

Ecological Vineyards Governance Activities for Landscape's Strategies

Deliverable T 1.2.1

Structural analysis of selected areas and vineyard mapping

Responsible Partner

Provincia Autonoma di Trento

AZRRI Ltd Pazin

date 31/12/2020

BASIC PROJECT INFORMATION:

PROGRAMME CALL: INTERREG V-B Adriatic-Ionian ADRION

Project Acronym ECOVINEGOALS

Project Number: 866

Programme Priority Axis: 2

Start – End Date: 01.03.2020 – 31.08.2022

Total budget: EUR 1 939 505.59

ERDF: 1 399 759.25 IPA: 248 820.5

Lead Partner Organisation: LAG Eastern Venice, Italy

Url: www.ecovinegoals.interregadrion.eu

DOCUMENT INFORMATION

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Contributors	WP6
Dissemination Level	PPs

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July, 2020

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1. TEMPLATE FOR COMPILING T1.2.1

For each selected pilot area, an analysis of the fundamental structural characteristics of the territory must be carried out from a geographical-environmental, political, economic and social point of view as well as a structural census of the active wine-growing companies and the identification of the production systems used as well as the description organizational and functional characteristics of the wine production chain present in the area. For each selected area, any existing environmental, economic and social problems must also be identified, as well as the presence of any conflicts affecting the wine sector, the population and the territory. For these analyses, existing data from the relevant institutions and relevant economic operators, interviews and contributions, indications and information provided by stakeholders are used. On the basis of the structural analysis of the pilot area, a minimum number of 30 (thirty) companies will have to be identified on which technical-productive and economic-managerial investigations will be carried out through the use of a prepared questionnaire. These farms will be offered good agroecological practices for the wine sector available in the technical-scientific context and proposed by the project partnership for the purpose of their implementation in the farms identified. The good practices have been identified within the project document T1.1.1.

What to write in details:

EXTENSION IN HECTARES OR KM²

A PICTURE THAT GEOGRAPHICALLY INDIVIDUATES THE PILOT AREA

GEOMORPHOLOGICAL EXPLANATION (EXPLAIN IF IT IS FLAT, HILLY OR MOUNTAIN)

PRESENCE OF NATURAL AREA, RIVERS, LAKES, ANTHROPIC AREAS

TYPE OF VARIETY GROWN AND TRAINING SYSTEM

TYPE OF WINE PRODUCED AND QUANTITY OF GRAPES PRODUCED, EXPLAIN IF IT IS A TRADITIONAL OR NEW AREA FOR WINE GROWING

30 FARMS INDIVIDUATION (you must report the nominative of the farms)

QUESTIONNAIRES ADMINISTERING WITH EXPLANATION OF WHAT HAS BEEN EMERGED

POLITICS CHARACTERISTICS of PILOT AREAS ABOUT THE THEMATICS OF THE PROJECT (Agroecology, landscape habitat and participation)

ECONOMIC AND SOCIAL POINT OF VIEW

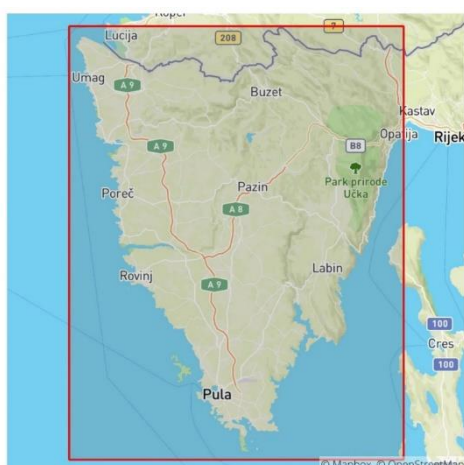
NB: It is recommend a photography gallery to apply at this document.

In addition, is necessary, when the questionnaires were administered by each partner of each pilot area, to fill in the "excel page" (that is attached in the mail together these guidelines). For each column include what has emerged from questionnaire. In the column CODE FARM, every project partner will give a number, following the increasing numeration. E.g: 1-2-3,.....until 30 or the last number of the questionnaire.

SELECTED PILOT AREA IN CROATIA



Image 1. Selected pilot area for T1 and T3 – Region of Istria-HR (Source: haop.hr)



Open Street Map in specified area of interest (red rectangle) in 2020.
Ramm & Topf (2011) <http://planet.openstreetmap.org>

Croatian pilot area for T1 & T3: ISTRIA

Area: 281,297 ha or 2,813 km²

Relative area size to country size (%): 4,98

Situated in the north-west of the Adriatic Sea, Istria is surrounded by the sea from three sides, while the northern border towards the continent is made up by a line between the Miljski Bay (Muggia) in the direct vicinity of Trieste and the Preluk Bay, right next to Rijeka.

Such favourable geographic position, almost at the heart of Europe, half way between the Equator and the North Pole, Istria has always represented a bridge connecting the Middle European continental area with the Mediterranean. (*istra-istria.hr*)

Image 2. Local Ecological Footprint Tool - Specified area of interest, Region of Istria-HR (Source: left.ox.ac.uk)

REGIONAL SPATIAL INDICATORS

	Basic thematic unit	Indicator group	Indicator		Data
1	GENERAL INDICATORS OF DEVELOPMENTS				
1.1	DEMOGRAPHIC STRUCTURE	A. Distribution and structure of the population	1	Population	208.055
			2	Population trend index	100,83
			3	Natural population growth	-713,00
		B. Distribution and structure of households	1	Number of households	78.732
			2	Household growth index	1,09
			3	Average household size	2,64
1.2	SOCIO-ECONOMIC STRUCTURE	Economic development	1	Development index	156,80%
			2	Development index group	4th (highest)
2	SETTLEMENT STRUCTURES AND DEVELOPMENT AREAS OUTSIDE SETTLEMENTS				
2.1	SETTLEMENT FEATURES	Distribution, settlement and population density	1	Number of settlements	655
			2	Settlement density	2.33/1000 km ²
			3	Population density	73.96/ km ²
2.2	LAND USE IN SETTLEMENTS	A. Settlement area	1	Settlement area	281.297,00 ha
		B. Building area (BA)	1	Area of BA settlements - total planned	20.478,40 ha
			2	Share of BA relative to total county area	7,28 %
			3	Share of built BA relative to total county area	3,94 %
			4	Share of unbuilt BA relative to total BA	45,84 %
			5	Share of unregulated BA relative to total BA	4,84 %
			6	Population / total BA	11,12 per ha
			7	Population / built BA	20,53 per ha
			8	Population / developed BA	43,28 per ha
2.3	SEPARATE BUILDING AREAS (OUTSIDE THE SETTLEMENT)	Separate building area (SBA)	1	Area of SBA outside the settlement - total planned	10.385,27 ha; 0,046 ha/inhab
			2	Area and share of SBA area of individual purpose relative to the total area of SBA:	
			2a	Hospitality and tourism purpose	3.524,07 ha; 33,93 %
			2b	Economic purpose - total (production, commerce, etc.)	2.645,25 ha; 25,47 %
			2c	Sports and recreation	3.819,26 ha; 36,78 %
			2d	Special purpose areas	No data
			2e	Cemetery area	86,63 ha; 0,83 %
			3	Total planned accommodation capacity	225.810 beds
			4	Number of tourist beds per km ² of coastline	396,15 beds / km ² costline

3	USE AND PROTECTION OF SIGNIFICANT AREAS				
3.1	NATURAL RESOURCE USE	A. Agriculture	1	Total agricultural land	93.579,00 ha
			2	Share of agricultural land	33,27 %
			3	Agricultural land per capita	0,450 ha/inhab
		B. Forestry	1	Total forest land	117.792,00 ha
			2	Share of forest land	41,87 %
			3	Forest land per capita	0,566 ha/inhab
		Agriculture and forestry	1	Total area of other agricultural soil, forests and forest land	34.738,00 ha
			2	Share of other agricultural soil, forests and forest land	12,35 %
			3	Area of other agricultural soil, forests and forest land per capita	0,167 ha/inhab
		C. Water	1	Surface water areas by type (lake, pond, artificial pools, sea, etc.)	reservoirs: 396.83 ha lakes: 39.55 ha
			2	The share of surface water areas relative to the area of the county	reservoirs: 0,141 % lakes: 0,014 %
			3	Length of watercourse	2.055,33 km
		D. Seashore	1	Length of coastline	570,01 km
		E. Mineral resources	1	Number and total area of exploitation fields of mineral resources	50
					1.688,30 ha
3.2	PROTECTED NATURAL VALUE	Protected natural areas	1	Number and surface of protected areas	35
					19.511,60 ha
			2	Ecological network area, by species	2 conservation areas for birds, 46,502.38 ha 65 conservation areas for varied species and habitat types, 128,072.80 ha
3.3.	CULTURAL GOODS	Structure of registered cultural assets	1	N° of protected immovable cultural property	278
			2	Number and share of restored cultural assets	79
					28 %
			3	Endangered cultural assets	No data

Table 1. Spatial Indicators, Region of Istria-HR (Source: Report of the Spatial Conditions in the Region of Istria 2013-2016, Institute for Spatial Planning of the Region of Istria, www.zpuiz.hr)

GEOGRAPHICAL AND ENVIRONMENTAL CHARACTERISTICS

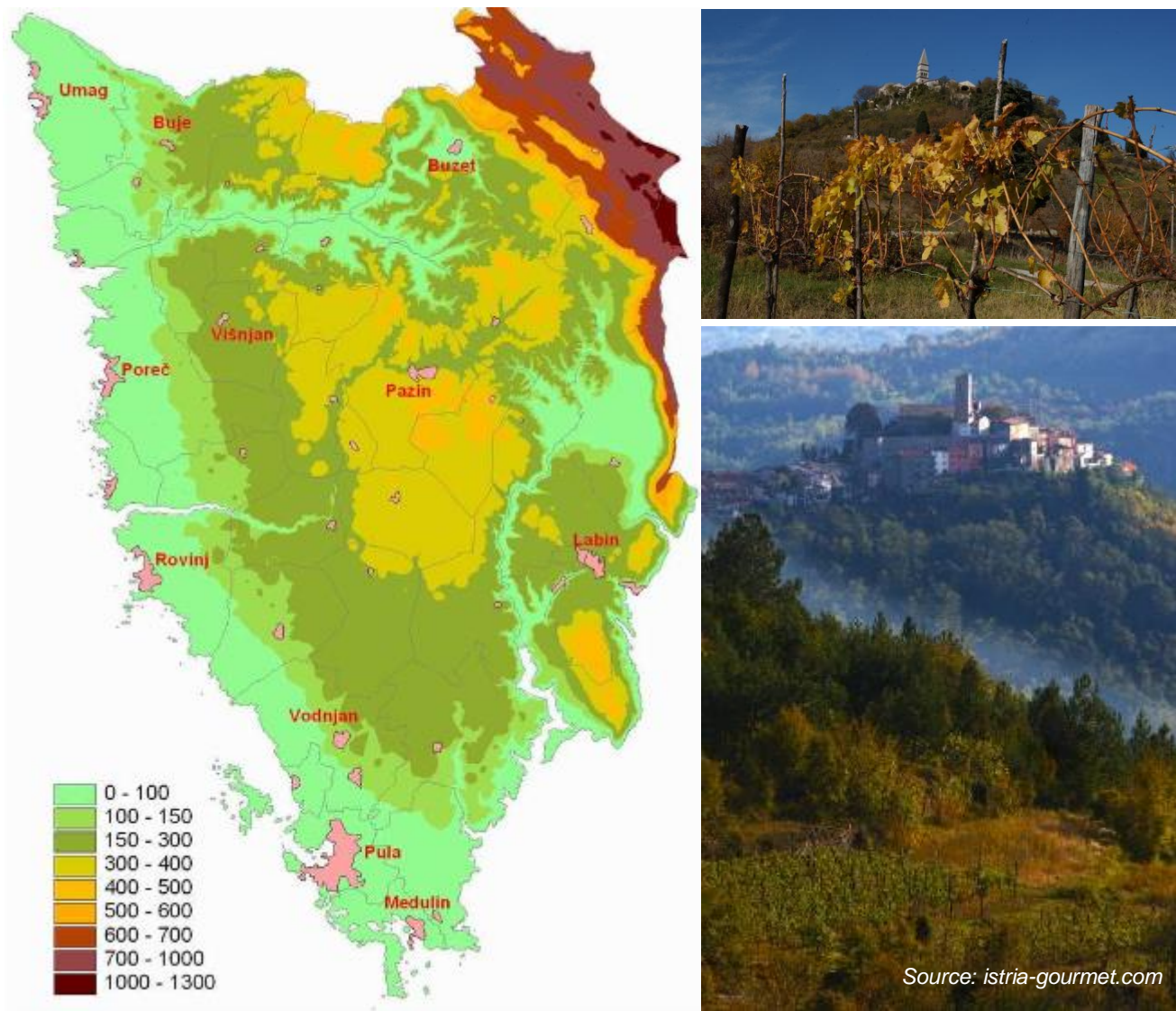


Image 3. Terrain elevation, Region of Istria-HR (Source: Istrian Environmental Protection Programme, istra-istria.hr)

The area of the Istrian County has an extremely diverse terrain (relief), with elevations in the range of 0 to 1300 m above sea level, and four basic relief units.

The lowest (and spatially largest) coastal area is the so-called Poreč-Pula plains of western and southern Istria, characterized by larger flat complexes and hills that become more pronounced as they move inland. It is followed by the central hilly part of Istria, characterized by a very developed relief that was created as a result of historic (Pleistocene and Holocene), but still ongoing processes of flat, furrowed and ditch erosion. The highest area includes the pre-mountain and mountain massifs of Čičarija and Učka in the extreme northeast of the Region.

Finally, a significant area is occupied by Istrian fields and valleys. Of the fields, these are, for example, Čepićko and Krapansko polje, created by the reclamation of Čepićko and Krapansko lakes, respectively, and among the valleys the most significant are those along the rivers Mirna, Raša, Boljunčica and Pazin stream.

According to the geological and geomorphic structure, the Istrian peninsula can be divided in three completely different areas. The hilly northern and north-eastern part of the peninsula, due to its scarce vegetation and nude Karst surfaces is also known as White Istria. South-west from White Istria stretches the area that is considerably richer morphologically. These are the lower flisch mountainous tracts consisting of impermeable marl, clay, and sandstone, which is why this part is called Grey Istria. Limestone terrace along the coastline, covered with red earth is called Red Istria.

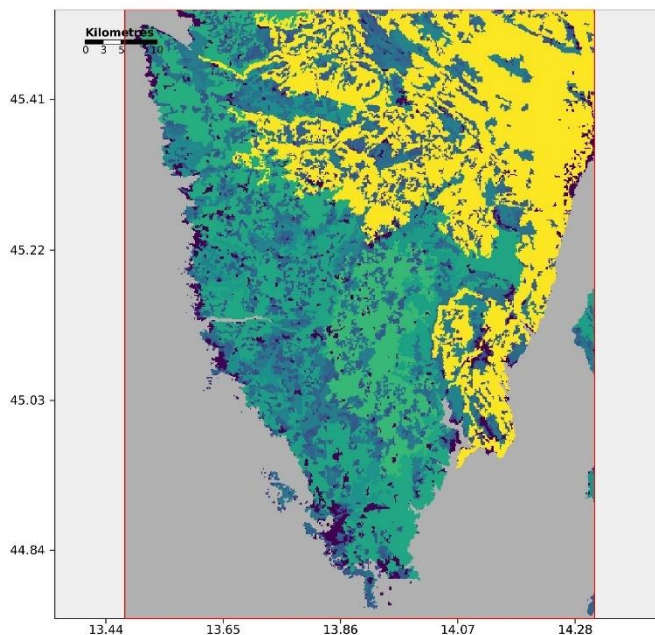
Grey Istria is sometimes also known as Green Istria, due to its extensive vegetation. In general, one third of the Istrian peninsula is covered with woods. Along the coast and on the islands prevail pine woods and macchia, decorated by trees of holm oak and strawberry-tree. A special feature of the Istrian vegetation is pedunculate oak next to the Mirna River, characteristically growing in the continental lowlands of Croatia.



Image 4. Relief units based on geological composition and soil type, Region of Istria-HR (Source: istra.lzmk.hr)

Intactness

To identify patches of intact habitat in the specified area of interest, the land cover map (see page four) was reclassified. Pixels in the urban/artificial, bare ground, and snow/ice categories were omitted from consideration. Every remaining pixel was assigned to a group of neighbouring pixels with the same land cover class, and the area of each group in hectares was calculated. In the resulting map those areas with a greater intact patch size are less fragmented, and carry a higher ecological value.

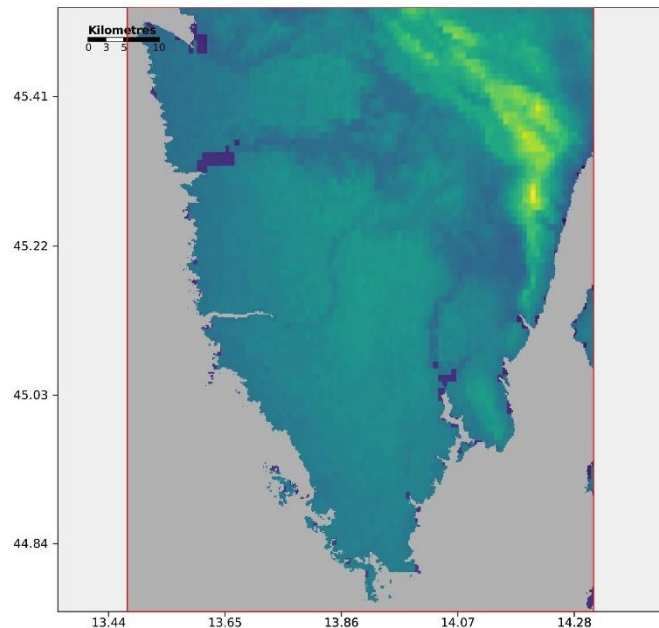


Intactness map. Values express the size of the land cover patch to which each pixel belongs. Urban, bare, and snow pixels were assigned an intactness value of 0. Resolution of the data is 1 arcsec, or about 30m.

Image 5. Local Ecological Footprint Tool - Intactness, Region of Istria-HR (Source: left.ox.ac.uk)

Spatial Pattern of Biodiversity

Georeferenced occurrence records for plants and terrestrial vertebrates were retrieved from GBIF (see page three). Species records were combined with environmental covariates to express the pattern of biodiversity (beta-diversity, i.e. spatial turnover in species) across the area of interest. To do this, a Generalised Dissimilarity Model (GDM; Ferrier et al 2002) was run. The environmental covariates used in the model were annual mean temperature, annual mean precipitation, temperature seasonality, precipitation seasonality (Hijmans et al 2005), soil nitrogen, soil water holding capacity (Land and Water Development Division, FAO 2003), and land cover class (GlobCover 2009). To ensure the maximum number of records for modelling, occurrence data were obtained for the area of interest and a surrounding 3-degree buffer.

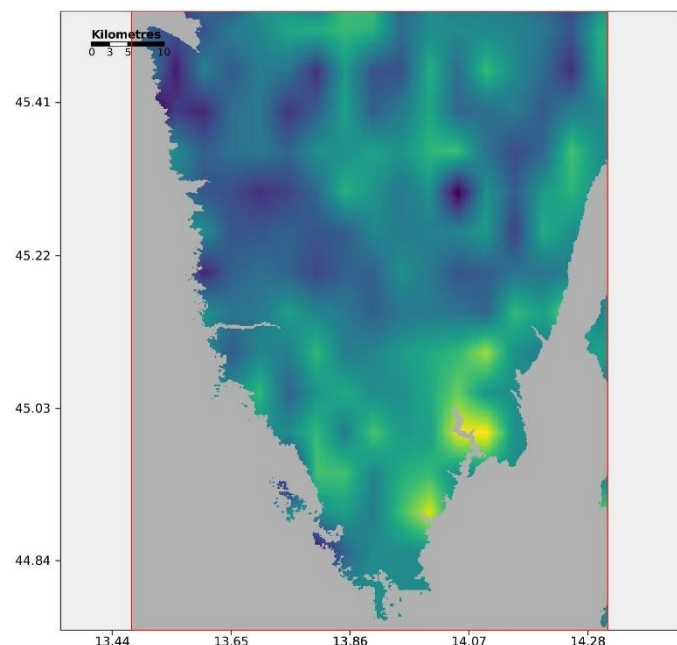


Map displaying beta-diversity in the specified area of interest. High values of beta-diversity (in yellow) represent greater spatial heterogeneity in the set of species present compared to other parts of the area of interest. Low beta-diversity values (in blue) indicate a relatively homogeneous set of species. Spatial resolution is 1 arcsec, or approximately 30 metres.

Resilience

The resilience of vegetation to climate perturbations was estimated using monthly time series of Enhanced Vegetation Index (EVI) and three climate variables over the period 2000-2013. A PCA regression was performed between EVI and air temperature, the ratio of actual to potential evapotranspiration, and cloud cover. This identified the months when EVI is related to climate drivers and measured the strength of that relationship over 14 years. For those months with a strong climate response, variability in vegetation productivity was divided by climate variability as a metric of vegetation sensitivity.

In the resultant resilience map, high values indicate areas where vegetation greenness showed relatively little change despite fluctuations in climate. Low resilience values reveal areas where photosynthetic activity changed even in the face of small fluctuations in climate. For full details of the methodology used to calculate the resilience metric please see Seddon et al (2016).



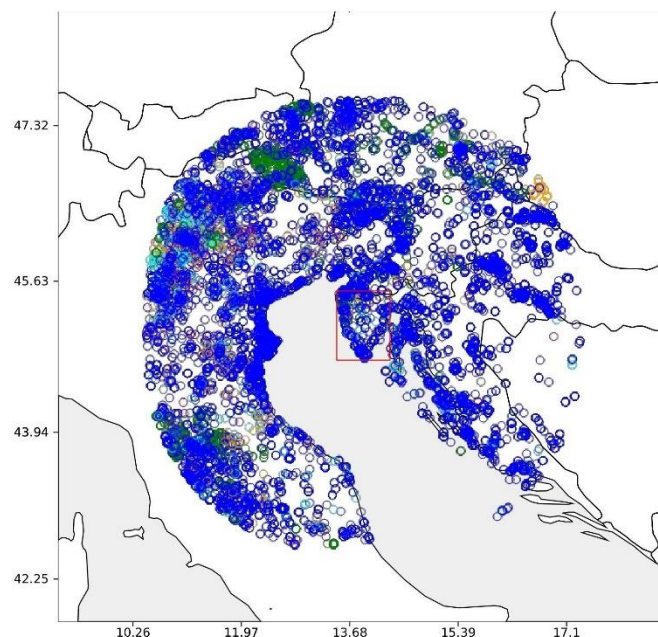
Map displaying vegetation persistence across the selected region over the past 14 years despite climate fluctuation. Yellow indicates regions where vegetation appears to demonstrate greater resilience to climatic perturbations occurring between 2000-2013.

Image 6. LEFT - Spatial Pattern of Biodiversity & Resilience, Region of Istria-HR (Source: left.ox.ac.uk)

Species Occurrence

Georeferenced species occurrence records were retrieved from the Global Biodiversity Information Facility (GBIF, www.gbif.org, see page three). The adjacent map indicates the distribution of the georeferenced GBIF species occurrence records of amphibians, reptiles, birds, mammals, and plants for the specified area of interest plus a 3-degree buffer zone. Any duplicate records (of the same species recorded more than once in the same location) were removed. Text files containing these records are available in a premium analysis.

Class	No. of Species	No. of Occurrences
○ Amphibians	29	3212
○ Birds	418	253997
○ Mammals	105	4016
○ Reptiles	51	4360
○ Plants	2958	45826



Biodiversity Records from the Global Biodiversity Information Facility (GBIF) in specified area of interest (red rectangle) and in a surrounding 3 degree buffer in 2019. Land is shown in grey.

Image 7. Local Ecological Footprint Tool - Species Occurrence, Region of Istria-HR (Source: left.ox.ac.uk)

Protected species

The International Union for Conservation of Nature (IUCN) curates the world's most comprehensive inventory of the global conservation status of biological species – the Red List of Threatened Species. According to the Croatian Red Book Inventories, the Region of Istria contains the following figures of endangered species:

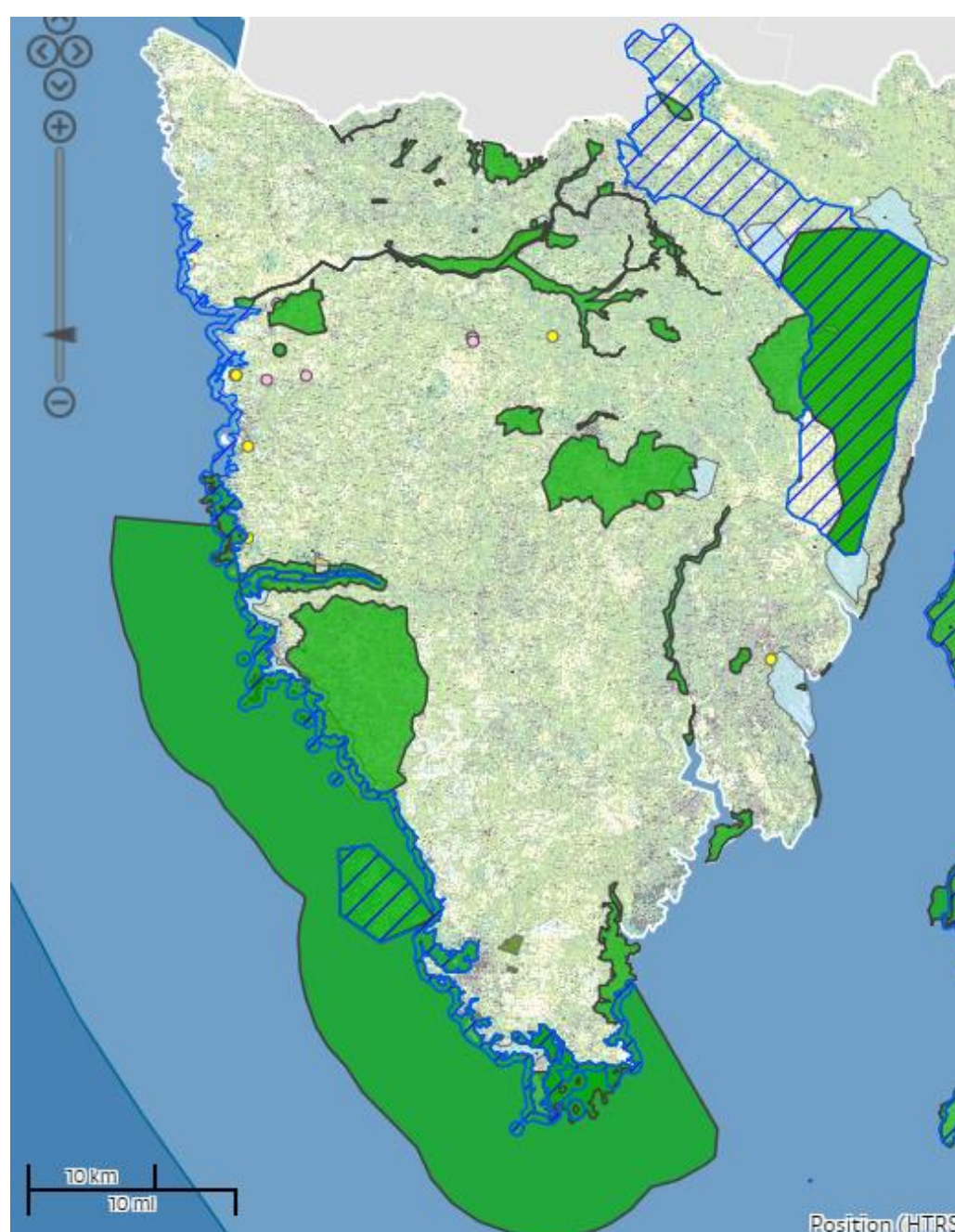
- Vascular Plants: 101 species;
- Mammals: 24 endangered species;
- Birds: 28 highly protected species;
- Amphibians: 3 endangered species;
- Reptiles: 4 species under protection;
- Freshwater fish: 11 threatened species;
- Sea fish: 42 taxa, of which 2 are critically endangered;
- Butterflies: 13 species under protection;
- Dragonflies: 13 endangered species;
- Decapods: 2 autochthon species.

NATURAL AREAS AND WATER RESOURCES

Natura 2000 and natural protected areas

County area	281.531,878 ha	
Number of protected areas	36	
Total protected area	20.202,54 ha	7,176 %
Mainland protected area	15.892,73 ha	5,645 %
Sea protected area	4.309,81 ha	1,531 %

Table 2. Natural protected areas, Region of Istria-HR (Source: bioportal.hr/gis)



Among the legally protected landscape in the Istrian Region are well-known natural reservations: national park Brijuni, nature park Učka, protected landscape Limski Bay, the Motovun forest, forest park Zlatni Rt and the ornithologic reservation Palud near Rovinj, forest park Šijana near Pula and protected landscape Kamenjak in the extreme south of Istria.

The Istrian soil abounds with natural monuments, among which the especially interesting Brijuni archipelago should be mentioned, as the habitat of about 680 plant species. It is also decorated by the most diverse vegetation and traditional olive groves. On the northeastern hills Učka and Čičarija, at 500 metres above sea level grows a beech-tree wood.

Image 8. Nature 2000 and other protected areas, Region of Istria-HR (Source: bioportal.hr/gis)

Water resources

The hydrological characteristics of the Istrian region are determined by the relief, climate, and complex geological conditions characterized by karst phenomena and processes. The standard division of Istria into White, Grey and Red can also be used in the analysis of the water regime.

The area of White Istria receives the most precipitation, but the it quickly sinks into the ground through a permeable geological base and does not manage to form more permanent surface watercourses.

The waterproof base of Grey Istria (built of waterproof flysch deposits and other clastic rocks) retains rainwater, so the main surface watercourses of the region are formed on it.

Finally, in the area of Red Istria, with a permeable limestone base covered with a thin layer of red soil, rainwater is again directly infiltrated into the soil, so no permanent surface watercourses are formed.

Surface streams are important water resources of Istria, belonging to the area of Coastal and Istrian basins.

The most significant surface watercourses in the Region are rivers Mirna, Raša, Boljunčica, Dragonja, and undercurrent Pazinčica.

The Mirna River is the longest and the richest Istrian river. Its length is 53 km, it springs near Buzet, and it empties into the Adriatic Sea near Novigrad.

In terms of water supply, the Butoniga reservoir has a consistently reliable function.



Image 9. River Mirna Basin (Source: coloursofistria.com)

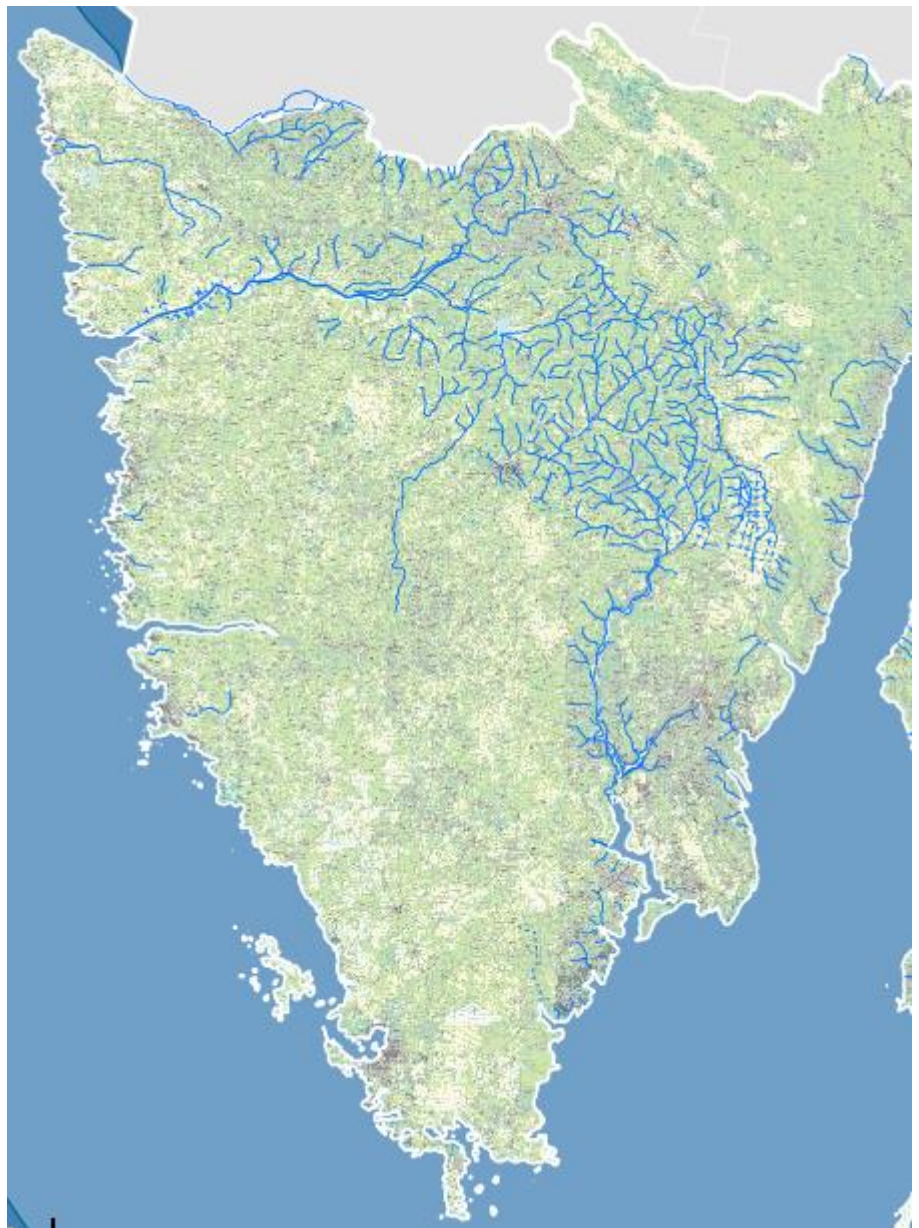


Image 10. Water resources, Region of Istria-HR (Source: envi.azo.hr)

Viticulture in the Region of Istria

Lovingly dubbed by visitors as the Green Mediterranean Hideaway, the Region of Istria encompasses the northernmost area of the Croatian coast. The landscapes of the heart-shaped peninsula adorned by mosaic vineyards have over centuries provided a reliant source of high-quality wine, the staple of local culture since the dawn of time.

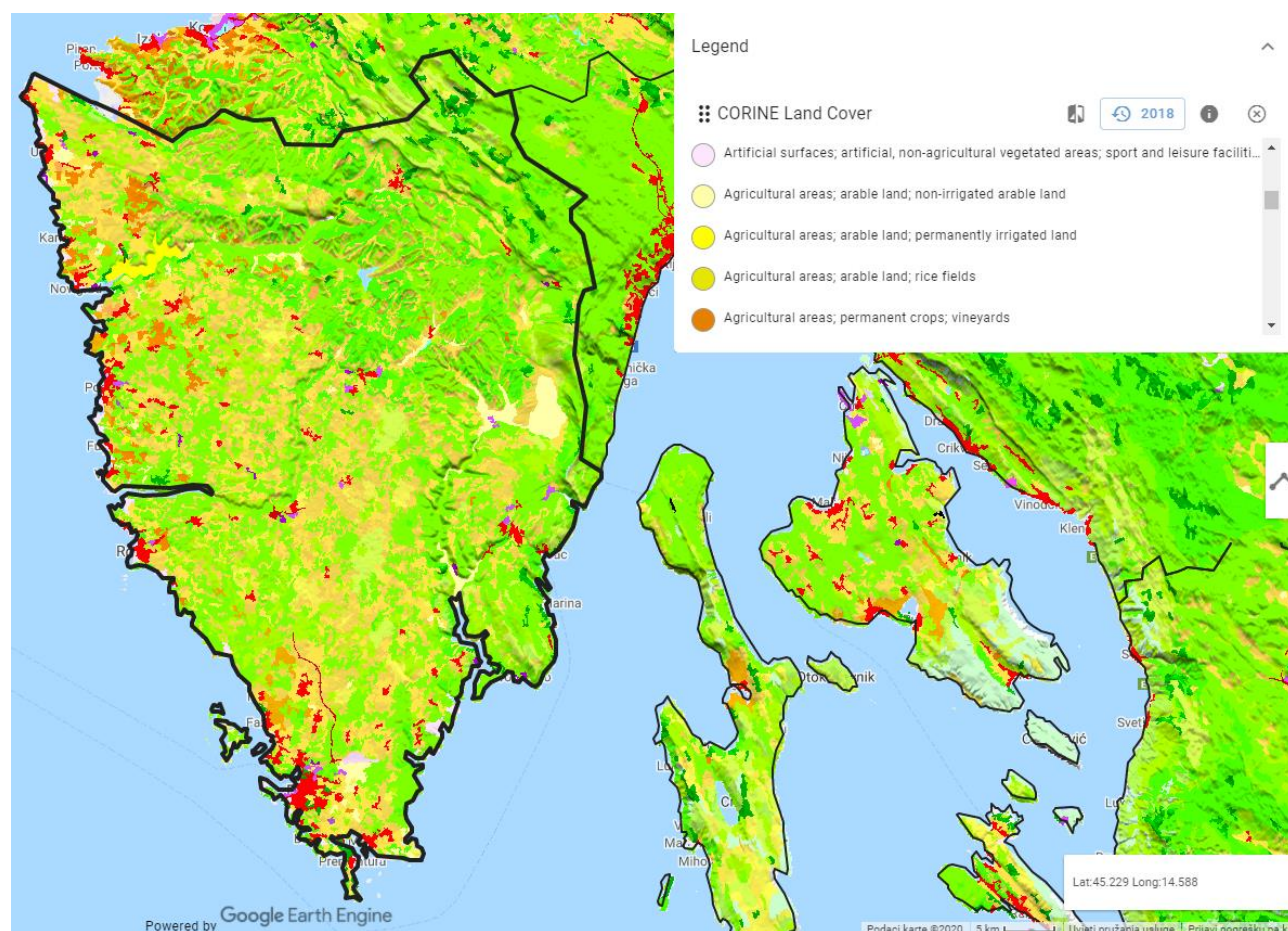
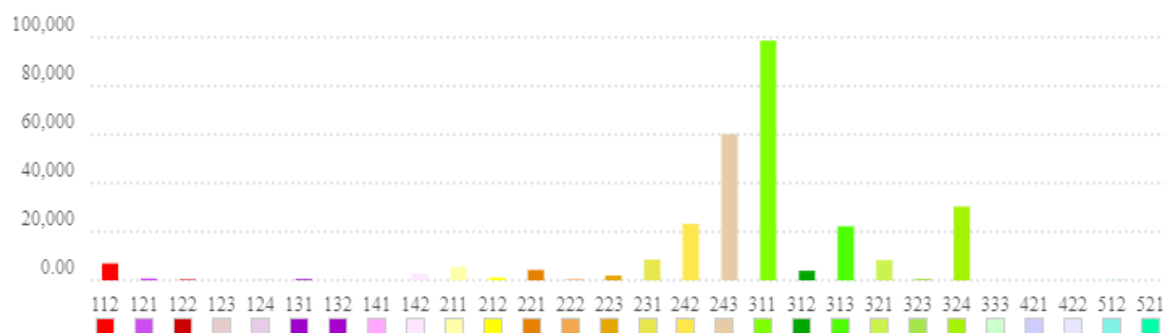


Image 11. CORINE Land Cover of pilot area, Region of Istria-HR 2018 (Source: earthmap.org)

The relief of the region is characterised by rolling hills and positions that come down to the seashore along the western coast, with all elevations being suitable for wine-growing. The hilly topography and extensive coastline mean that a myriad of microclimates and aspects are spread across Istria's over 4.000 hectares of vines, making it a very diverse wine-growing region and a treasure trove for avid wine connoisseurs.



Graph 1. Comparison of CLC areas on 3rd level of CLC classification, Region of Istria-HR 2018 (Source: haop.hr)

The 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. 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 region is at the meeting point of three climatic zones. The Mediterranean climate is dominant in western and southern Istria where the majority of vineyards are found, while the central parts of Istria are dominated by a continental climate. In the coastal areas the average annual temperature is about 13.5 °C, while in the interior of the region it is 11 °C. The number of hours of sunshine is also very high, as is across the coastal Croatia, and totals 2447 hours. The annual precipitation is 907 mm, of which 241 mm on average falls during the vegetation period.



Graph 2. CORINE Land Cover – Variations in vineyards cover, Region of Istria-HR, 1990-2018 (Source: earthmap.org)

Throughout history, with the clearing of forests or using the soil in the small areas among the rocks in the coastal zones, suitable areas were developed for the growing of various crops. Those methods have irreversibly changed the landscape, creating what we have today – a mosaic landscape of exceptionally rich and diverse flora and fauna. With the selection of the position for vineyards and centuries of work on the vines, dwellers have shaped the landscape through traditional viticulture, making the landscape more diverse, and with the construction of wooden and stone structures in the vineyards, they have shaped the natural and cultural heritage of Istria. The appearance of vineyards, like the selection of varieties in a certain area, is based on the natural specificities of the soils, climate (being at the crossroads of central Europe and the Mediterranean), and cultural heritage coalescing into a unique *terroir* or "sense of place".

The Croatian Istria has been divided administratively into three wine-growing hills: Western Istria, Central Istria and Eastern Istria. The recommended varieties for the region are: Alicante Henri Bouschet, Ancellotta, Barbera, Blaufränkisch, Cabernet Franc, Cabernet Sauvignon, Carmenère, Chardonnay, Croatina, Gamay Teinturier, Hrvatica, Malvazija Istarska, Manzoni Bianco, Merlot, Moscato Ottonel, Moscata Rosa del Trentino, Moscato Giallo, Muscat Blanc a petits grains, Nebbiolo, Petit Verdot, Pinot Blanc, Pinot Gris, Pinot Noir, Red Muscat, Refosco dal Peduncolo Rosso, Sauvignon, Sauvignonasse, Semillon, Syrah, Tempranillo, Teran, Trebbiano Toscano, Verduzzo Friulano, Viognier and Žlahtina.

Traditional cultivars

Throughout Istria, the primary cultivar of the grapevine is Malvazija Istarska, which accounts for the majority of plantations in this region. Istria is also well known for the production of red wines, particularly Teran. High quality dessert wines are obtained from the varieties Muškat Momjanski and Muškat Ruža.

Malvazija Istarska

Also known as Malvasia Istriana, this is the dominant grape variety in the region, making up almost 60% of total plantings in Istria, and 11% in the whole of Croatia. The cultivation of Malvasia in the northern Adriatic (today's Croatian, Slovenian and Italian part) has a centuries-old tradition, which is documented in historical documents, such as the description of Malvasia from Istria published by Libutti in 1913 in the magazine *L'Istria Agricola* under the name *Malvasia bianca*, whose description corresponds exactly to Malvasia in Istria.

The fruits grown in Grey and White Istria produce zesty, refreshing wines with notes of acacia flower, citrus fruit and a touch of bitter almonds. Some good examples are also made using long skin maceration and also the local speciality of acacia barrel ageing. Wines aged in acacia barrels have similar structure and aroma to oak-aged wines, but with less pronounced vanilla and toasty flavours, providing more room for the inner aromatics of Malvasia Istriana to emerge.



Source: *istria-gourmet.com*

Teran

The red grape Teran is a very old local variety, which is gaining prominence again by contemporary winemakers. The first written traces of Teran wine date back to the end of the 14th century from the Udine area in Italy, while the first description of the morphological characteristics of the Teran variety, grown in Barban in Istria, was published in 1824 by Canon Pietro Stancovich. During the 19th century, Teran was the dominant variety in Istria and before the infection with phylloxera it occupied about 80 percent of Istrian vineyards. During the 20th century, its share in the Istrian assortment gradually declined, but even today it remains the most represented indigenous red grape variety in Istria and is the second Istrian variety most planted in the area, after Malvasia.

For many winemakers it is a challenging variety as it's hard to ripen, but when successful it yields deep darkly-coloured wines with high levels of acidity and tannin, strong body and with a pronounced aroma reminiscent of cherry marasca. The quality of Teran wine has come to the fore in recent years, when producers have become aware of the characteristics of this variety and realized how to use the potential that Teran offers. Blends of Teran with Merlot and other international varieties embrace a modern approach, but keep their distinct Istrian character.



Source: *istria-gourmet.com*



Source: *istria-gourmet.com*

Muskat Momjanski

Muskat Momjanski (Moscato di Momiano) is an original variety that has been growing around Momjan township in the western part of Istria for centuries. It makes refreshing, medium-sweet wines with intense floral and stone fruit notes. The wine has been awarded the EU's Protected Designation of Origin (PDO) label in 2015 due to its unique character given by the specific microclimate and soils of the Momjan hills.



Source: istria-gourmet.com

Muskat Ruza

Muskat Ruza or Muškat ruža porečki (Moscato delle rose nero, Moscato rosa del Trentino) is a very old and well-known variety in Istria, and almost everyone who describes it emphasizes one of its virtues - extremely pleasant and pronounced scent, reminiscent of the scent of the wild rose flower. The wine comes in a lighter red colour, markedly aromatic, highly alcoholic, full and harmonious, belonging to the group of dessert wines.



Source: *istria-gourmet.com*

International Varieties

As a result of both proximity and history, the Italian influence in Istria is very strong. Therefore, it comes as no surprise that Italian varieties like Pinot Grigio, Pinot Bianco and Refosco are well represented. International varieties like Chardonnay, Sauvignon Blanc, Syrah, Cabernet Sauvignon and Merlot are also present and equally yielding very high-quality wines.



Source: *istria-gourmet.com*

History of Istrian winemaking

Records show that the first grapes were introduced to Istria by the Greeks as early as the 6th century BC making it one of the oldest winegrowing regions in Europe. However, a turbulent history has prevented it from becoming one of the classic regions. Named after the Histri, the first settlers on this heart-shaped peninsula of the North Adriatic, the Region of Istria was part of the territory of many nations throughout its chequered history.

Today, there are just circa 4,000 hectares under vine in Croatian Istria, compared to 44,000 ha at the end of the 19th century, before phylloxera struck.

The fall of Yugoslavia in the early '90s saw the decline of bulk producing state cooperatives, providing the opportunity for the Istrian wine scene to develop and become a high quality brand. Excellence aiming producers started to emerge, modernising wineries and lowering yields to produce more concentrated and complex wines, yet at once keeping alive the rich heritage of their forebearers.



Source: *istria-gourmet.com*



Source: *istria-gourmet.com*

Types of Istrian terroir

Nowadays Istrian producers are looking to build on the unique geography of the region often referred to as the largest green oasis of the North Adriatic.

The Istrian climate is Mediterranean, strongly influenced by the Alps that bring cold air in the evenings, prolonging the ripening season and retaining acidity levels. Sea breezes from the Adriatic during the day keep vineyards cool, dry and disease free.

Croatian Istria, as already mentioned, is often divided into Red Istria, Grey Istria and White Istria, due to different soil varieties which provide special characteristics to the wines produced in each area.

Red Istria, named for its iron rich soil called Crljenica (Terra Rossa), is found closer to the sea and is mainly reserved for growing red varieties. However white varieties are also grown on this soil and result in full-bodied and structured wines.

Grey Istria, found in the central part of the peninsula, has flysch soil (sedimentary rock with grey clay rich in limestone) more suitable for white varieties. Wines from these soils have good acidity levels, pronounced aromatics and medium body.

White Istria has a more rocky structured soil with even higher limestone content than Grey Istria. This soil is found mainly inland on higher ground. Wines from these soils tend to be higher in acidity, more aromatic and elegant.



Source: *istria-gourmet.com*

Istrian winemakers – Survey findings

The winemakers of the Region of Istria are numerous and almost all are part of VinIstra, the Association of Istrian Wine Producers and Growers (the list of producers is available at <http://www.vinistra.com/>). They also feature in the wine roads programme coordinated by the Istrian Tourism Board at regional level (all winemakers are showcased on the programme website at <http://www.istria-gourmet.com/>).

Regional partners, AZRRI and Association Informo, performed face to face meetings with 14 producers spread across the region, and administered them a questionnaire prepared by the Autonomous Province of Trento. The survey results have been analysed and a synthesis generated with key insights coming from the survey with Istrian winemakers is presented in the extract below.

Summary of findings

Section 1 - General information about the company

- Key insights
 - The surveyed winegrowers are positioned at significant wine localities spanning from the north to the south of the pilot area, and were chosen to provide a representative sample of the wine-growing farms in the Region of Istria. The size of their farms span from 5 to 31 hectares, constituting an area of 19 ha on average. Number of people working on the farms span from 2 to 45 (including seasonal workers).

Section 2 – Grapevine varieties

- Key insights
 - Malvazija Istarska, as expected, was the variety that most all surveyed viticulturalists reported growing in the largest share. Two other popular indigenous varieties of the Istrian region, Teran and Muskat, followed. Borgonja was only mentioned by a few respondents.
 - Other international grapevine varieties most often chosen in Istria were Merlot, Cabernet Sauvignon, Chardonnay and Pinot.

Section 3 - Management of the farm

- Key insights
 - Most viticultural farms in the Istrian region are managed conventionally – in the sense that they are not certified organic, integrated or biodynamic – but it must be emphasized that farmers are managing their lands traditionally with the highest respect for nature and the aim of protecting their soils and functions of ecosystems which directs them towards very ecologically oriented production modes.

Section 4 - Land structure, roads and terracing

- Key insights
 - On average producers report good public infrastructure, including the condition of roads, and other public goods. Partial terracing of vineyards is present in the Istrian region, with vineyards present at higher elevations in the north constituting a higher percentage of terraces.

Section 5 - Production of grapes, winemaking and market

- Key insights
 - Istrian viticulturalists use the entirety of their grape quantities for wine production and a minority of them acquires additional quantities from local subsistence winegrowers.
 - All viticulturalists sell their wines directly to consumers and most of them sell also to retailers, wholesalers and export outside of Croatia.
 - Most winemakers in Istria participate in the regional quality scheme “Istrian Quality – IQ”.

Section 6 - Best practices

Although the concept of agroecology was not very familiar to producers, the practices of agroecology certainly were, and in fact a significant number of Best Practices on the list compiled by project partners were already adopted by Istrian winemakers.

- Already adopted BEST PRACTICES
 - Most commonly applied practices:
 - Vineyard Canopy Management,
 - Cover Crop,
 - Green manure in vineyard,
 - Hand picking the grapes,
 - Mechanical Inter-row weed control in vineyard,
 - Wine routes as promotional tools for viticulture.

STAKEHOLDER COMMENTS:

- These practices were jointly considered as part of good vineyards management, covering a combination of traditional customs (hand picking) and modern ways (wine routes), also complementary in nature (cover cropping and green manure).

- Average application in vineyards:
 - Bio stimulants in viticulture,
 - Maintenance of traditional elements of Winescape - Dry stone walls,
 - High Nature Value Farming (HNV),
 - Mulching,
 - Land Use Maintenance,
 - Bird nests and shelter for bees and pollinating insects,
 - Resistant grape varieties,
 - Social learning and knowledge generation in agriculture,
 - Soil fertility monitoring (fertilization plan),
 - Wood poles.

STAKEHOLDER COMMENTS:

- The bulk of these practices are seen by producers as attractive for their resilience enhancing capabilities and for providing added value to the wider environment and biodiversity. The importance of dry stone walls was underlined as a significant and desirable traditional landscape feature that accompanies the grapevines of the region and provides beneficial functions for the ecosystem.

○ Rarely applied practices:

- Agroforestry,
- Mating disruption,
- “Pyro-weeding” in vineyards,
- Decision Support Systems to reduce the use of pesticides in viticulture.

STAKEHOLDER COMMENTS:

- Agroforestry has been mentioned as a practice not deliberately used in the Istrian context, but since a significant portion of vineyards have been planted adjacent to tree segments or at the edge of longstanding forests, it could be understood as a type of agroforestry system.

○ Least applied practices (seldom or not at all):

- Bio-district,
- Biodiversity friend,
- Sustainable irrigation in the vineyard,
- Landscapital Board game,
- Participatory Guarantee Systems (PGS).

STAKEHOLDER COMMENTS:

- Most of the cited practices that are least in use are top-down or exogenous to the operator, which explains the lack of their practical application in the wine sector.



Source: istria-gourmet.com

- Interested to adopt BEST PRACTICES
 - Practices that sparked the highest interest for adoption:
 - Bio-district,
 - Biodiversity friend,
 - Land Use Maintenance,
 - Decision Support Systems to reduce the use of pesticides in viticulture,
 - Sustainable irrigation in the vineyard.

STAKEHOLDER COMMENTS:

- In the Region of Istria irrigation is not a current concern or a present need in most vineyards, but producers expect it might become a necessity in the future. This is due to probable climatic changes that might arise as a result of the expected rise in global average temperatures. Organic and sustainable top-down and collaborative practices such as the Bio-district were portrayed as a possibly endorsable solution.

- Key insights
 - Given the results of the survey, it can be concluded that wine operators in the Region of Istria are already operating closely to the agroecological high standards, although there remains room for improvement in the social and institutional, as well as biodiversity front.
 - Cover cropping is a practice that is receiving increasing traction among wine producers in the region and further experimentations with different covers are planned in next years.
 - The interest expressed for the Biodiversity friend standard shows that a regional, national or EU-level designation for biodiversity friendly farms might find a fruitful ground for adoption among Istrian winemakers.

Section 7 - Knowledge of agroecology and organic or sustainable cultivation

- Key insights
 - The practices of agroecology in vineyards are well known to Istrian famers, but the holistic approach of the concept as simultaneously a science, practice and social movement is not comprehended and can be further fostered and encouraged. Through the participative governance workshops foreseen in the project, the winemakers will be engaged and assisted in the process of acquiring the holistic view of agroecology and apply it to their farms and landscapes.

The future of Istrian viticulture

Benefiting from centuries of experience, an ingrained wine culture, and a keen sense of being in balance with nature, the Region of Istria is well poised to claim a harmonious and quality future for its wine-producing region. Given the findings of the structural analysis of the region and the insights from the surveys, it can be stated that the winemakers in Istria are already very much aligned with the principles of agroecology.

The region is a pinnacle of the spirit and pillars of agroecology, even if the concept is quite new to locals. Istrian wine-makers have always had high respect for nature and heritage, proudly rooting the quality of their wines in terroir, the unique combination of people and place, where the soils and climate of the area are joined in harmony with the traditional knowledge of ancestors passed down through generations.

This insight will be used as a comparative advantage towards the agroecological transition of the region.



Source: *istria-gourmet.com*

Literature

1. Dennis Drazan Sunjic, Croatian Istria – New Old World, WSET Global 2016, accessible at <https://www.wsetglobal.com/knowledge-centre/blog/2020/february/18/croatian-istria-new-old-world>
2. Green Book, Indigenous Grapevine Varieties of Croatia, 2015, accessible at www.haop.hr
3. Istrian Environmental Protection Programme, accessible at www.istra-istria.hr
4. Report on the spatial situation in the Istrian Region 2013-2016., accessible at www.istra-istria.hr
5. Region of Istria – General data, accessible at www.istra-istria.hr
6. Wine roads, accessible at www.istra-gourmet.com