Ecological Vineyards Governance Activities for Landscape's Strategies

Deliverable 1.3.4

Guidelines for the Agroecological transition of viticultural areas

Responsible Partner

Autonomous Province of Trento

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Project Summary

ECOVINEGOALS promotes sustainability and resilience in the winemaking industry by encouraging the transition of intensive viticulture towards agroecological management systems that protect natural habitats and landscapes, while reducing chemical and fossil fuel inputs and harmful emissions. The project aims to enhance stakeholders' skills in participatory local governance, to strengthen transnational cooperation and provide specific transnational instruments to promote, support and manage the agroecological transition.

Expected results

- Sharing between partners in the ADRION countries of fundamental concepts and practices necessary for the transition from intensive viticulture management systems, towards agroecological management methods.
- Improvement of the participatory local governance skills of decision makers and all other viticulture stakeholders, both public and private, to jointly develop and define strategies and plans aiming to protect natural habitats and rural landscapes.
- Transnational communication, cooperation, and exchange between regional authorities and civil society organizations concerning common objectives to protect vulnerable environments, to promote ecosystem services, to prevent or mitigate climate change, and to avoid social conflicts in land use.
- An increase in the number and quality of tools and strategies available to support the planning and management of the agroecological transition of viticulture systems in the region.

Partnership:

PP1- LP	**LAG EASTERN VENICE, VEGAL (IT)**
PP2	Autonomous Province of Trento, PAT (IT)
PP3	Chamber of Agriculture and Forestry of SIovenia, KGZS-Zavod GO (SI)
PP4	Research Centre of the SIovenian Academy of Sciences and Arts, ZRC SAZU (SI)
PP5	Agency for rural development of Istria Ltd. Pazin, AZRRI (HR)
PP6	Association for the promotion of employment, vocational training and education, INFORMO (HR)
PP7	Business Development Center Kragujevac, BDCKG (RS)
PP8	Foundation Business Start-up Center Bar, BSC BAR (ME)
PP9	Municipality of Bar, BAR (ME)
PP10	Mediterranean Agronomic Institute of Chania, CIHEAM MAICh (EL)

Associated Partners (APs):

General Union CISL Cultivators Venice (IT)
Bio district of production and biological community of central-eastern Venice - BIO VENICE (IT)
IAL - Innovation Learning Work S.r.l. - Social enterprise (IT)
AIAB-Italian Organic Agriculture Association (IT)
Agroecologiki SP (EL)
Municipality of Topola (RS)
Šumadija winemakers association (RS)
Ministry of Agriculture and Rural Development (HR)
Agroecology Europe (BL)

EXECUTIVE SUMMARY

The purpose of this document is to outline the guidelines to promote an ecological transition in the management of wine-growing areas in the ADRION cooperation region. The transition is aimed to make grape production compatible, at a farm and a landscape level, with the conservation of natural habitats and the biodiversity of species and ecosystems, and able to the provide several ecosystem services, to include all the products obtainable from a vineyard other than wine, to enhance local culture and traditional landscapes relating to vineyards, and to support other social and economic activities in rural communities, such as tourism, outdoor recreation, the creative economy, and commerce in local products, and traditional culture. This guidelines for agroecological transition give information to include the transition process, promoted by the project, in a European context, to encourage the use of existing EU support tools and programs, to encourage the exchange of knowledge and experiences between different realities, the create internal and external networks for agroecology promotion and implementation, to respond to the needs of citizens, consumers and farmers for landscape and habitat preservation and to monitor progress towards sustainability objectives. They are mainly based on the experience and data collection made in the project pilot areas for the application of the strategic framework developed by the project partnership (see chapter 9. Annex) that link the best practices defined so far to the agroecological principles and ecosystem benefits.

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1. Introduction

The purpose of this document is to outline the guidelines to promote an ecological transition in the management of wine-growing areas in the ADRION cooperation region. The transition to agricultural production models inspired by the principles of ecology is increasingly evoked in the documents and programs of national, European and international institutions. The impetus for transition is concern over the loss of biodiversity, the fight against ongoing climate change, the need to reduce environmental pollution levels, to protect ecosystems, to safeguard the healthiness of food, and to prudently manage resources (water, soil, energy). In addition, there is a need to ensure greater social fairness and a better balance between the primary sector and market activities, with particular regard to small producers. Focusing on the wine sector of the Adriatic-Ionian area, the project also addresses the cultural aspects relating to the landscape and tradition as highly important elements in the operational context. It is important to underline that agroecology is today an emerging concept that resists unequivocal definition, and that there exist various nuances and approaches specific to geographical location, and various schools of thought. The ten elements of agroecology defined by the FAO (diversity, synergies, efficiency, resilience, recycling, co-creation and sharing of knowledge, human and social values, culture and food traditions, responsible governance, circular and solidarity economy) represent the vastness and complexity of the concepts and a wide framework on which further work remains to be done. This wide definition contributes the difficulty of identifying a precise destination for the transition path for the viticulture sector which has been determined broadly by the ECOVINEGOALS partnership to be: to make grape production compatible, at a farm and a landscape level, with the conservation of natural habitats and the biodiversity of species and ecosystems, and able to the provide several ecosystem services, to include all the products obtainable from a vineyard other than wine, to enhance local culture and traditional landscapes relating to vineyards, and to support other social and economic activities in rural communities, such as tourism, outdoor recreation, the creative economy, and commerce in local products, and traditional culture. Using metaphors of travel experiences we can say that what matters about the journey is the path not the arrival and that to travel further is better to be in a group and have new eyes. From the ECOVINEGOALS experience this document identifies pathways, collaborations and visioning to support wine growers in the transition towards agroecology.

2. General aspects

2.1 The transition concept

Transition is defined as “the process or a period of changing from one state or condition to another”. It can be considered as a movement, a passage, a transformation process to a new system state. To start the transition process a suitable perturbation or a shock is needed. During the passage there might be resistance and deviation. In the figure (Schilling et al., 2018) the ball (the system) rolls out of the center of a relatively stable basin of attraction through a transition pathway toward an alternative basin of attraction. The depth and the width of the passage represent respectively the resistance and the possibility of deviation without losing the ability to revert to the original orientation.

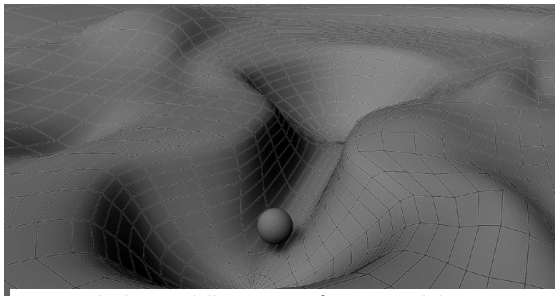


Figure 1Ideal-typical illustration of a sustainability transition process under

The word transition comes from a Latin “*transire*”, which means to go across, and often refers to the path and process and not the end result. Thus, “transitioning” is the act of making a change, of going from one set of characteristics or circumstances to another. It may not be an instantaneous process; more often, a series of steps or phases characterize the transition. Generally four typical transition phases are identified: predevelopment, take-off, acceleration, and stabilization. Transitions may take place over the short, medium or long term and are dependent on the characteristics and potential of social and ecological drivers of change. Differentiated contexts determine the different forms of the transition process in response to the dialogue between driving forces and barriers to change.

2.2 The transition dynamics

Social systems and ecological systems are continually co-evolving with complex dynamics; both are characterized by non-linear processes and potential tipping points. A tipping point is a position of unstable equilibrium from which “a small perturbation can cause a qualitative change in the future state of a system”. Both socio-economic and ecological changes may influence the transition pathway and interact. Hence the importance of integrating agronomic, environmental, geographical, economic, social and cultural aspects in the analyses of a specific territory to understand the possible transition dynamics. The transition should be a “purposive transition”, “deliberately intended and pursued…to reflect an explicit set of societal expectations or interests”. Agroecological transition requires multi-level socio-technical transitions. The ECOVINEGOALS project identifies the three pillars: agroecological practices, landscape and habitat, and participation that, in addition to being the areas of work of the project, are also important elements of the transition strategy and represent the levers to start

and govern the transition process. Niches of innovation play an important role within each pillar and the interconnection between them. The niches of innovation in the territorial contest should be identified and actions be proposed to strengthen and enlarge them.

To understand and design the transition dynamics of farming activities toward agroecology we should consider the interactions among the socio-economic, ecological (ecosystem functions and services) and technical (innovations) subsystems. To realize a long-last agroecological transition that is able to address difficulties and barriers and effect an extensive change in the viticulture sector and not simply some technical adjustments of the "status quo", the transition process has to be multi-actor and to include the three strategic dimensions: **progress**, **stability** and **adaptability**. Within the progress dimension we have to identify agents of, drivers of and barriers to change, either at a farming, socio-cultural and territorial level. To ensure stability in the transition process we should always search for win-win solutions to solve conflicts and to reconcile different interests using participatory methods. To face changes in the boundary conditions (such as markets, norms, policies, technical innovations...) we should improve the adaptive capacity and be ready to adjust the strategy accordingly for a new situation. These three key aspects lead to consideration of the importance of building effective networks (internal and external) in order to forge alliances at a territorial level, share knowledge and experiences, and possibly to predict changes in advance. This means we should go beyond the model "efficiency-substitution-redesign" (Agroecology Europe, 2021) that considers only the farm scale in the strategy, and examine the system at a territorial level, encompassing institutions, associations, representatives of the tourism sector, of the education and training system, and territorial actors active in the cultural and environmental sector, and integrate the territorial capitals in the transition plans. As stated by G. Ollivier (2018) a durable/sustainable transition requires "strengthening the links between socioeconomic, ecological, and technical aspects; integrating more agencies into social-system thinking; taking ecological dynamics into account; and taking technology seriously".

2.3 Agents, barriers and drivers of change

Agents of changes are individuals or groups that can take actions that open windows of opportunity in order to foster the agroecological transition. They should know the territory and the socio-economic contest and be able to listen in order to understand problems and identify constraints, and be able to avoid competition among stakeholders, and encourage cooperation in the organization of collective efforts. During the first phase of the ECOVINEGOALS project, the aptitude to play an "active role" was mainly found in farmers already applying organic and biodynamic farming methods (irrespective of certification) or using some of the agroecological best practices identified the project partners. New farmers and young farmers are generally more inclined to adopt changes in their farming practices and more oriented towards social relations. The difficulties

faced in large areas of the partner territories in access to the land makes them potentially important actors to confront the challenge of the abandonment of agricultural areas. Other important agents of change are the experts and consultants from scientific institutes, advisory services or farm organizations (cooperatives, associations, farmers' trade unions). They are trusted by the farmers and have the technical skills to explain the agroecological principles. Experts and advisors could play a facilitative role but at the moment progress mainly depends on the aptitude of the individual to shift from "business as usual" to more environmentally friendly farming practices and to change his way of acting. For the project partnership the local stakeholder evaluation using the matrix of power-interest can be used identify the agents of change among the stakeholders identified within area B. Of course the agent should be able to conduct dialogues with all stakeholders, not only with the farmers, and to promote the dialogue among them. Other agents of changes could be other projects or initiatives already existing within the territory, that might not have been designed to promote agroecological transition but which share some general objectives (environment and landscape protection, social fairness, cultural heritage promotion, etc.). Public institutions and local authorities generally have an initially detached position in the participatory process, standing on the margins of the debate pending clear proposals for evaluation in relation to the policies and plans they intend to activate.

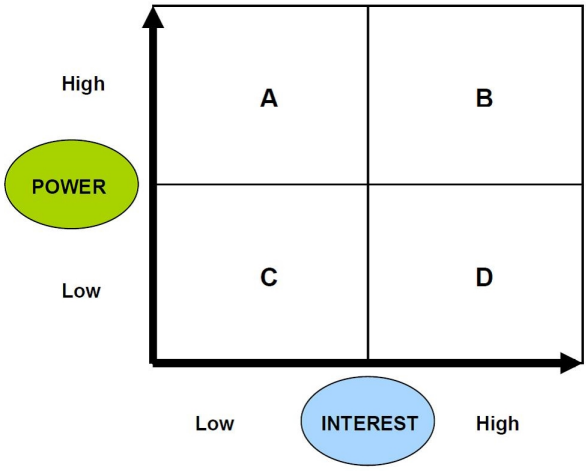


Figure 2Power-Interest Matrix

With regard to barriers to agroecological transition, the ECOVINEGOALS partnership, through focus groups and farms interviews, identified the following:

1. A lack of knowledge of the meaning of agroecology, how to perform it (best practices) and how to communicate its application in vineyard management to the consumers. Currently there is no widely-shared definition of agroecology, mainly because this production model is not recognized by official standards or certifications as is the case for organic farming. As a result, different interpretations of the concept and its principles coexist.
2. A lack of useful data at a regional level for the development of action plans for the wine sector from an agroecological perspective. In particular, it is difficult to obtain spatial data (GIS) showing the main agroecological structures (corridors, stepping stones, buffer areas, ecotones) that exist within the territory of the pilot areas. The analysis of the geographical connections among vineyards, habitats and cultural core areas are essential for the successful implementation of agroecology.

3. The identification of the landscape units requires particular skills not widely available within rural communities. Moreover the approach to the landscape analysis as instrument for combining the different interests requires a cultural effort among stakeholders.
4. The financial and programming instruments for the agroecological transition are fragmented and generally designed for single farms and not to a territory as a whole.
5. In some regions land abandonment and a progressive marginalization of farming activity could affect the agroecological transition because of the unstable economic situation inhibits investments (new machinery, planting of resistant varieties, new irrigation systems).
6. The professional figure of facilitator is not easy to find in rural areas.

Regarding the identification of leverages of change, an emerging issue is the possible contribution of digital tools and decision support systems (DSS) to the support and development of agroecological best practices. The use of remote sensing devices to monitor vineyards (phytosanitary health, water status in vines and soil, canopy vigour, etc.) is an additional resource that can help farmers reduce water consumption, properly schedule and manage plant protection interventions and quantitatively reduce applied resources, increasing input efficiency and reducing costs. Moreover Information and Communication Technologies (ICTs) can facilitate exchanges of data, information and knowledge, and contact among stakeholders. Accounting management tools and online sales tools can also contribute to more efficient and effective farm management. Certainly, the implementation of technical assistance programs supported by regional or state administrations and the establishment of specific aid schemes are fundamental elements of agricultural transition. Nevertheless, even initiatives promoted by associations or groups of farmers can start the transition process and obtain interesting results that can act as a stimulus for wider initiatives.

In order to ensure the maintenance of the impetus towards transition, it is strategically important to identify an organizational model that ensures a constant dialogue between stakeholders, and stimulates the implementation of initiatives. In this perspective, the phenomenon of “biodistrict” that has been implemented in various territories is interesting, as it forges links through an agreement between various actors in the common interest of protecting the environment and traditional landscapes, thus enhancing social relations and local culture.

To support these initiatives, the application of environmental assessment procedures such as Life Cycle Assessment applicable to the entire wine supply chain, and the activation of a local system for the payment for ecosystem services (PES) could strongly contribute to the achievement of important objectives in line with the European Green Deal, such as the reduction of climate-altering gas emissions, carbon sequestration, water regulation and a prudent use of the water resources, and the preservation of biodiversity and the landscape. LCA is the evaluation of the total impact of production

and usage activities on the environment, by considering the phases of the product throughout its "life cycle", that is until the raw materials are extracted from nature and the final wastes return to nature.

3. Methods and materials

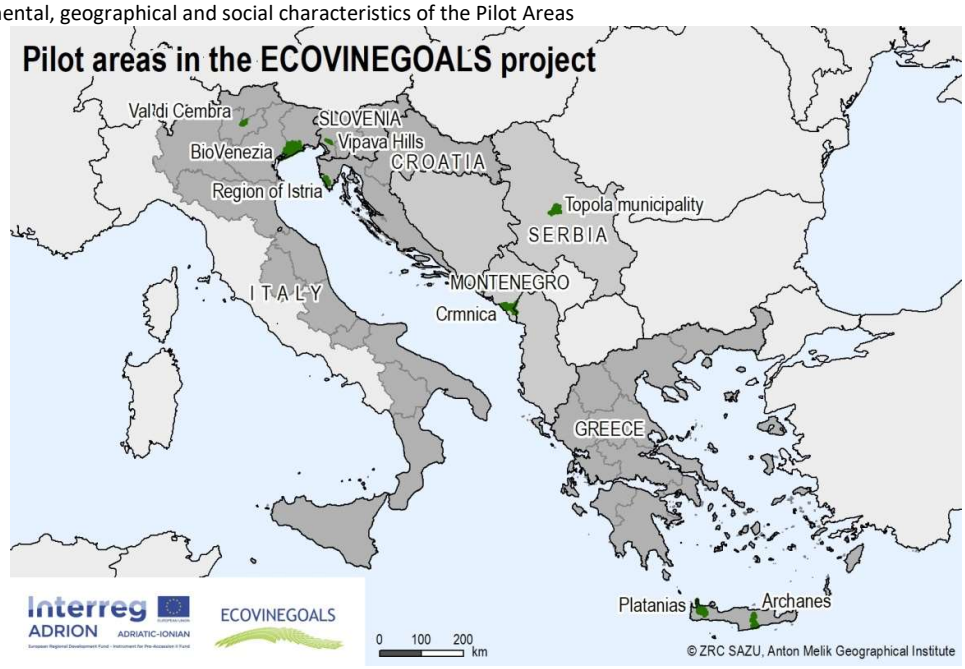
In order to build the agroecological transition strategy, the main results of the activities of the surveys carried out by the partners in deliverable WP2-T1 should be briefly analyzed. For a detailed examination, please refer to the individual reports.

3.1 Findings from the structural analysis of the pilot areas

The activity was carried out by partners in each country to analyze the structural characteristics of each territory from a geographical, political, economic and social point of view, provide a census of active vineyards, and identify the most widespread viticulture systems. Furthermore, environmental and social conflicts present in the area were considered.

Pilot area	Average annual temp. (°C)	Average July temp. (°C)	Annual precipitation (mm)	Inhabitant/km2	% of flat surface on total area	% of protected areas on total area	n. of vinegrowers
Venice biodistrict (IT)	13.5	24.3	905,4	206	100%	7%	1.600 wine farms
Cembra Valley (IT)	10.5	19.5	800 mm	81.94	0 %	0.58% (7.801,2ha)	278 farms
Vipava Hills (SI)	11.9	23	1,534.5	80.3	17.6	46.1	587
Istria County (HR)	11.7	21.1°C	1,095	73.96		20,20.,54 ha7.2 %	2,715 (2021). Only 565 registered
Crmnica (ME)	16.7°C	21.8°C	2,334.6	38 - 78 inhabitants/km^2	54%	56.9%	18 registered; estimated 200
Sumadija district (RS) – Topola	11.5°C	22°C 29°Cmax, 15°C min	637.2	63/km2 22,329 inhabitants total	23,22%	0.2% 86.2ha	1,348 (Rep. Inst. of Statistics) 164 in the vineyard register.
Archanes – Asterousia (EL)	16.75°C	23.5°C	454	50/km2		25%	
Platanias (EL)	18°C	25°C	647	34/km2		31%	

Table 1Environmental, geographical and social characteristics of the Pilot Areas



Pilot area	**Main findings from structural analysis**
Venice biodistrict (IT)	1- Pilot area "Biodistrict of the organic production and community of central-eastern Venice" (BIOVENEZIA), covers an area from Cavallino-Treporti to San Michele al Tagliamento and from the border with the province of Treviso to the Adriatic Sea; it includes seventeen municipalities, two of which fall within the province of Treviso, for a total area of just over 1000 km^2. 2-BIO VENEZIA was born in 2016 from the union of 19 founding members. It is committed to promoting the organic production method, enhancing local identity and supporting research, training and information involving a large part of the community. Currently BIO VENEZIA has about 50 organic farms and is an active partner in the "BIO TERRITORIES" project. 3- The total Usable Agricultural Area (UAA) in 2010 was approximately 59,000 hectares, which correspond to 56% of the total land area. In the last decade the UAA increased at 74.815 ha. 4-Venetian viticulture occupies approximately 7% of the cultivated agricultural area (9,300 hectares - Istat, 2020). Most of the plants are concentrated in the hinterland. The organic UAA, equal to 2,316 ha, represents 3.9% of the UAA. 5- About half of the wineries benefit from the presence of naturalistic elements (woods, water channels, hedges, etc.), close to the vineyard, which citizens can use for walks.
Cembra Valley (IT)	1. Pilot area “Val di Cembra”, situated in the Autonomous Province of Trento (Trentino Alto Adige region), cover an area of 9.198,83 ha with an average of altitude of 600 m. The whole area represent almost the entire winegrowing area of Cembra Valley. 2. Vineyards cover an area of 1.054,78 ha and the surface managed as organic amount at 139 ha in the year 2020. 3. The surface non-irrigated represent the 35% of the total area. 4. Important characteristics of viticulture in the pilot area are the high fragmentation of the agricultural areas divided in many land parcels, and the high slope of the cultivated surfaces that led to the need to build terraces: 728 km of dry stone wall characterize the valley landscape.

	5. The two main varieties cultivated are Chardonnay (used for the “Spumante”- a sparkling wine production) and Muller thurgau (typical variety used for the production of steel white wine).
Vipava Hills (SI)	1. Pilot area »Vipava Hills« covers an area of 6860 ha with an average altitude 206 m (from 59 to 556 m). It is part of the Vipava Valley wine growing district which belongs to one of the three Slovenian wine growing regions, called Primorska. 2. The forest covers almost half of PA (49%) and significant part is a part of Natura 2000 (46%). Agricultural land in use covers an area of 3197 ha. 3. Vineyards on PA covers an area of 936.4 ha (13.7%), 84.6 ha or 9% of them are cultivated organically (5,1% in Slovenia). Also, a significant share of 17% of all vineyards is occupied by local, autochtonous varieties of Rebula, Zelen and Pinela. Abandonment and even overgrowth of vineyards is very prevalent in the »Vipava Hills«. 4. Important characteristics of viticulture in the PA are high fragmentation of agricultural areas and the large portion on the slopes. Therefore 572.9 ha or 61.2% of all vineyards in the PA »Vipava Hills« are on terraces. 5. Total number of all vineyards that are cultivated by almost 600 winegrowers is 1850.
Istria County (HR)	Istria is located on the largest peninsula of the Republic of Croatia in the northern part of the Adriatic coast and it covers an area of approx. 2.813 km2. Relief of this area is characterized by rolling hills and positions that come right down to the seashore along the western coast of the peninsula. Due to the exceptionally favorable climate, the wine-growing positions are found at all elevations. Western coast of Istria descends gradually to the sea, and the soil is fertile and deep, so that vineyards are found at higher elevations (about 100 m) in deep red soil and the eastern coast of Istria is steep, and the vineyards are positioned in the steep karst terrains, often planted on the terraces facing the sea. The size of the farms interviewed span from 5 to 31 ha, constituting an area of 19 ha on average. 80% of the farm area of the interviewed viticultural farms is covered in vineyards, where the MalvazijaIstarska is the variety that most of surveyed viticulturalists reported growing in the largest share, and the Istrian varieties are Teran and MalvazijaIstarska including international varieties Muskat, Merlot, Cabernet Sauvignon, Chardonnay and Pinot. Most viticultural farms in the Istrian region are managed conventionally – in the sense that they are not certified organic, integrated or biodynamic but it’s managed traditionally with the highest respect for nature and the aim of protecting the ecosystems. The slope of the landscape units: 60% is on inclination 0-10%, 27% on 11-30% and 13% on 31-50%. South facing vineyards (S, SW, SE) are the 66,67% and North (NW, N, N-E) facing vineyards are the 33,33%
Crmnica (ME)	The subregion of Crmnica spreads from 42°16’46” to 42°04’43” N and 62.97% of the area is located from 100 to 400 meters above sea level. Being a hilly wine-growing region, the proportion of the fields and arable lands in Crmnica is relatively low, except in the close coastline of Skadar Lake, where most of the largest vineyards and wineries are located. There are almost 24 ha of vineyards in this area and cca 20.7% of those are located in the protected area of National park “Skadar Lake”. Crmnica is the richest subregion of grapevine growing in Montenegro in terms of cultural-heritage diversity.
Sumadija district (RS) – Topola	1. The total extent of the municipality of Topola is 35.698 ha. Oplenac vineyards according to cadastral data are about 500 ha with 1,348 vinegrowers, but in reality the extent it is about 280 ha of vineyards. - There are evident problems of discrepancy between the cadastrial data with the real situation.

	2. 55% of the total area of vineyards is from 0.1 to 0.5 ha and almost half of winemakers have a production capacity of up to 20,000 liters and they are the best category for agroecological transition. 3. Oplenac vineyards are 100% managed as conventional production, no organic farming is present. 81.59% of the total territory is agricultural land, and about 0.55% are vineyards. -71% of agricultural area is on elevation between 100m-300m asl, -60.76% of total area is on inclination 0-9%,and 34.18% is on inclination 10-29% - North facing vineyards (N, NE, NS) are the 42.76% and South facing vineyards are the 31.21% 4. 11 agroecological practices (related to the natural aspect) are practiced in the pilot area, socio-economic best practices are unknown 5. in the last two years, the number of members of the Sumadija winegrowers' association has almost doubled from 19 members to 36 members, which reveals a good predisposition and location for the expansion of viticulture and winemaking, and that now is the right moment to introduce an agro-ecological type of production through a local action plan and set some parameters and methods for further land use. The Municipality of Topola belongs to the second group of development of municipalities from 80% to 100% of the national average.
Archanes – Asterousia (EL)	The Municipality of Archanes-Asterousia covers an area of is 35,500 ha. The Regional Unit of Heraklion is the island's largest vineyard area. Total area under vines in municipality of Archanes-Asterousia is 3,777 ha. As far as organic viticulture in the region is concerned, only 125 vineyards have been officially registered as organic cultivations. As it is typical for the rest of island, vineyard plots in the Municipality of Archanes-Asterousia are small, with almost 80% of them ranging in size from 3000 m^2 (0.3ha) and below. Within the municipalities borders the protected areas (NATURA 2000) of mount Giouchtas and the Asterousia mountain range are located. Issues facing viticulture in the region include: land fragmentation, shortage of water and vine diseases like Eutypalata and viruses.
Platanias (EL)	The Municipality of Platanias covers an area of is 49,100 ha. The Regional Unit of Chania is Crete's second largest vineyard area. Total area under vines in municipality of Platanias is 451.6 ha. Regarding organic production of grapes, as of 2021 only 12 vineyards have been officially registered as organic. Especially obvious are the relatively small plots and scattered land ownership in the Municipality of Platanias as almost all of the vineyards (93.1%) range in size from 3000 m^2 (0.3ha) and below. Within the Municipality's borders lie the protected areas (NATURA 2000) of the Rodopou peninsula, Fassa valley and Keritis stream as well as the White Mountains and the entrance to the Samaria Gorge. Issues facing viticulture in the region include: economic dependency on tourism and a lack of coordination between the touristic and primary sector, land fragmentation.

Some common social concerns emerged from the structural analysis of the pilot areas, briefly these were: ageing of the agricultural population; poor relations between farmers and civil society representatives; little interest from young people in the wine sector; difficulties in finding agricultural labour; lack of knowledge and qualifications particularly in soil science and fertility management (grape growers most often use plant nutrition

products without prior soil analysis); lack of knowledge of autochthonous varieties; difficulties in building networks beyond those with other farmers; scarce initiatives for including local historical and cultural aspects in the wine production; lack of territorial initiatives for market innovation, consumer communication and relationships with the tourism sector.

3.2 Results from the farm questionnaires

The synthesis of the main results arising from the questionnaire (see annex) submitted to 30 farmers for each pilot area relating to agricultural transition are:

Pilot area	Wine making on farm (Y/N)	Product destination: C (Directly to consumers); R (Retailers); W (wholesalers); E Exporters; P (Processors)	Values of sales (wine €/bottle – grape €/t)	Farmer Age and Experience, Gender	Total farm area (ha)	Vineyards (ha) Yields (q)	Irrigation Y/N Irrigation method (**M**icro, **S**prinkler, **F**lood-surface)
Venice biodistrict (IT)	Y:60% N:40%	C. W.R. 37% E.P: 63%	B: 4-10 G: € 0,50-0,80/kg (variety of glera for prosecco wine: €1-1,30/kg)	A:53,3 E:30,3 G: 74,1% M	37,7 (average value) Median= 15	33,1 ha (average value) Median= 14 ha Y: 120-160 q other varieties. 150-180 q of glera for proseccowine	Y: 83 % N: 17 %
Cembra Valley (IT)	N: 80% Y: 20%	P: 83 % C.R.E.P: 17 %	B: € 14 G: € 1,221	A: 40.8 E: 15.5 G: 96.7% M	7,03	4.55 (64.7 %) Y: 120,5	Y 100% M 100%
Vipava Hills (SI)	N: 6.0 % Partially: 6.0% Y: 88 %	P: 6,1% C: 9,1% C,P: 30,4% C,E: 6,1% C,R: 6,1% W,E,P: 3,0% C,E,P: 12,1% C,R,W: 3,0% C,W,E: 3,0% C,R,P: 3,0% R,E,P: 3,0% C,R,E,P: 3,0% C,R,W,E,P:12,1%	B: € 8.3 G: € 0.4-0.8/kg € 2.1/l (average values)	A: 45.7 E: 24.8 (average values) G: 90.9 % M	14.3(average value)	6,4 ha (average value)	N: 100 %
Istria County (HR)	Y_ 100%	CRWE: 53% CRW: 7% CWE: 13% CR: 20% C: 7%	B: 2,5;5; 5,5; 7; 7,5; 9; 10; 11; 14€ G: 1000 €	A: 45,4 average, (MIN age 32 and may age 68) E: 25,7	18,91 ha average Y: 10,54	V= 13,16 ha	N: 93,3 Y:6.7% water resource (lake)

				average G: 80% M; 20% F			
Crmnica (ME)	Y: 100%	C: 43% C,R:26,7% C,R,W: 16.7% C,R,W,E: 13,3%	B: € 12 G: € 0.7 - 1	A: 53.6 E:8 - 50 G: 93.3 M	18,6	23,96	Y: 56.7% N: 43.3% M: 55% S: 45% water sources: groundwater; municipal network, ponds;
Sumadija district (RS) – Topola	Y: 70% N: 30%	C: 57% C,R,W,E,P: 43%	B: 7€ G: 0,60€	A: 56,8 E:26,3 G:50% M 50% F	17,3ha(average value)	V: 11,93ha Y: 7t/ha (average)	No: 100%
Archanes – Asterousia Platanias (EL)	Y: 77% N: 23%	C: 26% C,R,W:19% C,R,W,E: 19% W & WP:23% C,W,E&P&R:13%	B: 8€ G: 1€	A: 48 E:26,7 G: 100% M	4,08 ha (average value)	4 ha Y: 6 t/ha (average)	YES: 75% No: 25% Network, Well, Tanks

3.3 Results from multicriteria analysis of the agroecological and economic performance of selected pilot farms

Results of the survey on Main Agroecological Structure (MAS) and Territorial Environmental Context (TEC), made on ten farms of each pilot area, are the following (the methodology adopted is described in the deliverable T.1.3.1):

PILOT AREA	MAS	TEC
Cembra Valley (IT)	57.4	42.65
Topola (RS)	48.7	42
Istria County (HR)	75.1	52.1
Crmnica (ME)	66.8	53
Platanias, Archanes–Asterousia(EL)	41.1	39.9
Venice Biodistrict (IT)	60.6	41.2
Vipava Hills (SI)	83.1	50

Table 2MAS and TEC for each pilot area.

The MAS gives a qualitative evaluation of the spatial arrangement of the farm analysing the ecological connectivity between its different parts and the connectivity of the farm with the external environment.

The TEC (TEC = EP + NRS + CTEHH + FWM) gives a qualitative evaluation regarding the perception of the territorial context and its vocation for agroecology (EP: Economy and Production; NRS: Network, Relations and Social recognition) and on the perception of the environmental impact of agricultural activity and its management (CTEHH: Compounds Toxic for the Environment & Human Health; FWM: Farm Waste Management).

The indicators necessary for the construction of the MAS index			
	Indicator	**Acronym**	**Description**
1	Connection with the main ecological landscape structure	CMLES	Assesses the distance of the farm in relation to the nearby fragments of natural vegetation, mainly forest covers and bodies of water.
2	Extension of external connectors	EEC	Evaluates the percentage of the linear extension of live fences located in the perimeter of the farms.
3	Extension of internal connectors	EIC	Evaluates the percentage of the linear extension of the rows of vegetation but internally.
4	Diversification of external connectors	DEC	Evaluates the diversity of live fences or hedges located in the perimeter of the major agroecosystems.
5	Diversification of internal connectors	DIC	Evaluates the diversification of internal living fences.
6	Use and Soil Conservation	USC	Evaluates the distribution percentage of different covers within the farm and the conservation of the soil (evidences of erosion).
7	Management of Weeds	MW	Evaluates the management practices and systems of weeds control
8	Other management Practices	OP	Evaluates the types of production systems (ecological, conventional or in transition) of each farm.
9	Perception – Awareness	PA	Evaluates the degree of conceptual clarity and awareness of producers regarding agrobiodiversity.
10	Level of Capacity of Action	CA	Evaluates the capacities and possibilities of farmers to establish, maintain or improve their MAS.

The final calculation of the MAS is obtained by adding the resulting value of each indicators, according to the following formulation:
MAS = CMELS + EEC + EIC + DEC + DIC + USC + WM + OP + PC + CA
The calculation of TEC is obtained by adding the resulting value of several indicators: TEC = EP + NRS + CTEHH + FWM
EP: Economy and Production (general income from agriculture + income from wine production + quality of the wine + quality of the grapes + yield production + phytosanitary management)
NRS: Network, Relations and Social recognition (participation in local institutions and association + cooperation with the tourism sector, access to new techniques and solution, social recognition of farmer/winemaker, visibility of the products on market, production chain efficiency and sustainability, relationships with other farmers

TEC perception	Value
Extremely favorable context for agroecological transition	49 - 62
Favorable context for agroecological transition	33 - 48
Unfavorable context for agroecological transition	17 - 32
Very difficult context for agroecological transition	1 - 16

MAS development ranking	Value
High developed	80 – 100
Moderately developed	60 – 79
Slightly developed	40 – 59
Weakly developed, with cultural potential	20 – 39
Weakly developed, without cultural potential	10 – 19
No agroecological structure	1 – 9

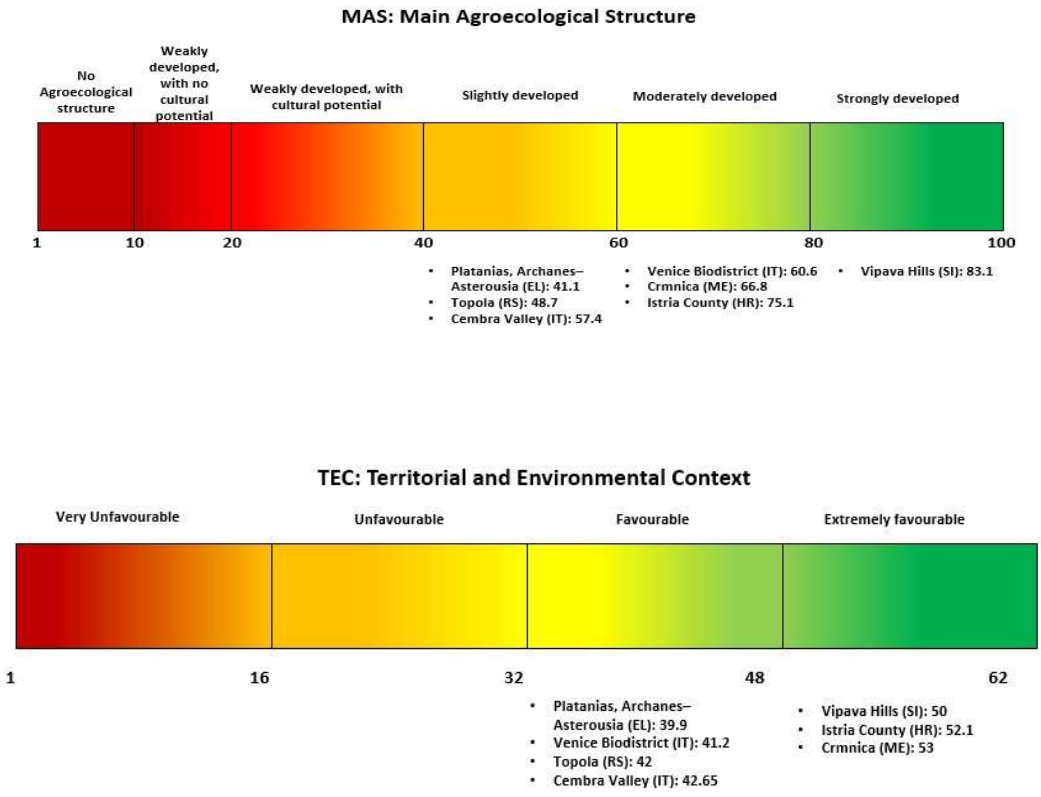


Figure 3 Pilot Areas within the MAS and TEC spectrums.

It is important to read the results of the multicriteria analysis nor as a merit ranking between the territories of the Pilot Areas, nor as a ranking between the single farms inside the same Pilot Area. It should represent an indication for the implementation of local and regional policies and a suggestion for the selection of the most suitable agroecological practices to be activated, according the specific geographical, productive and socioeconomic contexts. To do so it is possible to look to each indicator as a field of action to enhance the agroecological transition. For example the indicator DIC (Diversification of Internal Connection) in a specific farm in a specific Pilot Area shows now a low number. This lead to propose a series of best practices in order to increase the presence of living internal fences in that particular farm, and/or in that particular context (the Pilot Area), to move further steps towards the agroecological transition. Moreover,

the picture coming out from each multicriteria survey, should underpin the construction of affordable and useful local action plans. Periodical multicriteria surveys (for example one each three years) - beyond the conclusion of the Ecovinegoals project activities - should be done to update the picture and by that verify the efficacy of the action plans proposed, and possibly correct the strategies and the related actions.

3.4 Considerations arising from the ECOVINEGOALS seminars and meetings

During the first meetings with the partners, the question of how to make agroecological transition effective considering the diverse situations in the various territories involved arose. The main aspects underlined by the partners were the following:

1. the necessity for the acquisition of new and more versatile skills by operators (farmers, wine-producing companies, retailers), the rethinking and reviewing of community resources, the building of a solid local collaboration by acting with passion and motivation;
2. to define a clear set of principles and practices for agroecological vineyard management and new forms of market access for farms;
3. to promote participation and the integration of farmers into the civil society and a progressive familiarization of the whole population with new agroecological criteria of cultivation, improving capacity and willingness to cooperate and aggregate;
4. to propose viable solutions for disadvantaged areas, such as steeply sloped small terraces where the application of mechanization is very limited;
5. to legally define environmental measures and incentives for farmers - who are in the main responsible for maintaining the environment in rural areas;
6. to involve more agricultural technicians, researchers and scientists in sharing knowledge and initiatives;
7. to enhance traditional practices that are still implemented by some small farmers (manual harvesting, mechanical soil and weed management, occasional irrigation, interrow cropping, mulching, green manure, organic manure application, bee keeping and animal husbandry in symbiosis with vineyards etc.);
8. to better define the advantages of implementing agroecological practices for landscape and natural habitats and communicate better with farmers and the general population;
9. to interconnect knowledge and practical experiences including in the fields of natural and social sciences and their transfer to agricultural production;
10. to foster the use of environmental and nature-friendly technologies in production and processing, with minimal involvement of external resources and waste generation, while ensuring quality crops and competitive production;
11. to combine smart systems with ecologically sound practices for vineyards to increase climate resilience and achieve simultaneous improvement of both the

economic and environmental performance of the farm based on a higher degree of knowledge (scientific: precise, real-time, based on global navigation satellite system GNSS and remote sensing data, and traditional: based on indigenous knowledge accumulated over generations) and their incorporation into the decision-making process;

12. to adapt specific tools, on the model of SAFA (Sustainability Assessment of Food and Agricultural Systems - FAO) to evaluate pesticide risk, fertilizer pollution risk, biodiversity loss, carbon footprint and other environmental qualitative aspects.
13. To select a set of SMART indicators and sub-indicators and the unit of measurement in order to evaluate the advancement of the agroecological process. Agroecology Europe has developed a multidimensional evaluation system at farm and territorial levels, called OASIS (Original Agroecological Survey and Indicator System). The set of indicators chosen to evaluate the farming systems is classified in five dimensions:
(i) production practices, (ii) economic viability, (iii) socio-political aspects (iv) environment and biodiversity impacts (v) climate and economic resilience. The five dimensions are divided into 15 themes and themes are divided in criteria that are the main output of the framework.

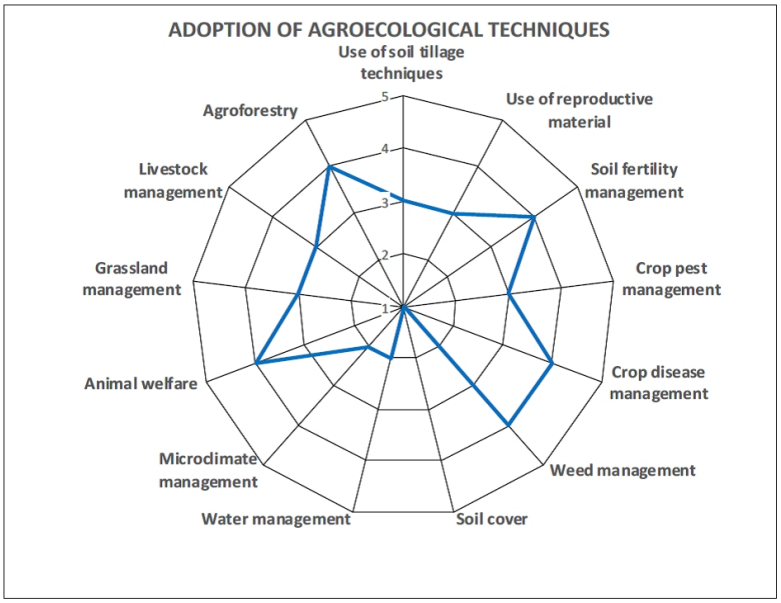


Figure 4Example of a radar figure on the theme of adoption of agroecological techniques.

A criterion is assessed by one or several indicators. There is a total of 57 criteria that need to be evaluated in a farm.

In order to acquire more knowledge and perspectives on agroecology, three on-line seminars were organized in collaboration with Prof. Massimo de Marchi, Professor of Agroecology and Ecosystem Services at the University of Padua - International Joint MSc Degree Program: Sustainable Territorial Development Climate Change Cooperation Territory:

1. on 16/12/2020 “Main agroecological structure: integrations between agricultural practices and landscape ecology” by Prof. Tomás Enrique León Sicard - Instituto de Estudios Ambientales Universidad Nacional de Colombia;
2. on 02/03/2021 Agroecological management of biodiversity for vineyard resilience held by Prof. Miguel Angel Altieri - Department of Environmental

Science, Policy, & Management UC Berkeley;
3. on 16/03/2021 “The ark of values: community maps in agroecology” held by Dr. Luca Lietti - Agenda 21 Consulting srl.

Prof. Tomás Enrique León Sicard explained the concept of the Main Agroecological Structure (MAS) of agroecosystems from the perspective of environmental thinking (ecosystem-culture relationships) and considered as a dissipative cultural structure. The MAS concept refers to the arrangements of the internal and external connectors of the farms (fences, hedges, living fences or patches of forest) and can relate to the probability of resilience or adaptation of agrarian systems to disturbances of different natures. The index of the MAS emerges as the answer to the need for connection between the landscape and the elements of the farms. The MAS has five ecosystem or biological indicators (connection of the farm with the ecological structure of the landscape, extension of external connectors, extension of internal connectors, diversity of external connectors and diversity of internal connectors) and five indicators of cultural order (land use and soil conservation, weed management, other ecological or conventional management practices, perception-awareness and capacity for action).
The ECOVINEGOALS partnership applied the method of multicriterial analysis of the agroecological and economic performance of selected pilot farms adding socio-economic indicators relating to the perception of each farmer of the impact on production (quality, quantity and income), and of the relationship with the social and community dimension of the selected Pilot Area (territorial context - TC).
Prof. Miguel Angel Altieri highlighted that a key strategy in sustainable viticulture is to enhance biodiversity at the landscape and field level through the use of cover crops, corridors, and various habitats. Emergent ecological properties develop in such diversified vineyards, allowing them to function in a self-regulating manner.
The main approach in ecologically based pest management is to increase agroecosystem diversity and complexity as a foundation for establishing beneficial interactions that aid in keeping pest populations in check.
Dr. Luca Lietti presented the methodology of community mapping (or participatory mapping) that combines cartography with participatory methods to represent the territorial knowledge of local communities. This methodology will be implemented by the partnership during the meetings with stakeholders.

3.5 Document analysis

Among partners several working documents on agroecology, position papers made by the main organizations (Agroecology Europe, IFOAM, OIV, ARC2020, EURAF) and institutions (FAO, OECD, EU), EU regulations, proposals on the new CAP, and findings from other projects and programs (UNISECO- Horizon 2020, EIP-AGRI), were circulated with bibliographical references in order to share information, data, methods and approaches.

4. Setting the scene

4.1 The grape production in the partners' countries, regions and pilot areas

Grape production in partners' countries - Source OIV; year of reference 2016 (https://www.oiv.int/it/statistiques/)

Country (Nuts 1)	Vineyards surface (ha)	Grape production (t)	Wine production 1000 hl	Export 1000 hl	Import 1000 hl	Consumption 1000 hl - l/capita
Italy (IT)	692,726	8,393,927	50,920	20,636	1706	22,400 – 42.7
Slovenia (SI)	15,604	94,780	497	40	134	811 – 45.9
Croatia (HR) (2016) (2021)*	 25,155 18,126.36	 123,651 84,603.66	 760 660	 36 53,6	 310 256,87	 1,207 – 33.5 1061,31
Montenegro (ME)	2,989	28,930	172	68	23	115 – 22.5
Serbia (RS)	22,150	145,829	648	100	208	796 – 10.7
Greece (EL)	105,343	1,083,000	2,490	274	165	2,365 – 26

* data from Croatian partner (AZRRI)

In Italy and Greece viticulture area is increasing, and in 2020, respectively, was 719,000 ha and 109,000[1] ha.

Region (Nuts 2)	Vineyards surface (ha)	Grape production (t)	Wine production 1000 hl
Veneto (ITH3)	94,291	1,400,000	11,746
Trentino (ITH2)	10,200	120,000	800
Crete[2] (EL43)	17,358	152,852	300
Zahodna SI (SI04)	6,285	38,000	200
Jadranska HR (HR03)	10,248	46,821	309

Grape production within the project pilot areas (data source: partners'communication).

Pilot area	Total surface (ha)	Utilized agricultural area (UAA)	Vineyards surface (ha)	Grapevine varieties

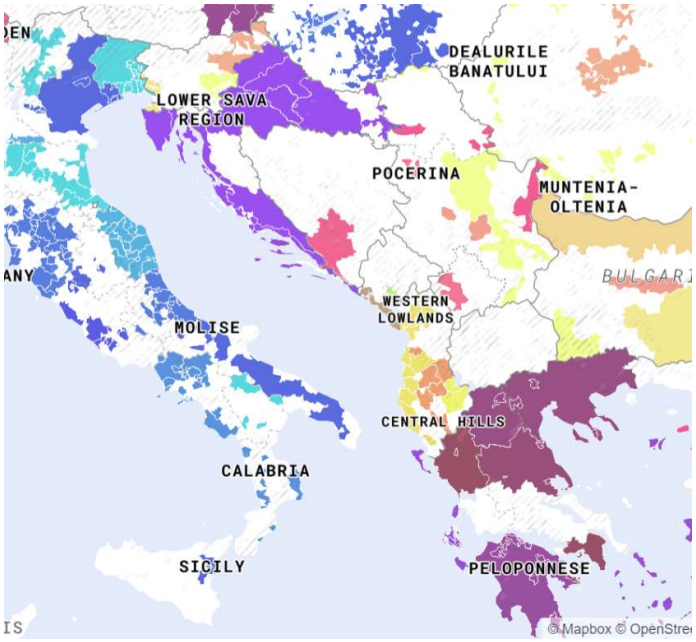
[1]According to the Hellenic Statistical Authority, total vineyard surface in 2016 in Greece was 73.573 ha which grew by 2019 to 87.0130 ha

[2]2019-2020, The Hellenic Ministry of Rural Development and Food

THE VENICE BIODISTRICT	105,800	74,815.1	10,061.7	Glera, Pinot Grey, Merlot, Cabernet, Chardonnay.
CEMBRA VALLEY (IT)	11,655	1,415	691.78	Müller Thurgau, Chardonnay, Traminer, Riesling, Pinot Nero, Schiava.
VIPAVA HILLS (SI)	6,869	3,021	958	Malvazija, Sauvignon, Laški Rizling, Chardonnay, Beli Pinot, Sivi Pinot, Rumeni Muškat, Rebula, Zelen, Pinela, Pikolit, Poljšakica, Klarnica, Vitovska Grganja, Pergolin, Glera, Merlot, Cabernet Sauvignon, Barbera, Refošk, Modri Pinot, Cabernet Franc, Syrah, Marselan, Pokalca
ISTRIA COUNTY (HR)	19,659	8,479	2.844,89	Ten leading grapevine varieties in Istria are: Malvazija Istarska, Merlot, Teran, Cabernet Sauvignon, Chardonnay, Refošk, Muškatmomjanski, Frankovka (Borgonja), Cabernet Franc, Muškatžuti. Other are: Pinot Sivi, Pinot bijeli, Pinot Noir, Plavac, Istrijanac.
CRMNICA (ME)	48,056	796.86	23.96	Vranac, Kratošija, Chardonnay, Cabernet Sauvignon, Graševina, Malvazija, Muškaćera, Pinot Blanc, Pinot Gris, Pinot noir, Lisičina, Riesling, Marselan, Melot, Sauvignon, Petit Verdot, Sangiovese, Syrah, Žižak
TOPOLA municipality	35,698	29,093.57	280	Merlot, Cabernet Sauvignon, Sauvignon Blanc, Chardonnay, Morava,Prokupac, Cabernet Franc , Pinot Noir and Pinot Blanc, Muscat Hamburg, Vranac, Smederevka and Tamjanika.
ARCHANES – ASTEROUSIA (EL)	33,500	18,125.66	3,777	Assyrtiko, Vilana, Vidiano, Dafni, Thrapsathiri,Muscat Spinas, Plyto,Chardonnay,Sauvignon blanc,Malvasia,Sultana,Grenache rouge, Cabernet sauvignon, Kotsifali,Liatiko,Mandilaria, Merlot,Romeiko, Syrah, Kotsifoliatiko, Rozaki
PLATANIAS (EL)	49,100	19,445.12	451.6	Assyrtiko, Vilana, Vidiano,Muscat Blanc, Muscat Spinas, Chardonnay, Sauvignon blanc, Agiorgitiko, Grenache rouge, Cabernet sauvignon, Carignan, Kotsifali, Liatiko, Mandilaria, Romeiko, Syrah, Fokiano, Rozaki, Sultana

4.2 The wine market: global and local features

The International Organization of Vine and Wine (https://www.oiv.int/en/) is a scientific and technical intergovernmental organization that provides yearly data on the situation of grape and wine production Worldwide. According the last report "*In 2020 the world area under vines, corresponding to the total surface area planted with vines for all purposes (wine and juices, table grapes and raisins), including young vines not yet in production, is estimated at 7.3 mha*." After a decline in the world vineyards surface occurred in the last decades, as shown in the next graph, the situation seems to have stabilized, even if differences are evident among the world regions (FAO maps of grape production 2000-2018).



Within the European Union the area of vineyard amounts to 3.3 mha, and due to the application since 2016 of the Regulation (EU) No. 1308/2013 for the management of viticultural production potential Member States are allowed to authorize the planting of an up to 1% increase in the existing vineyard area annually.

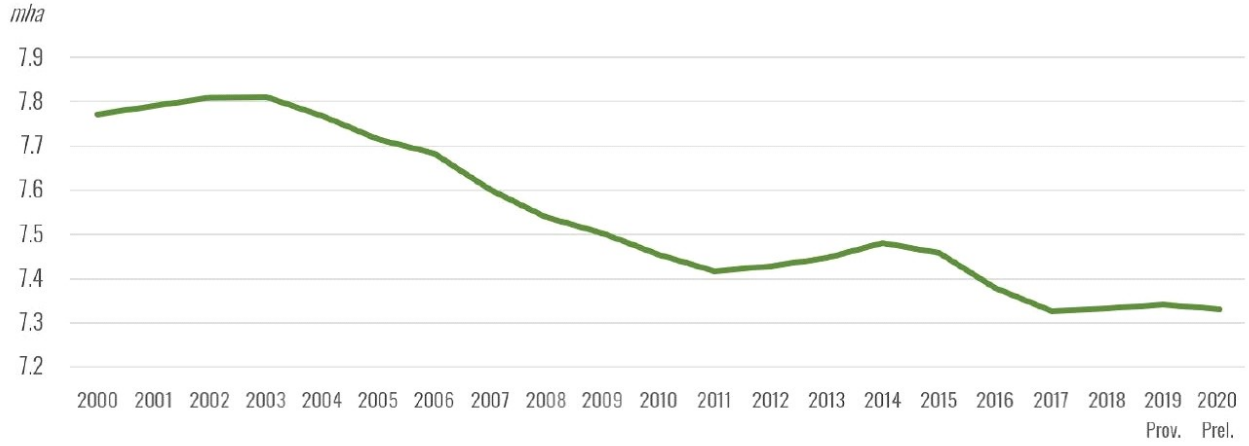
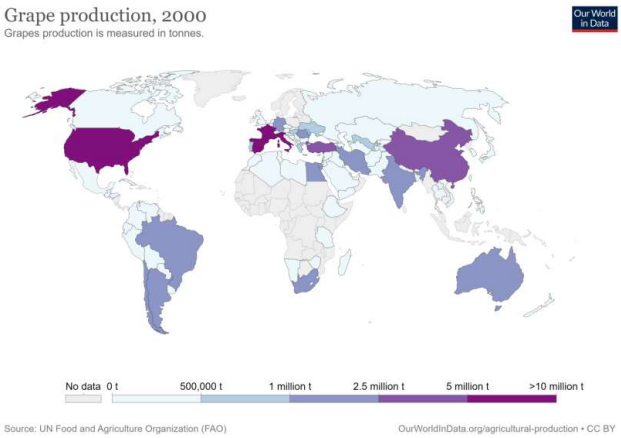
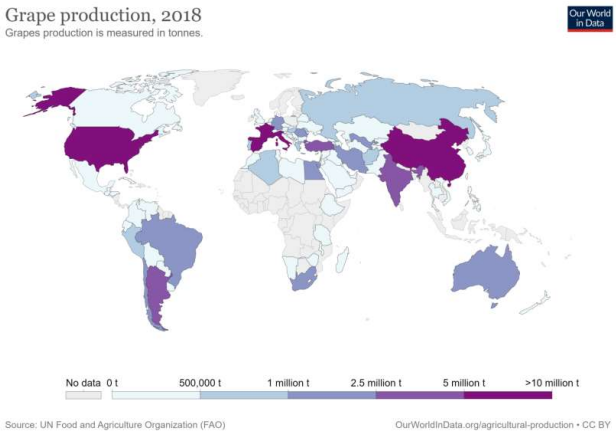


Figure 5 Evolution of the world vineyard surface area.





Wine production Worldwide is estimated at 260 mhl, of which 165 mhl are produced in the EU by an estimated 2.4 million vine growers. World wine consumption had decreased continually since the 2008 financial crisis and in 2020 was estimated to be 234 mhl, the lowest level of consumption since 2002. The Covid-19 Pandemic and the lockdown restrictions are mainly responsible for the recent further reduction in consumption and for a large decline in wine exportation by many countries. The economic difficulties experienced by many countries, the reduction of tourist mobility and trade uncertainties will probably continue to affect the wine sector in the coming period. The current situation may encourage producers and wineries to adopt new strategies in grape production and in wine marketing. Among the several adaptive strategies, an enlargement of e-commerce (survey data suggests that wine drinkers are committed to continue with online purchasing), and a reduction in wine production volumes appear reasonable.

Changes in consumer demand only partially related to the Covid-19 pandemic detected by wine sector analysts are the following: increasing demand for sparkling wines; increasing demand for wines produced from regional/local/autochthonous grape varieties that express the characteristics of the territory, and are often available at lower prices; increasing demand for wine that is easy to drink; increasing demand for organic and biodynamic wines. Regarding the selling formats, some market analysts foresee a larger use of large packaging formats, such as bag-in-a-box, and small packaging formats, such as cans mainly in the US, UK, Australia and Japan markets.

In 2019, organic wine consumption reached 802 million bottles Worldwide, and the forecast for 2023 is 976 million bottles. Organic vineyards currently represent about

10% of EU vineyards and 6.7% of vineyards Worldwide, with an area of around 500,000 ha (OIV 2019 454 kha, representing 6.2% of the World's total area under vines). This shows that the importance of sustainability has been highlighted by the pandemic which brought consideration of environmental and social responsibility into the wine landscape.

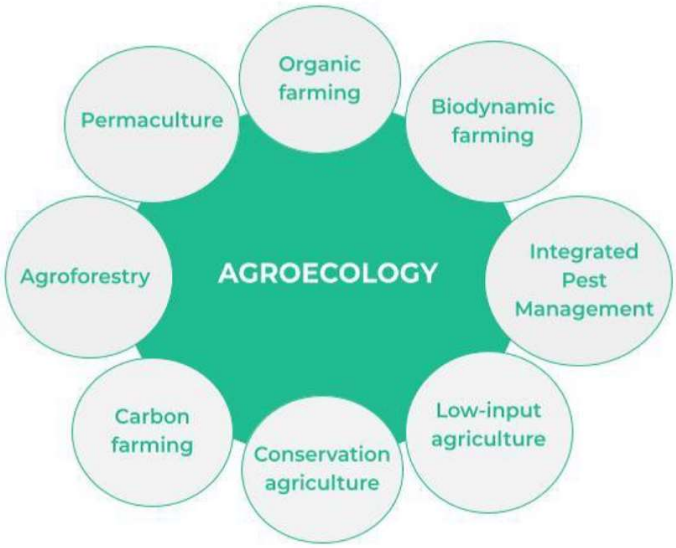
4.3 Climate change and grape production

Climate change can affect quantitative and qualitative parameters of grapevines and has emerged as a driver of transformation in numerous wine regions. The foreseen changes indicate for the Mediterranean area an average warming between 2.5 and 5.5 ◦C by the end of the 21st century. Temperature rising, thermal stress, drought and an increase in extreme weather events have been evident during the growing seasons of the last decade. The consequences are losses in production, higher rates of evapotranspiration and more irrigation needs, anticipation of phenophase timings and harvesting dates with potential threat to wine typicality, loss of aroma precursors due to earlier maturation, higher sugar and lower acidity levels.

The aforementioned situation lead to the adoption of adaptation measures by winegrowers such as improved irrigation efficiency, providing protection against sunburn, selection of grape varieties and rootstocks, changes in the training system, site relocation.

4.4 Precision agriculture, conservation agriculture, organic and biodynamic agriculture and agroecological practices for grape production.

Agroecology, as a science, as a set of practices and as a social movement, interacts continuously with other agricultural production systems and practices that seek solutions for a more sustainable farming and food system. Any solutions based on natural and ecological processes, that are equitable, environmentally friendly, locally adapted and controlled should be taken into consideration, analyzed, tested and evaluated under the key principles of agroecology (recycling; reducing the use of inputs; soil health; animal health and welfare; biodiversity; synergy; economic diversification; co-creation of knowledge; social values; fairness; connectivity; land and natural resource governance; participation). In our vision, among the principles relating to land and natural resources, we also include landscape protection and enhancement. Among all the farming systems that refer



to agroecology principles, organic agriculture has many points of overlap, especially if we consider not only EU regulations but the whole organic farming movement and principles[3]. The divergences between them are historical: the initial paradigm of organic farming is the soil, including soil fertility and soil research, while agroecological research started from ecology and pest prevention, in which biodiversity plays a crucial role (IFOAM 2019). Organic farming is a certification system that defines in detail minimum requirements and obligations for the organic operators and verifies their compliance through a third part control system. This is not the case of agroecology where clear thresholds and regulations are not defined and there is no control system as it is based on trust. Sharing a common vision on nature-based solutions, biodiversity preservation, respect for the environment and natural resources, social and market fairness, organic and agroecology should not be considered to be in opposition to each other, but should be considered through their synergies, common principles and drivers. Organic certification can be seen as a checking point on the path towards agroecology that in turn can be seen as a free-thinking space to create concepts and practices for organic farming to develop beyond the organic regulation.

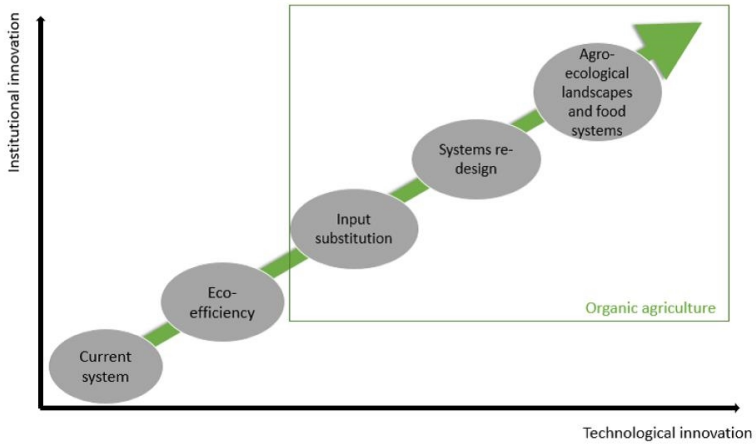


Figure 8 Development of agrofood models and role of organic agriculture. *Source: adapted from Tittonel, 2014 and from Barberi et al, 2017*

There are different forms of ecological intensification in agriculture. Some scholars distinguish between a "weak ecological intensification" and a "strong ecologically intensive agriculture". The first is based on an "efficiency/substitution" model aiming to increase resource use efficiency of fertilizer, pesticides, and water, and to foster the recycling of waste or by-products, the wider application of existing good agricultural practices and the use of precision-agriculture technologies, replacing chemical inputs with organic inputs. The second is defined as "biodiversity-based agriculture" or "eco-functional intensification" and is based on the use of biodiversity at field, farm and landscape scale in order to produce "input services" that support production, (water availability, fertility, pest control) and regulate flows (water quality, control of bio-geo-chemical cycles). This implies the development of diversified cropping and farming systems, the use of agroforestry and positive interaction with livestock, a drastic reduction in the use of

[3] *"Organic Agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved. (IFOAM 2005)*

external inputs, relocating agriculture and its policies into the heart of regional and local systems of ecological, economic and community development.In the ECOVINEGOALS vision the two models are not alternative but can be considered as different steps of a process in a time frame ranging from short term to middle-long term,depending on the capacity of local community to develop initiatives, relations, knowledge, and innovation.

4.5 Wine and tourism

There is an increasing interest in wine tourism and the role it can play in local and rural development. Many events organized by local tourism operators are linked to wine production and they represent a chance for vine growers to reach new consumers and expand their market. Many initiatives on wine tourism claim to highlight sustainability, wellbeing, cultural landscape, and natural resources. The advent of new forms of tourism as eco-tourism, green tourism and environmental tourism can fit with the adoption of agroecology practices (AE) in vineyards. This kind of tourism, based on the growing interest of tourists in "green" issues, can be an interesting lever for fostering the adoption of AE practices and for an intensification of biodiversity-based agriculture. The inclusion in the vineyards of medicinal and aromatic plants, animal husbandry, or agroforestry could enrich the farmer's proposal and the experiences of the visitors. Moreover eco-wine tourism is strongly linked with local cultural heritage, landscape and habitat conservation, and can help in the diversification of the rural economy. Building collaborative networks is essential for this kind of approach.

Alongside the experience of visiting vineyards, wineries, tasting wines or participating in wine festivals and wine shows, agroecology has the potential to provide an authentic and holistic experience, adding important values and increasing interaction with the visitors. These are connected with the best agroecology practices suggested by the ECOVINEGOALS project that mainly address biodiversity, landscape, rural heritage, local customs and culture.In addition, the product life cycle also contributes to green marketing. As for the marketing contributions, it increases the value of the product as a green marketing tool and increases the competitive element both locally and globally.

4.6 Grape production, landscape, habitats and cultural heritage

Each wine has its own natural and cultural landscape (Lugeri et al. 2011). Vineyards are considered to be a very important part of European cultural heritage and worth managing to safeguard both the natural and cultural aspects of the so called "winescape". To analyze the link between vineyard cultivation practices, landscape and cultural heritage is a special focus of the ECOVINEGOALS project and should be an important part of the strategy for AE transition. Thus the strategy should find the best means in a local context to increase awareness of the winescape among stakeholders.

Landscape is the result of a long term interaction between nature and human activities and needs to be understood and recognized as a part of our heritage and at the same

time it needs to be protected in order to become a resource. The quality of the landscape is important for social and individual well-being, for quality of life and for local cultures.
The vineyard has always belonged to the cultural heritage of the Adriatic-Ionic area. Its cultivation was not related to the basic food needs of the population but provided them other kind of services of a playful, recreational, relational and aesthetic character. This function has determined a particular position of the vineyard in the human imagination, generating over centuries important cultural perceptions and meanings, able to assume symbolic and identity values. We find vines more frequently than other crops in religious scripts, artistic representations (painting, sculpture), poetry, and literature.
The values associated with vine are always positive, as if to reaffirm the importance and goodness of the choice made at that time: to devote labour, time and resources to a production that is not essential for mere survival. In ancient texts and graphic representations, the vineyard is often associated with life, prosperity, birth, fertility, "good care", fatigue and man's work, regeneration, pleasure and inebriation, i.e. the ability to cheer up the man's life and relieve the inevitable pains. Noah emerged from the ark, in a land still shaken by the universal flood, and as the first act "planted a vineyard" that then assumed the symbol of rebirth of the Earth. The figure of Bacchus/Dionysos binds the vineyard not only to the time and seasons of man and the Earth but also to eternity by tying it to the divine. The same happens in the Christian religion where the product of the vineyard, the wine, becomes the blood of the son of God and therefore a symbolic part of man's path to salvation. The importance of the vineyard for the landscape is evidenced today by the inclusion of numerous wine landscapes in the list of sites of intangible cultural heritage of humanity promoted by international bodies.
Through the research and analysis of pictorial and photographic artistic productions, past and recent, project partners could try to identify the hallmarks of the vineyard landscapes in their area. The perception of artists in their presentations of the vineyard in the landscape context of a given territory is an important element in assessing meanings and values attributed to the “living” vineyard landscape. The analysis of figurative artistic productions carried out in past times to represent a given vineyard area would allow to compare the current situation and analyze the changes that have taken place and their effects on landscape. In some cases it could also reveal any techniques and practices useful for the agroecology approach.

5. Frameworks of analysis

5.1 Technical aspects, knowledge and diffusion of best agroecological practices

An increasing number of initiatives deal with the identification, definition, evaluation and diffusion of agroecological practices learned directly from farmers and local communities. The limit of a vertical, top-down, linear vision of knowledge dissemination in agriculture indicated that new means must be found to build the required knowledge base through

interaction among farmers, or between farmers and advisors or researchers in a co-creation process. Here is a brief description of some of the initiatives:

Agroecology Europe in collaboration with Agroecology Europe Youth Network (AEEUYN), provided in 2020, a wide-ranging report mapping agroecological initiatives across several European countries.

The project UNISECO developed a web tool, an Agro-Ecological Knowledge Hub, for the diffusion of information and knowledge related to agrecology. Among the different tools developed by the project, the SESSIT (Socio-Ecological System Interaction Tool) is an interactive map that allows the user to explore sustainable agriculture in different ways around the globe.

The FAO developed an Agroecology Knowledge Hub that has a database with a wide collection of existing knowledge on agroecology, articles, videos, case studies, books and a Tool for Agroecology Performance Evaluation (TAPE) that aims to measure the multi-dimensional performance of agroecological systems across the different dimensions of sustainability.

The CONECT-e platform (www.conecte.es) is a citizen science initiative to digitally store and share traditional agroecological knowledge in a participatory way. It includes sections focusing on traditional knowledge regarding plants, landraces, and ecosystems.

At a research level there are initiatives such as the Agroecology and Livelihoods Collaborative (ALC) (https://www.uvm.edu/agroecology/) a community of practice at the University of Vermont, which utilizes an approach grounded in agroecology, participatory action research (PAR) and transdisciplinarity. The aim is to integrate academic disciplines with real world knowledge to seek solutions to pressing global challenges through a transdisciplinary food system focus.

5.2 Landscape and habitats in the pilot areas

The landscape dimension has multiple relationships with agroecology. From the farm point of view landscape is the frame in which the farm is immersed and the surroundings can enrich or affect the farm production, both from aesthetic and ecological-environmental aspects. The connections between the farm and the landscape can affect the ecological functioning of the farm ecosystem. An open farming system in which the exchanges with habitat core areas are facilitated by the presence of natural corridors, living fences, and hedges can act as a dissipative structure and increase the probability of resilience or adaptation of the agro-system to disturbances of different natures, and can improve biodiversity. Landscape ecology has focused on studying the composition, structure, functionality and changes of the landscape and in

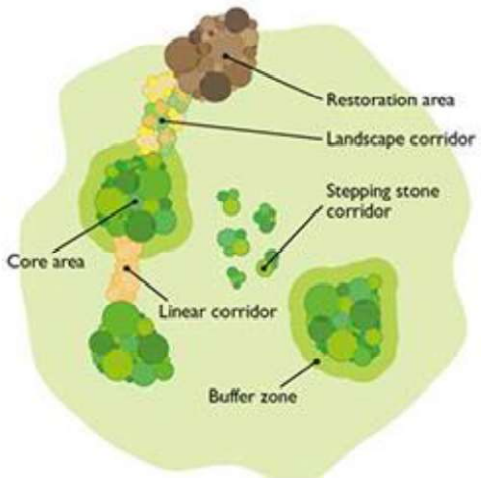


Figure 9Ecological network. *Source: Lawton (2010)*

this sense the analyses have concentrated on three of its main components: matrices, patches and corridors (see T. E. León-Sicard, 2018).
The green infrastructure within a landscape can be seen as an ecological network that supports life and ecological processes.
From an observer's point of view vineyards form part of the landscape and the way they are planted, the pattern of their cultivation and their relation to the other elements of the landscape, whether natural or built, affect aesthetic perceptions. Both dimensions are considered by the ECOVINEGOALS project and should be reflected in the transition strategy to improve the ecological connections and the aesthetics of the landscape.

5.3 Social and economic aspects and the participatory approach

Understanding the socio-economical context and encouraging participation of relevant stakeholders is essential for the design of an effective and long-lasting AE transition. For these reasons ECOVINEGOALS promotes the collection of information and data and participative practices. Data are essential to analyze and describe the current situation, but also to reveal the constraints and the potential of viticulture, and can be used to provide a common understanding among all stakeholders. Thus it's important to find the most reliable and up-to-date sources for data and present them in a clear and simple way. Regarding participation, different techniques should be adopted according the target, the objective, and the phase of the transition process. In any case decisions are more effective when the majority of the stakeholders take an active part in the decision-making process. Some principles are common to all participative techniques: set out the context in a clear way; find a hospitable space for the meetings; explore questions that matter and that are relevant to real-life concerns; encourage all participants to contribute and to express their ideas and perspectives; try to connect diverse perspectives; listen and pay attention to themes, patterns and insights arising during the meetings; capture the 'harvest' of the meetings and share it with all participants.

6. Building a strategy

Although each territory must identify a specific strategy on the basis of its environmental, social, political and economic condition, it is appropriate to identify some common methodological and steering elements. These elements are important to include the transition process in a European context, to encourage the use of existing support tools, to encourage the exchange of experiences between different realities, to respond to the needs of citizens, consumers and farmers and to monitor progress towards sustainability objectives.
An important element is the knowledge of the current situation. For this reason, it is essential that those actions that make it possible to fill any gaps are included in the transition strategy. The main problems on data collection we encountered during the EVG project activities concern land cover status and its changes, biodiversity and

environment assessments. In order to solve these problems it is important to establish lasting relationships with local research institutes to have accurate and dedicated data for the wine sector.
To start the transition process it is important to give importance and visibility to the situations that are already implementing initiatives that go in the same direction. Therefore the strategy should contain measures that support the niche of innovation in the agroecological approach and their expansion. This should include the implementation of demonstration actions, testing of new technologies and practices, farm visits and meetings at leading farms. The two most important aspects to consider from a technical point of view are soil management and disease management. For these two aspects it is important to identify minimum thresholds for the start of the farm transition: to eliminate weeding and drastically reduce the use of chemicals for plant protection. Alternative methods must be identified in collaboration with farmers and technicians working in the area considering all the options based on natural and ecological processes.
A high level of biodiversity within and outside the farm is essential for a successful application of agroecological best practices. In this sense, it is important to implement initiatives to promote ecological connections between the farm and the natural and semi-natural areas around it and to diversify the farm structure as much as possible by creating hedges, trees, and buffer areas.
At the same time, it is essential to promote informed civic debate to increase social awareness on agroecological principles and benefits for the whole population. Social recognition of the agroecological approach and the farmer's role should be included in a wide perspective on landscape quality perception by insiders and outsiders and on the positive relationship with tourism activities that can be built adopting agroecological best practices.

6.1 The adaptive approach

Agroecological transition requires profound changes at different levels (farms, institutions, territorial governance, natural resources management, supply chain, local market, etc.) and involves a large number of stakeholders with different interests. Local socio-cultural-economical dynamics are complex and require adaptive capacities in the transition management in order to steer and modulate the dynamics of transitions through interactive and iterative processes among networks of stakeholders. Adjustments in the transition pathway are often necessary in order to avoid conflicts that could cause damage to the process. Sometimes changes in the modes of action and informal agreements are sufficient to improve social learning, mutual understanding, viewpoint-sharing and collective management of the transition process and to reduce asymmetries in local relationships.

6.2 Global market and local development

Among the ten elements of agroecology defined by FAO (2018) there is CIRCULAR AND

SOLIDARITY ECONOMY. In the FAO rationale agroecology has the objective to reconnect producers and consumers through a circular and solidarity economy that prioritizes local markets and supports local economic development by creating virtuous cycles. It is widely recognized that short chain circuits and direct selling on farm or in local markets can increase the incomes of farmers while maintaining a fair price for consumers. Of course if regional wine production is high, local markets will not be able to absorb it and application to global markets is necessary.

The debate between "local" and "global" has emerged as a hot topic for the wine sector. Many issues are involved (environmental, economic, social and ethical) and the complexity is increased by the fact that in the wine sector many dimensions of both local and global contexts are combined.

Wine quality is determined by specific local conditions such as climate, soil, grape variety, canopy management and farmer knowledge, and thus wine identity is often linked to the area of production (protected designations of origin -PDO, protected geographical indications –PGI, traditional terms[4]) also in the global market.

The increasing role in the wine market of big companies, international investors, wholesalers and supermarkets lead to the presence in global and local markets of both global wine and local wine. The emerging role for rural development of wine routes and wine tourism highlight the importance that increasingly wine should be made available at the site of production. In the meantime organic wines are expanding their position in the global market require separate export strategies.

Therefore three different types of wine chains coexists: "local," "global" and "local in global". This suggests that mixed strategies combining local chains with global chains, including local and global dimensions within the same chain should be developed. The cooperative system seems to be able to successfully link wine tourism and wine export if they adopt technical and organizational innovations, invest in the social dimension (corporate socially responsible) and promote new codes of sustainable practices at a farm level, such as the adoption of organic certification.

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[4]The **designation of origin** consists of the name of a region, a specific place or (in exceptional cases) a country used to describe a product. It can be used when the quality and characteristics of the wine product are essentially or exclusively due to a particular geographical environment with its inherent natural and human factors. The grapes used for its production must come exclusively from this geographical area, and its production must take place in this geographical area. In addition, the product must be obtained exclusively from the vine varieties belonging to *Vitis vinifera*.

The **geographical indication** refers to a region, a specific place or (in exceptional cases) a country used to describe a product. It can be used when the wine product possesses a specific quality, reputation or other characteristics attributable to that geographical origin. At least 85% of the grapes used for its production must come exclusively from this geographical area, and its production must take place in this geographical area. The product must be obtained from the vine varieties belonging to *Vitis vinifera* or a cross with other species of the genus *Vitis*.

Designations of origin and geographical indications relating to geographical areas in nonEU countries can also be eligible for protection in the EU.

Traditional terms are used to describe the characteristic of a PDO/PGI product (such as a production method, a quality, colour, type of place or a particular event linked to the history of the product) and also benefit from protection against unlawful use. Any misuse of the protected term, misleading indication or other practice likely to mislead the consumer is forbidden.

6.3 Internal and external networks

The ability to build networks of relationships both locally and internationally is fundamental for the dissemination of the agroecological approach to wine production and for its recognition from a social and economic point of view. The benefits of networking are highly recognized for our social life and for business purposes. Also in local development projects the networks can play an active role for promoting and organizing activities, and for the dissemination of information and the results of project activities. Regarding the building of local networks supporting agroecology transition it's important to ensure a wide and diversified representation of the cultural, generational, gender and professional components present in the territory, and foster the active participation of all the components. After a clear definition of objectives, values shared, structure and functioning of the network, the organization of regular meetings, seminars on specific issues, joint reflections, and collective analysis of documents can maintain the network living and able to take actions. Regarding external networks it's important to highlight that many participatory networks have been built in recent years, as part of projects or programs, and thus the local network may assess membership of an existing network on the basis of similarities of interests or socio-economic, environmental or cultural conditions. Participation in existing networks can improve local actions, the sharing of knowledge, ideas and solutions, challenges, experiences or goals, and can increase the visibility of activities.

6.4 Alliances and covenants among sectors

An alliance is commonly defined as any voluntary agreement between several subjects, public and private bodies and also individuals, made for the fulfillment of common goals and the implementation of flagship initiatives. Exchange, sharing, co-development, support, contribution (technical and economic), can all form part of the formal agreement. The transition process to agroecology requires broad cross-sector coordination and the adoption of appropriate instruments to maintain active dialogue among stakeholders to drive the change. Territorial pact[5], rural pact[6], development pact, bio/organic-district are different forms of territorial alliance that can positively act in synergy with agroecology principles.

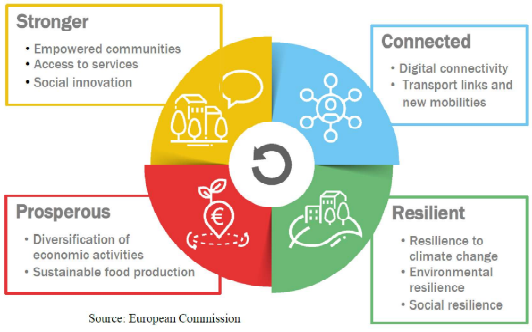


Figure 10Main drivers shaping the future of rural areas for 2040 and the four complementary areas for action

[5]A contract between different level of government (local, regional, national) of the same country or between different countries; a formalized local partnership on different market. This contract represents the relationship between governance and widespread participation of different social groups, for various objectives (economic, social, and cultural).

[6]The Rural Pact is a framework for cooperation among authorities and stakeholders at the European, national, regional and local level. It aims to contribute to achieving the shared goals of the long-term vision for the EU's rural areas.

Some key elements of such a territorial alliance are: to define a common agenda in order allow different subjects/stakeholders to act in concert; to define shared measurement systems and a list of indicators that allows measurement advancement towards the goals; to define mutually reinforcing activities for each participant that must undertake a specific set of activities in a way that supports and is coordinated with the actions of others; to ensure continuous communication among participants; to create a backbone support organization, because collaboration cannot occur without a supporting infrastructure.

6.5 EU instruments and politics

The European Union's institutional organization is complex: 7 European institutions, 7 EU bodies and over 30 agencies. Each have distinct specific roles: to develop EU laws, to define the EU policy, to implement policies and to work on specialist areas.
The main institutions that are responsible for the EU policy direction are:

1. The European Parliament: represents the citizens of EU countries and is directly elected by them. It takes decisions on European laws jointly with the Council of the European Union. It also approves the EU budget;
2. The European Council: is formed by the Heads of state or government of EU countries. It set the EU's political agenda, decides on the EU's overall direction and political priorities but it does not make laws;
3. The Council of the European Union: represents the governments of EU countries, it negotiates and adopts laws, together with the European Parliament, and coordinates policies. Government Ministers meet in different configurations depending on the topic to be discussed;
4. The European Commission: is the EU's main executive body steered by a group of 27 Commissioners (the College). It has the "right of initiative" to put forward proposals for new laws that are submitted to the European Parliament and the Council of the European Union for their adoption. It manages the EU policies and the budget through the various European funds and ensures that Member States apply EU law correctly.

Some bodies have the task of advising the institutions:

- the European Economic and Social Committee: is formed by 329 members representative of employers (group 1), trade unionists (group 2) and social, occupational, economic and cultural organizations (group 3), appointed by the Council on a proposal by Member States.

-The European Committee of the Regions: a political assembly composed by 329 members from all EU countries who have been elected at local or regional level as Mayors or Presidents of a region.

These bodies have issued several documents[7] promoting agroecology as a new paradigm

[7]EESC Promoting short and alternative food supply chains in the EU: the role of agroecology - NAT/763 2019

for food and farming and for the adoption of a structured action plan for agroecology at regional, national and EU level, supporting the transition to more sustainable food systems. A better coherence and integration of policy objectives and instruments among agriculture, environment, health, climate, employment, must be ensured taking into account the three pillars of sustainability.
European Commission is organized into policy departments, known as Directorates-General (DGs) responsible for different policy areas, and Executive Agencies that manage programs set up by the Commission. The most relevant for agroecology issues are: DG AGRI (Agriculture and Rural Development), DG ENV (Environment), DG CLIMA (Climate Action);the agency CINEA (European Climate, Infrastructure and Environment Executive Agency); DG SANTE (Health and Food Safety), DG REGIO (Regional and Urban Policy), DG RTD (Research and Innovation), the agency European Research Council Executive Agency, JRC (Joint Research Centre).
The Commission acts with directly-managed instruments (Horizon 2020, LIFE) and shared management instruments (ESIF European Structural and Investment Funds). Over half of EU funding is channeled through the 5 European ESIF founds that are: ERDF – European Regional Development Fund, Cohesion Fund, ESF - European Social Fund, EAFRD - European Agricultural Fund for Rural Development and EMFF – European Maritime and Fisheries Fund). They are jointly managed by the European Commission and the EU countries.

6.5.1 CAP-specific objectives

On 25 June, 2021, negotiators of the European Parliament, the Council of the EU and the European Commission, agreed on the reform of the Common Agricultural Policy (CAP). On 23 November 2021 the EU Parliament in the plenary section approved the three regulations that are the legal basis for the CAP 2023-2027. The policy focuses on nine specific objectives, linked to common EU goals for social, environmental, and economic sustainability in agriculture and rural areas. They are the following:
(a) to support viable farm income and the resilience of the agricultural sector across the Union in order to enhance long-term food security and agricultural diversity as well as to ensure the economic sustainability of agricultural production in the Union;
(b) to enhance market orientation and increase farm competitiveness both in the short and long terms, including greater focus on research, technology and digitalization;
(c) to improve the farmers' position in the value chain;
(d) to contribute to climate change mitigation and adaptation, including by reducing greenhouse gas emissions and enhancing carbon sequestration, as well as to promote

EESC Opinion on From farm to fork: a sustainable food strategy 2020 NAT/787
ECoR Opinion on CAP reform 2018 NAT-VI/034
ECoR Opinion on Agro-ecology 2021 NAT-VII/010
ECoR Opinion on EU action plan for organic farming 2021 NAT VII/019
COM(2021) 345 finalA long-term Vision for the EU's Rural Areas - Towards stronger, connected, resilient and prosperous rural areas by 2040

sustainable energy;
(e) to foster sustainable development and efficient management of natural resources such as water, soil and air, including by reducing chemical dependency;
(f) to contribute to halting and reversing biodiversity loss, enhance ecosystem services and preserve habitats and landscapes;
(g) to attract and sustain young farmers and new farmers and facilitate sustainablebusiness development in rural areas;
(h) to promote employment, growth, gender equality, including the participation ofwomen in farming, social inclusion and local development in rural areas, includingthe circular bio-economy and sustainable forestry;
(i) to improve the response of Union agriculture to societal demands on food and health, including high-quality, safe and nutritious food produced in a sustainable way, to reduce food waste, as well as to improve animal welfare and to combatantimicrobial resistance.

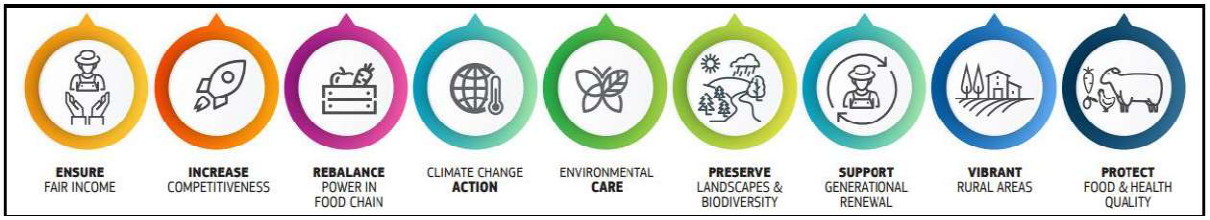


Figure 11 The Nine CAP objectives

The Common Agricultural Policy (CAP) and the European Green Deal, together with the strategies Farm to Fork and Biodiversity, form the new vision under which the Member States have to design the national strategic plans outlining how they intend to meet the EU's green goals. The CAP total budget is € 386.6 billion (€ 270 billion for direct aids to farmers, € 60.5 for rural development), representing almost one-third of the EU's budget (31.95%), and will be implemented from 1st of January, 2023. The approved text has been judged by environmentalist and green groups to be inadequate to counteract effectively the ongoing climate and biodiversity crisis and the loss of small farmers all over Europe because there are no obligations to meet Green Deal objectives, some elements of conditionality have been weakened, and the adoption of capping is left to Member States. The next steps are the adoption of the regulations by the Council and the Commission and the subsequent adoption of the Commission's delegated and implementing acts to allow Member States to finalize their national CAP strategic plans and deliver them to the Commission the end of the year. After approval of all 27 plans, the new CAP is expected to be in place in 2023.
The most important requirements of the reform are:

1. farmers receiving CAP support need to dedicate at least 3% of their arable land to protecting biodiversity;
2. from 2023 Member States must allocate 20% of their income support budget for direct payments to farmers on "eco-schemes", rising to 25% of payments in 2025-2027. Eco-schemes, that are voluntary for farmers, will reward them for climate- and environmentally-friendly practices such as organic farming

and agroecology;
3. Member states have to distribute at least 10% of the support to smaller farms and at least 3% to young farmers;
4. Member states must ensure that at least 35% of the rural development budget is dedicated to environmental and climate measures.

The reform also creates a 450 million euro crisis fund in case agricultural markets are disrupted by an emergency such as a pandemic.

6.5.2 EU green deal targets

The Green Deal is the EU's main new growth strategy to transition its economy to a sustainable economic model in order to become the first climate neutral continent by 2050.
The "European Green Deal", adopted by the Commission on 11 December 2019(COM (2019) 640 final) foresees reaching the following targets by 2030:

1. reduction in nutrient losses by 50%;
2. reduction in fertilizer use by 20%;
3. reduction in pesticide use by 50%;
4. reduction in sales of antimicrobials by 50%;
5. increase in organic farming to 25% of utilized agricultural area (UAA)
6. increase in high-diversity landscape features to 10% of UAA

In order to face climate and biodiversity emergencies the Commission on 14.7.2021 adopted the communication COM(2021) 550 final 'Fit for 55': delivering the EU's 2030 Climate Target on the way to climate neutrality. The Fit for 55 package consists of a set of inter-connected proposals to ensure a fair, competitive and green transition by 2030 and beyond. It includes legislative proposals and new initiatives across a range policy areas and economic sectors: climate, energy and fuels, transport, buildings, land use and forestry.
The main strategies related to the European Green Deal are the following:
a) EU Biodiversity Strategy for 2030; Bringing nature back into our lives; 20.5.2020 COM(2020) 380 final.
b) Farm to Fork (F2F) Strategy for a fair, healthy and environmentally-friendly food system; 20.5.2020COM(2020) 381 final.
c) New EU Forest Strategy for 2030; 16.7.2021COM(2021) 572 final.
d) EU Nature Restoration Targets.
e) EU Strategy on Adaptation to Climate Change - Forging a climate-resilient Europe;24.2.2021 COM(2021) 82 final.
f) EU Strategy to Reduce Methane Emissions; 14.10.2020COM(2020) 663 final.
g) EU Soil Strategy (EU Soil Strategy for 2030 Reaping the benefits of healthy soils for people, food, nature and climate{COM(2021) 699 final}.

h)Sustainable Bioeconomy for Europe; (Staff Working Document SWD(2017)374).
i) Circular Economy Action Plan for a cleaner and more competitive Europe.
j) Zero Pollution Action Plan -Towards Zero Pollution for Air, Water and Soil; 12.5.2021COM(2021) 400 final.
k) Long-term Vision for the EU's Rural Areas - Towards stronger, connected, resilient and prosperous rural areas by 2040; COM (2021) 345 final of 30 June 2021.

While a complete assessment of the impact of the EU strategies as a whole has yet to be made, some research institutions have analyzed the economic impact and market effects of the F2F and biodiversity strategies[8]. Analyzing different scenarios and using different models (CAPRI; GTAP-AEZ; Case studies) the research reports highlighted the effects of the EU strategies on agricultural production, income, prices and trade. All the reports agreed that there will be a general reduction in crop production (ranging from -10% to -20%), an increase in production costs, an increase in the prices of products such as wine, a reduction in exports and increasing of imports into the EU. Although the studies carried out do not take into account many aspects contained in the European Union strategy and the positive effects, also on agricultural production, resulting from the increase in biodiversity and the reduction of pollutants, the importance of formulating a local transition strategy for the best application of good agroecological practices in vineyards and to strengthen internal and local markets appears increasingly important.

6.5.3 The Commission's proposals for the eco-schemes

Eco-schemes (schemes for the environment and climate) are the main innovation in the green architecture of the CAP. They will be proposed by Member States and each eco-scheme shall cover at least two of the following areas of actions:
(a) climate change mitigation, including reduction of greenhouse gas emissions from agricultural practices, as well as maintenance of existing carbon stores and enhancement of carbon sequestration;
(b) climate change adaptation, including actions to improve resilience of food production systems and animal and plant diversity for stronger resistance to diseases and climate change;
(c) protection or improvement of water quality and reduction of pressure on water

[8]See report made by the European Commission's Joint Research Center (Barreiro-Hurle, et alii. Modelling environmental and climate ambition in the agricultural sector with the CAPRI model. Exploring the potential effects of selected Farm to Fork and Biodiversity strategies targets in the framework of the 2030 Climate targets and the post 2020 Common Agricultural Policy, EUR 30317 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-20889-1, doi:10.2760/98160, JRC121368.); report made by the USDA -United States Department of Agriculture (Beckman, Jayson, et alii.. November 2020. Economic and Food Security Impacts of Agricultural Input Reduction Under the European Union Green Deal's Farm to Fork and Biodiversity Strategies, EB-30, U.S. Department of Agriculture, Economic Research Service; report made by Wageningen University & Research.(J. Bremmer et alii Impact Assessment Study on EC 2030 Green Deal Targets for Sustainable Food Production: Effects of Farm to Fork and Biodiversity Strategy 2030 at farm, national and EU level; 2021 Wageningen University & Research)

resources;
(d) prevention of soil degradation, soil restoration, improvement of soil fertility and of nutrient management and soil biota;
(e) protection of biodiversity, conservation or restoration of habitats or species, including maintenance and creation of landscape features or non-productive areas;
(f) actions for a sustainable and reduced use of pesticides, in particular pesticides that present a risk for human health or environment;
(g) actions to enhance animal welfare or combat antimicrobial resistance.

The European Commission published on January 2021 a list of potential agricultural practices that eco-schemes could support. The most relevant practices for the grapevine sector that can be part of the local action plans are the following: conversion to organic farming; maintenance of organic farming; buffer strips with management practices and without pesticides; mechanical weed control; increased use of resilient, pest-resistant crop varieties and species[9]; use of crops/plant varieties more resilient to climate change; land lying fallow with species composition for biodiversity purposes; cover crops between tree rows on permanent crops - orchards, vineyards, olive trees - above conditionality; practices and standards as set under organic farming rules; establishment and maintenance of landscape features above conditionality; shepherding between permanent crops; semi-natural habitat creation and enhancement; reduction of fertilizer use, low intensity management; conservation agriculture for carbon sequestration; appropriate management of plant residues; precision crop farming to reduce inputs (fertilizers, water, plant protection products); improving irrigation efficiency; measures to reduce and prevent water, air and soil pollution from excess nutrients such assoil sampling if not already obligatory, creation of nutrient traps; managing crop water demand (switching to less water intensive crops, changing planting dates, optimized irrigation schedules); erosion prevention strips and wind breaks; establishment or maintenance of terraces and strip cropping. The 29 best practices developed by the ECOVINEGOALS project so far, include all the eco-schemes related issues andgive practical indications and information for their implementation.

6. 6 Knowledge transmission (horizontal and vertical) and exchange of experiences

Co-creation of knowledge and horizontal sharing of knowledge, including local and scientific innovation, especially through farmer-to-farmer exchange is one of the agroecological principles adopted by the FAO. It is well known that public investment in research has only been minimally concerned with the agroecological approach. For the wine sector there is little technical and scientific knowledge of the application of agroecological principles. Even in the school and training sector there is very little

[9]To enable producers to use vine varieties that are better adapted to changing climatic conditions and that have higher resistance to diseases, REGULATION (EU) 2021/2117 permit the use of designations of origin for products made from both vine varieties belonging to *Vitis vinifera* and vine varieties stemming from a cross between *Vitis vinifera* and other species of the genus *Vitis*

teaching of agroecological principles and methods. It therefore seems necessary that the ecological transition strategy for the wine-growing areas should include an important action to fill the lack of knowledge and to promote the transmission of the knowledge obtained by farmers through experience. The role of farmers' associations is essential for initiatives to improve agricultural knowledge construction and exchange by farmers by putting the farmers at the center of the process. Knowledge is the process of learning plant behavior and ecological interactions at plot, farm and landscape level and solving specific problems occurring in crop/farm management, with the product being the result of the learning process that can then be disseminated. Through interaction between farmers, technicians and researchers it's possible to plan co-designed experiments, to expand the validity of local findings, to test agroecological practices and methods in different environments and to share results with a larger audience. The farmers' agronomic knowledge, raised from their experience and through their interactions with the local environment, should circulate beyond the context in which it has been produced and should be shared with other farmers, researchers and technicians within a framework of fair and mutual collaboration. This kind of initiative allows farmers to improve their observational and interpretative capacities, including the use of digital tools, data collection, storage, and analysis and to define actions to improve the sustainability of their production system. Experiments and data collection should be conducted on-farm, and farmers should participate in the experimental design and data evaluation. The aim is the production of local knowledge directly useful for farmers and the validation of this knowledge through the evaluation of the results in scientific terms in order to enable its transfer to other farmers in other regions.

Components of an area's capital according to LEADER EO (1999)	Factors of territorial capital according to OECD (2001)
• Physical resources • Human resources • Culture and identity • Institutions and governance • Know-how and skills • Activities and business firms • Markets and external relations • Image and perception	• Geographical location and size • Climate and natural conditions • Factor of production endowment • Agglomeration economies, business incubators, industrial districts, business networks • Traditions, understandings, customs, informal rules, "untraded interdependencies", solidarity, mutual assistance, co-opting of ideas (social capital) • Combination of institutions, rules, practices, producers, researchers, policy-makers

Figure 12: Components and Factors of territorial capital

6.7 The integration of territorial capital

Territorial capital can be defined as the set of assets of different natures which characterize territories (Camagni 2008). The assets are both tangible and intangible, they can be public or private but and also mixed situations between tangible/intangible, public/private exist. The LEADER European Observatory (LEADER EO 1999) and OECD (2001) defined the components and the factors that form territorial capital, they are listed in the following table (Toth, 2017). Alongside the material assets (hard capital) an increasing role in local development where assigned to other kinds of (soft) capital (human, social, cultural, intellectual, relational and creative capital).

A more articulated definition of territorial capital was proposed by Camagni (2009) in which the components are classified according two dimensions: rivalry (moving from public to private goods passing through the intermediate class of club and impure public goods) and materiality (moving from tangible to intangible goods, passing through the intermediate class of mixed goods in which material and immaterial elements exist together). According this vision the 4 intermediate classes and the central class represent the "innovative cross" while the corner positions represent the "traditional factors" or classes of sources of territorial capital usually taken in consideration by regional policy. The capitals included in the innovative cross represent innovative elements worthy of attention while designing the transition strategy because they are considered able to give a competitive advantage to the territory as a whole. Collective goods such as landscape and cultural heritage, relational capitals as cooperation and collective action capability, cooperation networks for research, development and local knowledge, and relational services for farms and enterprises, are also important aspects for the agroecology transition strategy and territorial capitals can support the transition process enhancing local resources and specificities. If we see the territorial capital development as a dynamic and

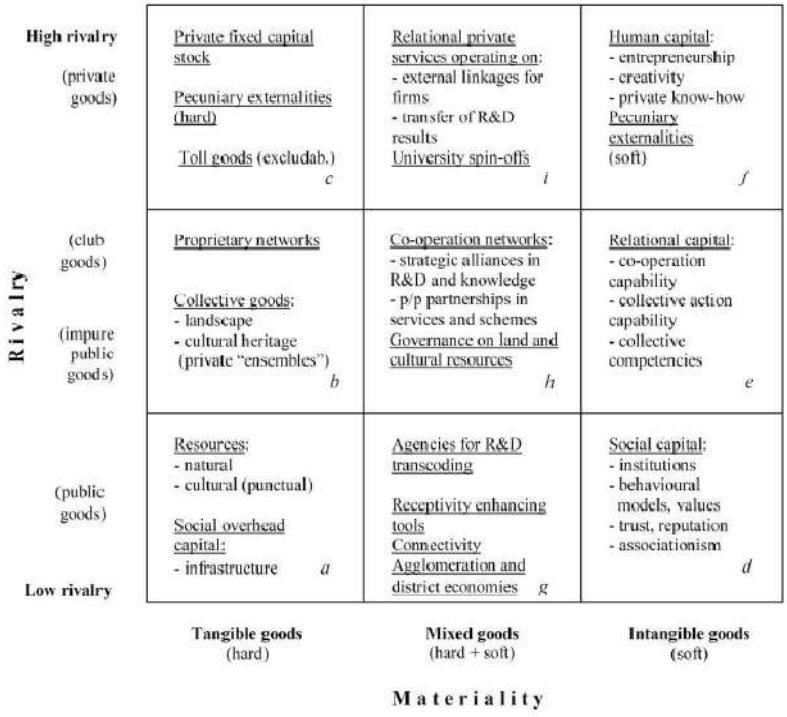


Figure 15:Rivalry/Materiality classification of territorial capital

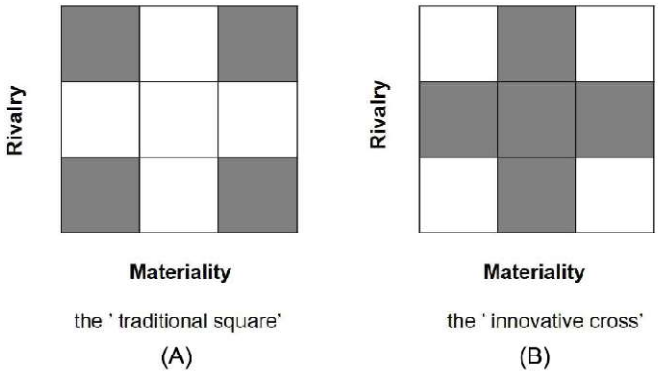
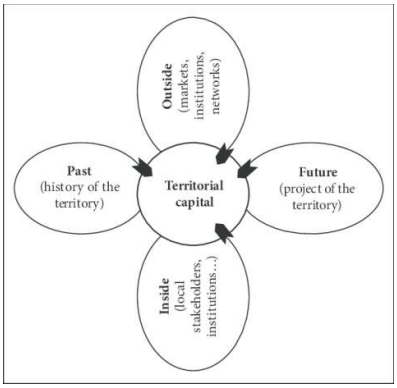


Figure 14: Traditional and innovative factors



relational process, related to the history of the territory and to his vision for the future and also related to the internal and external driving force acting on the society, the integration among territorial capital and agroecology transition strategy will increase the capability of the territory, understood as collective actor, to face the increasing competition (in the wine market and in tourism), and bring benefits to the whole population.

7. Final remarks and suggestions

As stated in the introduction this guidelines for agroecological transition are mainly referred to the wine-growing areas of Adrion cooperation region and to the strategic framework developed by the project partnership (see chapter 9. Annex) that link the best practices defined so far to agroecological principles and ecosystem benefits. Of course agroecology as general concept include political, socio-cultural, economic, environmental and technological changes in all the agricultural sectors and production involving institutions, farmers and consumers for building a new model of production and consumption based on the principles of agroecology, well-illustrated by the association Agroecology Europe in the following info graphic.

THE FIVE LEVELS OF TRANSITION TOWARDS SUSTAINABLE FOOD SYSTEMS AND THE RELATED 13 PRINCIPLES OF AGROECOLOGY
SOURCE: GLIESSMAN (2007) AND HLPE (2019)

For analyzing the transition dynamics of social, economic and environment systems a useful tool could be the x curve. (Silvestri, et al., 2022).

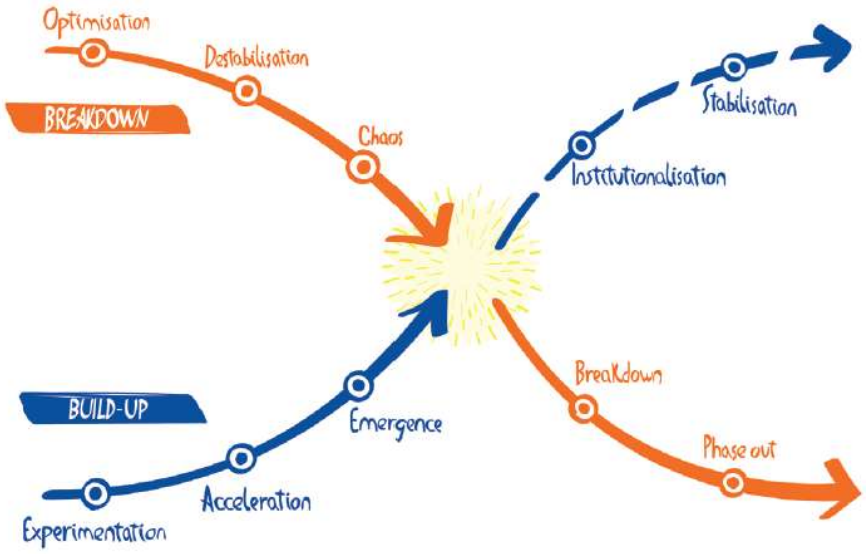


Figure 16: X-curve of transition dynamics.*Source: X-CURVE booklet.*

The patterns of the breakdown curve and of the build-up curve can be analyzed during the participatory meetings for identifying the intervention needs.

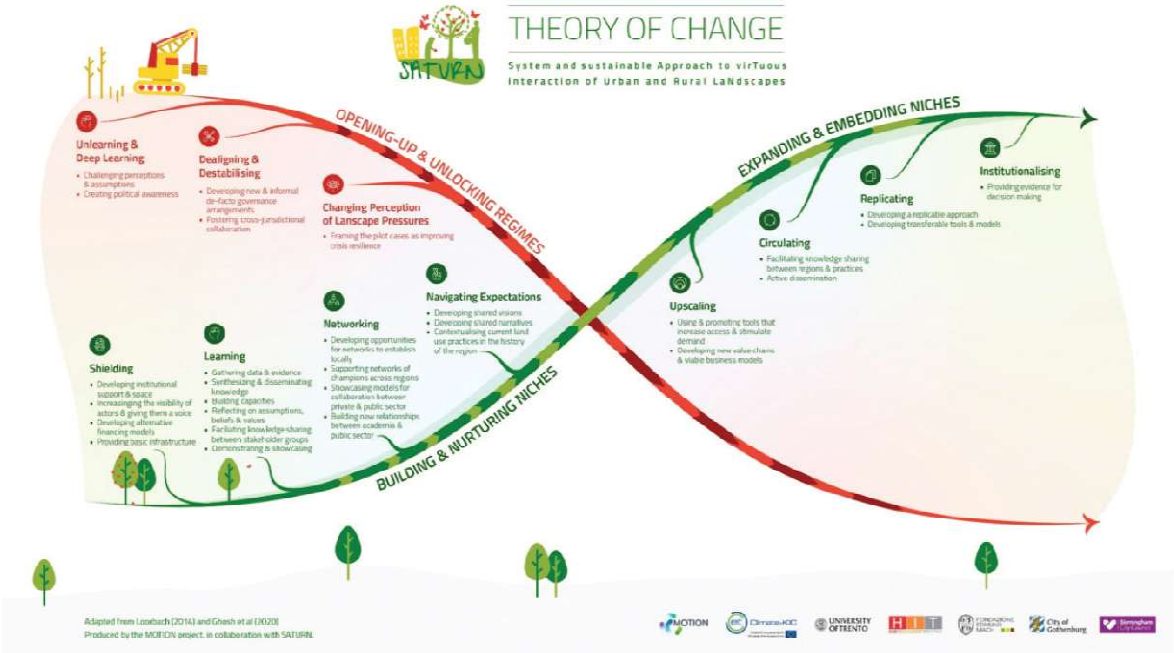


Figure 17: X-curve of interaction between urban and rural landscapes.

A number of factors might influence the process of transition (personal, farm-specific and external factors); these include profitability, policy support, regulatory and market issues as well as social factors. The three influencing spheres of willingness to adopt, ability to

adopt and farmer engagement with environmental device are represented in the following graph.

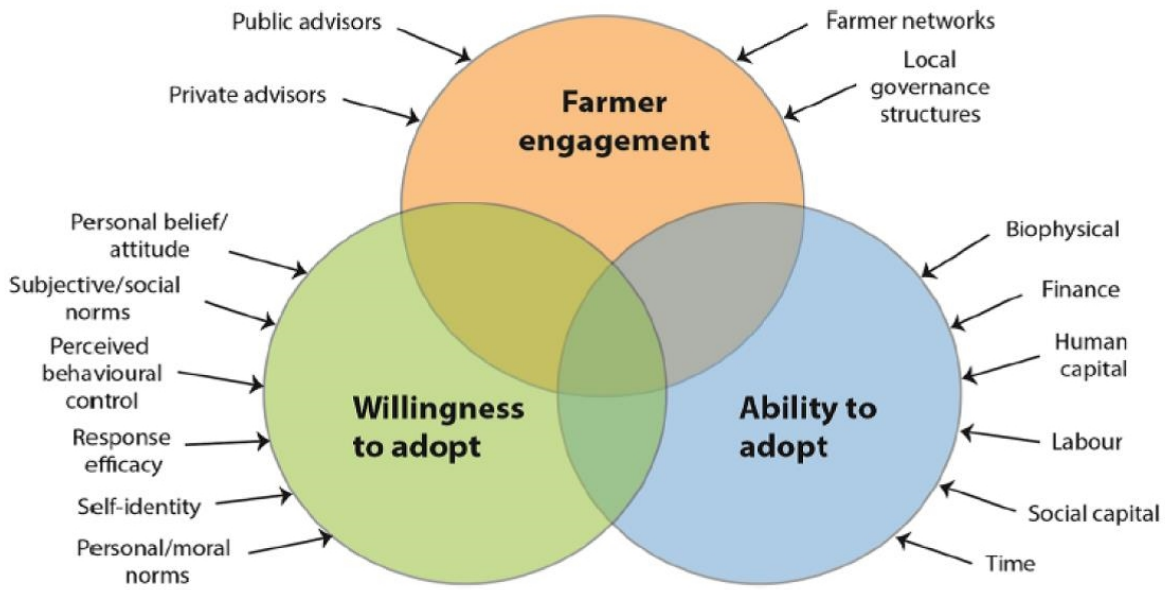


Figure 18: Factors influencing farmer environmental decision-making. *Source: Mills et al. (2016)*

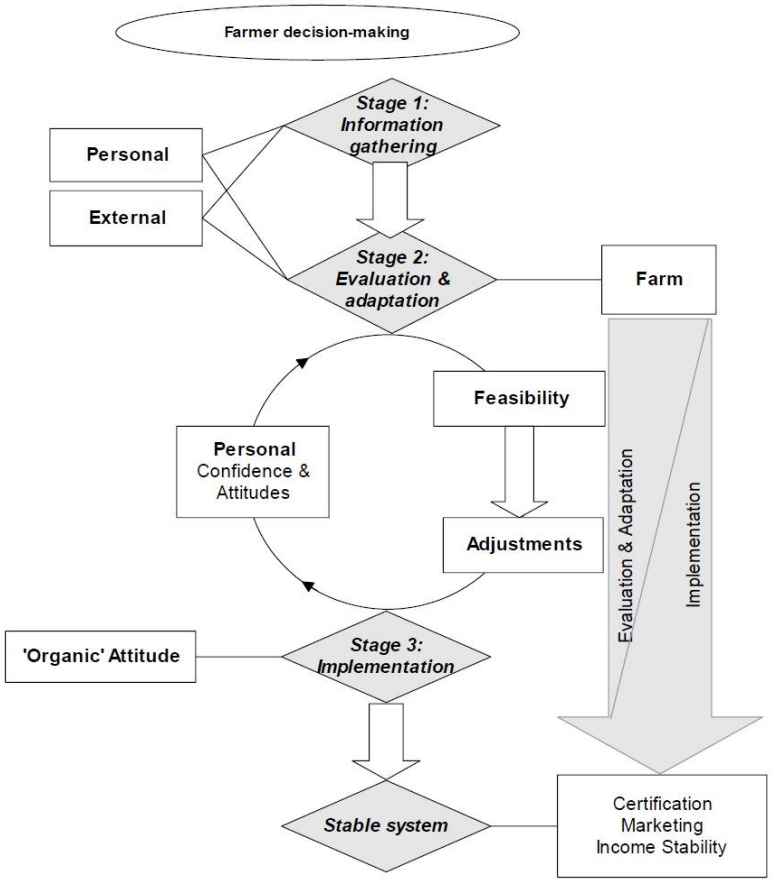


Figure 19: Stages of the organic conversion process. *Source: Padel (2002)*

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9. Annex

Strategic framework to maintain or increase the production of ecosystem services within an agro-ecosystem (see M. Duru 2015; FAO)

General key principles (3 properties, 4 governance principles)	Challenge	Agroecological practices in vineyard EVG open list. Note: a practice can respond to more than one challenge and benefit.	Ecosystem benefits
D - Diversity (taxonomic, functional) of biological (genes, species, ecosystems, spatial heterogeneity) and social (individual, social groups, networks, institutions) entities and their levels of redundancy, define the potential for ecosystem services provision, and for adaptation and innovations of the system.	Maintain core native habitats and corridors.	1. Agroforestry in vineyard (D, C)	Increase number of different habitat
	Protect endemic and rare species.	2. Bio-district (C, P, G, A)	Increase bird habitat
	Crop and farming system diversification	3. Biodiversity friend certification (D, L, A)	Increase insects habitat
	Use of local genetic resources		Presence of beneficial predatory insects.
	Increase crop-livestock interaction		
	Increase soil biodiversity	4. Bio stimulants in viticulture (S)	Limit to diffusion of plant/animal diseases
	Increase the biodiversity associated to farm cultivations.	5. Vineyard Canopy Management (S)	Increase landscape attractiveness
C - Connectivity between biophysical entities, as well as social entities, determines circulation of materials, energies and information and thus the system's performance. Biophysical dimension: spatial relationships between landscape elements (patches). Social dimension: multiple dimensions of social networks.	Improve landscape connectivity	6. Cover crops - Flowering c. c. (D, S)	Maintain traditional/cultural landscape
	Improve connectivity inside the farm.	7. Maintenance of traditional elements of "winescape" - Dry stone walls (C, D)	
	Improve connectivity between farms and natural and semi-natural areas.		Conservation, enhancement and restoration of key ecosystems, habitats, species and features of the landscape.
	Improve social connectivity	8. Green Manure in vineyard (S)	
		9. Hand picking the grapes (P, D)	

S - The state of Slow Variables[10](soil organic matter, water resources, management agencies, social values) determines dynamics of fast variables of the system (field management, water withdrawals, authorization to access resources). The manner of middle or long-term management of slow variables thus determines day-today, year-to-year and long-term system functioning.	Increase water use efficiency	10. High Nature Value Farming (HNV) (D, S)	Carbon sequestration
	Increase water availability		
	Reduce water footprint of grape production	11. Mechanical Inter-row weed control in vineyard. (D, S)	More water available for the ecosystem and for biological process, landscape benefit
	Avoid soil erosion		
	Maintain soil fertility and organic matter	12. Sustainable irrigation in vineyard (S)	Reduction of pollution and contamination
	Increase soil water holding capacity		
	Limit chemical inputs	13. Landscapital board game to identify the perception of the value of the viticulture based on the Landscapital (P, G, A)	
A - Understand the social-ecological system as **a complex and Adaptive system** characterized by emergent and nonlinear behavior, a high capacity for self-organization and adaptation based on past experiences.	Apply adaptive management practices.		A better management of natural resources
	Strengthening the adaptive capacities of governance systems	14. Mating disruption (D, S)	Environmental Risk reduction
	Understand interactions among farming systems, the landscape matrix, natural and cultural resource management.	15. Mulching (D, S) 16. Participatory Guarantee Systems (PGS) (P, G, A)	
L - Encourage Learning and experimentation as a process for acquiring new knowledge, behavior, skills, values or preferences at the individual or collective levels, which ultimately determines decisions and actions in situations of uncertainty and thus methods for managing the system.	Improve Agricultural Knowledge, Science and Technology (AKST)	17. Land Use Maintenance (P, G)	
	Social learning	18. Bird nests and shelter for bees and pollinating insects (D) 19. "Pyro-weeding" in vineyards (S) 20. Decision support systems (DSS)	

[10]Within a complex system, it is helpful to focus on separating "fast" and "slow" variables (see, e.g., Ludwig et al. 1978, Holling 1986, Carpenter and Turner 2000 for ecosystems; Crépin 2007 for social–ecological systems). "Fast" variables are typically those that are of primary concern to ecosystem users, for example a pest species or (often) ecosystem goods and services, such as crop production, clean water, and favored species. The dynamics of these fast variables are strongly shaped by other system variables that generally change much more slowly, and hence have been referred to as "slow", or "controlling" variables. recognizing that "fast" and "slow" are relative terms. The slow variables, such as amount of soil organic matter, shape how a fast variable, such as crop production, responds to variation in an external driver, such as variation in rainfall during the growing season.

P - Develop Participation: the participation of stakeholders in governance and management processes facilitates collective action, relevance, transparency, legitimacy, acceptability of social organizations, decisions and actions.	Improve social interactions between the farmers and other stakeholders	to reduce pesticides in viticulture (L, A) 21. Resistant grape varieties (S) 22. Social learning and knowledge generation in agriculture (L, A)	
G - Promote polycentric subsystems of Governance that structure debate and decision-making among different types of stakeholders, at different levels of organization, and in different forms (bureaucratic, collective, associative, informal).	Mutual understanding, sharing of viewpoints, collective development of new adaptive management strategies for resources, establishment of "communities of practice".	23. Soil Fertility Monitoring (S) 24. Wine routes as promotional tools for viticulture (G) 25. Wood Poles in vineyards (D) 26. Strategy for communication Agroecological Products (P, G) 27. Erosion prevention (S) 28. Composting or mulching of grape vine winter pruning residues (S) 29. The use of wood chips (BRF - bois rameal fragmentè) (S)	Conservation, enhancement and restoration of key ecosystems, habitats, species and features of the landscape through the creation of an effective governance structure.

Annex 2

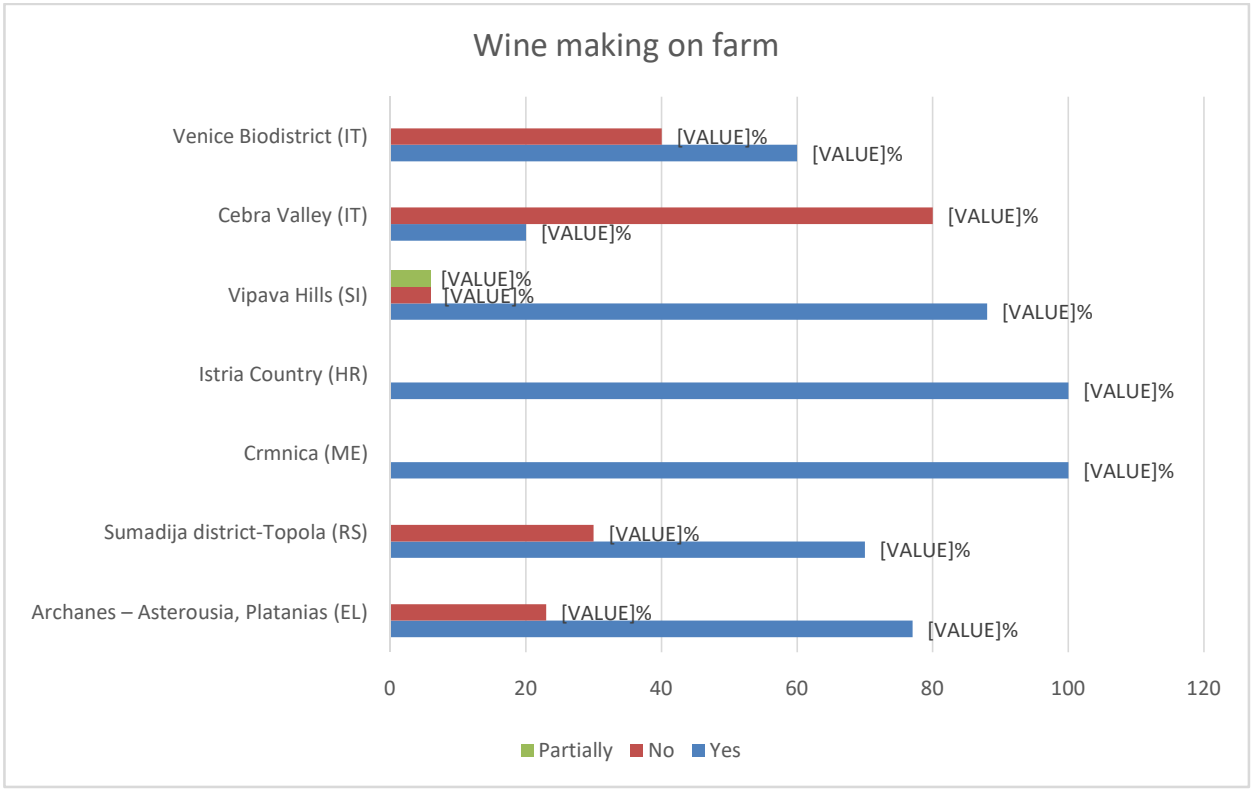

Figure 20: Percent of wine making on farm

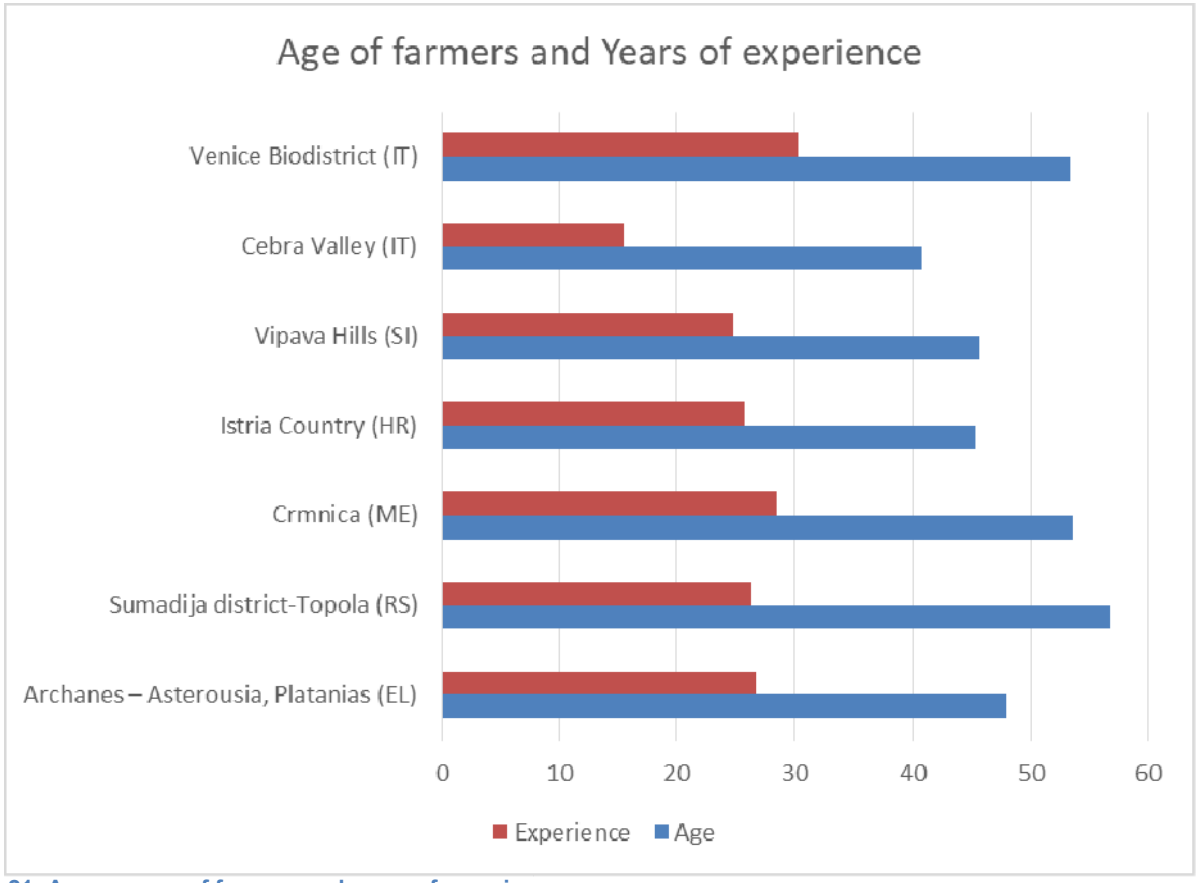

Figure 21: Average age of farmers and years of experience

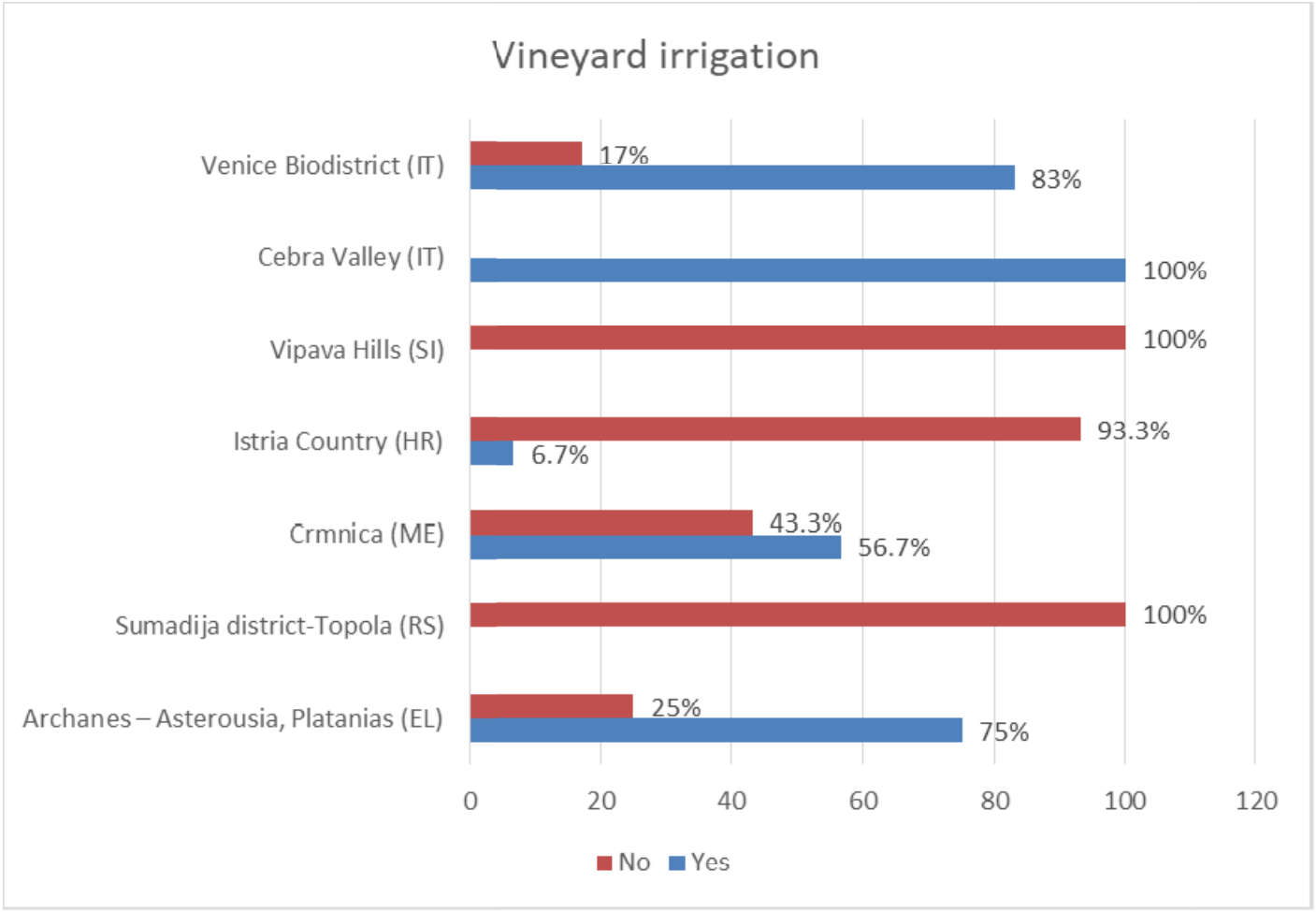

Figure 22: Percent of irrigated vineyards

ECOVINEGOALS QUESTIONNAIRE FOR FARMERS:

Date of the interview:	Name of the interviewer:	Organization:

SECTION 1: Farm general Information

Name of the interviewed: Position in the fare:	Farm name:	Type of farm management[1]: IDSDCD

Address:	City:	Zip code:	Region:	State:
VAT N.:	Phone:	E-mail:		
Farmer's experience (years):	Educational level of the farmer: ❑None ❑elementary school ❑middle school ❑professional school ❑high school ❑university ❑other	Age of the farmer: years old Gender: M❑ F❑ Current total number of people working on farm:_____persons, of whom: family worker s ;employees ; seasonal employed_____		
TOTAL FARM AREA (FA) [2]: ha_____	Utilised agricultural area (UAA) [3]: ha_____	[4] Natural area: ha__ Semi natural area and pasture: ha _____ Artificial area: ha_____		
The size of your farm is big enough for your needs?	Yes ❑ No ❑	Why?		
Geographical reference (DMS)	Latitude:	Longitude:	Altitude (AMSL):	

SECTION 2: Crop data

Crop (species) [5]	Variety (indicate if is an international, local or resistant/PIWI variety)	Hectares (ha)	Crop yield (t)

Animal husbandry [6]: Yes ❑ No ❑	Species:	Breeds:	N. of heads	Livestock Unit (LSU)

SECTION 3: Farming Management

Conventional ❑	Integrated (IPM) ❑	Organic ❑	Biodinamic ❑	Mixed ❑	Other:

How many Landscape Units (LU) do you recognise in your farm[7]?	List the Landscape Unit (LU), assign a code, a name, a short description and the category of the slope (1. 0-10% flat; 2. 11-30% moderated; 3. 31-50% steep; 4. > 50% very steep); exposure: N, NE, E, SE, S, SW, W, NW
LU CODE 1 2 3 4 5 6 7 8 9	LU: short description, categories of slope and exposure

Soil Fertility Management interviewer note [6]:	LU CODE	Difference for each Landscape units (LU)

What are your soil types? [9]	LU CODE	Difference for each Landscape units (LU)

What are your soil/nutrient deficiencies?	LU CODE	Difference for each Landscape units (LU)

Organic matter (level) LU 10	Very low 0-1%; low 1-1,8%, medium 1,8-2,5%; high 2,5- 3,5% very high >3,5%					
Do you have soil erosion problems? DYES ❑N0 [11]	.					
Weeds control [12]	Permanent crops					
	Arable crops					

	Others				
Pest and disease management for vineyards	Var.	n. of treatments per year	The major disease	The most used product (active substance)	
Pest and Disease (for each of the following vine parasites indicates the degree of damage in a typical year (1 none, 5 a lot of damage)	1	2	3	4	5
Plasmopara viticola					
Erysiphe necator					
Botrytis cinerea					
Guignardia bidwellii					
Lobesia botrana					
Empoasca vitis					
Planococcus ficus					
Halyomorpha halys					
Metcalfa pruinosa					
Thrips tabaci/Frankliniella sp					
Candidatus Phytoplasma vitis					
Xylella fastidiosa					
Does farm produce energy?	❑YES ❑NOT (if YES) indicate which kind produce: ❑Solar power energy ❑biogas/biomass❑wind power❑other_____ ❑directly engaged in the farm ❑entered into the regional/local network				
Irrigation management	YES ❑NO				

Source of water:	well	river	pond/lake	spring	municipal	irrigation district	other (specify)

Water quality problems (salinization-ECw-,							
Type of irrigation [13]	drip	flood	furrow	sprinkler	other (specify)	pumping or free fall system	

SECTION 4: land setting, hydraulic arrangements, terracing rural road network	
Describe for each LU the type of land setting, the hydrological arrangements, the presence of terracing and the state of the rural roads (accessibility)	
LU	LAND SETTING DESCRIPTION

SECTION 5: grape production, wine making and market	
Grape utilization	Fresh table grape ❑wine grapes ❑other .
Wine making	On own farm ❑; Made by other wine makers for my farm ❑; Made by other wine makers and sold by them ❑;
Products Sales Destination	Directly to consumers ❑; Retailers ❑; wholesalers ❑; Exporters ❑ Processors ❑
They are multi annual contracts with buyers?	Yes ❑ No ❑ Sometimes ❑
Do you participate at quality systems?	Yes ❑ No ❑ If yes, please list:_____
VALUE OF SALES	

VARIETIES:				
Wine bottle selling €/0,751				
Grape selling €/t				
Wine selling _____€/t and/or _____€/l				

Do you use labeling and farm communication strategies?	Yes ❑ No ❑ (if YES) which is the attractive element of the label? _____ _____ _____ Other communication strategies of your farm: _____ _____ _____

SECTION 6: BEST PRACTICES

Already adopted BEST PRACTICES	Describe
Interested to adopt BEST PRACTICES [14]	From the EVG BP list

SECTION 7: KNOWLEDGE ON AGROECOLOGY AND ORGANIC FARMING	
Do you know organic regulations?	Yes ❑ No ❑ Very few ❑ Enough ❑
Have you previously applied for organic certification?	Yes ❑ No❑
Do you intend to certify wine/grape as organic in future?	Yes ❑ No❑
Do you know agroecology?	Yes ❑ No ❑ Very few ❑ Enough ❑
Which is the meaning of agroecology: Explain	

SECTION 8: OTHER INFORMATION	
PROJECT AND EXPECTATIONS [15]	Please describe briefly:
PARTICIPATION IN COOPERATIVE, ASSOCIATION, PROGRAMMES	Yes ❑ No❑ If yes, please make a short description:
Do you participate at initiatives with other farmers to solve farming problems (production and marketing problems)?	Yes ❑ No❑ If yes, please make a short description:

Observations and comments of the interviewed: