innovation then comes to enrich the institution that is responsible for managing the “teaching Agroecology, a new production paradigm”. If the pedagogical didactic and epistemological reflection work had to be established, it would thus be a sign of its success. It is not about saying that only a constructivist practice would be innovative or even effective in terms of transition support, but that it is one of the possible ways if the teachers are able to have it on all educational possibilities.

CAPITALIZATION

The case under study is specific. Considering the support of the agroecological transition, it deals with environmental issues (those of promoted agricultural practices) as well as ethical issues (social responsibility, professional citizenship). But the objectives of this study (show how the case falls under the support of the agroecological transition and what is innovative in it) made us to go through an analysis of the teacher’s work over a relatively short and precise time.

Innovation here is educational innovation; it is based on a systemic approach of Agroecology. Therefore, it cannot fall within a single indicator. Speaking of education, innovation is above all social. It is about the support of the transition, it questions social responsibility and the ethics of future farmers, their autonomy of decision and it affects a community. It does because its implementation and its analysis with the teaching staff are meant to establish a reflection process on any teaching practices.

[12] Project about training called PEPIETA “teaching method with a multidisciplinary team to teach the agroecological transition”, national support device to agricultural education

INNOVATION RUBRIC

Type of innovation (from the list)	**Description**	**Science, Practice, or Movement?**	**How does it apply to Agroecology?**	**How can it be turned into an educational tool?**
Social innovation linked to sub-indicators: - Education -Transition - Community -Social responsibility - Ethics - Autonomy	Implementation of a constructivist pedagogy based on learning judgment training. If this educational trend is not new, its implementation in France remains rare. These teachers, not satisfied to equip their pupils with a tool for characterization of the models and ways of the agroecological transition, also put it to the test of their peers so as to encourage them to question their own practices collectively. Analysis of this educational practice has on the one hand helped the team to build a beginning of common culture in science education and on the other hand to bounce on the writing of a new EIE. This time, for first year of high school classes, and thus making more collective innovation.	The case study focuses on agricultural practices even if it assumes more scientific and social approaches later.	Working from pupils' conceptions and building the ESR model with them, the teachers enable the students to read the composite reality of Agroecology, of agricultural families which refer to it and to choose the transition path(s) which are best for their action system. In doing so, they aim so to develop the lucidity of their students helping them to identify the range of possibilities and the related margins. Analysis of practice also helped the team teachers to share their own conceptions of Agroecology, making them more explicit, benefiting learners eventually.	The analysis of this case with groups of teachers, like the work done with their peers, first enables to see risks and crossing points of the agroecological transition support, with an audience of unconvinced students.

CHANGES

4 interviews with pupils regarding this lesson enabled to refine what they keep and the way they see the instruction built in class (if it seems to them operating as part of the agro-ecological transition).

One of them explains the purpose of their work: "We worked on the agrosystem, (...), on several practices for a same culture (…) and the agricultural interests of the introduction of alfalfa" and another explains what their teachers wanted: "we learn how to save inputs [gives examples of combined crops, legumes], but the most important thing is the three categories of how it will change. If it changes the workshops or if it not influences a lot." For another, "they [teachers] have shown 4 cases to see the difference between different models". Cooperative group work, was very appreciated. They found interest to "see what others think." They find interesting the ESR grid: "because it allows to see different work systems on a same culture", "it shows we can produce as much taking care of the environment", "it is useful to compare," "what it brings, is to qualify in a model". They can see the gradients in terms of Agroecology. They realize that at the highest level, one takes into account the complexity, the complementarity of systems, but they have difficulties in saying it: "At first, it is not detailed and then the last really more', "at the beginning he tries and at the end he did really well in fact", "It's useful to watch practices, be aware of the differences of the various systems to be better with the environment", "it shows that we are not obliged to change everything, to do it all of a sudden! We can do little by little. We can already put a legume to reduce inputs and then do tests, and if it works, we can review the workshop." They see the operating dimension since they all say thinking during the class to use it at their parents and/or work placement; this way, some, without thinking, qualify their farm as under the conventional or of substitution. Most importantly, three of them emphasized the need to make tests, search: "Takes several years to develop well" and confess their difficulty: "it's hard to change, we're used to the practice we do."

CASE CONCLUSION

The support of the agroecological transition involves changes in education. In particular, training students to observe and reason the action. This means that observation tools / reading grids should be built, that they must be learnt how to problematize, diversify their assumptions of solutions, to diagnose, test, evaluate, adjust... by using at all times de-contextualization / re-contextualization of knowledge and by integrating the entanglement of new space-time scales. This implies a real upstream teaching and instructional job for the teachers.

The case study was designed to see if the proposed lesson falls or not within the support of the agroecological transition and if this action is innovative in teaching (at least in French teaching). The lesson under study was aimed to begin from the pupils' images and to build a model which could enable the pupils to see the reality of Agroecology, of agricultural families which refer to it and choose the path(s) of transition best for their action system. The objective was to work on the youth's ability to judge. The interviews with four of them at the end of the lesson show that constructed knowledge is operative for them, it gives them influence on the agricultural patterns/practices they are facing. The need for a systemic, necessarily more complex approach, seems more obvious to them. They highlight the need for them to reflect, to experiment, to adjust their practices... They stand out of the recommendation "applicant" model. Finally, at the end of this lesson, they are aware of their own resistance ("it's hard to change, we are used to the practice we do") and they stop putting the blame on the current system and its socio-technical locks. A state of mind which, ultimately, is necessary even if it is not enough to begin thinking transition.

COUNTRY CONCLUSION FRANCE

These case studies highlight various aspects of Agroecology and different levers facilitating the transition. Thus, the commitment of the actors in a given area to work together facilitates the development of projects and the implementation of new practices. The technical topics are varied: landscape management, improvement of the water quality, use of bio-controls and management of feed resources in order to achieve food self-reliance of the herds at the territory level. Experimentation and evolution of farmers' practices are essential points of the transition. It passes by a group dynamic to bring together various actors around common objectives and to promote communication and sharing of experience.

However, learners, future actors of the territory, should also be aware of the evolution of practices and agroecological stakes. It is important to get them to think about this in different ways. It is interesting to make them face professional situations, to make them interact directly with farmers, actors of the sectors...

Various innovations were highlighted through the case studies. Technical innovations were highlighted too. Thus, the organic producers EEIG thought about implementing multispecies pastures, about developing combined crops and about the use of a toaster and a spreader with spreader table. All this results in greater food self-reliance of the herds, which can lead to improving the resilience of the farms, as well as their environmental performance. The Toulouse experimental platform enables to work on alternative practices such as mechanical weeding, the use of bio-stimulants for the protection and nutrition of plants and integration of plant covers. The preservation of functional biodiversity through the reduction in the use of pesticides is also an important element. The first case study breaks new ground for the development of practices related to the wine landscape management. Indeed, the establishment and maintenance of landscape elements enable the preservation of water and soil quality.

Social innovations are also highlighted in this document. Through experimentation on offshore sites, the agroecological platform of Toulouse team accompanies the change of practices in different territories. This allows to expand the creation of technical references and the possibility of communication and sharing on a larger scale and contributes to the agroecological transition at the national level. In the same way, creating a management method for the vineyard landscape and a landscape and environment Charter-showed in the first case study- enables to accompany the territory actors in the transition thanks to innovative tools.

Finally, educational innovations are highlighted. Indeed, the two recent case studies illustrate the importance of developing innovative teaching methods. This results into a significant involvement of the learner in the reflection of new agroecological systems. Thus, students are expected to reflect on Agroecology and the way to reach it, especially through professional situations and exchanges with the territory actors.

These case studies will supply the third intellectual output of the project in different ways. This will allow to highlight interesting practices-to be developed with learners- in different forms (game, study cards, debates...). In addition, these examples will serve to illustrate the importance of the group dynamics within a territory. This can lead to a reflection on what is possible in the local agricultural context of learners. Finally, the present educational tools and methods can be reused, analysed or adapted by the teaching staff.

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SLOVENIAN CASE STUDIES

In this section the best-case case studies of agroecological innovations within Slovenia are elaborate through a presentation of each of the cases, an analyses and concluding remarks. Written and compiled by UM: Ana Vovk Korže and Janja Lužnik

INTRODUCTION: CASE STUDY SELECTION AND REASONING

In Slovenia, we have selected for cases of AE the educational polygon Dole, the Nature Development Centre and the open-air museum in Rogatec. Selected cases represent innovative practices at the local and regional level, because they operate on the principles of AE, focusing on the sustainable use of renewable resources, pollution reduction, conservation of natural resources (in particular conversation of water, energy, and soil), including the local community and thereby activate the local economy and take steps to strengthen the diversity and adapt to natural conditions, or they follow the steps in their activities. The activities reinforce the functioning of the people (promote their empowerment) and thereby increase the long-term benefits of the region.

The main purpose of each of the three approaches was to inform and educate leaders of agricultural sectors, small farmers and educational institutions on fundamental principles in the field of agroecological self-sufficiency, high-quality food production, presentation of opportunities for integration and cooperation of various stakeholders in the community in the direction of effective sustainable regional development in the field of agriculture. Selected example cases also have an important role in the local economy and society which could be new alternatives to the community builder based on the promotion and conservation of natural and cultural heritage, cultural tradition, biodiversity and sustainable agriculture practices.

Case study 1: Educational polygon for self-sufficiency Dole – private research and training center supports research, education and develops new skills in the field of sustainable innovation for all generations with practical experiences. It is only Slovenian research and education center at local level, which supports and promotes AE techniques and practices and plays an important role in outdoor learning.

Case study 2: Nature Development Centre for sustainable development in municipality Poljčane is an administrative center for supporting Organic Farming (OF) in Natura 2000 and protected areas and plays an important role in the local economy and society. With various activities the center increases awareness among the local community about the: nature and biodiversity conservation, quality local food production and supply, promotion of intergeneration activates.

Case study 3: The village Rogatec has in an innovative sustainable way promoted local development within the concept of Open air museum Rogatec that is based on sustainable farming and a variety of service activities in the country. They have been able to attract some other institutions such as schools, public institutions, interested individuals in their regional development and they have established a network of cooperation. The museum presents an innovative approach and an integration of local communities. The Museum is 80% co-financed by the state, 20% of the income is made by its own activities with an emphasis on their own production and processing, the sale of innovative organic food products (bread made from organically grown traditional indigenous cereals) and other products in the Museum shop. With the implementation of a variety of educational workshops in the field of sustainable agricultural practices and self-sufficiency they significantly contribute to education and with it they also support local farmers. For youth and adults, they carry out

ethnological workshops, museum demonstrations and workshops of teaching cottage industry, farm work and the cultural traditions of the regional area.

DEFINITION OF INNOVATION

Innovation or new feature, a new phenomenon, is a new idea, a new product or process technology, a new product or object with new features. Innovation differs from inventing (invention) in commercialization. Innovation is therefore successfully adopted in the market. Innovations bring a new, enhanced usability in the form of a raising quality, decreasing costs, raising corporate reputation, the restriction of competition (//sl.wikipedia.org/wiki/innovation, 19. 6. 2016).

AE deals with contents as the ecology in agriculture, organic farming, sustainable agriculture, green agriculture, permaculture, ecoremediations, integrated farming and natural agriculture. According to the official definition the term AE means the use of traditional practices that are consistent with the characteristics of the local environment and do not limit only on food production, but also on food processing (recipes), products made from natural materials, especially wood, stone and construction as well as on ways of sustainable relationship to nature (water storage, attitude to water use, attitude to soil, shallow ploughing, attitudes toward animals, plants).

In Slovenia the term is limited to the understanding of the importance ecology in agriculture. The term AE is thus very broad and it is understood as a responsible way of life according to the tradition of the local environment (Raman 2006; Dunphy, Spellman 2009). The approaches that are developed in Slovenia and in which we can find the content of AE, are limited to single segments of the term. Thus Organic Farming (OF) means farming according to EU guidelines, which takes into account the relationship to plants and animals, but they are not based on heritage or tradition and they do not direct natural resources in the direction of energy-saving use. OF knows irrigation and reclamation of land, ploughing, spray and protective agents. OF procedures are certified and as such generally applicable everywhere, regardless of location, tradition or the conditions of nature. Typical of biodynamic agriculture is to compliance with the rhythm of nature and to understand the cosmic forces and energies of the Earth, such as ethers. This is the highest level of responsible attitude to nature, but is not officially supported since it is not interesting for biodynamic agricultural markets because it does not use poisons (Piercea 1990). In Slovenia, permaculture is increasingly expanding and takes into account a comprehensive approach to nature, but it also has a hint of Asian elements, in particular, vertical gardening and various green systems, many of which are not suitable for Slovenian situations (green walls require a lot of water). We note that the concept of AE connects all the elements of responsible lifestyles, so we are introducing this concept as an integral for all the terms that have been used up until now in Slovenia.

Innovations in AE mean an approaches that goes beyond the classical farming and includes all dimensions of sustainability. In practice, this form of AE means a new opportunity for the development of rural areas and employment, especially for young people.

Slovenia is in diversity a rich country and it has great potential for further development toward AE, but the cooperation of all stakeholders and innovative approaches are needed for developing unique Slovenian agriculture based on sustainable small size family farming model with adequate social standards.

Slovenian innovative practices are introduced in the field of AE at the local and regional level. The AE is represented primarily as a practice and science aspects: educational (educational programs for all stakeholders based on AE principles), technical (new technology for efficient use of renewable resources, AE principles for food production and processing), economical (improving the economic standard of small-scale farmers, the setting up of new sales concepts), social (networking and integration of the various participants in the

community , an increase in social activities in the community, promoting a healthy lifestyle), as well as political (regional administrative support). With selected examples we want to encourage small farmers in particular, and the various stakeholders of local communities to take advantage of the benefits of agro-ecological approaches that contribute effectively to the sustainable development of the local environment. The focus is on sustainable use and conservation of renewable and natural resources with low levels of external inputs, connecting local community for the purpose of increasing the social and economic benefits of individual and the community, adaptation to climate change and local natural conditions and environment, the reduction of pollution and environmental protection, nature conservation, promoting restoration of the soil and biodiversity in production systems. These measures strengthen the operation and integration in the community and increase the long-term benefits of the region, the establishment of a healthy lifestyle and the strengthening of responsibility at the individual level.

CASE STUDY 1: EDUCATIONAL POLYGON DOLE

This case study illustrates the educational, research and technological approach in the field of self-sufficiency, with an emphasis on transfer of science into practice where the participants are actively involved in the learning process. To achieve this goal, the various tools and methods are used: learning by doing educational processes (observation, fieldwork, laboratorial work, interpretation), cooperation with community. The main expected results are to educate various target groups in the field of self-sufficiency through firsthand experience.

Educational polygon Dole is dedicated to enhancing the experience and education about how to become self-sufficient, as far as possible, in the field of food, fertile soil, water, energy, and in the management of natural resources. The focus is on education, on the introduction of the new green technologies in the field of ecoremediations (natural systems), permaculture and biodynamics, which combined represent agro-ecology. On the educational polygon there is a process of forming new knowledges based on AE approaches, the flow of this knowledge into practice and the transfer of this knowledge to the local environment and this educational approach can help in the transition to agroecology.

This example is chosen because it is the only one of this kind of approach in Slovenia, where there is a practical education in nature with the transfer of academic knowledge to the level of direct applicability. Approaches of ecoremediation are used, therefore the observance of natural processes, permaculture, that is the use of vertical beds with internal water balance, as well as the design of sustainable buildings, on the principle of efficient use of energy.

In this area, we can see how it is possible to live sustainable and revive the soil with observing the nature and connecting natural resources such as energy, biological resources, water, humus and rocks.

CASE DESCRIPTION

The educational polygon Dole provides a comprehensive understandment of approaches of AE in the area of 1.5 ha. With the connection of tradition (terraces, the observance of natural resources) and the connection of innovation (ERM, permaculture), and by using the service activity (education, information, purchasing products) a visitor of the Educational polygon Dole can understand AE.

The key principles of AE, which are maintained on the Educational polygon Dole are:

- **The use of renewable resources** (collecting water and diverting water retarding basins for water ecosystems, solar energy, the use of biomass for the production of compost, the use of plant parts for mulching the soil and to preserve moisture in the soil);
- **Conserving natural resources** (soil conservation without machining, moisture retention in the soil with mulch and maintaining compost process (VPN) on the spot, promoting the formation of soils by retaining moisture and the process of humification, keeping the nutrients in the soil, the decrease of soil erosion by using a terrace systems, production and storage of indigenous seeds, conservation of genetic resources of indigenous varieties of seeds by collecting and storing seeds and thus — reducing dependence on external inputs for household and farm use);
- **Adjusting this to local environments** (selection of plant species that are well adapted to microclimatic and site conditions);
- **Managing the ecological relationships in the production system** (promotion of the diversity of species, regulating the natural balance in nature by attracting beneficial organisms and supporting ecosystem services);
- **To maximize long-term benefits** (recycling of nutrients through composting, preserving smooth processes of micro-organisms in the soil without any additional cultivating or watering, by establishing a permaculture-based approaches that do not require watering, as they reduce the internal water balance in the soil);
- **To minimize toxics in the environment** (there is no use of chemicals);
- **To manage the whole systems** (the establishment of natural ecosystems and the use of natural materials, which allow the circulation of water, the retention of water in the soil and deep-rooting of plants, which is essential for the health of the plants and for growing seeds);
- **To value health and healthy life style** (with educational activities, information, active learning, the acquisition of practical experience and transforming them into your own practice);
- **Diversify** (implementation of various agroecological practices-crop rotation, offer diverse products like tea, herbs, seeds for their own use and sale; the formation of different study programs; the use of diverse plant species and types of planting; the use of multiple crops it; ensure production over the whole year);
- **To empower people** (education of agroecological principles and permacultural methods of production; cooperation with the local community; to conserve indigenous knowledge and culture; the transfer of academic knowledge into practice with the aim that the knowledge is available for the general public, that scientific knowledge is produced in practice and that they are beneficial to the welfare of humans and animals).

Figure 5: The educational polygon for self-sufficient supply Dole

CASE OBJECTIVES

- **The educational polygon Dole becomes the central center for education about the AE approaches** as a way of life in Slovenia, both for the agricultural profession, educational institutions and the interested public;
- The main content emphasis of the educational polygon Dole is **the development and application of new knowledge in the field of innovative and responsible use of natural and renewable resources**, in particular water, soil, vegetation and energy sources;
- The advantage of educational polygon Dole is **the transfer of academic knowledge into practice,** therefore, researches take place on the polygon, allowing for the activation of the new practices for retention of water in the soil, the nutrients, water resources and monitoring of soil properties;
- **The promotion of the use of innovative agricultural technologies, based on the principles of AE and the transfer of knowledge to the general public** with the participation of the state institutions with workshops, excursions and education in nature on the basis of developing a variety of educational programs adapted to the needs and prior knowledge of the users. It is essential that the polygon Dole is suitable for all generations;
- **The promotion and encouragement of self-sufficiency and awareness** that each may be at least partly self-sufficient, without large investments and with some invested time, all it takes is the will, motivation and awareness that dependence on global trade networks does not improve the quality of life. That is why the so-called easy self-sufficiency that a visitor experiences visitor is a motivation, to withstand the experience that they get on the educational polygon in their own practice;

- **The promotion and encouragement of innovative concepts of sustainable forms of farming encouraged by the community** with the aim of individuals earning a basic or additional source of income. This has already started the movement for self-sufficiency, many people of different generations, already have its own gardens, young people are buying land and are arranged their own self-sufficient corners. We are find that in the community there is already a strong self-sufficient movement, but it's still not recognized by the politicians.
- **To promote and strengthen the conservation of ecosystems, ecosystem services and biodiversity** at the level of the garden and fields with the help of different AE approaches.

HOW OBJECTIVES ARE CHOSEN

Educational polygon for self-sufficient Dole is reaching the aims of AE education and research through four approaches:

- **Physical arrangements in nature:** in the area of educational polygon are techniques of ecoremediation, permaculture and agro-ecology, by means of which rainwater is collected, renewable sources of energy are gained, humus is made, the soil is detained on the slopes and other similar arrangements;
- **Information on the spot:** all the processes, arrangements and planting are marked with information and learning tables, which allow the user to learn on his or her own from the situation on the spot, so the user of the polygon can at all times be accompanied by arrangements and gains the information about the polygon in live;
- **A professional guidance with workshops and excursions** take place on request. The target groups ask for education that is oriented towards practical experiences, so they gain direct experience, which they can transfer to their own practice;
- **Scientific support for education** through research and books, which are formed on the basis of data collection, monitoring processes and evaluations.

The fundamental approaches to achieving the objectives are based on the integration of the participants, so the participants are active on the tour or excursion to obtain the consciousness that there is a possibility of being able to establish its own model of self-sufficiency and gain the motivation to take care of the soil, water, natural resources, and the circulation of substances in nature on the surface of 1.5 ha.

Thus, when an individual develops inside the need and the motivation to want to be at least partially self-sufficient also in the area, which is not ideal in a natural way, the individual begins to realize the importance of the knowledge we need for the development of degraded and poorly-developed areas where there must be an integration of natural resources, allowing the growth of plants, the layout of the sustainable buildings and with this the so-called sustainable way of being , which is also a global aim. In the case of the educational polygon Dole this aim is achieved individually, with no carbon footprint, with minimal cost and with a lot of knowledge that has been developed in the past.

CAPITALIZATION

INNOVATION RUBRIC

This rubric illustrates the innovations seen in the Case Study, and how they apply to Agroecology. In this section please select from the list below the sub-indicator and the corresponding main indicator from the list below to describe different innovations from the case study in the innovation rubric below. The indicators chosen will help us typologize the answers and identify patterns and gaps in the various case studies for the general capitalization section.

Type of innovation (from the innovation list)	Description	Science, Practice, or Movement?	How does it more specifically apply to Agroecology?	How could this be transformed into an AE teaching tool?
Innovation 1 **(Educational)**	**Outdoor learning** With direct experience of self-sufficiency an individual gains a practical experience, which they can use in their own practice, and so begin a personal process of self-sufficiency. Innovation arises from the connection of natural conditions of a particular area (what do you have?), with what you want (your goals, why do you want to be self-sufficient?), and they can see ways how they can be self-sufficient at the polygon (what do you have to do for self-sufficient?). It is this concrete approach that attracts many individuals to change their existing bad practices and develop sustainable approaches.	Science, Practice	Ecology in agriculture can be achieved only from below to upwards. It is therefore essential to wide crowd of people has knowledge and experience, since the usual school system is not based on applicable knowledge, but mostly on the remembering information without personal interaction with the content. Therefore, the resistance to classical education is big and it doesn't give the needed results. On the other hand, directives and regulations do not bring concrete changes of which organic farmers have already been warning about and they need concrete approaches, solutions and not theories. That is the great advantage of experiential learning for AE.	On the basis of physical arrangements covering the so-called natural systems, green technologies, sustainable facilities, and include water, energy, seeds, crops and produce self-sufficient we will develop curricula/modules, through which teachers will be able to mobilize young people to actively monitor and recognize AE. In Slovenia, the AE has not yet been identified. Through a catalog of AE, where individual systems will be presented this kind of knowledge will be developed and later on the knowledge would be upgraded on the field where additional information about its characteristics and operations would be gained (for example how high the vegetation belts are, etc.) and then the awareness of the importance of this kind of arrangements in the region where we live will be developed. Approach contributes to spread the systemic awareness of the importance of the AE.
Innovation 2	**Support of different AE and ecoremediation techniques**	Science, Practice	Concrete spatial arrangements at the level of the garden and fields are carried	The demonstration of different AE spatial planning approaches for the promotion of

(Technical)	The imposition of new green technologies in the field of ecoremediations (ERM), permaculture and biodynamics that are based on AE principles and presentation of self-sufficient energy facilities for the purposes of food production. On the educational polygon new innovative knowledge and researches in the field of AE are being developed and carried out.		out according to the principles of AE. There are the first such comprehensive arrangements for the purposes of research and education, supporting the formal education system for small farmers, students and professional staff.	spatial biodiversity, ecological management of pests and diseases, etc. The demonstration of different ERM spatial planning arrangements for an effective reuse of renewable resources, the protection and strengthening of ecosystems, etc. Professionally guided tours of examples of good practices.
Innovation 3 **(Social)**	**Inclusion of different target groups, stakeholders and cooperation with local community.**	Practice, Movement	Strengthening of the support and spreading the awareness of self-sufficiency on the level of individuals and of the community. In cooperation with the local community the educational polygon Dole contributes to regional development, promotes the creation of green jobs in the field of self-sufficiency, green tourism, etc.	Tours of best practices, implementation of educational workshops, educational lectures, etc.

OVERLAPPING BOUNDARIES

On the educational polygon in Dole, along with the **educational innovation** -outdoor learning with different educational programs for all stakeholders based on AE principles, it is also possible to see new **technological innovation** – energy self-sufficient facilities, sustainable eco-innovation – the application of principles of AE, ecoremediation and permaculture, and **social innovation** – integration of the different target groups in gaining their own knowledge, networking and connecting different stakeholders in the local environment, promoting a healthy lifestyle.

CHANGES

Slovenia began to encourage conversion to sustainable forms of farming, for which there were EU and national financial incentives, which helped farms to replace the lost income due to the transition. Slovenia promotes the introduction of agricultural practices, which in the long term contribute to the preservation and protection of the environment, sustainable management of non-renewable natural resources, soil fertility, preserving biodiversity and traditional rural cultural landscapes, protection of drinking water resources, adaptation to climate change and at the same time ensuring the production of high-quality and safe food (online source 6).

Educational:

- **Creating learning environments in order to promote self-sufficiency after the model of educational polygon Dole** educational institutions (kindergarten, primary and secondary schools, student campuses). In the last five years of operation of the educational polygon for self-sufficiency Dole in Slovenia we perceive the increase of the term educational polygon. Many schools, smaller companies and private individuals have taken up this term and use it as a concept for the areas where they have highlighted the arrangements that they have seen and actively recognized at the educational polygon in Dole (the process of mimicking has begun immediately, individuals had already started to abide permacultural arrangements);
- **Dissemination of knowledge in the field of self-sufficiency** and AE practices through a variety of educational programs, publications, lectures, workshops, which are aimed at different target groups;
- **Strengthening of cooperation with various educational and other institutions in the field of AE,** in the local, regional and international environment.

Social:

- **Strengthening consciousness of environmental protection and responsible attitude towards the environment.** On the local level, we logged many changes in all generations, as in the younger who want a different way of life, as in the elderly, who are eager to have a healthy way of life and a healthy relationship to the environment.

Economic:

- **The development of green jobs.** By supporting the educational polygon Dole in the local environment, a number of "green jobs" has developed (the development of complementary activities in organic farms in the area of green tourism, the development of innovative food products, etc.);
- **Improve the integration of the various stakeholders in the local community and promote regional development.**

Technical:

- **Supporting innovative agroecological practices;**
- There is an increase of sustainable AE practices in the local environment in the field of renewable energy sources, the promotion and preservation of biodiversity, the ecological management of pests or diseases, without the use of chemicals but instead the use of natural substances for pest control, the introduction of beneficial organisms in the production system at the level of garden. Many participants of the polygon have in the past used the chemicals to promote plant growth, after the education at the educational polygon Dole and after seeing good practices where plants grow well without chemistry, which is healthier and more affordable cost the participants are replacing their own practice.

CASE CONCLUSION

Educational polygon Dole is selected as the only example of an educational center in the field of AE, and it represents an innovation in the field of the transfer of academic knowledge into practice at the national, regional and local level. AE as a practice is carried out at the level of practical approaches and the use of new knowledge in the field of innovative and responsible use of natural and renewable resources. As a science AE is represented through the development of new AE practices, education and transfer of academic knowledge in a broader general and expert public. AE as a movement consists mainly of social level, since the implementation of the activities in the polygon promotes and encourages self-sufficient production and processing, according to the principles of AE and the possibility to create green jobs to improve the personal income of individuals. A great emphasis is on the environmental aspect, where the promotion of sustainable AE practices promotes conservation and encouragement ecosystems, ecosystem services and biodiversity at the level of the garden, field, landscape and climate change adaptation.

Useful knowledge from practice motivates individuals to change their own practice and that they want to be self-sufficient. The awareness that self-sufficiency needs knowledge and experiences is required for the AE, which is based both on traditional practices and innovation. Therefore, it is essential the realization from the educational polygon Dole for AE in specific approaches where the theory gets materialized and gets personal responsibility. Only with this, radical changes are possible in the society, and this is already recognized by teachers and interest groups.

The main emphasis is on the ' learning by doing ', which means working and learning. "We have extended these activities into a pillar of lifelong education. We educate housewives, artisans, entrepreneurs, people who are interested in new approaches of cultivation, production, either because of their job or completely private. Participants come to us on trips for science days or to a research camp. " The idea is to work and along with work to get to know ways which allow self-sufficiency in many different areas. Finally, science is brought to a point where it is actually useful. We can now pass on in real life some of the leading-edge scientific results. The achievements made by the modern agriculture developed with sprinkling and fertilization have burdened the environment, and the land is now a dead skeleton. If we do not change the method of treatment, and return the nature what belongs to it, the outlook is poor. We have to start to revive the soil with new approaches. In this, we see a way out of the crisis. The fact that we find ourselves so low is the result of unhealthy competition and impossible situation in the economic world, based on unrealistic facts. This must be stopped. We have selected the Poljčane municipality, which has an official status of educational municipality. These two polygons for self-sufficiency and green technology are an example to show people what can be done. The whole infrastructure is set up for learning. The focus is on education and connecting traditional knowledge with innovative approaches. Only traditional knowledge is not enough anymore. The situations used to be different,

there was a different pace of life and the top-quality science, which is not set as a way of people's lives is not useful today. These two spheres need to be connected.

Figure 2: Agroecology in practice connects the scientific level with practical experience, spurring a movement for self-sufficiency.

CASE STUDY 2: NATURE DEVELOPMENT CENTRE

Nature development centre in Dravinjski Valley was established with the purpose of helping the region in sustainable development, since most of the valley is under Natura 2000 area or a protected area of landscape parks (Boč, Donačka gora, Štatenberg, Požeški ponds), so these areas require a different development. As an institution it offers a political support to farmers in the area of Natura 2000 in Dravinjski Valley. The centre organizes lectures for farmers, where they receive their official guidelines for land use in protected areas. At the same time, the center supports and implements projects and as a foundation it cooperates with the University and the economy.

The central theme of the presented case is the sustainable regional development, with an emphasis on the promotion of natural and cultural heritage, traditions, cultural landscapes, green and educational tourism.

CASE DESCRIPTION

The Nature Development Centre was established in 2010 in the framework of the EU regional development project, which aim was to obtain the space and building for the connection of the public (workshops, education). The center is a part of the municipality of Poljčane and it employs one person. The main activity of the centre is to connect with the local and regional environment in order to achieve sustainability. The Nature development centre also has the nickname "Center for sustainable development of the Dravinja Valley" with the aim to reach sustainability in all areas with the help of the public.

Project of Nature Development Centre – phase 1, presents the project where the main factor of development is nature, with the aim that the Nature Development Centre would not be only local centre but also regional centre, where activities in the area of management of protected areas would take place. The entire project is highly focused on the preservation of authentic nature and sustainable development of the area and the region, with emphasis on the integration of the local environment.

The main activities of the center are:

- Implementation and support of innovative ways of integrating the natural and cultural heritage for educational purposes;
- Development of educational, touristic, promotional and commercial activities;
- The development of new knowledge, ideas and projects;
- Information on the implementation of activities in the local environment;
- Close cooperation with local societies and sections;
- Promotion of the municipality, its natural and cultural resources;
- Consulting for innovative general regional development, based on the protection of nature;
- The international integration with faculties, schools and other institutions;
- Cooperation with the research course for nature (ecoremediation polygon), the production of permacultural and thematic routes and;
- Information on tourist offer of the area, the natural and cultural heritage, the gastronomic offer and the possibilities of spending the night in the town and surrounding areas.

The key AE principles of the Nature Development Centre:

- **The use of renewable resources** (promotion of sustainable use of renewable resources);
- **Conserve natural resources** (conservation of biodiversity, ecosystems and ecosystem services);
- **Adjusting to local environments** (promotion of the local cultural heritage);
- **Maximize the long-term benefits** (implementation of activities that are locally supported financially, the integration of the local population in a variety of activities);
- **Diversify** (offer a variety of products and services for sale);
- **Empower people** (implementation of educational activities, information about local activities, conservation of indigenous knowledge and traditional culture, the local people are included in the decision making process through the educational workshops, connecting local communities).
- **Organisation structure:**

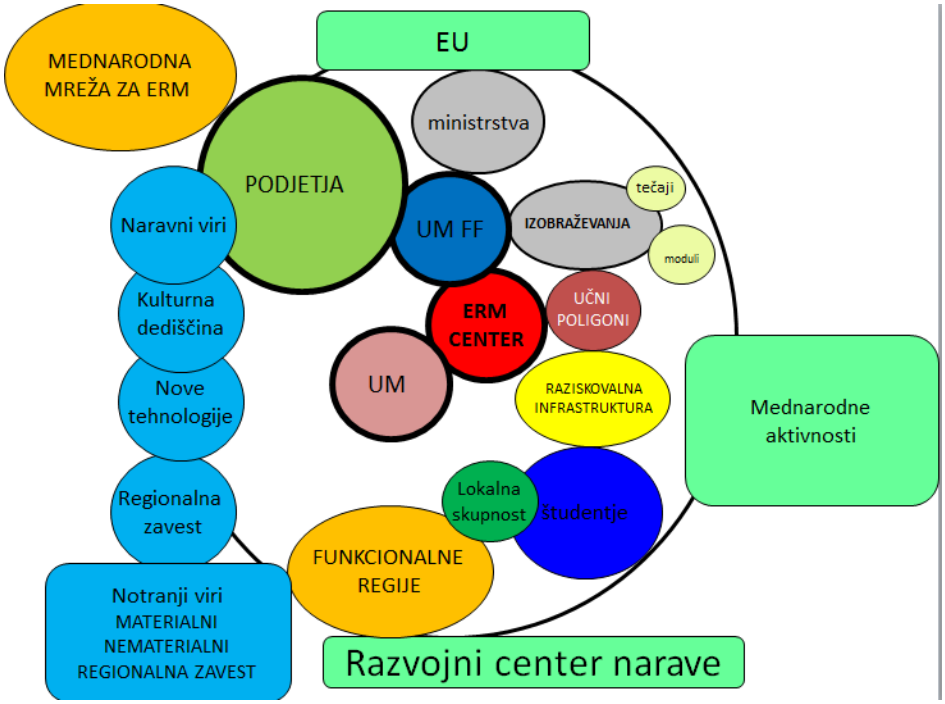

Figure 3: The schema shows organization of the Nature Development Centre – phase 1 as a local and regional center focuses on the preservation of authentic nature and sustainable development of the area and the region, with emphasis on the integration of the local environment.

CASE OBJECTIVES

Please describe here in bulleted points the objectives of your case study (max. ½ page).

- Connecting people that live in protected areas;
- Activation of individuals for organic production;
- Transfer of academic knowledge into practice;
- The exchange of good and bad farming practices on protected areas;
- Informing about the laws and regulations;
- Organizing social events;
- The promotion of social inclusion and economic development in rural area;
- Providing ecosystem services and public goods;
- Preserving the natural and cultural heritage and cultural landscape.

HOW OBJECTIVES ARE CHOSEN

The municipality of Poljčane lies in the flood area of the Dravinja Valley and therefore has more than 50% of protected areas of Natura 2000. In this area there are special protection regimes for agricultural use, as for the other activities in the area. To get people approached with living on protected areas and help them understand the importance of preserving ecological balances in ecosystem-sensitive environment, in 2010 the Nature Development Centre was founded. Its main objective is to provide for the conservation of nature in flooded areas along with the simultaneous protection needs, this is to take into account the natural dynamics of floods,

to adjusted by selection of crops, so that the nitrogen bound in the soil and does not occur in flooded river, taking care that the soil is covered with plants, that flooded water does not wash out the soil, reduce the classical processing of soil by inverting and the sustainable use of soil through the strengthening of biodiversity. This can be seen in nature with the conservation of protection vegetation belts, polyculture are dominant, domestic varieties of seeds, etc.

The economy of region supports independence from a single type of crop, the use of alternative markets, creating added value to the crop, finding alternative income and agrotourism is straightening. What is against this are subsidies that people still get for farming in flood areas.

The municipality Poljčane has the Municipal Environmental Protection Programme noted with the following vision: "Citizens of Poljčane live in harmony with nature and with the help of ecoremediation develop innovative development activities for quality of life." In the vision document it is written: Municipality Poljčane becomes a recognizable educational, tourism, recreation and business destination with a strong enhanced nature based on ecoremediation. The area of municipality Poljčane has becoming the largest and most recognized outdoor classroom and offers a direct experience of the processes in nature, especially for young people to gain the opportunity of education for sustainable cohabitation. Nature provides a basis for innovative development programs that bring quality of life for all locals and visitors alike.

CAPITALIZATION

INNOVATION RUBRIC

Type of innovation (from the innovation list)	Description	Science, Practice, or Movement?	How does it more specifically apply to Agroecology?	How could this be transformed into an AE teaching tool?
Innovation 1 **(Environmental, Social, Political)**	**Regional development with emphasis on nature conservation** The Nature Development Centre with its operations covers more indicators; in the basis is based on the environment, since it is a major concern of the centre to maintain biodiversity, healthy soil, landscape and enable adaptation to climate change. This allows ecosystem services to operate, which means the ability of the water to cleans itself, as well as soil self-regulation. The use of ecoremediations allows tourism, marketing of locally sourced products and self-sufficiency, setting of short local supply chains.	Practice	AE is incorporated through traditional approaches of farming. Ecology is included in the production and in the marketing with the sale on the local markets and delivery system to homes. Traditional knowledge enables sustainable preservation and management of cultural landscape; alternative farming with the use of ecoremediations in production systems also includes flood areas, where classical agriculture is not possible. The Nature Development Centre connects ecology, culture, economics, society, with the aim of achieving sustainability. Strengthening of a collective approach. Adding value to local products.	Through the tours of protected areas in Nature 2000 in Dravinjska Valley or similar sites in other countries and the visit of Nature Development Centre (excursions, field visits) or institutions similar to this.

OVERLAPPING BOUNDARIES

Interlace of social, environmental, economic innovations, technical innovations are less represented.

CHANGES

Political:

- **The strengthening of local economic development and environmental awareness.** Promote the re-population of the people, in the last 5 years 300 people immigrated in the municipality of Poljčane. There is a greater concern for the environment and nature, new institutes and companies are registered that deals with nature and the environment. The increase in prosperity and economic standard of small-scale farmers;
- **Support and implementation of projects** for the promotion of regional development based on the preservation of the natural and cultural heritage;
- **Support and development of sustainable activities** that support nature conservation, since people have accepted the way of life with nature.

Educational:

- **Evolution of the educational practices.** The operation of the Nature Development Centre promotes self-sufficiency, many homes have gardens, which previously did not have. Dravinjska Valley in 2011 become a Classroom in nature for all generations, carried out a number of educational, promotional and tourist activities to enhance awareness of the importance of natural heritage, biodiversity, and ecosystem services.

Technical:

- **Development and promotion of green jobs** and the development of a diverse range of complementary activities and selling of traditional local products.

Social:

- **Diversity of stakeholders** (local farmers, students, local population, public institutions, entrepreneurs).

CASE CONCLUSION

The Nature Development Centre, with its operation provides a political and administrative support to the various stakeholders of the local community, in particular the small farmer at the Natura 2000 protected areas, with the aim to contribute to the development of the region, with a focus on the conservation of nature. The selected case presents AE mostly from the environmental, social and political point of view. As a practice, at the level of fields, landscape, local community and region AE is found in traditional approaches of conservation and management of the traditional cultural landscape (hedges and grass strips, appropriate crop rotations etc.) especially in flooded area of the Dravinja River, where the classic intensive agriculture is not possible. Social and economic aspects are represented in the use of alternative markets and additional revenue (sales on the local market, the system sales at home) and the establishment and promotion of short supply chains, creating added value to local products, use of alternative markets, promoting green jobs, connecting local providers, and thus to strengthen the collective approach and the development of agri-tourism.

The Nature Development Centre has a primary focus on the activation of people to take care of agriculture adapted to flooding and the protection regime of Natura 2000. Without the Nature Development Centre people would not think that is sensible to farm by the protective principles as it is mowing, later than usual, crops are bound to the selection of such varieties that are not tuberous plants (potatoes is not grown) due to the risk of flooding and organic farming principles are used. The people, the owners of these sites, need additional skills, information, psychological support, too, in the sense that it pays to farming in these areas and, therefore, is the role of Nature Development Centre is necessary. Their results are manly seen in disseminating knowledge to people, so that farmers are linked to the experts for an exchange of knowledge and do not get instructions from top to bottom, but in parallel, they inform each other. With this the participation of farmers and growers is enhanced and sales chains have created between public institutions, farmers and individual customers. With the formation of the society Treasures of the Dravinja Valley that works at the premises of the Nature Development Centre is an enhanced local partnership between producers and users. In the society there are people of different age, education and a very different generations and society has 100 members (which is in a town Poljčane with the total population of 4,500 quite a lot). An important role has educational tourism, therefore learning about sustainable approaches, where the knowledge of agroecology is already transposed into practice.

Figure 4: Education in nature along the educational path in the flooded area of Dravinja Valley.

CASE STUDY 3: OPEN-AIR MUSEUM ROGATEC

The Rogatec open-air museum is the response of the local community, to connect the rich history and heritage of the place with people, and instead of being the least developed municipality, they make their own story of success and all are involved in the local-regional development. Therefore, the Rogatec open-air museum is a center for the promotion of food production on the natural way and with this they wanted to maintain and activate people to continue to cultivate the soil in an otherwise difficult relief conditions. They connected

tradition with education for all ages in the old, renovated buildings and thus motivate different generations to participate, from artisans, showing ways of life to the promoters, which transmit knowledge. They have connected with environment and they supply the region with food and products through green public orders. The open-air museum Rogatec is a center for events, workshops and schools.

The museum preserves the folk architectural heritage and cultural tradition of the Obsotelje region between the 18th and 20th centuries.

CASE DESCRIPTION

Founded in 1981, the **Rogatec Open Air Museum** is the largest open air museum in Slovenia. It presents unique cultural, ethnological, regional, and historical features of eastern Slovenia. The museum presents the life and work of farmers and craftsmen at the end of the 19th century and the beginning of the 20th in the Rogatec area, under the Boč, Donačka Gora, and Macelj Hills. The skansen was conceived by the Celje Regional Office of the Institute for the Protection of Cultural Heritage of Slovenia. In 1999 it was declared a cultural site of national importance and in 1997 it was nominated for a European Museum Award.

The Rogatec Open Air Museum comprises 15 different relocated or reconstructed buildings and associated materials which make up the museum space and form three separated sections. The homestead of poet Jože Šmit (1922–2004) with a garden, an outhouse with manure pit and a field toilet, beehives, a pig stable, and a hay rack (*kozolec*). The administrative part are *loden*, an old shop with mixed merchandise, that is today also a museum shop and office. The third part is a domestic inn with a wine cellar and bar called *pušenšank* surrounded with vines that provide welcome shade in the summer and juicy grapes in the fall.

Some buildings are originals and have been transferred to the museum from the nearby villages, others have been reconstructed based on examples of existing buildings in the area. The museum includes: a dwelling house (a house where poet Jože Šmit was born), a farm house, a pigsty, a splendid hayrack from 1892, a latrine toilette and an interesting typical well. The blacksmith's workshop, an old grocery store »Lodn« (from the German word »Laden«), a vineyard hut and a beehive are of more recent origin. The buildings themselves and their interior is genuine, the green environment is neatly maintained and the view of steep Donačka mountain is incredible. A true country romance.

They provide guided tours in the museum and twice a week individual visitors can participate in fascinating workshops (with no extra costs) and get a first-hand 'taste' of the life and work of our ancestors. For closed groups they organize various educational workshops or demonstrations of handicrafts, bread baking, folk dancing etc. They can also arrange a feast in their vineyard cottage.

The staff do their best to create a rich activity program and they are also planning to extend the museum with new buildings and even more performances of the farmers' lives in this area.

Key AE principles for the selected case are:

- **The use of renewable resources** (implementation of sustainable production techniques for improving soil, moisture retention in the soil;
- **Conserve natural resources** (the use of indigenous species of plants and animals);

CAPITALIZATION

INNOVATION RUBRIC

Type of innovation (from the innovation list)	Description	Science, Practice, or Movement?	How does it more specifically apply to Agroecology?	How could this be transformed into an AE teaching tool?
Innovation 1 **Social, technical, political, educational**	Open-air museum links tradition and knowledge, which they had known in the Pannonian area centuries ago, with today's activities, namely tourism, marketing; they care for the environment, local organic food, as well as cooperation with the region.	Science-Practice	- Taking into account the traditions of the area - The transfer of traditional knowledge in today's way of life (food storage, food processing, preservation of the indigenous species of plants and animals) - Marketing through green public orders - Integration with the region - The development of new activities that the region did not know - Creating added value to local products - Integration of young people - Awareness-raising and education about sustainable approaches of self-sufficiency	Field tour, visit and participation in practical and educational workshops

CHANGES

The settlement with the operation of the open-air museum Rogatec open-air became recognizable around the world. Otherwise, the border settlement does not have other resources, but it has a very rich history, which has connected Rogatec with its development. Sustainable design for development, especially farming and service activities, in rural areas on the basis of tradition inspired other institutions such as schools, public institutions, interested individuals to establish a network of cooperation at the regional level. Since the open-air museum in a part of nationally important heritage, it gets 80% of the funds from the state for its development and 20% of the income is generated by its own activities. This is the production of organic products, compartments, they have their own facilities for production and processing, they bake bread and have a store inside the Museum. A significant part of the income is generated by the workshops in renovated old buildings, where they carry out activities connected with the customs, traditions and lifestyle in the past, by which many are deeply touched (can't believe how people lived 50 years ago).

CASE CONCLUSION

The Rogatec Open Air Museum is presented as an innovative example of the organization of centre at the regional level to encourage and promote the production of food in a natural way, linking different stakeholders of the local environment, promoting social inclusion and tourist development of the rural areas, support market development for bio-based products and processes, preserving local natural and cultural heritage, cultural tradition and cultural landscape. AE is in this case represented mainly from economic, social and environmental point of view. The Rogatec Open Air Museum as an umbrella regional organization promotes economic development in the region. In particular, through the integration of local providers and a wide variety of stakeholders provides the formation of new local businesses. This case is connected with AE from environmental point of view, since the implementation of traditional agricultural practices in the local area the area successfully adapts to heavy relief conditions and climatic conditions, preserves the image of tradition cultural landscape and promotes the native species of plants and animals.

Sustainable principles of AE in the Rogatec open-air museum are manifested in the use of renewable energy sources, as far as possible domestic raw materials are used for the products, which are then sold in their own stores and at alternative sales channels. With the restoration of the old building heritage suggests the principle of reuse, their activities are carried out exclusively in the renewable buildings. Raw materials from imports are not used, but domestic Slovenian material are used, those they do not produce themselves, they buy from organic farmers. With this they have a direct impact on reducing the pollution of the environment, since they do not use substances that do not burden the environment. Erosion is reduced with growing of perennial crops, using humus, and thus not breaking on the slopes, terraces are arranged there. The use of perennial crops does not require a lot of water, so they do not have to irrigate. They have a great concern with maintaining and storing seeds, maintenance of local native species and taking into account the sustainable use of the soil, so they have included animals in farming. Thereby, they directly strengthen the living organisms, increase biodiversity and adapt to natural conditions with a selection of varieties of plants and animals. Their principle is that they must act so that they can make a living from their own work and they transferee this to younger generations with very attractive workshops.

Figure 5: Heritage connects the tradition, natural materials and indigenous species of plants

COUNTRY CONCLUSION SLOVENIA

In the report are selected examples of good practice, in which it is possible to trace the approaches of AE on the basis of which we want to inform and educate in particular the head of the agricultural sectors, small farmers and educational institutions on fundamental principles in the field of agroecological self-sufficiency, high-quality food production, present opportunities for integration and cooperation of various stakeholders in the community, and with this speed up the transition to agroecology at the local as well as at regional and national level.

Slovenian innovative practices are introduced in the field of AE at the local and regional level. The AE is represented primarily as a practice and science aspects: **educational** (educational programs for all stakeholders based on AE principles), **technical** (new technology for efficient use of renewable resources, AE principles for food production and processing), **economical** (improving the economic standard of small-scale farmers, the setting up of new sales concepts), **social** (networking and integration of the various participants in the community , an increase in social activities in the community, promoting a healthy lifestyle), as well as **political** (regional administrative support). With selected examples we want to encourage small farmers in particular, and the various stakeholders of local communities to take advantage of the benefits of agro-ecological approaches that contribute effectively to the sustainable development of the local environment. The focus is on sustainable use and conservation of renewable and natural resources with low levels of external inputs, connecting local community for the purpose of increasing the social and economic benefits of individual and the community, adaptation to climate change and local natural conditions and environment, the reduction of pollution and environmental protection, nature conservation, promoting restoration of the soil and biodiversity in production systems. These measures strengthen the operation and integration in the

community and increase the long-term benefits of the region, the establishment of a healthy lifestyle and the strengthening of responsibility at the individual level.

Educational polygon Dole is selected as the only example of an educational center in the field of AE, and it represents an innovation in the field of the transfer of academic knowledge into practice at the national, regional and local level. AE is carried out as a practice, science and a movement at the garden, field and landscape level.

The Nature Development Centre operates as an administrative center for supporting Organic Farming in Natura 2000 and protected areas and plays an important role in the local economy and society. AE is represented from the environmental, social, economic and political point of view, particularly at the landscape, local community and regional level.

The Rogatec Open Air Museum as an umbrella regional organization is presented as an innovative example of the organization of centre at the regional level for promoting sustainable food production and traditional lifestyle. AE is represented mainly from economic, social and environmental point of view at local, regional, national and international level.

For the case of educational polygon Dole, the teaching tools could be produced in the form of a teaching module developed on the basis of the spatial organization of the educational polygon based on AE principles and allow individuals to actively monitor and identify AE in practices. Different natural systems, green technologies, sustainable facilities, which operate on the principles of AE are presented in a form of a catalogue. An individual with the help of the catalogue develops knowledge of sustainable farming and gardening. By seeing good practices of local production systems (learning-research center, organic farm, farmers' associations, etc.) an individual will on the basis of its own assessment of the real situation, new information and discussion, upgrade obtained theoretical knowledge and support it with practical knowledge. The modules encourage the active participation of all stakeholders. Teaching modules will help to understand and recognize the problems of local production systems and promote knowledge and awareness about the importance of AE and sustainable agriculture. In particular, small farmers and individuals in the field of food self-sufficiency will be via views of good practice, educational workshops and lectures helped to develop a responsible attitude to the environment and enable them to improve that their economic and environmental performance.

Teaching tool for the case of nature Development Centre and Open Air Museum Rogatec could be carried out in the form of excursions and field experience on agroecological research sites, production systems in protected areas, institutions for regional development with an emphasis on nature conservation and cultural heritage, the implementation of educational and practical workshops for transfer of knowledge and awareness of different target groups in the local and regional environment (the presentation of good practices preserves biodiversity in the production system).

Examples of good practice in Slovenia show that AE has already exercised in practice, that passes through the activities into practice and that education in the field of AE takes place, in particular, at the informal level. Because people of different generations are very interested in the content of AE, we believe that AE is the upgrading of the agricultural knowledge and transfer of sustainability in practice, thereby grows the insurance that sustainable development will not be alive only in theory but also in practice, right through AE.

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Lithuanian Case Studies

In this section the best-case case studies of agroecological innovations within Lithuania are elaborate through a presentation of each of the cases, an analyses and concluding remarks. Written and compiled by PLZMMC: Lina Gumbrevičienė and Edvardas Makšeckas

INTRODUCTION: CASE STUDY SELECTION AND REASONING

The case studies presented in the report are innovative by their nature in Lithuania. They cannot be accepted as a worldwide innovation or should not be treated as scientific innovations. According to the definition of innovation approved in the legal acts of the Lithuania Republic, they should be accepted as the successfully introduced products, services, ideas and organisational models into existing market. The case studies described are considered as practical innovations.

DEFINITION OF INNOVATION

Lithuanian Innovation Strategy for the year 2010-2020 (hereinafter – the Strategy), approved by the Government of Lithuania on February 17, 2010, No. 163, is a long-term strategic planning document which sets vision, objectives, goals and results to be achieved in the field of Lithuanian Innovation up to 2020. The purpose of this Strategy is to mobilize and manage state resources effectively: to create competitive knowledge economy based on the latest technologies and qualified human resources.

This Strategy was developed in accordance with the State Long-Term Development Strategy, approved by Resolution No. IX-1187 of 12 November, 2002, of the Government of the Republic of Lithuania (Official Gazette, 2002, No. 113-5029), the National Lisbon Strategy Implementation Programme 2008-2010, approved by Resolution No. 1047 of 1 October, 2008 of the Government of the Republic of Lithuania (Official Gazette, 2008, No. 124-4718), the science, technology and innovation development provisions of the Action Programme of the Government of the Republic of Lithuania, approved by Resolution No. XI-52 of 9 December, 2008 of the Seimas of the Republic of Lithuania (Official Gazette, 2008, No. 146-5870).

Definitions used in this Strategy:

Innovation – the process by means of which social and economic needs are met with new ideas and new products, services or business and organizational models are created; they are successfully introduced into existing markets or are capable of creating new markets.

Innovation system – a complex of interrelated organizations, links and means of their interaction.

Research and experimental (social, cultural) development (hereinafter - R&D) – systematic artistic activity for knowledge of nature, human, culture and society and use of its results.

Creative society – society of production of nonmaterial values; its resources are knowledge, and result is information.

Creativity – a complex of personal qualities that allow to achieve original, socially relevant, new quality results of activity; it is the process of mind (mental) and social process, incorporating discovery of new ideas and concepts or new links and interactions between known ideas and concepts.

Entrepreneurship – personal way of thinking and the social, managerial and other expertise, enabling to adapt the available knowledge in everyday life, i.e., specific skills, providing an opportunity not only to organize one's own business but also to take the risk of the decisions made.

CASE STUDY 1: ECOVILLAGES

The movement of the ecovillages reached Lithuania in the beginning of the XXI century as a socio-cultural and eco-settlement innovation. The newly established ecovillages or eco-communities joined the Baltic Sea Region (BSR) network of ecovillage. The ecovillage movement was researched by the Lithuanian Institute of Agrarian Economy through the project "Ecovillages for sustainable rural development". The Ecovillages project has contributed to the implementation of the Baltic Sea Region strategy and had a status of the lighthouse project of the Council of the Baltic Sea States. The aim of the project was to collect experiences and good practices from ecovillages around the Baltic Sea and foster the development of ecovillages as a more sustainable way of living in the region. Project was seeking to present sustainable solutions, innovations and lifestyle models tailored in ecovillages to the broader society at the same time encouraging ecovillages to spread these ideas and providing instrument for that.

Ecovillage is a settlement which combines sociocultural environment with a low–impact way of living. Choosing to live in ecovillage is choosing an alternative way to individualistic, materialistic and consumer-oriented lifestyle. This innovation deals with climate change, environmental pollution, resource shortages and social problems people face nowadays.

The case study of ecovillages was chosen, as this movement is linked with the AE through several aspects:

- socio-cultural aspect, as builds the healthy communities;
- economical aspect, as secures long-term sustainability;
- ecological aspects, as promotes the ecological and sustainable way of living, including farming;
- technical aspect, as eco-settlement practice applies environmentally friendly technologies.

CASE DESCRIPTION

The overview about ecovillages of Baltic Sea Region (BSR), is based on gathered data in 2011. An ecovillage is a human-scale settlement consciously designed through participatory processes to secure long-term sustainability. All four dimensions (the economic, ecological, social and cultural) are seen as mutually reinforcing. Attention to each is essential for holistic and healthy community development. (GEN, www.gen-europe.org, 2011).

The ecovillages are an outcome of citizens walking their talk in lowering ecological footprints while increasing their sense of belonging and purpose. It demonstrates that it is within human capacity and knowledge to consciously enhance and improve the environments in which we live.

The biggest density of ecovillages is found in Sweden, as well as in Russia. In Lithuania, Latvia and Belarus the ecovillage movement has just started only in XXI century. During the past 10 years, a significant increase in the number of ecovillages is witnessed. Most of the ecovillages were established in 2000 ï 2011. This is the tendency for Lithuania, Latvia, Belarus, Russia, Finland, Poland and Russia. The situation in Sweden is completely different. 25 of the 33 known ecovillages were established during the period of 1967 – 1999.

The number of people living in ecovillages is increasing. In Lithuania the average amount of people living in ecovillages ranges from 10 to 40. The bigest density of population of Baltic sea region ecovillages is in Sweden. There is one ecovillage with more than 300 residents was found. In addition there are 5 ecovillages with 100 - 300 residents, while the remaining ecovillages have 3 – 80 residents per ecovillage, with average being of 71 residents.

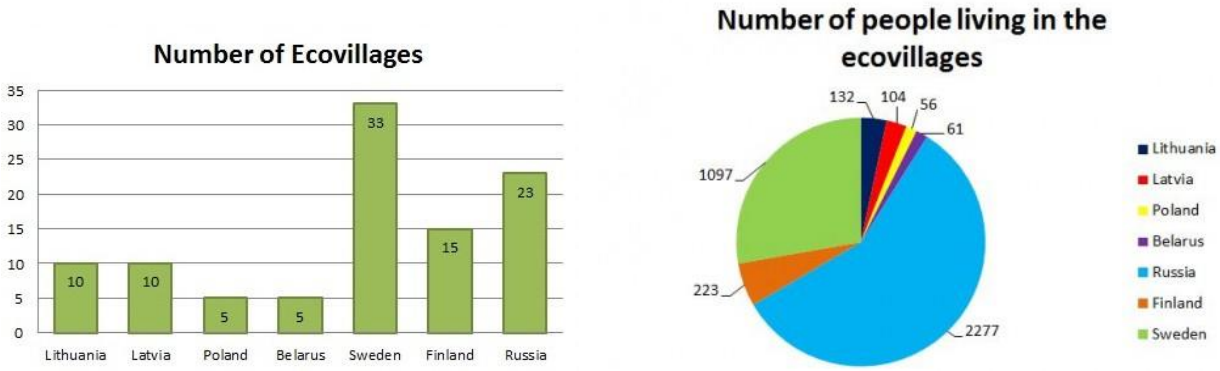

Figure 1: Number of Ecovillages adn people living in the ecovillages in the Baltic Sea Region (Source: http://www.balticecovillages.eu/ecovillages)

The number of houses and buildings usually depend on the size of the ecovillage. In most cases there is one small house for one family, so presupposed that there are 20 inhabitants living in the ecovillage, we would most probably find 5 - 7 small houses there. This is a trend for smaller ecovillages, with up to 50 residents. In bigger ecovillages it is not unusual for a couple of families to live in one bigger house. In Swedish and Russian ecovillages, which are counting more than 100 residents, it is common for 2-10 families to share one house. Houses are usually being built by the residents themselves. For instance, in Lithuania, Poland, Finland and Belarus houses were built by the hands of the residents. In the other countries the houses are built by the building companies.

CASE OBJECTIVES

- Illustrates how ecovillages can contribute to the holistic and healthy community development, and environment protection (agroecology).
- Illustrates how ecological communities can act as laboratories of progress and change towards sustainable development

HOW OBJECTIVES ARE CHOSEN

The movement of ecovillages is vital and involves more interested people every year wishing to find the copartners for establishing new ecovillages. The case study shows that the movement corresponds the needs of small part of the modern society wishing to promote healthy and sustainable way of living and contribute to the environment protection. Ecovillages allow people to experience their personal connection to the nature and living earth. People enjoy daily interaction with the soil, water, wind, plants and animals. They provide for their daily needs - food, clothing, shelter - while respecting the cycles of nature.

The eco-communities, especially the new ones, face various problems in such areas as renewable energy, permaculture/natural agriculture, alternative education, renewable construction technologies, alternative policy movement, and participatory approach in community decision making. The solutions of the problems

find out by the inhabitants of the ecovillages, sometimes with the assistance of the scientists and experts, acts as the laboratories for changes towards sustainable development.

CAPITALIZATION

Social – Community; Communication; Values and Ethics; Education; Autonomy-food sovereignty.

Environmental - Soil health; Biodiversity; Climate change; Plant health; Animal health; Landscape (spatial dimension); Ecosystem Services (clean water, air, etc).

Economic - Autonomy (e.g., less inputs less costs, etc.); Self-sustainability.

Technical – New technologies (housing, energy).

INNOVATION RUBRIC

Type of innovation (from the innovation list)	Description	Science, Practice, or Movement?	How does it more specifically apply to Agroecology?	How could this be transformed into an AE teaching tool?
Innovation 1 Social – Political	**A holistic approach to sustainability** - encompassing the Social, Cultural, Ecological and Economic dimensions of human existence. Ecovillages are communities in which people feel supported by and responsible to those around them. They provide a deep sense of belonging to a group. People are then able to participate in making decisions that affect their own lives and that of the community on a transparent basis. Ecovillages allow people to experience their personal connection to the living earth. They provide for their daily needs - food, clothing, shelter - while respecting the cycles of nature.	Movement	Ecovillages is a tool for developing the communities targeted towards ecological and agroecological aspects: - growing food as much as possible within the community bio-region supporting organic food production there; - Creating homes out of locally adapted materials Using village-based integrated renewable energy systems; - Protecting biodiversity; - Fostering ecological business principles; - Assessing the life cycle of all products used in the ecovillage from a social and spiritual as well as an ecological point of view; - Preserving clean soil, water and air through proper energy and waste management; - Protecting nature and safeguarding wilderness areas.	It could be transformed to an interactive computer game "AgroEcovillage", where the player have a task to set the Agroecovillage in different steps: choosing the peace of land, forming the community, building a house, starting farming, treatment of waste and etc.

CHANGES

Ecovillages are intentional communities whose goal is to become more socially, economically and ecologically sustainable. Most range from a population of 50 to 150 individuals, although some are smaller, and larger ecovillages of up to 2,000 individuals exist as networks of smaller sub-communities. Certain ecovillages have grown by the addition of individuals, families, or other small groups who not necessarily are settling on the periphery of the ecovillage and effectively participating in the ecovillage community.

The ecovillagers are united by shared ecological, social-economic and cultural-spiritual values. Concretely, the ecovillagers seek alternatives to ecologically destructive electrical, water, transportation, and waste-treatment systems, as well as the larger social systems that mirror and support them. Many see the breakdown of traditional forms of community, wasteful consumerist lifestyles, the destruction of natural habitat, urban sprawl, factory farming, and over-reliance on fossil fuels as trends that must be changed to avert ecological disaster and create richer and more fulfilling ways of life.

Ecovillages offer small-scale communities with minimal ecological impact or regenerative impacts as an alternative. However, such communities often cooperate with peer villages in networks of their own (see Global Ecovillage Network for an example). This model of collective action is similar to that of Ten Thousand Villages, which supports the fair trade of goods worldwide.

CASE CONCLUSION

The case study of the ecovillages familiarises with an alternative way of living, where the key point is preserving the earth where we live. Nevertheless the ecovillage movement is accepted as an alternative one and joins rather small scale communities, it might influence in changing attitude of wider community towards way of changing wasteful consumerist lifestyle, the destruction of natural habitat, urban sprawl, factory farming into richer and more fulfilling ways of life.

CASE STUDY 2: ALEKSANDRAS STULGINSKIS UNIVERSITY

Aleksandras Stulginskis University (ASU) is a state institution of higher education and research, which is constantly improving its activity and meeting the highest expectations of society needs. At present it has over 5000 students in a wide range of study programmes of biomedicine, technologies and social sciences.

It is the only state institution of higher education and research in Lithuania awarding the diplomas and degrees at PhD, MSc and BSc levels in the fields of food sciences, agriculture, forestry, water and land resources management, bioenergy and mechanical engineering, climate change and sustainable use of natural resources. These degrees are recognized all over the world and have the highest standard of equivalence.

As most of activities deal with natural resources which have no borders, our scope is to be global experts in a sustainable use of resources whatever smart technologies are applied.

Research and teaching staff of the University consists of 400 people, including 200 professors and associated professors.

University is situated in the area of 719 ha, it has 5 academic buildings, experimental station, training farm, academic campus for students and faculty. The academic infrastructure is being modernized with a number of

recent projects funded by the EU funds. All academic buildings provide 40 auditoriums, 42 classrooms, over 100 laboratories, library with the funds of 600 thousand books.

ASU plays an important role in development, transferring agricultural innovations in Lithuania.

CASE DESCRIPTION

ASU case is chosen showing how researches of ASU on topics related with agroecology can serve for developing innovations through various R&D activities linking business or rural communities.

1st example. ASU Center of Agroecology (which is department of Faculty of Forestry and Ecology) in collaboration with JSC "Agrolinija" implemented two projects of companies waste handling by transferring it into organic fertilizers suitable for organic farm use.

JSC "Agrolinija" main activity is extensive cattle breeding for organic meat production. They grow around 100 cattle simental and angus breed.

During ASU cooperation with JSC "Agrolinija" two products were developed out of companies' production waste. First is bio-humus, fertilizer produced by using earthworms, second is granulated cattle manure. Both products have organic certificates provided by Lithuanian organic farming certification authority "Ekoagros" so it allows organics farms to use these fertilizers to improve soil quality.

2nd example. ASU staff during collaboration with Vilkyskiai community, which are small village in southwest of Lithuania developed a community based activity. The aim of this collaboration was to develop additional source of income for rural population, improving quality of living in rural areas.

During this activity a dryer for medical herbs was constructed. It was installed in rural communities territory, people were trained how to pick, dry, pack medical herbs, how to develop a whole chain from field to end user. Now this activity is vital, broader and community sells herbs to the cities inhabitants directly or via internet. All the herbal collections have "Ekoagros" certificates which proves they are organic.

This is an example how science can be linked with local economy development.

CASE OBJECTIVES

- Illustrate how knowledge transfer can contribute to environmental development (agroecology)
- Illustrate how knowledge transfer can contribute to social development of rural areas

HOW OBJECTIVES ARE CHOSEN

Example of collaboration among ASU and JSC "Agrolinija" shows that knowledge transfer from R&D world to business world gives possibility to contribute sustainable and ecological way of running business as well meeting markets demand (supply of fertilizers to organic farms).

Example of collaboration among ASU and Vilkyskiai community shows how knowledge transfer can let to new relations and new value chains development and during that creating local economies.

CAPITALIZATION

Indicators - Environmental, Social, Economical

INNOVATION RUBRIC

Type of innovation (from the innovation list)	Description	Science, Practice, or Movement?	How does it more specifically apply to Agroecology?	How could this be transformed into an AE teaching tool?
Innovation 1 (Example ASU- JSC "Agrolinija") **Environmental** **a) Soil health,** **b)Ecosystem services**	**Industrial waste recycling.** During cooperation they solved problem of agricultural company waste management by turning the waste into a organic fertilizer	Practice	In cooperating together business and science developed a method for agricultural waste handling. This contributes to impact of the company reduction. On other hand because waste is transformed into organic fertilizers it helps organic farmers to improve (take care) of the quality of soil.	It could be transformed as a training material describing method, or quiz or puzzle showing ecological cycle of product and waste.
Innovation 2 (Example ASU-Vilkyskiai community) **Social-** **a) community;** **b) tradition;** **Economic – Green jobs**	**Medical herbs drying, selling.** During this activity a dryer for medical herbs was constructed. It was installed in rural communities territory, people were trained how to pick, dry, pack medical herbs, how to develop a whole chain from field to end user.	Practice	In cooperating together rural community and science developed a method for assuring incomes through traditional production industrialization.	It could be transformed as a training material describing method, or it could be presented as interactive movie with value chain explanation.

CHANGES

Innovative waste handling method gives as well an access to organic fertilizer in market. It as well creates a new know-how available at domestic market.

Industrializing traditional way of production gives local source of income giving vitality to rural area.

CASE CONCLUSION

In cooperating together business and science or communities can give an impact of new products availability, make sources of income, generate added value and contribute to agroecology by segmented activities.

CASE STUDY 3: MOBILE FARMERS' MARKETS

Mobile farmers markets is a cooperative Lietuviško ūkio kokybė ("Quality of Lithuanian farm") established in 2008 by Lithuanian farmers for direct marketing of products produced in the farms of its members.

The aims of the cooperative are strengthening relations between farmers and consumers, promotion of Lithuanian made farm products, promotion of traditional products, strengthening relations between urban and rural areas

As a case study it was chosen because before 2008 there were no practice in Lithuania for farmers to sell their products directly.

It is interesting how this phenomenon (of mobile markets) shaped market, legal system, farmer-consumer relations within a rather short period.

The cooperative has 250 members (farmers), selling their products in various market places, starting from autovans and ending in shopping moal stands in the cities of Lithuania.

The cooperative mainly gives marketing support to a producers. As well, it serves as quality assurance body or quality mark having own standard, near to all legal requirements.

CASE DESCRIPTION

Mobile markets "Quality of Lithuanian farm" is a cooperative which was established in 2008 by Lithuanian farmers for direct selling products produced in its members farms.

Its aims are - strengthening relations between farmers and consumers, promotion of Lithuanian made (in farms) products, promotion of traditional products, strengthening relations between urban and rural.

It has 250 members who are farmers, they are selling their products in markets, from autovans, in shopping moals stands in big cities of Lithuania.

The cooperative mainly gives marketing support to a producers.

Members can be farmers that are selling goods from own farm, gardeners selling fruits and berries, beekeepers selling honey and other bee products, sellers/producers owning organic production, exceptional production or traditional (folk) production certificates.

CASE OBJECTIVES

- Investigating how movement for direct selling can shape (influence) customers behavior, market, legislation.

HOW OBJECTIVES ARE CHOSEN

Objectives can be achieved by investigating customers' behavior, legislation changes or number of legal acts for direct selling appearance. Investigation of relations between produsers and reselers over time.

CAPITALIZATION

INNOVATION RUBRIC

Type of innovation (from the innovation list)	**Description**	**Science, Practice, or Movement?**	**How does it more specifically apply to Agroecology?**	**How could this be transformed into an AE teaching tool?**
Innovation 1 (Mobile markets "Quality of Lithuanian farm") Social – Transition/ Transformation Economic - Autonomy	Mobile markets "Quality from Lithuanian farm" is a cooperative which was established in 2008 by Lithuanian farmers for direct selling products produced in its members farms. Its aims are - strengthening relations between farmers and consumers, promotion of Lithuanian made (in farms) products, promotion of traditional products, strengthening relations between urban and rural.	Movement	Movement of mobile markets can be applied to Agroecology as fair way for distributing value in value chain among producer and customer. Mainly because of its nature of short value chain or so called direct selling	It could be transformed as a training material describing method, or it could be quiz with different requirement for different selling products. It can be a web page or webshop tutor. It also can be a tycoon type of strategic game for developing community of producers - consumers

CHANGES

Mobile markets "Quality from Lithuanian farm" is a cooperative which was established in 2008 movement for direct selling can shaped customers behavior, market, legislation in such ways that demand for traditional products is constantly increasing. Moals started to build traditional products stands, organize farmers markets near moals. Resellers started giving better conditions for purchasing (in terms of fair price, payment terms etc.).

CASE CONCLUSION

Social movements if they are focused with clear goals gain influence and achieve changes in customers' behavior, legislation changes. Relations between producers and resellers investigation during time.

As a key success for movement Mobile markets "Quality of Lithuanian farm" indicates initiative from the bottom, hard times (or appearance on right time), clear focus, close collaboration with managing authorities and public bodies, common work, good will.

COUNTRY CONCLUSION LITHUANIA

The report describes three selected study cases which are linked with the AE and provides any innovation. According to the legal acts of the Lithuania Republic, innovation is defined as the process by means of which social and economic needs are met with new ideas and new products, services or business and organizational models are created; they are successfully introduced into existing markets or are capable of creating new markets.

The study cases described are the following:

- Movement of Ecovillages, where the goal of their communities is to become more socially, economically and ecologically sustainable

- University of Aleksandras Stulginskis (ASU), developing innovations through various R&D activities related with AE and linking business or rural communities.

- Cooperative of "Quality of Lithuanian Farm" setting the system of mobile farm markets for direct selling of food and agriculture products produces in the farms.

Each of the case study have interrelation with the AE:

- Ecovillages is a tool for developing the communities targeted towards ecological and AE aspects, such as growing food as much as possible within the community bio-region supporting organic food production there; creating homes out of locally adapted materials using village-based integrated renewable energy systems; protecting biodiversity and fostering ecological business principles, asnd etc.

- Movement of mobile markets can be applied to AE as fair way for distributing value in value chain among producer and customer. Mainly because of its nature of short value chain or so called direct selling.

- In cooperating together business and science developed a method for agricultural waste handling. This contributes to impact of the company reduction. On other hand because waste is transformed into organic fertilizers it helps organic farmers to improve (take care) of the quality of soil.

Each case study can be transformed into some innovative and interesting teaching tool:

- Ecovillages could be transformed to an interactive computer game "AgroEcovillage", where the player have a task to set the Agroecovillage in different steps: choosing the peace of land, forming the community, building a house, starting farming, treatment of waste and etc.

- The innovations of ASU could be transformed as a training material describing methods researched and developed by ASU, or quiz or puzzle showing ecological cycle of product and waste or it could be presented as interactive movie with value chain explanation.

- The innovation of mobile farm markets could be transformed as a training material describing method, or it could be quiz with different requirement for different selling products. It can be a web page or webshop tutor. It also can be a type of strategic game for developing community of producers - consumers

All three cases described in the report should be accepted as the successfully introduced products, services, ideas and organisational models into existing market. The case studies described are considered as practical innovations. The case studies presented in the report are innovative by their nature in Lithuania. They cannot be accepted as a worldwide innovation or should not be treated as scientific innovations.

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AUSTRIAN CASE STUDIES

In this section the best-case case studies of agroecological innovations within Austria are elaborate through a presentation of each of the cases, an analyses and concluding remarks. Written and compiled by BOKU: Milena Klimek and Phillipp Dietrich

INTRODUCTION: CASE STUDY SELECTION AND REASONING

To illustrate innovative examples of Agroecology in Austria we have selected three case studies that exemplify awareness of the social level and its potential impacts—e.g. cooperations, policies, farmer-consumer partnerships, education, and innovative marketing schemes. Additionally, because of Austria's entry point into Agroecology through organic, organic will continue to be an influence in Austria's definition, interaction and connection to Agroecology. The three case studies chosen are Arche Noah; Via Campesina through the Austrian farmers association (Österreichischer Bauern Verbund (ÖBV); and the BOKU-Community garden at the University of Natural Resources and Life Sciences, Vienna (BOKU).

Arche Noah is an organization primarily focusing on loss of biodiversity in seeds. They mitigate this loss of biodiversity in influencing policy at the national and international level, work with farmers and gardeners to create a living seed bank, and partake in a wide variety of educational activities.

Via Campesina is an international organization that through policy work and awareness raising aims to support marginalized farming communities through sustainable farming and food sovereignty. The Austrian context, through the ÖBV predominantly focuses on small and family farm support and awareness while occasionally highlighting specific special interest issues such as milk prices, etc.

The BOKU-Community garden is a very place-based case study providing space for students to learn and practically apply agro-ecological principles by organizing and running the BOKU-community garden. They tackle issues from polyculture diversity at their plot level and communal space sharing, to (university) politics in keeping the space available for themselves.

These three cases independently illustrate social innovation (see definition below) and highlight the social through AE as a movement (also below). Together they show various levels of political influence and navigating challenges from international, national and university bureaucracy levels. They also portray AE at the political, educational and technical levels.

DEFINITION OF INNOVATION

When identifying an 'innovation' pertaining to Agroecology we were looking for innovations that are considered innovative for Austria. Examples of Organic farming and most stand alone biophysical AE examples are no longer innovative within Austria. As we stated in our report, recent literature has helped define and categorize different understandings and definitions of agroecology. In Wezel et al. (2011) the authors' systematically categorize different perspectives of agroecological traditions in various key-playing countries. They describe the different traditions of AE through examples from these key countries. The three categories given are AE as a *scientific discipline*, a *movement*, and a *practice*. We believe that innovation in Agroecology in Austria is seen either as a combination of all three AE categories in one case study, or in the movement in the form of social innovation. While we believe that the inability to accept Agroecology's wider societal

implications in the food system today as an archaic practice, social innovation and its connection to agroecology through AE as a movement was an important perspective for us in selecting our case studies.

For a comprehensive definition of social innovation we turned to Pol & Ville: "An innovation is termed a social innovation if the implied new idea has the potential to improve either the quality or the quantity of life. Examples of innovations that fit nicely with this definition abound: innovations conducive to better education, better environmental quality and longer life expectancy are a few" (Pol & Ville, 2009 p.15). In using this definition it is open enough to not pertain to an innovation being solely economically useful, market driven and aiming toward a 'social good', which fits well in the AE as a movement.

CASE STUDY 1: ARCHE NOAH

Arche Noah is an organization primarily focusing on loss of biodiversity in seeds. They mitigate this loss of biodiversity in influencing policy at the national and international level, work with farmers and gardeners to create a living seed bank, and partake in a wide variety of educational activities. Arche Noah illustrates the educational, political and technical levels. It was chosen as a case study for agroecological innovation because it exemplifies all three of these levels and because it shows AE as a movement in combining these levels in working collectively towards diversified seed bank and overall biodiversity through collective action, policy work and education.

This section describes how Arche Noah exemplifies these three levels through its objectives, the AE indicators it fits into and the positive changes toward the quality or quantity of life it has contributed to—i.e., its connection to social innovation.

CASE DESCRIPTION

ARCHE NOAH was established in 1990 as an initiative from heirloom gardeners, farmers and journalists, concerned with the future of seeds and heirloom varieties. Their purpose is to improve biodiversity and crop diversity. They noticed that over the last 100 years, the diversity of cultivated plants has dramatically decreased all over the globe due to the industrialization of agriculture.

To work toward crop diversity and biodiversity, Arche Noah responds to the loss of agrobiodiversity with a positive vision and numerous activities. Arche Noah portrays this positive vision through viewing cultivated plants respectfully, valuing gardening and farming as a cultural achievement, considering ethically motivated consumption as a contribution to organic and sustainable agriculture, and seeing cooking as a declaration of love. Their over 13,000 members contribute to more diversity through the cultivation of threatened varieties in their gardens, through consumer awareness, and political commitment.

The genetic engineering and various seed-monopolies, climate change and wars are threatening the precious heritage in which they hope to preserve. The passing-on and exchange of knowledge concerning heirloom varieties, their cultivation and use is essential for saving and further developing agrobiodiversity for future generations. To work against seed-monopolies and climate change and toward agricultural biodiversity, Arche Noah is politically active not only within Austria, but also in EU seed policy and they campaign in Austria and Brussels. They believe that seed policy must safeguard diversity, promote healthy food and the rights of small farmers. In order to further the exchange of knowledge and experience, Arche Noah is participating in several different international Lifelong Learning Projects together with partner organizations from different European

countries focused on seed diversity. See: EU Project Grundvig: https://www.arche-noah.at/english/projects/eu-project-grundvig and The Leonardo Project https://www.arche-noah.at/english/projects/leonardo-project

Current Arche Noah projects and activities in Austria consist of:

- A political campaign against patenting plants and animals in Austria
- A show garden, highlighting diversity, rare and heirloom plant varieties, and how to grow and cook with them
- Development of a seed bank in a cooperative style-members register their heirloom and rare varieties
- The possibility to adopt a rare fruit breed—to support its success
- Publications for purchase and download
- Educational programs
- The possibility to purchase saved seeds

This non-profit organization houses Europe's largest private seed bank, works collectively toward agricultural diversity and biodiversity in a multi-faceted way. We believe Arche Noah is a model of Agroecology as a movement in integrating the social facet in their daily work.

CASE OBJECTIVES

The objectives of Arche Noah are as follows:

- To enhance the diversity of cultivated plant life and agricultural plants
- To enhance the biodiversity of landscapes in general
- To create a community that works together
- To have a political presence, both at the national and international level addressing general biodiversity and agrobiodiversity
- To educate future members and actors concerning biodiversity
- To provide an alternative to huge seed conglomerates
- To preserve cultural heritage in the form of seed saving

HOW OBJECTIVES ARE CHOSEN

Arche Noah achieves these objectives by the following:

- Attracting members who pay annual fee which supports activities
- Receiving financial donations from interested actors and 'adopt a heritage fruit tree'
- Annual plant sales of seeds and seedlings
- Maintaining an active network of members and interested actors
- Collective seed-saving
- Political lobbying on the national and international level
- Political pressure via campaigns that engage members and interested actors via email and letter writing and other actions
- Publications such as books, zines, and pamphlets
- Education through gardening, books, courses, seed saving and political actions

CAPITALIZATION

INNOVATION RUBRIC

Type of innovation (from the innovation list)	Description	Science, Practice, or Movement?	How does it more specifically apply to Agroecology?	How could this be transformed into an AE teaching tool?
Innovation 1 Social— Political	**Seed Policy Advocacy** - Although preserving traditional seeds and plants is also innovative in counteracting the current global seed market, we find the *way* Arche Noah has organized itself to tackle seed policy innovative. They have created a member-driven organization that together save seeds and traditional plants and cooperate to address seed policy.	Movement	In cooperating together to further biodiversity at a landscape and agricultural level through the preservation and use of heirloom and traditional seeds, Arche Noah has created a community of participants who are aware of a markets practical affect on the landscape. The more diverse and accessible the seed and plant bank, the more possibility for biodiversity, healthy soils, animal habitat and environmental health.	A seed bank game, that simultaneously teaches about biodiversity in plants but also sends messages of cooperation and the importance of understanding the market and policy. Made in the fashion of the new cooperative games (such as Pandemic) where you work as a team to beat the game, there could be a board that represents a landscape and a stack of cards and each card represents a different seed or traditional plant, and there are different soil types and sun, precipitation levels and plant guilds that work together and each person has a role, Arche Noah organizer, farmer, consumer, seed policy lobbyist, etc and you play out the game, with cards that also pose hurdles from climactic problems to evil Monsanto representatives to turns in the political sphere….etc.
Innovation 2 **Social— Community**	Collective Network—Arche Noah maintains an extensive network of over 13,000 actual members and many more interested actors. In offering educational workshops,	Movement	This type of collective network enables a community to be built of like-minded individuals supporting issues that they not only believe in but are informed upon. Such a community can then act	A video or a skit. The skit could be performed by the students if pre-defined roles are given, depicting the benefits of collective action.

	sharing of seeds, the purchasing of rare plant seeds and seedlings, and political actions, they maintain an active membership base.		collectively effecting the biodiversity or our landscapes and more specifically, agrobiodiversity.	
Innovation 3 **Social—Education**	One of Arche Noah's priorities is to focus on education. Education concerning seed saving, seed policy, of information concerning the current status of agrobiodiversity and seed saving, and traditional and cultural connections of agrobiodiversity to seeds, heirlooms, rare varieties. Education can reach people of all ages, backgrounds, race and gender and has proved to be a vital piece of Arche Noah's agenda.	Movement	Education describing to role of biodiversity in agriculture is a necessary step in agroecology.	Perhaps many of these innovations work best together and not separately. Therefore a systems game showing the importance of how innovations are interconnected. See: https://www.amazon.com/Systems-Thinking-Playbook-Exercises-Capabilities/dp/1603582584
Innovation 4 **Social—Transformation /Transition**	Arche Noah's whole premise lies on providing an alternative to large conglomerate seed companies. They wish to cater to the small farmer and gardener, to the historian who is interested in the culture and heritage of old breeds, to the person who believes in biodiversity rather than monocultures, and a few plants to feed our	Movement	Polycultures and biodiversity within agriculture is essential for agroecology. In seeking a transformation of a current harmful system to one that is sympathetic with these ideas and who is actively using them, Agroecology is activated.	Perhaps many of these innovations work best together and not separately. Therefore a systems game showing the importance of how innovations are interconnected. See: https://www.amazon.com/Systems-Thinking-Playbook-Exercises-Capabilities/dp/1603582584

	population. This illustrates the wish to transform the current system into one that functions for long-term.			
Innovation 5 **Social—Tradition**	In highlighting traditional plant breeds and their uses, Arche Noah is not only striving to achieve biodiversity but also show the importance of cultural traditions, history and tradition…a connection to a past in which many people wish to re-visit or use techniques from the past as solutions to current challenges.	Movement	There is a valid argument that the technics of past agriculture were more supportive of AE than the techniques of today. In understanding the biodiversity and agriculture of yesterday we can apply old solutions to new problems that ultimately support biodiversity and therefore agroecology.	Perhaps many of these innovations work best together and not separately. Therefore a systems game showing the importance of how innovations are interconnected. See: https://www.amazon.com/Systems-Thinking-Playbook-Exercises-Capabilities/dp/1603582584
Innovation 6 **Social—Autonomy /Food sovereignty**	In focusing on traditional and heirloom breeds, regional seeds, recipes and knowledge, Arche Noah supports Autonomy and food sovereignty.	Movement	Agroecology has been connected to and acknowledged as an integral part to food sovereignty. Movements supporting autonomy and food sovereignty show the importance of farming, gardening and food procurement done in a sustainable way. The relationship between the two is symbiotic.	Perhaps many of these innovations work best together and not separately. Therefore a systems game showing the importance of how innovations are interconnected. See: https://www.amazon.com/Systems-Thinking-Playbook-Exercises-Capabilities/dp/1603582584
Innovation 7 Environmental—Biodiversity	Arche Noah exhibits biodiversity through its seed saving and exchange of a variety of cultivated plant breeds. It is also politically active in the support of agrobiodiversity.	Science	Polycultures and biodiversity within agriculture is essential for agroecology. Biodiversity leads to a functional ecosystem with healthy soil, water, air and animals.	Show the difference of soil health between plots of land with high biodiversity and a functional ecosystem versus a plot of land with low biodiversity and a non-functional ecosystem. Soil sampling, a count of biodiversity / species in a specific area, see bioblitz: https://en.wikipedia.org/wiki/BioBlitz

Innovation 8 Environment—Landscape	Arche Noah combines both the importance of biodiversity which can be seen well at a smaller scale, and the preservation of old and traditional cultural varieties of plants, which can be best seen at a larger scale. These two combinations create health at a landscape level and preserve a certain image or picture of a particular landscape depending on the place.	Practice	Again, as traditional agriculture from the past has been identified as being more agroecological, specifically prior to industrialization, that type of landscape preservation is one that aids in a form of marketing that supports agroecology. When a specific landscape epitomizes a specific image that people associate with a certain culture or practices it not only supports the preservation of history, but in this case the sustainable use of the landscape.	To explore the ideas of imagery and perceptions of people to certain agricultural images, a photobooth can be arranged specific for this purpose to help discuss imagery and how it can help or harm agroecology. See: https://www.facebook.com/frameAfarmer/
Innovation 9 Economic—Membership	Instead of relying solely on sales, or huge donations, etc. Arche Noah, has an annual membership of over 13,000 people. This membership creates and engaged and informed community that rallies around biodiversity and seed-saving issues.	Movement	This type of financial setting enables more education and awareness concerning agroecological issues.	Perhaps many of these innovations work best together and not separately. Therefore a systems game showing the importance of how innovations are interconnected. See: https://www.amazon.com/Systems-Thinking-Playbook-Exercises-Capabilities/dp/1603582584
Innovation 10 Technical—Digital technology	It is important to realize the importune role technology plays As Arche Noah uses digital technology to convey and communicate it's message to its members.	Practice	In order to spread the message, education, days of action, political challenges and successes related to biodiversity, Arche Noah uses email, social media and other forms of digital technology to support agroecology.	Illustrate that awareness raising is key in order to further Agroecology, and digital technology is one very successful way of reaching the masses. See various youtube videos explaining marketing reasons of involvement with social media, etc.

OVERLAPPING BOUNDARIES

Many of the categories overlap, from biodiversity to plant, soil and animal health, etc. But we attempted here to be as clear as possible.

CHANGES

Through Arche Noah's 26 years of experience it has become not only a nationally but internationally recognized organization supporting agrobiodiversity, seed-saving and cultural landscapes. Their presence is strong within Austrian boarders as an organization advocating biodiversity through a multitude of educational opportunities reaching people from all walks of life. Their political campaigns have also been successful in creating a collective network of members and interested actors who inform each other about relevant issues needing support. One example of a successful political campaign is the: *Keine Patente auf Pflanzen und Tiere* (No patents on animals and plants) campaign, to influence the national legislation against the opportunity to protect ordinary/conventional breeds of animals and plants under patents. Arche Noah's international political influence has also been seen in the campaign F*reiheit für die Vielfalt* (Freedom for diversity), which is a campaign to positively influence European Union legislation on the marketing of seeds and plant propagation materials. Additionally, Arche Noah has worked on international projects mentioned above furthering their message across boarders. Within their 14,000 members around 160 actively preserve seeds and provide them in Arche Noah's *Sortenhandbuch* (Catalogue of rare seeds); around 100 members took over long-term sponsorships on specific varieties (as well as an additional 400 within fruit trees) and around 60 members participate in temporary seed-saving activities. Each year Arche Noah sells seeds and seedlings with a value of approximately 60,000€, supporting the direct implementation of biodiversity in gardens around Austria. They offer around 90 day long courses per year with around 500 participants and the *Arche Noah Magazin* (Arche Noah magazine) is published three times a year with a total circulation of 16000 as well as other publications (books, booklets, flyers, etc.), all furthering their agenda. Although not always specifying themselves as organic or following agroecology, their principles of biodiversity and cultural preservation are the backbones of agroecology and their influence in Austria as a countermovement to conventional seed companies has been phenomenal.

CASE CONCLUSION

Arche Noah represents an innovative organization applying many technics to achieve biodiversity and agrobiodiversity both in Austria and within the European Union. Their main objectives of increasing biodiversity in general and supporting agrobiodiversity through the preservation of cultural and traditional plant and fruit tree species is pivotal in Agroecology. As biodiversity leads directly to the health of soil, plant, animal and human systems and to functional ecosystems, Arche Noah is a key player for agroecology in Austria. With their many educational programs, literature, political activities and their active collective network of members saving seeds and spreading awareness, biodiversity in Austria is theme that is on the radar for many people in addition to the farming and gardening community.

Biodiversity of the social / movement

Arche Noah is an exemplary case of Agroecology in Austria as the organization illustrates AE as a science, practice and movement. As AE as a science and practice has been thoroughly examined, we believe focusing

on AE as a movement is an innovative way to describe and envision agroecology and its future. Arche Noah depicts many interesting innovations at the movement level including the political, community, educational, autonomy/food sovereignty, tradition and transition/transformation. It is important to note that although each of these movement related innovations are critical in understanding agroecology and its potential as a movement, what is really illustrated here is the power of many of these innovations together, which is innovative in itself. Through the collective benefits of these innovations as well as the innovations also identified as scientific and practical Arche Noah is seen as innovative through the definition that we gave earlier in this paper, or socially innovative. Thus the combination of all of these innovations has the potential to improve either the quality or the quantity of life, and therefore advocate and support Agroecology.

CASE STUDY 2: VIA CAMPESINA

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

This section describes how Via Campesina through ÖBV exemplifies these three levels through its objectives, the AE indicators it fits into and the positive changes toward the quality or quantity of life it has contributed to—i.e., its connection to social innovation.

CASE DESCRIPTION

The mountain farmer organization (ÖBV) was founded in 1974 to support mountain farmers in Austria. Overtime the organization began to include small farmers all across Austria, not just in the alpine regions. In 2005, this further development began to share goals with the wider Via Campesina movement and the organization combined the two. The ÖBV originally banded together small mountain farmers that were looking for an alternative to the agricultural system that was developing in the 70s. They were looking for autonomy and alternative marketing strategies because due to geographical as well as other obstacles, they physically couldn't grow anymore to fit the future development of agriculture in and outside of Austria. These core principles have continued to drive the movement leading to the melding of ÖBV and Via Campesina in Austria.

Via Campesina is an **international movement** which brings together millions of **peasants**, small and medium-size **farmers**, **landless people**, **women** farmers, **indigenous** people, **migrants** and agricultural workers from **around the world**. It defends **small-scale sustainable agriculture** as a way to promote **social justice** and dignity. It strongly opposes corporate driven agriculture and transnational companies that are destroying people and nature.

In the **Austrian** context the organization brings together farmers and other agricultural partners that wish to support **small farmers** and **food sovereignty**. The organization fights for **political rights** for mountain and small farmers alike.

ÖBV-Via Campesina Austria is funded largely by donations and membership dues. In addition to publishing a monthly informative magazine, ÖBV also aims to provide further education skill building for adults in relation to food and farming on the practical smaller and/or mountainous scale. They are a group that is active politically at the Austrian and international level, lobbying and raising awareness for small farmer support.

This non-profit organization attempts to push support for small farmers through political action, further education for adults, and awareness raising to secure a strong future for small and peasant farmers. As small farmers are known to pay close attention to the needs of their land and often use sustainable techniques, we believe ÖVB is yet another model of agroecology as a movement in integrating the social facet in their daily work. Specifically, their beliefs concerning food sovereignty, autonomy and ecology coincide with agroecology's often regional focus and understanding that healthy people can focus on the health of their land.

CASE OBJECTIVES

ÖBV-Via Campesina's objectives include:

- Farms instead of agro-industry
- Independent framers instead of industry dependent farmers
- Regional markets instead of unnecessary transportation
- Quality instead of quantity
- Animal welfare instead of factory farms
- Ecology instead of factory farms (including soil, water, and air)
- One world instead of contributing to the furthering of the third world

HOW OBJECTIVES ARE CHOSEN

ÖBV-Via Campesina achieves the above objectives through:

- Membership and donations and international support
- Methods and tools that are collectively learned or shared
- Awareness of individual situations and needs
- Overcoming speechlessness and silence through empowerment
- Discovered personal skills, power and resources
- Establishing a healthy distance from monotonous, everyday tasks
- Making ecological, economic, social and political coherency in agriculture visible and possible to learn
- Learning alternative ways for farming
- Exchanging experiences with other farmers in Austria and the international context, and supporting them as well
- Supporting the continuation of professional and operational learning

CAPITALIZATION

INNOVATION RUBRIC

Type of innovation	Description	Science, Practice, or Movement?	How does it more specifically apply to Agroecology?	How could this be transformed into an AE teaching tool?
Innovation 1 **Social—Community**	ÖBV strives to create a community both of small farmers needing support and actors who wish to support small farmers. They build this community through political actions, membership and a regular publication informing the community of relevant input. This community also side-steps boarders to give support not only regionally but also internationally.	Movement	This community collectively raises awareness for Agroecology as well as participates in political actions and events on a regional to an international level.	A video or a skit. The skit could be performed by the students if pre-defined roles are given, depicting the benefits of a community vs. an individual.
Innovation 2 **Social—Education**	ÖBV particularly focuses on the further education for small farmers facilitating then their personal, farm or economic situations.	Practice	In further educating farmers on alternative ways of marketing, farming, etc, ÖBV supports the agroecological agenda, specifically through realizing environmental changes and autonomy.	Perhaps many of these innovations work best together and not separately. Therefore a systems game showing the importance of how innovations are interconnected. See: https://www.amazon.com/Systems-Thinking-Playbook-Exercises-Capabilities/dp/1603582584

Innovation 3 **Social—Political**	ÖBV is politically active through being a member of La via Campesina—the international peasants voice—and supporting its campaigns.	Movement	By applying political pressure to support small farmers and their alternativeness, support is then given towards the goals of agroecology.	Describe or invite a key local player in a successful political case and it's the changes it incurred either locally or internationally. E.g., the governmental support of buffer strips, or supplements given to farmers illustrating environmental improvements on their farms.
Innovation 4 **Social—Food sovereignty / Autonomy**	ÖBV and Via Campesina strive for an autonomous farming community. They do so by empowering farmers in providing community but also in supporting further education and skill building. They promote alternative marketing schemes that are more appropriate for smaller farms and marginalized areas. They also further food sovereignty in promoting the livelihoods of small farmers and their ability for subsistence in connection to regionality and localness.	Movement	As agroecology is often applied at smaller scales and is already associated with autonomy and the food sovereignty movement the concepts already overlap with agroecological objectives. Because food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, this predominantly supports the ecological practices of agroecology.	Perhaps highlighting the culturally appropriate food production might be interesting, because often the culturally appropriate produce is linked to the geological and climactic conditions. Individual project reports on a specific vegetable or grain could be done. Linking the food to appropriate uses, recipes, regions, and growing conditions. See: https://en.wikipedia.org/wiki/The_Botany_of_Desire
Innovation 5 **Social—Transition / Transformation**	In its objectives the ÖBV attempts to achieve 'one world instead of more of the third world' is against factory farming, and was in its inception, an alternative to the agro-industry beginnings in the 1970s. Therefore they support an	Movement	In working toward a sustainable transformation of agriculture, ÖBV is directly affecting agroecology in a most positive way.	A matching game of pictures depicting 'black and white' scenarios of Industrial and sustainable agricultural visions. For more advanced groups, introducing more 'grey' area pictures might introduce some interesting class discussions.

	alternative and sustainable vision of and transition toward agriculture.			
Innovation 6 **Social—Tradition**	Food sovereignty advocates for culturally appropriate food production which has strong ties to traditions. Smaller farmers and mountain farmers in Austria are often very close to food and farming traditions.	Movement	Many traditional ways of approaching food and farming offer solutions to modern day challenges effecting more environmental choices.	Examining the use of traditional technologies in modern challenges or on farms today. E.g., a scythe and its economic, health and environmental benefits in compared to using a tractor for small-scale plots.
Innovation 7 **Social—Social Justice**	In ÖBV's support of food sovereignty, culturally appropriately produced food and small farmers' rights to define their own food and agriculture systems are key social justice factors. Via Campesina also takes gender and minorities into consideration in their support schemes.	Movement	In applying social justice to agroecology, a wider audience, feeling accepted and welcome is introduced to sustainable practices.	Food journalist videos addressing issues of race, migratory labor and gender via YouTube might be interesting to start conversation about social justice and how it links or pertains to agroecology.
Innovation 8 **Environmental—Landscape**	See: Innovation social Tradition. In supporting tradition, ÖBV also achieves the preservation of a traditional landscape.	Movement	See: the benefits of Social—Tradition; Innovation 6.	Explain the linkages of tourism to the preservation of traditional and cultural landscapes.
Innovation 9 **Environmental—Soil, Animal and**	Here we chose not to take the general term of Ecosystem Services, as that	Science	The overall health of soil, animal and plants, leading to biodiversity and general thriving ecosystems is essential to	Show the difference of soil health between plots of land with high biodiversity and a functional ecosystem versus a plot of land with low

Plant Health	often implies an economic benefit or worth. As one of ÖVB's objectives is quality over quantity, they choose to the view the health of each individual category as necessary for a holistic health of the land.		agroecology.	biodiversity and a non-functional ecosystem. Soil sampling, a count of biodiversity / species in a specific area, see bioblitz: https://en.wikipedia.org/wiki/BioBlitz
Innovation 11 **Economic—Marketing**	In its focus on small farmers, ÖBV highlights the importance of alternative marketing forms that are more appropriate to smaller scales.	Practice	Creating an economy that is appropriate to scale, one that is focused on quality rather than quality, what the land and animals can feasibly and sustainable offer is in line with agroecological goals.	Invite a diverse farmer with diverse marketing methods, or a panel of small farmers to compare and contrast various marketing opportunities appropriate to smaller farmers. This should also open up conversation towards zero growth, and the balance of quality and livelihood, and its direct effect on the land, animals and people involved.
Innovation 12 **Economic—Membership**	Instead of relying solely on sales, or huge donations, etc. ÖBV relies also on annual membership. This membership creates and engaged and informed community that rallies around small farmer rights, empowerment, sustainable farming and food sovereignty.	Movement	This type of financial setting enables more education and awareness concerning agroecological issues.	Perhaps many of these innovations work best together and not separately. Therefore a systems game showing the importance of how innovations are interconnected. See: https://www.amazon.com/Systems-Thinking-Playbook-Exercises-Capabilities/dp/1603582584

OVERLAPPING BOUNDARIES

Many of the categories overlap, from biodiversity to plant, soil and animal health, etc. But we attempted here to be as clear as possible. More specifically, often what we have described as part of the agroecological movement could also have been seen as a practice or science. We categorized each innovation with what we thought fit best while acknowledging possible overlaps in interest or relevancy.

CHANGES

In ÖBV's combined effort toward small farmer rights and food sovereignty with Via Campesina, it has successfully created a community of support. This farmer support positively effects—not only personally, on the farm and operationally—but also legal, economical and political situations surrounding them. This has thus created a unified search toward solutions.

ÖBV has become a well-known resource in Austria for alternative and small farmers not only to find community but also as a resource for small farmers or farmers to be in finding support, skills, information and political backing.

At the movement level, Via Campesina has become internationally renowned, specifically in its work with impoverished areas, marginal lands, migrant worker rights, women and people of various races. Social justice is a key piece of activism with Via Campesina in which they are well known through their efforts in pushing is the right of peoples, specifically those just mentioned above, to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, as well as their right to define their own food and agriculture systems. Through their work Via Campesina has not only become well known at the movement level but they have also caught the eye of man academics whom have begun to study the movement.

Collective work and promotion of solidarity has incurred change through smaller movements in Austria considering the reduced prices of milk, as well as aiding other similar movements or organizations such as Arche Noah, for example against the patenting of seed varieties in Austria and Europe.

CASE CONCLUSION

Since its inception in the 70s, ÖBV has expanded from a group of small mountain farmers in Austria to banding with an international movement, Via Campesina to extend its reach not only to other farmers in need in Austria but also in Europe and beyond. ÖBV's dedication towards farmer rights, autonomy and food sovereignty has lead to practices that directly coincide with agroecology's agenda. The promotion of ecological and sustainable farming methods link to the overall ecosystem health of agrobiodiversity in agricultural lands. The promotion of culturally appropriate food production also links to ecologically sound production of foodstuff that fit to local climactic conditions and traditions. And finally ÖBV and Via Campesina's support of small farmer rights leads to an empowered community ready to support each other as well as to further their skill set to further autonomy.

Many of the innovations for agroecology through ÖBV are linked to the movement level. From the community, political, educational, tradition, to the transition / transformation level and food sovereignty / autonomy level, the ÖVB is actually predominantly connected to agroecology as a movement. Therefore, ÖBV is yet another key

example of agroecology as a movement. Additionally, its strong ties to social justice add an important point to the future of small farmers and their possibilities.

Additional related innovations are at the environmental level, as the ÖBV strives to support small farmers who practice sustainable and ecologically sound farming as well as promotes the further education of such farmers to continue learning how to best implement holistic farm health. Finally, ÖBV shows economic innovative strategies in promoting alternative marketing resources appropriate to smaller farmers and their scale.

This case study, pertaining to ÖBV, illustrates our definition of social innovation in that it has improved either the quality or the quantity of small farmer's lives and has the potential to reach further and improve the lives via the small farmers of others, and not only human lives. Again, it is not necessarily the single innovations here that are innovative, although some may be, it is rather the combination of so many innovations within this one case study and its rather stark connections to the movement level which we feel is the most innovative at this time in the history of agroecology as well as in Austria.

CASE STUDY 3: BOKU-COMMUNITY GARDEN

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

This section describes how the BOKU-Community garden exemplifies these three levels through its objectives, the AE indicators it fits into and the positive changes toward the quality or quantity of life it has contributed to—i.e., its connection to social innovation.

www.boku-gemeinschaftsgarten.org

CASE DESCRIPTION

The BOKU-community garden is a space of around 4500m^2 located at BOKU´s experimental side located in Jedlersdorf in Sowinetzgasse 1, 21st district of Vienna. On the given area of the BOKU-community garden following components exist (see Figure 1: Map of the BOKU community garden):

1. *Cherry orchard:* Four rows of sweet cherries with flowering meadow as a cover plants. The cherries are cultivated and regularly cut and harvested by the students. The cover plants are divers and only cut partly at once to keep enough habitat for insects and other beneficial organisms
2. *"Wilderness area"* (area for habitat): This area is dedicated to provide habitat for beneficial organisms and other flora and fauna. Other components for the purpose of habitats (e.g. towers of bricks covered with a roof for a dry area for spiders and other insects, piles of larger stones with space inside for lizards, bugs, frogs, snacks and other fauna or piles of cut branches (partly covered) for

hedgehogs) are distributed throughout the whole area and are not only located in the *"Wilderness area"*.

3. *Production and storage facilities:* There is a high-pressure irrigation system, operated in case of droughts during the summer season and a tank with a volume of 5000 Liters of water for manual irrigation. The area of BOKU-community garden is fenced and separated from other existing BOKU facilities at the BOKU experimental site. The storage shed is used to store tools and equipment for the BOKU-community garden. The roof is green with a special substrate for xerophytic plants as a habitat for insects and *Lacerta agilis.* Additionally, there are three piles for composting and one pile for mulching material.
4. *Multipurpose and diversity hedgerow*: This area is used to cultivate a diverse range of local plants (bushes and trees like *Rhamnus frangula, Corylus avellana Sambucus nigra, Rhamnus catharticus, Crataegus spp. and Sorbus spp.),* for insects, birds and other animals as well as for food, forage (*ribes rubrum/nigrum, Rubus idaeus and Rubus* sectio *Rubus*), and fiber (*Salix spp.*).
5. *Area for perennial flowering plants*: used for ornamental purpose, habitat for beneficial organisms and to utilize as aromatic and medicinal plants. Examples for plants: *Artemisia absinthium L., Achillea filipendulina/millefolium/ nobilis, Dianthus carthusianorum/deltoides), Mentha suaveolens/spicata& Mentha × piperita, Echinacea angustifolia, etc.* The soil in the community garden is covered with sand and stones. This area is suitable for *Lacerta agilis (*regarded as threatened and is protected under Viennese law (http://othes.univie.ac.at/28178/1/2013-05-09_0620306.pdf)), *Bufo bufo* and smaller insects like *Forficula auricularia,* bugs (*Carabidae*), spiders (*Araneae*), *Syrphidae spp*., *Apoidea spp*. and *Lepidoptera spp*.
6. *Strips with berries* (*Aronia ssp., Vaccinium ssp., Morus nigra, Ribes rubrum/nigrum/uva-crispa, Rubus idaeus and Rubus* sectio *Rubus, Actinidia kolomikta* and *Vitis vinifera* subsp. *vinifera*) provide sweet food for the students and birds if the berries are not harvested.
7. *Area for vegetables production:* 30 plots with each 20m^2 for individual production and some 400m^2 for common production.

The BOKU-community garden was established in 2009 as an initiative from students facilitated by one lecturer to acquire an interdisciplinary and practical side for students to learn, teach and practically experiment. From the beginning, the purpose of the BOKU-community garden was to physically implement theoretical knowledge in systemic thinking in general and in organic crop, vegetable and fruit production in detail provided in class room sessions at BOKU. During the implementation process of the BOKU-community garden the practical questions, which cropped up (cottage, hedgerow, bike rack, etc.) were used to learn the implementation of the systemic approach: the activities and the results should entail multi-functionality and follow the four principles of Organic Farming.

As the BOKU-community garden is entirely self-organized by students that partake in the garden, the social-political dimension appears on several levels: i.) Internal organisation of a diverse and fluctuating group of students from different degrees and backgrounds (decision-making, splitting the responsibilities and tasks among group members); ii.) BOKU-internal organisation of the BOKU-community garden (with BOKU-officials) and; iii.) BOKU external organisation (formal procedures such as building permissions etc.).

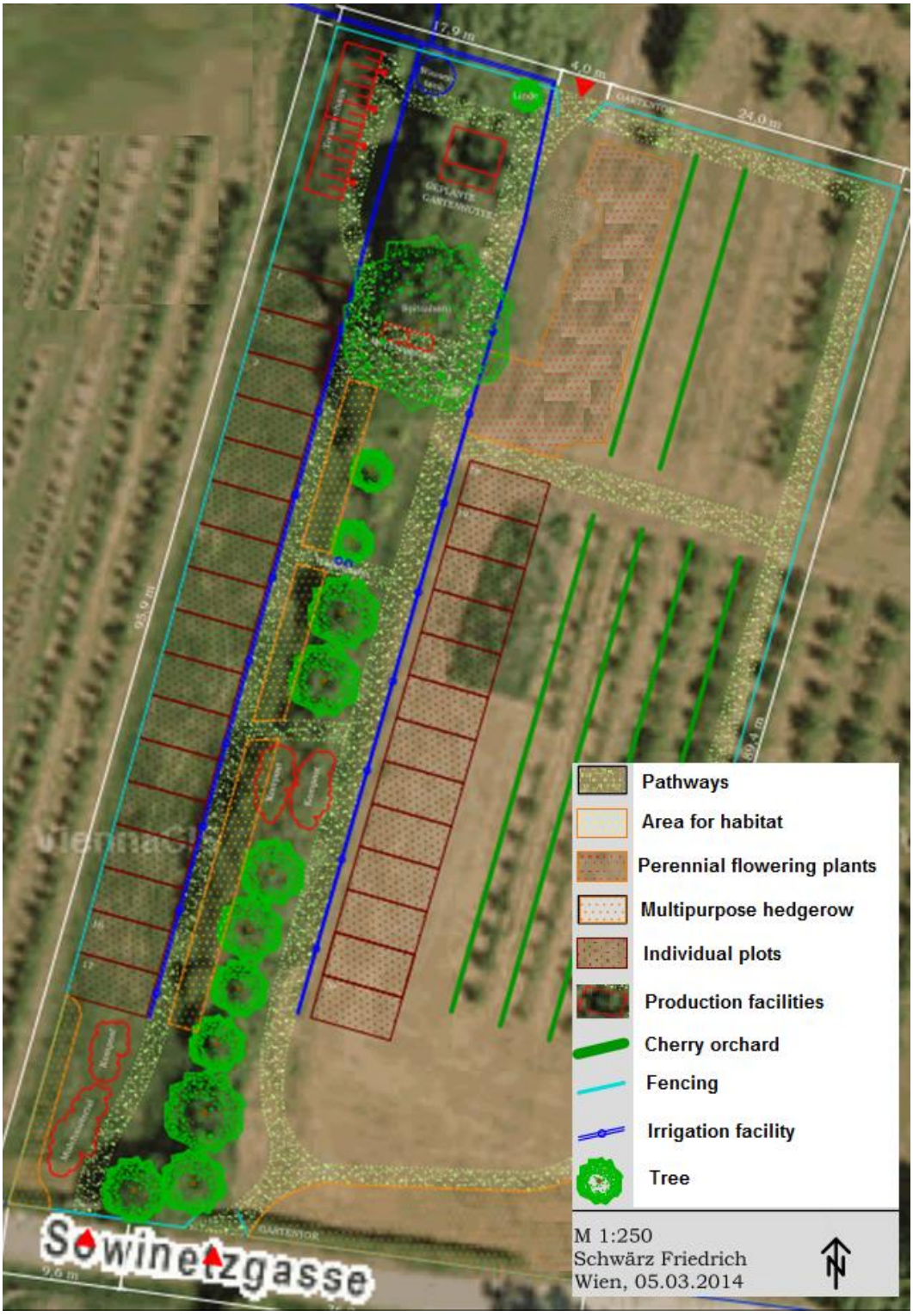

Figure 1: Map of the BOKU community garden

CASE OBJECTIVES

The overall objective of the BOKU community garden is to acquire, create, develop and retain a multidimensional space for students to learn, experiment and teach agroecological principles and methods. In detail the space entails following dimensions and objectives:

Physical-practical space:

i.) To practically apply theoretical class room knowledge in systemic thinking and agro-ecology by producing vegetables in an organic manner and
ii.) to acquire skills and experiences in all practical fields (tools and equipment, irrigation, soil tillage, construction, …) by planning, organising and develop the BOKU community garden´s facilities.
iii.) To enable the implementation of agroecological ideas (increasing diversity, creation of habitats for beneficiary organisms, exploration of agroecological solutions etc.) in a "protected" (no need for economic viability) setting.

Social space:

i.) To learn and apply methods for self-organisation of by setting objectives and conducting activities to reach it in a group of up to 60 people and
ii.) to enhance students´ skills to communicate, negotiate and discuss topics to come up with a common agreement.
iii.) To create a community of gardeners, who work together and learn agroecological practices from each other.

Individual space:

i.) To enable the individual experience of practically working in and with „nature" and (bio-)diversity by taking over responsibility for a piece of land for at least one season.
ii.) To enable the individual to define one´s position and responsibility by taking over activities in a group (social dynamic) and
iii.) to enable critical reflection on personal challenges (self-organisation, timekeeping, etc.) and therefore the basis for personality development.
iv.) To enable an environment for mutual learning from each others´ talents and capacities.

Societal-political space:

i.) To enable political socialization[13] of individuals by "acquiring the space" from BOKU and to then open up the movement's perspective of agroecology.
ii.) To develop students´ capacities to strategically work towards political goals within the university setting, and
iii.) to enable critical reflection of existing power relationships in the current political system.

[13] Political socialization as the "study of the developmental processes by which people of all ages and adolescents acquire political cognition, attitudes, and behaviours" Powell, L., & Cowart, J. (2003; p 15). Political campaign communication: inside and out. ISBN-13: 9780205318438

HOW OBJECTIVES ARE CHOSEN

The BOKU community garden achieves these objectives by the following:

- Attracting BOKU students who pay annual contribution of 20€ per plot to sustain garden's infrastructure
- Regular communication (internal forum, Homepage, meetings), organisational and working meetings: Compulsory work of 50 hours/plot (regulated in the articles of the BOKU community garden) and year and voluntarily work by gardeners for shared resources
- Initial financial donations from BOKU directorate and students union to finance about 15-20% of infrastructure in cash (rest was in-kind resources (labour, network, material etc.) from gardeners
- Parties and open house days for interested people
- Working groups for defined working areas (maintenance, finance, communication etc.)
- Maintaining an active network of members and interested actors
- Collective working meetings for individual resources to share knowledge and experience
- Political lobbying at different levels at the university
- Publicity via garden homepage

CAPITALIZATION

INNOVATION RUBRIC

This rubric illustrates the innovations seen in the Case Study, and how they apply to Agroecology.

Type of innovation (from the innovation list)	Description	Science, Practice, or Movement?	How does it more specifically apply to Agroecology?	How could this be transformed into an AE teaching tool?
Innovation 1 **Social-Political/ Social Justice/ Transition/ Transformation**	**Political sensation/socialization/action through appropriation and self-organisation** The BOKU community garden only exists because of students´ continuous struggle for its existence since the beginning. This process of appropriation of "space" from BOKU, mirrors common power relations and therefor enables participating students to reflect on the current socio-political environment where the BOKU community garden is embedded in. This process also provides the opportunity to develop students´ capacities to elaborate strategies to pursue and reach political goals (at	Movement	Land tenure and access to land is a huge challenge on global scale as it is quite unevenly distributed in most countries and access to this basic resource of agricultural production mostly restricted. The movement dimension of agroecology was often driven by this question (e.g. Brazilian landless movement). The consciousness about the political environment in general (the political system) and power relations in detail agriculture is embedded in enables students´ ability to recognise the political strategies of different stakeholders in the (political) debate of land tenure and land and permits active participation in debates.	A monopoly-style game in which land tenure is in focus: two of the players are well-equipped large corporate farmers and the rest has only the plot size for a poor livelihood. The small farmers can only survive if they build strategies together instead of having the idea of growing (to become a big farmer) with the effect that the other small farmers becoming even poorer.

	the university).			
Innovation 2 **Social, Environmental, Technical**	**Applied systemic thinking** The development and implementation of agroecological ideas provides a field to apply systemic thinking: the activities and the result should entail multi-functionality and follow the four principles of Organic Farming. Example: The community of gardeners recognized a need for a bike rack. The inherent function of a bike rack is to lean bikes during gardeners´ stays at the garden. So only solid iron sticks would fit to such a purpose. To implement a systemic approach, the bike rack was designed to host several other functions, which are necessary: i.) *production function* (growing hardy Kiwis *Actinidia arguta* in using the rack as a trellis; ii.) *function of hosting beneficial organisms* (solid horizontal beams enable birds of prey to sit there to observe mice to be hunted)	Science, Practice	The recognition of certain elements of a system and its interrelations (and hierarchy) to the other elements of the system is the basis of all agroecological endeavours. The challenge is to include this systemic perspective into science and daily practice. The BOKU community garden provides the opportunity to practise and apply this systemic approach exemplified with the development and establishment of the bike rack.	Systems development in drawing a picture a farm and its ecological environment. It would be possible to focus on certain elements like the potential establishment of a multi-purpose hedgerow and how this hedgerow might effect the surrounding elements of the system.

	and iii.) *spatial function* as a windbreaker, design element and protection for curious eyes into the garden.			
Innovation 3 **Social-community**	**Group learning and hands-on experiences** Participants are equipped with different skills, talents, capacities and knowledge. The innovation is to create a space to enable participating individuals to learn in manifold ways from each other by being exposed to "social-dynamics" within a large group in a democratic process of self-organisation and being held responsible for the establishment and further development in accordance of the agroecological principles of the physical space of the whole BOKU community garden.	Movement, Practice	Social justice and equity is only possible in a community where people are capable to learn from each other as learning is only possible by understanding your learning partners´ position. For agroecological applications it would mean to strengthen cooperation, equality and equity by learning from each other in all dimensions of agroecology.	Methods, in which the participants have to bring up solutions for a stated problem in a team.
Innovation 4 **Social-Values and Ethics**	**Individual experience of "nature" and personal development** The BOKU community garden offers the gardeners to observe "nature" in restricted areas ("wilderness" area) and to care about a piece of land (individually or in small groups) for at least one	Movement, Practice	Agriculture in Europe has changed tremendously during the last 80 years by introducing production techniques such as heavy machinery, agricultural chemicals and hybrid seeds. As a result biodiversity and natural habitats decreased enormously. By re-introducing buffer strips, "wilderness"-areas, etc. into agricultural systems diversity, but also resilience of the system, could increase again with only a	Design and implementation of a "wilderness area" with and by students to learn from it the non-utilization and to favor habitat function of agricultural systems. Required observation exercises throughout the semester or year, keeping a journal about what they see, notice, smell, feel, and how that changes over the year and seasons.

	season. For their plot students must organise themselves to cultivate it until the end of the growing season. Mostly this is the first time for students to experience "nature" and so to learn to deal with appearing variable weather conditions, weeds, pests and diseases, etc. This process also enables critical self-reflection on personal challenges (self-organisation, timekeeping, etc.) and therefore the basis for personality development. The observation and caring upon a restricted piece of land ("wilderness" area) allows students to reflect the current utilization and commodification of most natural resources on our planet and learn also to "keep things untouched" and do not utilize this resources for an own material purpose, but for "nature itself" and for immaterial purpose, namely to learn ecological principles of growing, maturing, reproduction, aging and decay from a observer´s position.		slight decrease in economic turnover at farm level.	

OVERLAPPING BOUNDARIES

As the BOKU community garden was developed and is developing as a systemic approach based on the principles of organic farming, all elements are interlinked with each other, and so are the innovations mentioned above. The difficulty is to attribute systemic characteristics to one single element of the community garden or dimension of agroecology. Therefore the innovations have to be understood in a systemic manner integrating the interlinkages.

CHANGES

Since the establishment of the BOKU community garden in 2009, around 300 students from BOKU participated in the implementation of this systemic approach in developing and implementing the BOKU community garden.

The most important change is the existence of the BOKU community at BOKU itself as it was never a top down process, but generated only by self-organized students interested in the implementation of agroecological learning, experimenting and teaching. The introduction was only possible by implementing or applying elements of all three dimensions of agroecology.

Figure 2: Visible changes within the BOKU community garden

For the student participants the process of learning to integrate a systems perspective in all garden-related activities is as individual and diverse as the capacities of the participating persons - there are no easy, fast and end of the pipe solutions possible, only continuous questioning, learning and reflecting about the interrelations. Students are highly motivated to learn and integrate this systemic perspective not only in their activities within the BOKU community garden, but also in the long run within their daily lives.

CASE CONCLUSION

The BOKU community garden is a non-scientific initiative, but implements theoretical knowledge taught at BOKU into practice by establishing, developing and implementing the BOKU community garden in a self-organizing manner. It opens up the field for students to increase and deepen their understanding of the systemic nature of agroecology and its three dimensions by political sensation/socialization/action. Political sensation/socialization/action occurs through appropriation and self-organisation (movement dimension of

Agroecology). By producing vegetables and fruits in accordance to the organic principles with an emphasis on creating habitat for wildlife the practices dimension of AE is mirrored. Sciences is on the one hand the theoretical reference of all students and on the other hand the BOKU community garden serves as a partner for scientific endeavours such as seminar thesis or as a practical side for (teaching and) project implementation.

COUNTRY CONCLUSION AUSTRIA

The selected cases of innovations in agroecology in Austria highlighted in this report aim to understand the social dimensions of agroecology as one has to consider the already institutionalized organic sector in Austria in which most biophysical agroecological examples are no longer innovative or only in specific settings. Therefore innovations within the cases were selected to be either a combination of the three dimensions of agroecology (movement, practice and science) apparent in one case study or in the dimension of movement in the form of social innovation. The three cases differ in their dimension of outreach and therefore diffusion of its innovations into Austria´s society.

Arche Noah is the most important and accepted case in Austria with over 14,000 members and huge network for lobbying and support. It entails all dimensions of agroecology with a focus on the movement. We detected innovations in Arche Noah´s activities with its advocacy policies towards diverse seeds at different levels (from educational workshops for practitioners, to lobbying on national and European level) in the social sphere indicated in the innovations rubric as **Social-Political, Social-Community Social-Education, Social-Tradition; Social-Transformation/Transition, Social-Autonomy /Food sovereignty.** Arche Noah's dimension of science **Environmental-Biodiversity** was also seen in their investigating and developing viable preservation and breeding strategies (linked also to education as the knowledge and skills are shared among the members and the network). The dimension of practice is entailed in the activities related to the implementation and communication of biodiversity at different levels indicated with **Technical-Digital technology** and **Environment-Landscape.**

Since its inception in the 70s, ÖBV has expanded from a group of small mountain farmers in Austria to banding with an international movement, La Via Campesina to extend its reach not only to other farmers in need in Austria but also in Europe and beyond. Nevertheless its outreach in Austria´s agricultural sector is rather limited, as it is often strongly linked to its mainly political standing to pursue food sovereignty, which currently is not on the agenda of Austria´s (agricultural) policy. It also entails all dimensions of agroecology even though its focus is predominantly on political activities attributed to the movement´s dimension of AE in progressing food sovereignty with several activities on different levels: **Social-Community, Social-Political, Social-Food sovereignty/Autonomy, Social-Transition/Transformation, Social-Tradition, Social-Social Justice, Environmental-Landscape, Economic-Membership.** The practical dimension is chiefly focused to develop and implement solutions for small-scale family farm challenges: **Social—Education.**

The case with the smallest impact on Austrian society is the BOKU community garden. It opens informal learning opportunities of AE for future BOKU-Alumni, who will be dealing with agriculture in their professional career. Although the BOKU community garden might only act as a multiplier for AE, it also provides innovative approaches that are interlinked with each other and not necessarily with a specific dimension of AE even if the practical dimension (production of vegetables and fruits) are superficially observable: **Social-Values and Ethics; Social-community; Social, Environmental, Technical, Social-Political/ Social Justice/ Transition/ Transformation**.

The three case studies illustrate mainly social innovations, which might contribute towards a more sustainable and just food system in Austria. In particular the institutionalised Organic sector in Austria could benefit from these innovations by integrating (and respectively strengthening) them into and within their policies and outreach activities.

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ITALIAN CASE STUDIES

In this section the best-case case studies of agroecological innovations within Italy are elaborate through a presentation of each of the cases, an analysis and concluding remarks. Written and compiled by OEP: Coordinated by Angelo Paladino and the Authors Salvatore Basile, Domenico Nicoletti.

INTRODUCTION: CASE STUDY SELECTION AND REASONING

Agro-ecology in Italy is considered today a transdisciplinary area of enquiry that is capable of changing our common vision of both agriculture and society (Prof. Caporali – Uni Tuscia). It's inherently connected to the development of the organic farming and the Bio-districts experience, started in the year 2004 by AIAB Campania in Cilento area (Province of Salerno, Italy). It's today the most important example of agro-ecological approach in Italy, applicable to the sustainable management of a territory. After the International Conference on Agro-ecology, that was held the 7th of October 2016 at the Carthusian monastery of San Lorenzo in Padula (Salerno) during the 3rd transnational meeting of the Euro-EducATES Project, the European Landscape Observatory (OEP) has launched the **"Charter of Padula on the Agro-ecology in the protected areas"** (http://www.agro-ecologia.it/carta-di-padula-per-la-promozione-dellagroecologia/). In collaboration with other Organizations (Legambiente Onlus and IN.N.E.R. International Network of Eco-Regions) OEP promoted in the year 2017 many public forums (in Campania region, in Vallonia Region-Belgium and in Bruxelles) for the dissemination of the Padula Charter's principles and for setting the bases of the **"European Agro-ecology Charter for the protected areas"** (http://www.agro-ecologia.it/carta_europea_agroecologia/). This is a methodological and certification tool that allow a better management of protected areas for the development of agro-ecology experiences in the transitory period. The central element of the Charter is the collaboration between all the stakeholders for the development of a common strategy and an action plan for the agro-ecology transition, based on an in-depth analysis of the local situation. The objective is to protect the natural and cultural heritage and to continuously improve the management of agriculture in the protected area for the environment, the local population, the businesses and the visitors. In addition, the Charter directly addresses the principles of the "International Sustainable Agriculture Guidelines" of the "Convention on Biological Diversity". Recently, Europarc Federation (www.europark.org) is committed to promoting the sustainable agriculture in the Parks at European level. The European Parks represent a good practice laboratory and the Italian Parks inside the Bio-districts have launched an Italian model to represent results and alliances between land-territory and good practices for the ecological resilience of resilient territories, considering climate change.

The 3 Italian case studies selected illustrate this new approach to agro-ecology.

1. **Cilento Bio-district** is a territory located in the "National Park of Cilento, Vallo di Diano and Alburni" (Campania Region-Italy), where farmers, citizens, tourist operators, associations and public authorities realized an agreement for the sustainable management of local resources, based on organic method and agro-ecological principles. It is a bottom-up organisational innovation enabling a multi-level territorial governance in which different actors are mobilized to transform an area's heritage into resources for innovation and sustainable development of rural areas.

2. **International Study Centre on the Mediterranean Diet** "Angelo Vassallo" is the Organization responsible of the dissemination, training research and study on the Mediterranean Diet (a cultural and life style innovation, started in Pioppi-Pollica-Salerno) since the 60s with the studies of Ancel Keys.

The 16th of November 2010 the Mediterranean Diet has been inscribed in the Representative List of Intangible Cultural Heritage of Humanity. This corresponded to the third and final point of Decision 5.COM 6.41 of the Committee. In its declaration of recognition of the Mediterranean Diet the UNESCO underlines that: the Mediterranean diet (from the Greek diaita, or way of life) encompasses more than just food. The Mediterranean diet constitutes a set of skills, knowledge, practices and traditions ranging from the landscape to the table, including the crops, harvesting, fishing, conservation, processing, preparation and, particularly, consumption of food. The quality of the food is very connected with the quality of the environment and the Eco sustainable methods of agriculture (organic farming, agro-ecology, recovery of ancient seeds and cultivars, family farming, etc.).

3. **Gardens of Sala**, 800 hectares of land, divided into small plots, managed by a cooperative of little family farmers, that intends to set up the Bank of Fruits and Seeds of ancient "Orti di Sala" entrusting seeds to farmers keepers. At the production of vegetables was added the cultivation of an ancient olive tree varieties prized for the oil made from it, called "Corniolo". Even now thousands of ancient olive trees complete the landscape of the gardens and this allows the community to be appointed full-fledged "producer of food community".

DEFINITION OF INNOVATION

IFOAM Organics International in the "Action Plan for innovation and learning" highlighted that Innovation is a broad concept that is generally defined as the development, introduction and application of new ideas, processes, products or procedures where an economic or social benefit is assumed for individuals, groups or entire organizations (Maier, 2001; Aichner et al., 2000). Put simply, it is something original, therefore new, that "breaks into" a market or society.

As evidenced in the IFOAM Organics International publication "Feeding the people-Agroecology for nourishing the world and transforming the agri-food-system Innovation", ***Innovation, in the broad sense of applying new ideas to daily practices, has always occurred. Agricultural practices have always responded to changing environmental conditions. Agroecology 'is by definition an innovative, creative process of interactions among small-scale producers and their natural environments'*** (IATP, 2013). However, the term 'innovation' has become narrowly defined as meaning technological, commercialized innovation. From the 14th century onwards, social innovations have contributed to that narrowing, especially through various privileges and patent laws that reward novelty. By the early 20th century, innovation was understood as the commercial adoption of technological inventions. This, in turn, was seen as causing cultural or social changes – rather than being dependent on such changes (Godin, 2008 and 2015). Hence 'innovation' has underpinned a technological-deterministic explanation of societal change. Agroecology faces the task of reclaiming 'innovation' for knowledge production and policy support. This includes innovation across the entire agro-food chain, linking farmers with other farmers and with inputs of natural resources, as well as consumers who support agroecological methods. Such initiatives act together to challenge the dominant models of innovation and agriculture.

Agroecology embraces other forms of innovation, alongside the technological-scientific.

• **Know-how innovation**: the development of new management approaches and the introduction of both new and traditional knowledge related to methods and practices.

• **Organizational innovation**: introducing changes to the actual patterns of management and cooperation, right across the agro-food value chains as well as between the farmers that share common landscapes.

• **Social innovation**: changing the behavior of groups in society, while maintaining or strengthening cooperation within farmers' networks, for example empowering primary producers vis-à-vis input suppliers and retailers, and altering the relationships between companies and the public (IFOAM EU Group et al, 2012: 3).

The European organic sector and its supporters have worked together to promote agroecological research with the concept of 'eco-functional intensification'. This links practical innovation, farmers' knowledge and scientific research.

CASE STUDY 1: CILENTO BIO-DISTRICT

Agro-ecology in Italy is inherently connected to the development of organic farming and the Bio-districts experience is today the most important example of agro-ecological approach, applicable to the sustainable management of a territory.

This case study enables to approach agro-ecology by the political, technical and educational point of view.

CASE DESCRIPTION

In 2004 the Italian Association for Organic Agriculture (Campania Regional branch - AIAB Campania) launched the first bio-district in Italy. A bio-district is a geographical area where farmers, citizens, tourist operators, associations and public authorities enter into an agreement for the sustainable management of local resources, aiming at the fulfilment of the economic and socio – cultural potential of the territory. They act according to the principles and methods of the organic farming and agro-ecology. Each Bio-district is marked by lifestyle, nutrition, human relations and nature. It results that agricultural productions are more valuable and typically characterized, hence more appreciated by the market.

The bio-districts represent an innovative approach for a sustainable, integrated and participatory territorial development which builds around the environmental, social and economic dimension by:

I. promoting participatory landscape design and adopting agroecological system approaches at field level;
II. finding and creating solid and equitable local markets;
III. enhancing land access to the young generations;
IV. simplifying organic certifications schemes for producers;
V. enhancing environmental awareness and local traditions;
VI. recognizing food sovereignty and culture identity of the local communities.

The first bio-district was launched in the Campania region in South Italy in an area inside the National Park of the Cilento, Vallo di Diano and Alburni. It covers an area of 3,196 square kilometres and includes 37 municipalities, 400 organic farms (23% of tot. organic producers in Campania) and 2,300 hectares. The Cilento bio-district area is recognized as World Heritage Biosphere Reserve by UNESCO.

The bio-district was created based on the request of a group of organic farmers which pushed local authorities to the development of a local organic market. 10 regional municipalities promoted a series of workshops and meetings, involving AIAB Campania and other organizations. These meetings shaped the concept of the bio-district. In 2009 the bio-district was officially recognized by the Campania regional authority with the multiple

goal of finding and implementing joint actions for inclusive territorial development strategies. Those actions included pilot organic group certification, setting up production guidelines for farmers, awareness campaign of sustainable agriculture production along with public procurement schemes to promote Mediterranean diet and local organic consumption in schools and hospitals canteens, and local administration offices.

In 2011 a non-profit association was created to ensure structured coordination of the bio-district activities. The bio-district involves many different actors, such as producers, consumers, farmers groups, local authorities, operators of the agro-food supply chain and local training and research centres. A multilevel bottom up approach is at the basis of the bio-district and is adopted to design interventions, changes adjustments and future development plan of the area.

Figure 1. Cilento Bio-district logo

The idea behind the bio-district approach is to create and reinforce links that would benefit everyone involved: organic farmers would get better market access, consumers would benefit from transparency about the origins of their food and enjoy fresh, organically grown local products, the tourist operators would offer new activities and destinations (eco trails and agro-tourism farms) while public authorities would ensure food security and rural employment. The multifunctional approach is the very innovation. It allows to incorporate various fields of agriculture combined with other farming activities: eco-tourism, education, culture, leisure, landscape preservation.

Prevalent activities in Cilento bio-district focus on the promotion and valorization of the bio-excellences of the territory as well as the encouragement of the organic/agro-ecology transition along the traditional agro-food supply chains (legumes, black pork and black goat, Cilento white fig, olive oil, honey, alici di menaica, goat cheese "cacioricotta", buffalo mozzarella, etc.). Most of the farms in the Cilento bio-district are small-size (about 5 ha) family-run enterprises often with multifunctional organization (i.e. offering accommodation, gastronomy, education, ecosystem services and other services). The main products include vegetables, pulses, fruits, chestnut, olive and grapes, cheeses and livestock products. The high number of mixed farms are the building blocks of a diversified landscape typical of the Mediterranean rural areas and reduce as much as possible the use of external inputs and favor nutrient recycling and ecological processes.

Figure 2. Bio-district farmers' market

Yet, about 50% of the inputs are purchased externally. Seeds are sourced from the local nursey and from the "seed savers initiative" which produces traditional varieties able to thrive in low input systems. To date 20% of the seeds used in the bio-district come from this initiative. About 56, 95 and 407 varieties of respectively cereal, vegetables and fruits, are available for farmers and conserved in the Museum of Germplasm of traditional varieties. If other inputs are needed, they are purchased through farmers association to decrease costs per unit of input.

Initial activities focused on creating a network of organic farms, producer associations, bio-city organizations, caterers, eco-tourism operators, and consumers, through short supply chain initiatives. In few years, the Cilento Bio-district had attracted a large number of local actors and produced other initiatives such as bio-spiagge (Bio-Beaches), Bio-sentieri (Bio-Trails) and an eco-tourist Cilento Bio-district Guide.

Figure 3. Landscapes of the Cilento Bio-district

The Cilento's experience has also served as a basis to the growing number of bio-districts that are spreading across Italy, Europe and Africa. To date there are 27 bio-districts running in Italy and other 30 are in the process of being formed, spread among 19 regions. Given the high number of bio-districts in Italy a specific law on bio-districts and organic farming is currently being debated in the Italian Parliament.

In September 2017 the Italian Ministry for Agriculture has signed an agreement with the International Network of Bio-districts and Eco-regions IN.N.E.R. to enhance the exchanges among Bio-districts and their potential territorial development. With this agreement Bio-districts play a strategic role into the policies undertaken by the Ministry for Agriculture to support organic agriculture and agro-ecology, as foreseen by the 2014 - 2020 European Agenda. The Ministry also wanted to frame this agreement in its policies to strengthen rural areas to make them become sites of innovation, research and experimentation, social inclusion, resilience to climate change, biodiversity conservation, valorization of traditional culture and knowledge. The agreement with the INNER network foresees to foster cooperation among Bio-districts with information and knowledge exchange, territorial promotion, information on the potential of the territorial approach of organic farming, by organizing a wide range of activities, including meetings and conferences on the sustainable development of the rural areas. The agreement also envisages to support actions of development and transfer of innovative know-how into international cooperation programmes, creating new premises to enhance the international dimension of the Network.

In 2017 the working methodologies of Bio-districts, for example, have been published among the agro-ecology profiles featured by the Agroecology Knowledge Hub[14] managed by the Food and Agriculture Organization FAO.

Those methodologies have also been qualified among the six best international "Good Practices on investments" for the FAO *Healthy Food Systems* policy and presented within the 44th Plenary Meeting on the Committee on World Food Security (CFS)[15] held on the 10 of October 2017 at the FAO Headquarters in Rome.

[14] http://www.fao.org/agroecology/database/detail/en/c/1027958/
[15] http://www.fao.org/cfs/home/plenary/cfs44/it/

Figure 4. Italian Bio-districts

From Italy the bio-district movement has expanded across Europe and Africa where an additional 10 bio-districts experiences are present in France, Austria, Germany, Switzerland, Slovakia, Portugal, Spain, Albania, Senegal and Morocco. In order to support and favor exchange between such a variegated communities the International Network of Eco Regions (IN.N.E.R) has been created. The network aims at enhancing system approach to organic production, strengthen multilevel governance policies, coordination and cooperation between bio-districts to reduce hunger and increase the sustainable of agricultural production and to promote project for international development to address the challenges that the global agriculture is facing.

CASE OBJECTIVES

The objectives of the case study Cilento bio-district can be grouped in three main areas.

- **Economic:** making agriculture more remunerative by applying a system approach at the field level and create new market opportunity for producers. At farm level practices, able to use inputs more efficiently are promoted while inputs (when needed) are purchased collectively in order to decrease costs. At market level, the bio-districts aim at building up a short supply chain by stimulating local market, public procurement and eco-tourism. Group organic certification schemes are promoted to reduce costs and enhance the supervision within the bio-district.
- **Environmental**: making agriculture more sustainable by applying practices able to reduce the environmental impact of farming.

- **Social:** favoring rural employment and enhancing social capital through facilitating land access to young generations, enhancing aggregations and knowledge exchange between different stakeholders and recognizing the role of farmers as the real ecosystem stewards.

HOW OBJECTIVES ARE CHOSEN

Cilento Bio-district achieves these objectives by the following:

- **Promoting the short value chain** - it's one of the strengths of the bio-district. The agricultural production and related processed products are sold directly by producers or through farmers associations. Direct marketing includes on farm sales, farmer's markets, purchase groups and the e-commerce platform and count for 75% of the bio-district economic flow. The public procurement, restaurants and tourists facilities (HO.RE.CA) represent 15% of the sales while the traditional distribution –which includes local, regional and national organic shops and supermarkets- only accounts for 5%. Export mainly concerns wine and olive oil and is a minor market channel with 5% of the sales. Overall 40% of the production is consumed locally while the tourist sector absorbs 55% of the production. In this short supply chain the different associations involved in the bio-district provide an essential contribution by mediating economic relationships, provide assistance and technical service to farmers and communicate the importance of sustainable production and local purchase which a single farm would not be able to coordinate. Different types of consumers are valorised and actively participate in the continuous improvement of products, services and production processes.

- **Providing technical support to the farmers** for the transition to organic/agro-ecology practices, able to reduce the environmental impact of farming on natural resources, greenhouse gas (GHG) emissions and build up a diversified landscape. Also well adapted local varieties are enhanced in order to save and make use of the local biodiversity.

- **Encouraging the inclusive approach of the bio-district**.

  Firstly: events, workshops, participations in farmer's associations and meetings represent opportunities to strengthen social relationships between the actors of the bio-districts. Those occasions have played a crucial role in linking communities from the coast with those living in the inlands which in turn also attracted tourists to new places.

  Secondly: farmers are recognized to be real ecosystem managers and food provider's thereby enhancing the social role of farmers, their identity and the need to support them through consumption of local food and public procurement.

  Thirdly: the rural communities are now much more empowered in dealing the local authorities and institutions due to the series of consultations and participatory landscape planning approach.

  Fourthly: the different associations, cooperatives and the involvement of academia represents an important platform for knowledge sharing and consultations for farmers. An *Innovation Service Center* has been recently established in collaboration with several Farmer's associations, the Agricultural Research Centre and University of Salerno, to provide technical assistance, support business management, monitor and enhance the performances of the bio-district.

- **Promoting the multilevel territorial governance**, it allows that political actors (municipalities, regional), other public Institutions (National Parks, Local Action Groups, etc.) and civil society (associations) to transform the area's heritage into resources for innovation and development of rural areas based on organic/agro-ecology model. It leads to a continuous improvement of the agro-food production system as demonstrated by the recent launch of the document "*Building a shared territorial development strategy*" promoted by IN.N.E.R. and Italian Ministry of Agriculture and Forestry and the Agreement "Charter of Padula on the Agro-ecology in the protected areas" signed by OEP, Legambiente and IN.N.E.R. to promote agroecology inside the Italian Parks.

- **Developing the Tool kit for the bio-district implementation and evaluation.** The kit developed by IN.N.E.R. (the International Network of Bio-districts/Eco-regions) includes a disciplinary (with the directions for the license to use the brand "Eco-Region" by the different categories of users), examples of Constitution act and Statute, guidelines for the elaboration of the strategic plan, resolution schemes and a specific analytical framework for the classification and performance monitoring of the bio-districts. The framework integrates four different approaches: an adaptation of the Porters' Diamond analysis of the Industrial Clusters competitiveness; an evaluation scheme for measuring the degree of compliance of the bio-districts with their principles; a classification scheme of the Clusters' stage of development and a classification scheme for defining the bio-districts' market orientation typologies.

CAPITALIZATION

INNOVATION RUBRIC

Type of innovation	Description	Science, Practice, or Movement?	How does it more specifically apply to Agroecology?	How could this be transformed into an AE teaching tool?
Innovation 1 **Social:** **Political/Community**	The Bio-district represents a ***bottom-up organisational innovation*** enabling a multi-level territorial governance in which different actors are involved to transform an area's heritage into resources for innovation and sustainable development of rural areas.	Movement	The development of the Bio-district model enables to gather different actors of the territory with a change of behavior. New relationships and common goals are established, based on the organic farming and agro-ecology principles and practices.	The bio-district model is presented to the students, i.e. using the media resources (video, ppt, images, interviews, etc.) available on the web sites of the International network of Bio-districts/Eco-regions: www.ecoregion.info or www.biodistretto.net. Students are divided into three groups, corresponding to the main categories involved in the establishment of a bio-district: farmers, public administrators, consumers. The teacher then asks them to describe a territory that they know and identify themselves in the represented category, identifying the possible advantages/disadvantages arising from the constitution of a bio-district. At the end, the work of the three groups would be compared and, with the help of a teacher, a synthesis document can be developed. This document can be later discussed with teachers/experts. Visits on the field could be organized, with interviews with the actors of the three categories.

Innovation 2 **Environmental: Biodiversity/Landscape/ Ecosystem services** **Technical**	In a Bio-district the farmers, in addition to ensure food production, are increasingly important to patrol and to protect the territory, the biodiversity, the hydro geological balance, the landscape, the natural resources. In a Bio-district there is an overall approach to the farm management, that combines ***best environmental practices, an high level of biodiversity and techniques for the preservation of natural resources.*** IN.N.E.R. – International Network of Eco Regions developed a Data Base of the agroecology best practices in the Bio-districts (http://www.ecoregion.info/db-bds/).	Practice	The Environmental dimension of a bio-district is interrelated with the economic and social components in a complex system producing the innovative outcome of a **virtuous cycle,** where these core dimensions lead towards the agroecology transition. In a Bio-district the farmers are also "guardians/stewards of nature and biodiversity"	Analyses of cases with teachers and students using the On-line Data Base of the Agroecology best practices in the Bio-districts - DBDs (http://www.ecoregion.info/db-bds/).

Innovation 3 **Economic:** **Autonomy**	The University of Bologna developed a specific analytical framework for the classification and the performance monitoring of Bio-districts. The aim of this tool is to increase the responsibility of the local economic actors in exploiting and preserving natural and environmental resources, reinforcing the integration between primary production, transformation and marketing methods. All these elements are aimed at improving the distribution of further added value to support the organic farmers.	Science	In a Bio-district the economic dimension is one of the interrelated components aimed at the agroecology transition. Circular economy, co-sharing of lands, collective use of resources, short supply chain, green public procurements … are some of the processes activated in a bio-district to achieve autonomy and food sovereignty of the territorial community. Thanks to the tool developed by the University of Bologna is possible also measure the level of autonomy and economic independence of a bio-district.	Comparison of different territories involved in the agroecological transition. Using the tool developed by the University of Bologna (Italy) is possible classify and performance monitoring of Bio-districts.

OVERLAPPING BOUNDARIES

The Cilento Bio-district has been developed as a systemic approach to the sustainable management of the rural territories, based on the organic farming and agro-ecology principles and practices.

The different components of a bio-district are interrelated in a complex system producing the innovative outcome of **a virtuous cycle where these core dimensions lead towards a sustainable and diversified healthy food system: 1) environmental** (i.e. local traditional cultivars, lower environmental impact, biodiversity, landscape, potential to deliver ecosystem services, efficient use of water sources, energy saving), **2) economic** (circular economy, co-sharing of lands, collective use of resources, short supply chain, green public procurements), **3) social/cultural** (i.e. social control over the quality produce the food security, particularly through the Participative Guarantee Systems; give back to the farmer his/her social role, an easier and wider access to underused or abandoned lands, the exchange of know-how and knowledge between elders and young people, providing new opportunities for young people and women, the value given to the food product, based on the local identity of the place, that is integrated with all other components of the local economy, in BDs territories becomes cultural heritage and a territorial mark/brand).

In a Bio-district many categories overlap, but it's typical of the systemic approach. It's important to study carefully all the interrelations and links inside the complex system of a Bio-district.

CHANGES

Since the establishment of the Cilento Bio-district, about 400 farmers have changed their approach to the farming and the community life, entering into an agreement with public authorities, citizens, tourist operators, associations, for the sustainable management of local resources, aiming at the fulfilment of the economic and socio - cultural potential of the territory.

The rural communities are now much more empowered in dealing the local authorities and institutions due to the series of consultations and participatory territorial planning approach.

An integrated approach of sustainable development is adopted by the Cilento Bio-district. The different actors are involved for shared purposes: the improvement of the life quality, the employment of local population and the reduction of population's decrease in rural areas, the employment increase of young people and women, and of the quality of agro-food productions and of local livestock premises. It's also relevant to ensure the consumers safety, a traceable and healthy food, the increasing and seasonal regulation of tourist flows (through a multiple eco-tourism and local culture supply), the biodiversity protection, the enhancement of landscape and natural resources.

Hence the food product in these areas also becomes cultural heritage and a local identity mark: local economic and social actors become more responsible in the management of natural and environmental resources, which are common to several sectors (agriculture, tourism, commerce, etc.). This awareness made the mobilisation and the protection of local resources easier, most of them related to agricultural systems and to agro-food industry.

The Bio-districts are therefore a real answer to the present trend of economic development causing massive phenomenon of abandonment of rural areas and the increasing urbanization of people in search of better condition of life and a higher income. The process affects both the most industrialized countries and developing countries, causing the degradation and the progressive impoverishment of territory resources, the loss of biodiversity and of the cultures and traditional knowledge.

CASE CONCLUSION

In a bio-district the sustainable agriculture and food production are realized through the social dialogue, direct commercialisation, by giving concrete answers to responsive consumers. They can create growth and new employment, at the same time enriching the community. This practice of economy of development joints together sustainability, ethic labour and social cohesion.

CASE STUDY 2: INTERNATIONAL STUDY CENTRE ON THE MEDITERRANEAN DIET

CASE DESCRIPTION

The International Study Centre on the Mediterranean Diet "Angelo Vassallo" is the Organization responsible of the dissemination, training research and study on the Mediterranean Diet (a cultural and life style innovation, started in Pollica (Salerno-Italy) since the 60s with the studies of Ancel Keys. The Headquarters is in the Castle of princes Capano, that was inherited in 1290 by Guido d'Alment, arrived in Italy in the wake of Charles I of Anjou, and later acquired by the Capano family. In 1997 the castle was purchased by the City of Pollica.

Since 2009 the Bio-district Cilento was actively engaged in the promotion of the Mediterranean Diet, participating in the Festival of Pioppi-Pollica, and then in recent years working closely with the International Study Centre on the Mediterranean Diet "Angelo Vassallo", also in the occasion of the participation to the Universal EXPO 2015 in Milan.

Figure 5. Meeting at the International Study Centre on the Mediterranean Diet of Pollica (SA)

The 16th of November **2010** the Mediterranean Diet has been inscribed in the Representative List of Intangible Cultural Heritage of Humanity. All this, further to the third and final point of Decision 5.COM 6.41 of the Committee. In its declaration of recognition of the Mediterranean Diet as Intangible Heritage of Humanity, the UNESCO underlines that: the Mediterranean diet (from the Greek diaita, or way of life) encompasses more than just food. The Mediterranean diet constitutes a set of skills, knowledge, practices and traditions ranging from the landscape to the table, including the crops, harvesting, fishing, conservation, processing, preparation and, particularly, consumption of food. This was the culmination of a transnational institutional effort that had commenced in 2004. In the same year started the process of construction of the first Italian Bio-district in Cilento, where since the 60s Ancel Keys conducted his studies on the Mediterranean Diet. With the law N. 6 of

the 30th of March **2012** the Campania Region recognizes the value of the International Study Centre on the Mediterranean Diet such as a Pole for the dissemination, training, research and study of Mediterranean food style.

In the small village of Pioppi, in the territory of the municipality of Pollica, there is the "Living Museum of the Mediterranean Diet", connected to the International Study Centre on the Mediterranean Diet "Angelo Vassallo". It's a teaching structure based at the Palazzo Vinciprova and managed by Legambiente onlus, the most important Italian environmental association.

Figure 6. Didactic room of the Living Museum of the Mediterranean Diet of Pioppi-Pollica.

The Museum is a place of dissemination of the principles of the Mediterranean Diet. In this territory Ancel Keys, father of the Mediterranean Diet, lived and studied for over forty years. The structure, recently restored, includes: the exhibition hall with descriptive panels, videos and images showing the history and principles of the Mediterranean diet, the laboratory rooms and the personal library of Ancel Keys, donated by his family to the Municipality of Pollica.

The spread of the guidelines of the Mediterranean Diet goes through a wide array of activities: guided tours, workshops, events and more. The museum's educational proposal is rich and varied, and includes thematic paths designed for all ages and study addresses. In the last school year, the Museum hosted about 15,000 students of every level of education from all over Italy, becoming one of the most visited structures in Campania region.

In addition to the classical guided tour, the student who make a stop at Palazzo Vinciprova is able to deepen his topics of interest through frontal lessons, practical workshops and scientific and artistic games, curated by the staff of the museum's biologists and, in some cases, by external experts. Laboratory activities are enriched with audio-visual media and practical experiments; but also by animated tours designed to stimulate a creative and interactive relationship between the spectator / participant and the crossed places.

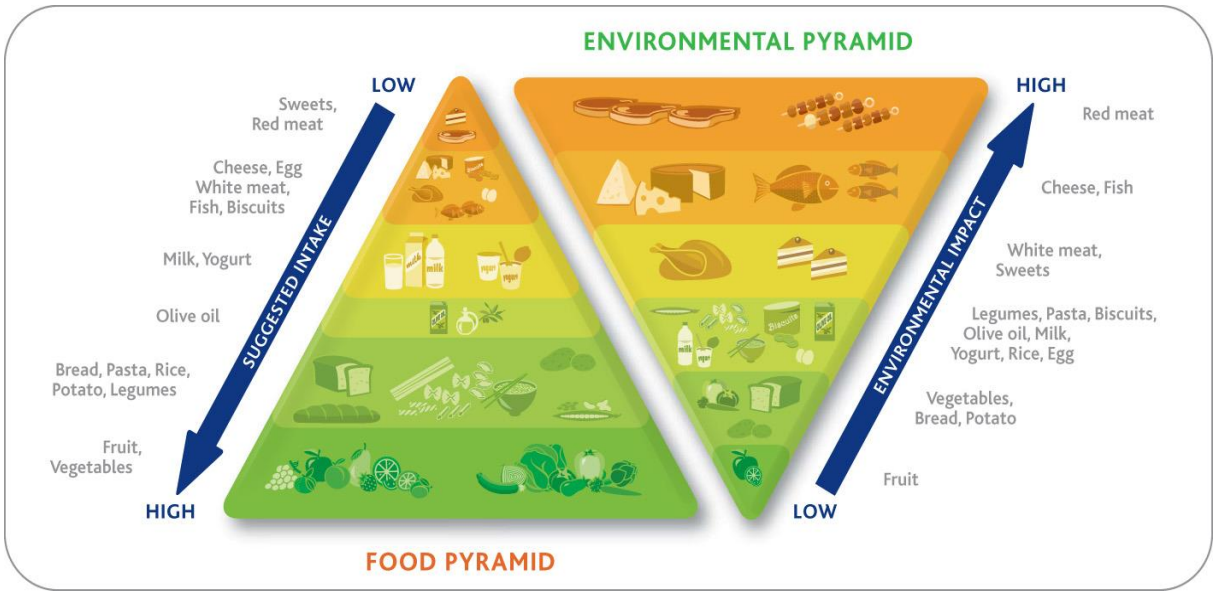

Figure 7. From the food pyramid to the environmental pyramid.

Here are some of the laboratories dedicated to the Mediterranean Diet: "From the food pyramid to the environmental pyramid", "The way of grain", "To make honey the bee wants" (with practical demonstration and expert beekeeper), "To rediscover the plants dyeing ","Oil and Surroundings","Cilento Cheese", "A Fruit World", "Natural Cosmetic Laboratory: Auto Oil Production", "Ceramic Art Workshop: Processing and Decorating" (with expert).

But the activities of the Museum are also extended beyond the walls of Palazzo Vinciprova, with paths, educational gardens, historical sites and intangible projects, thus fully developing the concept of Ecomuseum, which goes beyond the physical dimension, opening to the territory and to the community.

It is reach the calendar of events that the Museum hosts and organizes during the year. Worth to be mentioned is the Festival of the Mediterranean Diet. It is a “box” plenty of initiatives, developed for about forty days in the summer, which revolve around the most interesting cultural and anthropological aspects of the Mediterranean lifestyle. The event, promoted by Legambiente onlus and by the Municipality of Pollica with the patronage of the National Park of Cilento, Vallo di Diano and Alburni, includes meetings, debates, workshops, show cooking, children's theater shows, music concerts, excursions and many other activities. The Logistics Base is the Museum, but events are developed throughout the Cilento area.

In addition, the Living Museum of the Mediterranean Diet is part of the Cilento Green Card network, a project for enhancing the territory promoted by Legambiente Onlus with the patronage of the Campania Region and of the National Park. The annual tourist pass allows access to a discounted price to a range of museums, archaeological sites and naturalistic areas within the Park.

The Living Museum of the Mediterranean Diet is a point of reference to promote – starting from the younger generations - the Mediterranean Diet and its benefits to health and quality of life, thus consolidating the role of Pioppi as the world capital of the Mediterranean Diet.

CASE OBJECTIVES

The case study proposed aims to show the connections between territory, healthy life style, alimentation and good practices of agro-ecology.

- Educating young generation to the healthy lifestyles
- Enhancing the biodiversity of landscapes
- Preserving cultural heritage of rural areas

HOW OBJECTIVES ARE CHOSEN

The International Study Centre on the Mediterranean Diet achieves these objectives by the following:

- Political lobbying on the national and international level
- Creating and maintaining an active network of Communities involved in Mediterranean Diet
- Teaching agro-ecology starting from the Mediterranean Diet, as a cultural and life style connected with the nature and the agro-ecology principles
- Educating through books, courses, laboratories, video
- Exchanging experiences with other Communities
- Communication programs on the healthy lifestyles

CAPITALIZATION

INNOVATION RUBRIC

Type of innovation	Description	Science, Practice, or Movement?	How does it more specifically apply to Agroecology?	How could this be transformed into an AE teaching tool?
Social-Education	Teaching agro-ecology starting from the Mediterranean Diet (as a cultural and life style connected with the nature and the agro-ecology principles). Nutrition, territory and lifestyle are the factors that can have more influence not only on longevity, but also on quality of life.	Science	Ancel Keys (1904-2004) was a famous American scientist of Minnesota who studied the influence of diet on health and codified the Mediterranean Diet in Pioppi-Pollica. The relationship between territory, food, culture and local sustainable practices of production and consumption of food are the basis of the proper application of the Mediterranean diet.	Taking into account the experiences of the International Study Centre and of the Museum of Mediterranean Diet, could be realized with students many laboratories on the relationship between territory, food, culture and agroecology best practices. For example, laboratories dedicated to the "food pyramid" and "the environmental pyramid".
Environmental **Economic** **Technical** **Social**	Foster the multilevel skills, knowledge, practices and traditions that constitute the Mediterranean Diet.	Practice Movement	The Mediterranean Diet has nutritional, economic, environmental and socio-cultural characteristics that make it a "sustainable diets" that can favor the agroecological transition. It's based on the use of local food (many vegetables few meat), biodiversity, food security, low environmental impact, philosophy of sustainability (that is its core).	From field to fork guided tours (real or virtual). Workshops. Laboratories.

OVERLAPPING BOUNDARIES

The Mediterranean diet (from the Greek diaita, or way of life) encompasses more than just food. So there are many overlapping, from scientific studies to the practices and traditions ranging from the land to the table, including the crops, harvesting, fishing, conservation, processing, preparation and consumption of food.

The International Study Centre on the Mediterranean Diet "Angelo Vassallo" is the Organization responsible of the dissemination, training research and study on the Mediterranean Diet model as a science, a practice and a movement, connecting different people, promoting a healthy lifestyle.

So the activities promoted by the Centre are the example of how to overcome the overlapping and achieve the principles of the Mediterranean Diet.

CHANGES

The consumption of junk food contributes to an increased risk of chronic health conditions (cardiovascular diseases, obesity, diabetes, etc.) and negative environmental impacts (biodiversity losses, GHG emissions, nitrogen deposition and eutrophication, water, land and energy consumption, etc.). Healthy food isn't always a matter of personal choice! Through the activities promoted by the Study Centre Angelo Vassallo and by the international community the model of the Mediterranean Diet helping to improve the quality of life of millions of persons (especially of young people) in the World.

CASE CONCLUSION

Teaching agro-ecology starting from the Mediterranean Diet (as a cultural and life style connected with the nature and the agro-ecology principles) is the great challenge proposed by the International Study Centre on the Mediterranean Diet "Angelo Vassallo".

CASE STUDY 3: GARDENS OF SALA

"Family farmers are the people who hold the tools for practicing Agroecology" (FAO - Family farming knowledge platform).

The Sala's Gardens are located in the territory of the Municipality of Sala Consilina in the province of Salerno (Campania region) and they interest an area of almost eight hundred hectares, divided into small family plots.

CASE DESCRIPTION

The Sala's Gardens have an area of almost eight hundred hectares, divided into small family plots, they are exposed to the sun for the whole day and each piece of land is served by sources, that we like to call "water sanctuaries", of not just drinking but high quality water.

The water irrigates the ground through a network of majors and minors medieval ditches that dropping using a surface system. The land of the gardens was already cultivated three thousand five hundred years before Christ, in the Neolithic age, where the coast line marking the edge of the alluvial swamp, by people of Trans Adriatic origin, the **Enotri**, a word which in the Hellenic language intended to give them a connection with wine cultivation, that acknowledges our land an ancient agricultural expertise. The discovery of Enotrian ceramics in the gardens helps the archaeologists to confirm what the historians say, nowadays the findings are preserved in our museum.

What really made the garden's citizen famous throughout the valley were their millenary skills that permitted them to have so many kinds of vegetables, which is spring autumn, of a few hundred meters of land without losing fertility in the years.

The gardeners had selected for each kind of vegetable seeds suitable for cultivation of different places. The productions of low hill gardens were added to the productions of the mountain. They cultivated in this way biodiversity Because in that way also production of colder land and a lower water content was guaranteed.

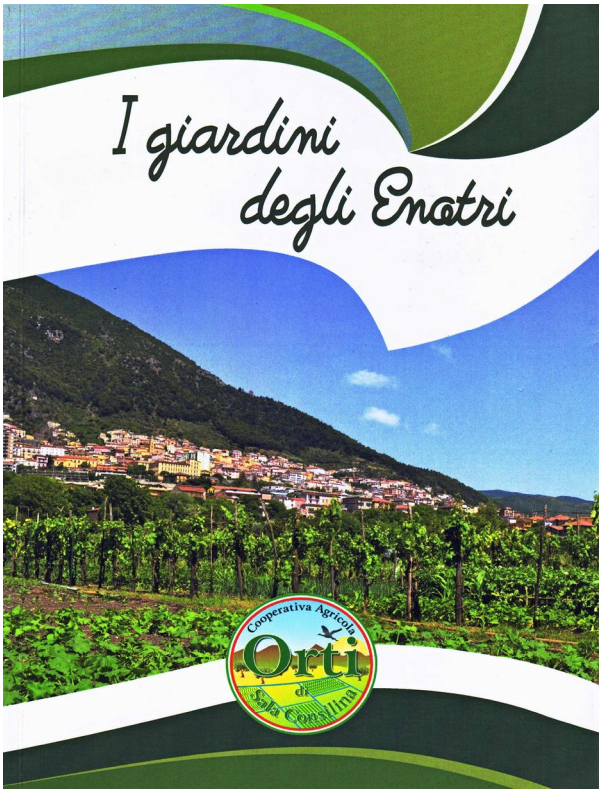

Figure 8. The book/guide on the Garden's experience

Currently the *gardeners* are making a search for old seed and thanks to them some historical varieties of tomatoes, onions, broccoli and so on, have been put into production.

Figure 9. Gardens of Sala

Research on ancient fruits is almost over, and with these was made a "field collection" with about ninety varieties of apples and pears, and also in the "collection field" vegetate a dozen varieties of cherries, plums, apricots etc.

Looking ahead the cooperative *Orti di Sala* wants to build the Bank of the Ancient Fruits and Seeds of Sala Gardens entrusting the seeds to farm keepers. About the olive cultivation, called Dogwood, the olive trees are almost millenarian with an excellent olive oil production. Even now, thousands of ancient olive trees complete the landscape of the gardens and this allows our communities to consider our self-producers of food.

CASE OBJECTIVES

The objectives of the Gardens of Sala Consilina are:

- to create a community that works together for the self-production of food
- to enhance the agrobiodiversity of the territory
- to preserve cultural heritage in the form of seed saving

HOW OBJECTIVES ARE CHOSEN

The Gardens of Sala achieves these objectives by the following:

- building the Bank of the Ancient Fruits and Seeds of Sala Gardens
- attracting new members in the family farmer's cooperative, through promotional actions
- maintaining an active network of members and interested actors
- collective seed-saving
- involvement in the Bio-district activities
- education through gardening, practical courses, seed saving and local political actions

CAPITALIZATION

INNOVATION RUBRIC

Type of innovation	Description	Science, Practice, or Movement?	How does it more specifically apply to Agroecology?	How could this be transformed into an AE teaching tool?
Innovation 1 **Social:** **Community/Tradition** **Environmental:** **Biodiversity**	The Sala's Gardens experience is first of all a network of family farmers. The cooperative of farmers offering sharing of seeds, the use of the commercial logo, the purchasing of food products and political actions, contributes to maintain an active membership base.	Movement	What really made the garden's citizen famous throughout the valley were their millenary skills that permitted them to have so many kinds of vegetables, in a small plot of few hundred meters of land without losing fertility in the years, thanks to the agro-ecological approach.	Observing and starting a discussion with the students through the video and the book on the agro-ecology best practices developed by the family farmers of the Sala's Gardens.
Innovation 2 **Technical**	Preserving traditional plant breeds and their uses, the farmer of the Sala's Gardens is not only striving to achieve biodiversity but also show the importance of cultural traditions, history and the use of new techniques/tools adapted from the past as solutions to current challenges.	Practice	The technics of past agriculture, adapted to the present, have became more supportive of AE than the techniques of today. In understanding the biodiversity and agriculture of yesterday we can apply old solutions to new problems that ultimately support biodiversity and therefore agroecology.	Guided tour (real or virtual) through the Gardens of Sala, with a description of the agroecological techniques used by the family farmers.

OVERLAPPING BOUNDARIES

Many of the categories overlap, from biodiversity to human health and food sovereignty, but we attempted here to evidence the holistic approach typical of the agro-ecology.

CHANGES

Looking ahead the cooperative "*Orti di Sala*" started with the project to build the "Bank of the Ancient Fruits and Seeds of Sala's Gardens" entrusting the seeds to farm keepers. All the citizens of Sala Consilina (municipality in province of Salerno, Campania Region – South Italy) agree with the project, which allows the safeguard of cultural traditions, history and the use of adapted techniques from the past as solutions to current challenges.

CASE CONCLUSION

Sala's Gardens represents an innovative family farmers' network applying many agro-ecology practices to achieve agrobiodiversity and food sovereignty in a little city of the South Italy. Sala is an exemplary case of Agroecology in Italy as a practice and a movement.

COUNTRY CONCLUSION ITALY

The selected cases of innovations in agroecology involves various approaches and dimensions, such as environmental, economic, ethical and social aspects. They show how agroecology can change our common vision of both agriculture and society.

Bio-district Cilento is the most important case in Italy, where the experience has spread in 19 regions and was created an International network. It's exemplary and all bio-districts are a profitable pathway of territorial development for the qualitative virtuous cycle that is there generated ("organic way of living"): a healthy and safe product is offered, environmental conditions are improved, costs of the socio-sanitary service system are cut down, together with those of the environmental management (natural disaster). The farms operate with a multifunctional organization and territories become more and more attractive.

The case study n. 2, "The Mediterranean Diet International Study Centre Angelo Vassallo", aims to educate young generation to the healthy lifestyle, to enhance the biodiversity of landscapes, to preserve cultural heritage of rural areas.

The example of the "Gardens of Sala" aims to create a community that works together for the self-production of healthy food, to enhance the agrobiodiversity of the territory and to preserve cultural heritage.

The three case studies illustrate the innovations which might contribute towards a more sustainable and healthy food system in Italy and in the rest of the World.

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SYNTHESIS

In this section we synthesize the results of each country's definitions of innovations and their 3-4 respective case studies. The case studies are synthesized through their level of impact that they might reach—from micro (farm level) through meso (regional or national) to macro (international level); the types of innovations that the case studies included (stemming from the innovation indicator list in the first section of this paper); and finally through their implications for teaching tools in order to show how this synthesis is relevant for the particular outputs 3-5 of this project.

FRANCE

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

AE was defined as – referring to the Constitutional Council in the framework of the Loi d´Avenir law in 2014 – the "Application of **ecological science by studying and conceiving and managing sustainable agro-ecosystems**" by assuming the that "agro-ecology is not limited to Organic, but is a production system which favours the farm autonomy and the improvement of their competitiveness by lessening the consumption of energy, water, fertilizers, phytopharmaceutical products and veterinary medicines. It comes to integrating the ecological dimension as a competitiveness factor."

The French partners therefore defined innovation as: **technical, pedagogical**, and **organizational** as it is in the context of the French action plan to implement AE at a national level. According to this plan innovations have to be developed to counter-act the already existing technical, pedagogical and organizational appearances of the current intensive agricultural production regime in France. Additionally related definitions are used underlining the social and pedagogical aspects of innovation:

Social innovation: "*innovation is not a good idea but the social and collective ability to make the good idea*" (Alter N., 2014).

Pedagogical innovation: *'process that is intended to change and has as a means of action the introduction of an element or a system in an already secured context'* (Pollen).

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

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

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

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

CAPITALIZATION OF AGROECOLOGY MATRIX

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

SYNTHESIS FRANCE

The selection of the cases follows the French definition of AE, which is defined in and for a specific agricultural policy purpose. This situation of a French governmental policy explicitly referring to AE is unique among the partner countries of this ERASMUS+ project and was the basis on which the given report was elaborated. This law-based definition is technical and biophysical science focused. It is also similar to the tradition in German

speaking countries where AE has been acknowledged and practiced as a science (on the interaction of agricultural practices on ecosystems – focusing mainly on the plot level) for decades, but equipped with holistic elements. AE in the described cases is perceived as a means to modernise agricultural sustainably and thus to enable economic competiveness for French agricultural sector. However, the definition of AE presented is much broader as it might be both the promotion and application of OA principles (case 2), the introduction of a "constructivist pedagogy" entailing systemic thinking (case 4), but it also might be a range of other different interventions into the agricultural system, such as a focus on the landscape level with an absence of specific references of the environmental sustainability of the suggested interventions (linked more towards an agricultural production system defined as integrated production). Finally, the top-down implementation of AE in France as a agricultural policy does not favour a strong AE movement challenging existing policy and practices agriculture is embedded in.

SLOVENIA

The Slovenian partners defined AE (as a working definition as there is no official definition from policies) as the "use of **sustainable practices based on traditional and local farmers´ knowledge**, consistent with the characteristics of **local environment and conservation of the biodiversity and cultural landscape**" (O2 – Aggregation of national abstracts - Slovenia: 25) entailing the systems approach and ecological principles. This mode of thinking and operating of AE principles is actually implemented by many non-governmental and non-state institutions and especially on regional level by small family farms that are present in the selected cases – even it is not called or defined as AE.

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

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

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

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

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

CAPITALIZATION OF AGROECOLOGY MATRIX

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

SYNTHESIS SLOVENIA

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

LITHUANIA

In Lithuania agroecology as a practice, science or movement is not widely known. Although the branch of ecology is more actively discussed, analysed and applied into practice agroecology is a relatively new term. The definition of agroecology is not approved in legislation of the Republic of Lithuanian, as there is no particular law established on agroecology so far. Nevertheless, a definition of AE can be found through the amalgamation of limited research: Agroecology (syn. Ecologic Agriculture) – is a branch of ecological science, which studies relations of crops biocenosis and external conditions of those linkages. It examines the concepts, principles, development and management of agricultural systems. Agroecology is an evolving science, covering agronomy, economy and sociology (V. Pilipavičius, 2007).

As AE is a rather new concept, agroecological innovation can take many basic forms. Innovation does have a very distinct definition in Lithuania, defined by the Lithuanian Innovation Strategy for the years 2010-2020. Innovation is a long-term strategic planning document, which sets vision, objectives, goals and results to be

achieved in the field of Lithuanian Innovation up to 2020. The purpose of this Strategy is to mobilize and manage state resources effectively: to create competitive knowledge economy based on the latest technologies and qualified human resources.

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

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

Below is a brief description of each case study pulled from the main text as well as a table depicting the capitalization of Agroecology through the case studies.

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

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

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

CAPITALIZATION OF AGROECOLOGY MATRIX

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

SYNTHESIS LITHUANIA

Agroecology being a relatively new field in Lithuania is reflected both in its definition of AE and the case studies representing AE innovation. The definition is incredibly based off of the science of ecology, although acknowledging the social perspective. The three case studies all reflect largely social aspects. Environmental and ecological viewpoints are embedded in these social aspects but seem almost secondary. They also all relate back to the economic interpretation of Lithuania's definition of innovation. Finally each of the case studies represent differing level of impacts, whether on the local, regional, national level.

AUSTRIA

As indicated in Output 1 from this project Agroecology (AE) in Austria is at a crossroads - AE has been acknowledged and practiced in Austria as a science for decades now, yet more recent interpretations of AE have begun to spur debates of the possibility and necessity of including the social into agroecological definitions.

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

As representatives from the Division of Organic Farming, and from a working group recognized for examining social change while focusing on transdisciplinary systems through sustainable agriculture, the authors of the

Austrian report found it important to stress their point of departure. They see the need to include social and economic aspects into their working group's definition of AE as well as agroecology's relationship with the organic movement. Thus they embrace broader definitions of AE such as "the ecology of food systems" (Francis et al., 2003). They also emphasize the importance of viewing AE as **science, practice and movement** and that this perspective, and any case study sharing this perspective is seen as innovative.

The Austrian partners defined innovation as: "An innovation is termed a social innovation if the implied new idea has the **potential** to **improve** either the **quality** or the **quantity** of **life**." Examples "innovations conducive to better education, better environmental quality and longer life expectancy are a few" (Pol & Ville, 2009 p.15).

In maintaining the opinion that AE should encompass science, practice and movement and that any case study sharing such a perspectives is innovative, the case studies they have chosen illustrate these different approaches of agroecology. Below are a brief description of each case study pulled from the main text as well as a table depicting the capitalization of Agroecology through the case studies.

Case study 1, highlights Arche Noah, an organization primarily focusing on loss of biodiversity in seeds. They mitigate this loss of biodiversity in influencing policy at the national and international level, work with farmers and gardeners to create a living seed bank, and partake in a wide variety of educational activities. Arche Noah illustrates the educational, political and technical levels. It was chosen as a case study for agroecological innovation because it exemplifies all three of these levels and because it shows AE as a movement in combining these levels in working collectively towards diversified seed bank and overall biodiversity through collective action, policy work and education.

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

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

CAPITALIZATION OF AGROECOLOGY MATRIX

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

SYNTHESIS AUSTRIA

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

ITALY

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

The Italian partners defined innovation as "a broad concept that is generally defined as the development, introduction and application of new ideas, processes, products or procedures where an economic or social benefit is assumed for individuals, groups or entire organizations" (Maier, 2001; Aichner et al., 2000).

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

Case study 1, highlights on how with the development of the Cilento Bio-district about 400 farmers have changed their approach to the farming and the community life, entering into an agreement with public authorities, citizens, tourist operators, associations, for the sustainable management of local resources, aiming at the fulfilment of the economic and socio - cultural potential of the territory. The different actors are involved for shared purposes: the improvement of the life quality, the employment of local population and the reduction of population's decrease in rural areas, the employment increase of young people and women, and of the quality of agro-food productions and of local livestock premises. Also to ensure the consumers safety, a traceable and healthy food, the increasing and seasonal regulation of tourist flows, through a multiple eco-tourism and local culture supply, biodiversity protection, enhance landscape and natural resources.

Case study 2, demonstrating that healthy food isn't always a matter of personal choise! Through the activities promoted by the "International Study Centre Angelo Vassallo" and by the international community the model of the Mediterranean Diet helping to improve the quality of life of millions of persons (especially of young people) in the World. The case study proposed aims to educate young generation to the healthy lifestyle, to enhance the biodiversity of landscapes, to preserve cultural heritage of rural areas.

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

CAPITALIZATION OF AGROECOLOGY MATRIX

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

SYNTHESIS ITALY

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

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

SYNTHESIS OF INNOVATION DEFINITIONS

No two partner countries had the same definition of innovation. In order to synthesize and organize the definitions for this report the following points were recognized in which the countries in bold had a significant tie to the different types of innovation mentioned:

- Broad (Austria, **Italy**)
- Social (**Austria**, France, Italy, Slovenia)
- Economic (**Lithuania**)
- Sustainable (**Slovenia**, Italy, Austria, France)
- Use innovation as technical means for specific transition (**France,** Lithuania)

COMPARISONS OF INNOVATIONS

The following gives an overview of the types of innovations found in all the country cases. This is not a scientific statistical example, but it helps to illustrate that the majority of innovations identified by the individual countries were social in nature, followed by environmental. Interesting enough, the French definition of innovation focused on the technical sides, however there were no technical innovations identified in their case studies. Also important to note here was that France had 4 case studies in total where the other countries only had 3. And finally Austria identified the most innovations within their case studies.

COUNTRY	SOCIAL	ENVIRONMENTAL	ECONOMIC	TECHNICAL
France	15	4	0	0
Slovenia	6	1	0	2
Lithuania	4	2	2	0

Austria	21	8	5	1
Italy	3	3	2	3
TOTAL	**49**	**18**	**9**	**6**

COUNTRY CASE STUDY SYNTHESIS

Here we offer a brief synthesis of all the case studies from the different participant countries, pulling out the main points from each country:

- **France** has a very country-specific agenda (AE transition)
- **Italy** and **Slovenia** have a sustainable (regional) development approach (albeit on different levels)
- **Lithuania** an economic focus
- **Austria** a social and systemic approach

The synthesis of the educational tools to use further in outputs 3-5 can be seen in the appendix.

CONCLUSIONS

Here we give a final synopsis of each country concerning the outputs for this report in one smaller section.

The French partners' ideas for innovation from their case studies are embedded in their national program for a transition towards Agroecology – the project called "The Agroecology Project". This describes their specific socio-political setting. Their idea of implementing 'constructivist pedagogy' (which is one of their pedagogical suggestions and was also represented in one of their case studies) supports the project. The overall level of agroecological innovation represented by the French cases was seen as stemming from the macro level (their national agenda) through the meso level (regions) to the micro level (individual farms). What is further interesting is that technical innovations are highlighted as important but their indicators do not include technical perhaps this needs to be re-assessed.

The Slovenian partners' level of impact concerning agroecological innovation is focused on rural development with a farm-based (micro-level) to regional stakeholders (meso-level), although is less so at national or governmental levels (macro level). This level fits with their country goals: to improve regional sustainable development. The overall level of agroecological innovation represented by the Slovenian case studies as seen as stemming from the micro level (the individual farm level or gardening program level) and staying at this micro level. There were not any innovative case studies showcasing larger movements or international connections.

The Lithuanian partners' ideas for innovation focus on economic activities. This supports and is consistent with their definition of agroecolgoy and innovation. In their case studies development is dominantly understood as economic development with sustainable aspects in which their particular cases exemplify their country specificity. The overall level of agroecological innovation represented by the Lithuanian cases was seen as stemming from the macro level (their national inputs for definitions and education—e.g., the university case study) to the meso and micro level (regions and individual farms).

The Austrian partners displayed a multi-level integration of innovations within each case study not just throughout all case studies combined. Their case study examples illustrated the importance and role of the integration of social and systems approaches within innovation. Because of this perspective the overall level of agroecological innovation represented by the Austrian cases was seen as bi-directional, from the macro to the micro levels (international and loacl integration of arche noah and via campesina) from the micro to the macro levels (the BOKU community garden).

The Italian partners' ideas for innovation focus on how agroecology can change our common vision of both agriculture and society. The level of impact of their innovative case studies were also seen as impacting multiple levels as they have a large focus on tradition and biodiversity not only regionally, but also nationally. The Italian case studies also largely followed a similar sustainable development approach as to Slovenia. The overall level of agroecological innovation represented by the Italian cases was seen as stemming from the macro level (national and regional agendas) to the micro level (community garden level).

Here we have seen that each country really has a unique approach to agroecological innovation. The French partners have a very country-specific approach due to the institutionalization and politicizing of agroecology; Lithuania has a very economic-based perspective of AE innovation; Slovenia and Italy have innovative approaches that are deeply connected to environment and sustainability and Austria has a viewpoint that what is truly innovative is a project that can encompass the environmental and scientific sides while integrating the

social. It is seen that all of the projects have given innovative case study examples including a social dimension. This not only supports the definitions embraced by the project, but also overwhelmingly shows how key social dimensions are in AE innovations. Subsequently, environmental innovations in agroecology were second in frequency and therefore importance in the case studies selected. Perhaps this shows the deep and obvious connections that agroecology has with the ecology.

In conclusion among all the different partners innovative case studies there have been different approaches and definitions towards agroecology and innovation. The different case studies selected as well as the definitions chosen to represent the partner countries´ perspectives offers a view into their cultural, political and social development as countries. It is fascinating to share the implications of the different case studies between the countries to see the many similarities and differences which help position us as a project group to move further toward the final outputs of the project. This is where we understand that there are also different perspectives of education in general and environmental and agricultural education among the different countries. This enables the group to begin to understand the differences and nuances that we as an international group need to understand in developing tools to teach AE within the different countries and in the dissemination and ultimate use of such tools, thus respecting the various countries different strategies towards agroecology, innovation and education.

APPENDIX

Suggestions to transform implications of cases into a AE teaching tools. Some ideas fit into more then one category

Scenarios and role playing

- Role-play of different landscape management actors
- To explore the ideas of imagery and perceptions of people to certain agricultural images, a photobooth can be arranged specific for this purpose to help discuss imagery and how it can help or harm agroecology.
- Scenario workshops

Skits and videos

- Animation
- Interactive movie
- Show food journalist videos addressing issues of race, migratory labor and gender from youtube to foster social justice component of AE
- Illustrate that awareness raising is key in order to further Agroecogoly, and digital technology is one very successful way of reaching the masses. See various youtube videos explaining marketing reasons of involvement with social media, etc.
- A student made video or a skit. The skit could be performed by the students if pre-defined roles are given, depicting the benefits of a community vs. an individual.

Teaching and Training

- Training materials
- Curriculum modules
- Module monitoring by students activated by teachers
- Demonstrations
- Practical and educational workshops

Systems

- Systems designing and drawing of a farm and its processes including its ecological environment. Highlighting multifunctionality.

Political

- Invite a board of panelists from UNESCO or cultural heritage sites to draw connections between preservation of traditional and cultural landscapes and tourism
- Describe or invite a key local player in a successful political case and it's the changes it incurred either locally or internationally. E.g., the governmental support of buffer strips, or supplements given to farmers illustrating environmental improvements on their farms. opportunities
- Internships

Methods

- Comparison of different agroecological methodologies
- Teaching teams
- Method descriptions
- Demonstrations
- Practical and educational workshops
- Participatory soil health analyses
- Participatory Bioblitz to quantify biodiversity
- Invite a board of panelists from UNESCO or cultural heritage sites to draw connections between preservation of traditional and cultural landscapes and tourism
- Examine traditional technologies in modern challenges or on farms today (e.g. the scythe)
- Show food journalist videos addressing issues of race, migratory labor and gender from youtube to foster social justice component of AE
- To explore the ideas of imagery and perceptions of people to certain agricultural images, a photobooth can be arranged specific for this purpose to help discuss imagery and how it can help or harm agroecology.

Social media and digital work

- Webpage or webshop tutor
- Show food journalist videos addressing issues of race, migratory labor and gender from youtube to foster social justice component of AE
- Illustrate that awareness raising is key in order to further Agroecology, and digital technology is one very successful way of reaching the masses. See various youtube videos explaining marketing reasons of involvement with social media, etc.

Presentations and panels

- Presentation in combination with group work
- Inviting a panel of small farmers to compare and contrast marketing
- Invite a board of panelists from UNESCO or cultural heritage sites to draw connections between preservation of traditional and cultural landscapes and tourism
- Describe or invite a key local player in a successful political case and it's the changes it incurred either locally or internationally. E.g., the governmental support of buffer strips, or supplements given to farmers illustrating environmental improvements on their farms. Opportunities
- Highlight the culturally appropriate food production; often culturally appropriate produce is linked to the geological and climactic conditions. Individual project reports on a specific vegetable or grain could be done. Linking the food to appropriate uses, recipes, regions, and growing conditions. See: https://en.wikipedia.org/wiki/The_Botany_of_Desire

Group work

- Student group work
- Students group work to create records for each service by identifying the roles of functional biodiversity
- Analyses of cases with teachers and students
- Demonstrations
- Design and implement 'wilderness area' learn through observation, comparison and implementation of the area(s)
- Participatory soil health analyses
- Participatory Bioblitz to quantify biodiversity
- Examine traditional technologies in modern challenges or on farms today (e.g. the scythe)

Games

- Deck of cards with information
- Interactive computer game
- Game to explain community of producers and consumers
- Monopoly-style game in which land tenure is the focus. Large corporate farms vs, smaller farms and the possibility to cooperate together
- Systems game to show the importance of innovation are interconnected
- A matching game of pictures depicting 'black and white' scenarios of Industrial and sustainable agricultural visions. For more advanced groups, introducing more 'grey' area pictures
- A seed bank game, that simultaneously teaches about biodiversity in plants but also sends messages of cooperation and the importance of understanding the market and policy. Made in the fashion of the new cooperative games (such as Pandemic) where you work as a team to beat the game

Reflection and Observation

- Constant reflection with other field cases and student progress
- Design and implement 'wilderness area' learn through observation, comparison and implementation of the area(s)
- Participatory Bioblitz to quantify biodiversity
- Observation exercises

On-Farm work

- Farm visits
- Professionally guided tours of best practices
- Demonstrations
- Open houses
- Participatory Bioblitz to quantify biodiversity
- Participatory soil health analyses
- Examine traditional technologies in modern challenges or on farms today (e.g. the scythe)
- Internships

Assessments

- Quizzes