STRATEGIC ENVIRONMENTAL MANAGEMENT ANALYSIS OF HIGH NATURE VALUE FARMING IN THE DALMATIAN ISLANDS

Case studies from Mljet and Korčula Islands and Pelješac Peninsula in Croatia



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Cover picture : Korcula island, March 2017 – picture taken by M. Bourdin.

FOREWORD

The formation and research group in “Environmental management of forests and tropical ecosystems” (www.agroparistech.fr/geeft) hosts every year students from diverse backgrounds – from agronomy to political sciences, through economy and ecology – as part of the FNS-MI specialized Master (Forest, Nature and Society, Management Nature and Society Abroad option). The goal is to train them to take into account social and environmental stakes in the management of forest and agro-forest ecosystems in an international context.

At the end of the formation, a collective field study in a foreign country is realized, in partnership with professionals and scientists from the hosting countries. It enables the students to apply on a field study the broad range of technical, theoretical and methodological competencies that they developed throughout the year. The study is coordinated both by teachers of AgroParisTech-GEEFT and by their partners. It spans through a period of 5 weeks: one week of preliminary work in Montpellier, followed by 3 weeks of fieldwork and data collection, concluded by a presentation in the host countries, and eventually a last week of report redaction in Montpellier.

This year, the fieldwork took place in South Dalmatia, Croatia. It aimed at contributing to the HNV-link research-action program. This program aims at fostering high nature value farming in Europe and is coordinated by the *Centre International des Hautes Etudes Agronomiques Méditerranéennes* (CIHEAM), which is an Intergovernmental Organization involved in transnational projects. The fields of expertise of the organization cover the Mediterranean Basin and are related to agricultural policies, rural development, agro-pastoralism and food systems among others.

The HNV link program works with 13 partners in 10 countries in Europe. Each of them are connected to a “learning area” where HNV farming is studied and promoted. The main partner for Croatia is the Local Action group 5 (LAG 5), and the “learning area” defined is the South Dalmatian islands. The LAG 5 was founded in order to locally implement and enforce the European Union LEADER program in south Croatia with a network of partner. LAG 5 collaborates with the Faculty of Economics at Split University namely to promote rural innovation and biodiversity on the Dalmatian islands. The LAG 5 engages a bottom-up approach to - 3 -avour sustainable development, and promote youth and social entrepreneurship as a model of rural development, by supporting and financing various initiatives.

In this context, AgroParisTech students were asked to contribute to the establishment of a baseline assessment of HNV farming in three Dalmatian islands: Mljet, Korčula and Pelješac peninsula. The objective was to contribute to the environmental and socio-economic assessment of the area and carry out an analysis of High nature value farming (HNV) within the framework of HNV-Link Project (H2020). The French embassy in Croatia contributed towards financing the fieldwork logistic.

Fourteen AgroParisTech students, and 4 HEC Paris students (*Hautes Etudes Commerciales*) from the "Sustainability and Social Innovation" Major participated to the

study. The project benefited from the precious help of 5 Croatian students from the Faculty of Economics of Split, not only as translators but also to better understand the country's culture. The group of students was coordinated by teachers from AgroParisTech: Sandra Nicolle, Alexandre Gaudin and Maya Leroy; and supported by the HNV link project: Claire Bernard-Mongin and François Lerin (CIHEAM) and Marija Roglic (LAG 5). One restitution was organized in Ston, and a second one at AgroParisTech in Montpellier upon arrival.

The following report is a synthesis of the main results of the fiedwork. It was written by the 18 students who conducted this study and then reviewed by the coordinating team (AgroParisTech and CIHEAM-IAMM).

ACKNOWLEDGEMENT

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Many thanks also to Claire Bernard and François Lerin, from the CIHEAM-IAMM, who introduced us to the landscape analysis approach and supported us all the way.

We are also very thankful to the LAG-5 for their warm welcoming and their help in finding contacts on the field; especially to the LAG-5 President for all the time he dedicated to us. This work would not have been possible without Marija Roglić, Vjera Radović and Dragan Medan.

All acknowledgements too to the Faculty of Economics of the University of Split, for putting us in contact with the Baseline Assessment team, welcoming us for our kick-off presentation in Split, and providing us with a team of great Croatian translators – Ante Perić, Natalija Ćurčin, Tino Junaković, Denis Vujević, Dajana Štrbić. Many thanks to them as well.

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ACRONYMS

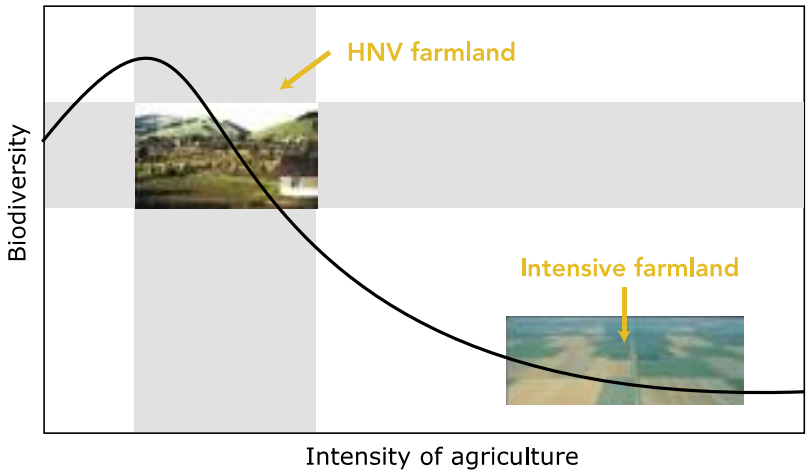
CAP	Common agricultural policy
CIHEAM	Centre International des Hautes Etudes Agronomiques Méditerranéennes
EEA	European Environment Agency
EFNCP	European Forum on Nature Conservation and Pastoralism
EU	European Union
HNV	High Nature Value
HNVf	High Nature Value Farming
LA	Learning Area
LAG 5	Local Action Group
LEADER	Liaison Entre Actions de Développement de l'Économie Rurale / Links between the rural economy and development actions
LPIS	Land Parcel Identification System
MAFWM	The Ministry of Agriculture, Forestry and Water Management
NP	National Park
PDO	Protected Designation of Origin
RDP	Rural Development Programme
SEMA	Strategic Environmental Management Analysis
UNEP	United Nations Environment Programme

1. General introduction

1.1 HNV farming concept

In Europe, over the centuries, agriculture has significantly contributed to shaping rural landscapes. Specific agricultural systems and practices have foster a particular biodiversity (Opperman et al. 2012). Baldock and *al.* (1993) described some characteristics of these low-input farming systems in terms of biodiversity and management practices. They introduced the term of high nature value farmland to characterise farming systems with low stocking densities, low use of chemical inputs and often labour intensive management practices. Recognizing that low-intensity farming systems sustain typical habitats and biodiversity, "High Nature Value" (HNV) farming refers to the forms of agriculture that are intimately associated with rich biodiversity through complex interactions between species and agricultural practices.

However, the industrialization of agriculture during the past decades has led to the development of monoculture and the increasing use of farm chemicals (fertilizer, herbicides, and pesticides), affecting the biodiversity in agricultural areas (Figure 1) (EEA/UNEP, 2004).



Source: after Hoogeveen *et al.*, 2001 (see Appendix B for further explanation).
Photos: Peter Veen (left); Vincent Wigbels (right).

Figure 1 : Conceptual graph - Source : EEA/UNEP, 2004

Furthermore, those industrial agricultural systems, more productive and less labor intensive, competed with more traditional ones. Becoming less economically viable, the latter gradually disappeared, leading to the abandonment of agricultural land.

This phenomenon was recognised at EU scale. From the 2000's, the concept of HNV became an operational tool to guide and design policies at different scales, to tackle environmental and biodiversity issues by supporting HNV farming. In 2004, European Environment Agency (EEA) and the United Nations Environment Programme (UNEP) published a Joint Message (EEA/UNEP, 2004), presenting a preliminary map of HNV farmland and analysing the targeting of agricultural policy instruments. They use the following definition of HNV farmland (defined by Andersen et *al.* (2004)): "*those areas where agriculture is a major land use and where that agriculture support, or is associated with, either a high species and habitat diversity or the presence of species of European conservation concern, or both*" (Andersen et *al.*, 2004). From 2004, the qualification and quantification of HNV agriculture is seen as very important to monitor both their evolution and the effects of European policies. Figure 3 shows the estimated distribution of HNV farming areas in Europe.

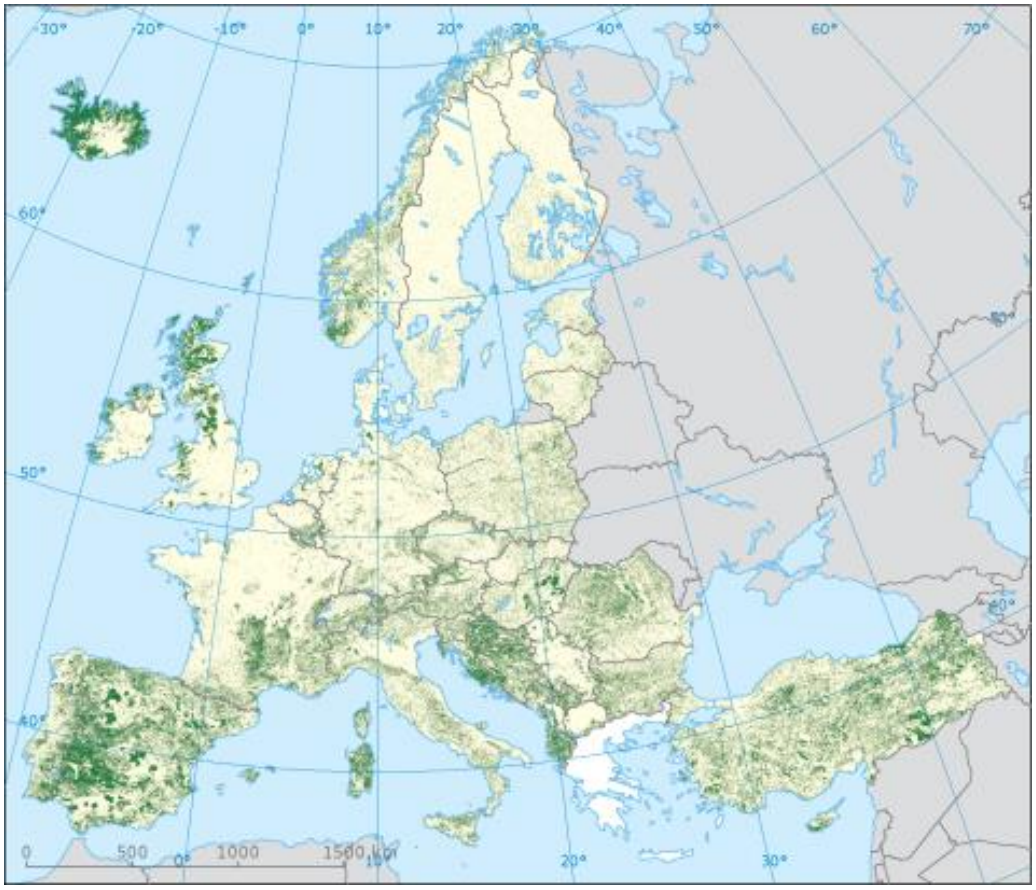
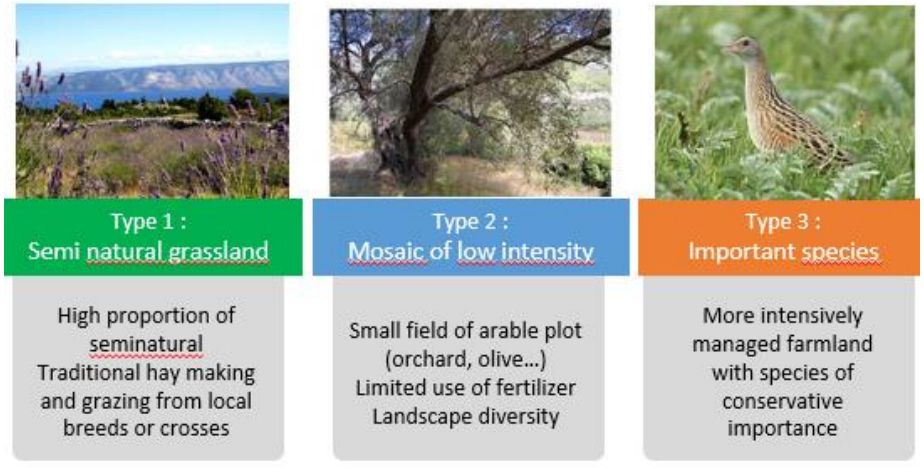


Figure 2 : Map of estimated HNV arming areas in Europe. Source: EEA 2012[1]

Figure 3 shows the three various types of HNV farming.



[1] https://www.eea.europa.eu/data-and-maps/indicators/agriculture-area-under-management-practices/agriculture-area-under-management-practices-2

Figure 3: 3 types of HNV farming

HNV farming concept was also integrated in the European agricultural policies. Keenlyside et *al.* (2014) made a review of the situation for all European countries (apart from Croatia that was not studied in detail as it entered the EU during the course of the study). They show that the degree of integration of HNV farming in the Common Agricultural Policy (CAP) and other European policies strongly varies from one country to another. Indeed, all countries have to make an inventory of their HNV farming potential areas, based on land use typologies as well as on existing biodiversity inventories. However each country can, or not, include measures favourable to HNV farming in their national declinations of European policies. 13 "learning areas" in Europe are forming now an international HNV-Link network supported under the European Union's Horizon 2020 Programme.

We have seen that the concept of HNV farming enabled at the EU scale to delineate and highlight a specific environmental problem: with the industrialization of agriculture, the loss of agricultural practices which used to shape and maintain a specific biodiversity. This concept became also a tool that European state members can now make use of to foster these agricultural system usually more labor intensive et less competitive on local and global markets. We will now describe how this concept was implemented in Croatia, and more specifically in Croatian islands.

1.2 HNV farming in Croatia

Croatia accessed the EU in 2013. It is among the biologically richest countries in Europe – it ranks third for the number of plant species per area. The high biodiversity in Croatia is enhanced by its location in quite different climatic, geo-morphological and hydrological zones: the Danube floodplain, the Karst limestone zone, the Dinaric Alps and the Mediterranean Coast with its unique islands. The great part of the existing biodiversity is linked to agricultural practices in these landscapes significantly shaped by human activity.

The map produced by the State institute for nature protection, based on CORINE land cover selections refined with species distribution data and biodiversity areas, shows that most of the territory is concerned by potential HNV farming areas (Keenleyside et *al.* 2014).

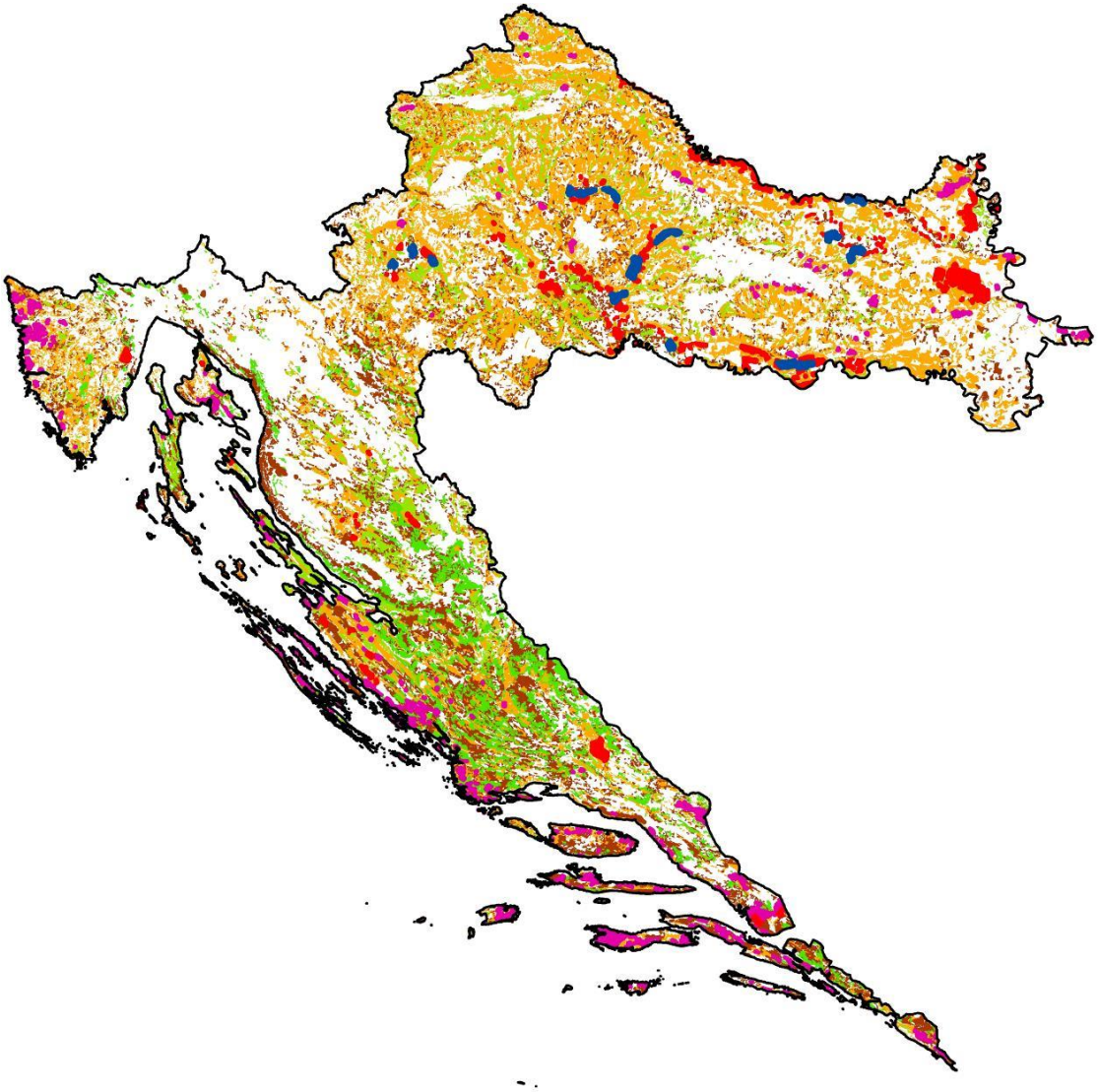


Figure 4: Map of indicative HNVf in Croatia (blue – carp fishponds, red – arable areas, green – grasslands, brown – transitional areas (succession), orange – mosaics, pink – vineyards, orchards and olive groves)

The main threat identified for HNV farming in Croatia is the abandonment of agricultural land (Kazakova & Stefanova, 2011; Keenleyside et *al.* 2014).

However, public policies are mainly favourable to industrialised agriculture. In 2009, 1% of the farmers received 40% of the subsidies with an average payment of 320 euro/ha. HNV farming received no targeted public policy support and faced a continuous decline in the number of farmers and a loss of traditional land management practices (Kazakova & Stefanova, 2011). The same report listed some favourable measures towards potential HNV farming in the new agriculture law published in 2011 (State Support for Agriculture and Rural Development, in compliance with the EU requirements):

- a flat basic payment for arable land at 274 Euro/ha and for pastures and meadows at 94 euro/ha.
- the definition of Less Favourable Areas (LFAs) - mountainous areas and islands - where support would be provided on an area basis.
- the possible lease of state-owned land for common grazing for a period of 20 years.

Since then, no systematic analysis of HNV farming in Croatia has been produced.

We are looking now more precisely to the Dalmatian coast (Southern Mediterranean islands), where some local actors are interested to recourse to the concept of HNV farming. We can as of now highlight the originality of this report. Most studies led on HNV in Europe concern mountain pasture and more rarely Mediterranean forms of agriculture.

1.3 South Dalmatia and HNV farming

As we can see in the map below, South Dalmatia (black rectangle) is a territory with a high potential for HNV farming.

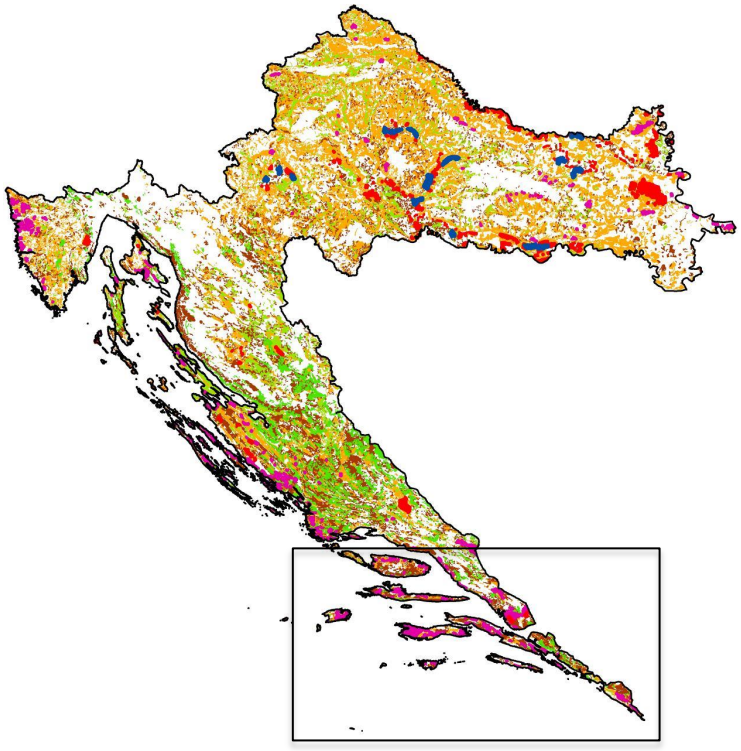


Figure 5: Provisional map of HNV Farming types on the Islands (source: DZZP / AZO)

Resuming the categorization of HNV farming types in Europe (see figure 3), it highlights the predominance of HNV type 2 on the Island, which consist of a mosaic of low intensity farming namely composed of small fields of arable plots, vegetable gardens, orchards and vineyards (pink colour on the map), usually on stone wall, which is a typical landscape pattern in the area.

However, agriculture practices seem to be declining in the region, and the main economic sector is nowadays tourism.

In this context, the Local Action Group 5 (LAG), an organism built to help local actors to access European funds for rural development, identified the HNV concept as a potential lever to promote an alternative rural development, not only focused on tourism, but also on traditional (or innovative) agricultural practices.

With two other LAGs, the LAG 5 decided to get involve in the HNV link program (see foreword) to analyse and promote the HNV farming practices on their territories, and to exchange with other HNV farming experiences in Europe. In the HNV link program, they built the Learning Area (LA) of Dalmatian Islands, which encompasses territories of LAG Škoji, LAG Brač and LAG 5. On

this latter area, the agricultural landscape is dominated by permanent crops (olives groves, vineyard, orchard, almond tree…).

In this context, the LAGs asked the Economic Faculty of Split to help them and build a first report called "baseline assessment", to identify on a bibliography basis what could be the challenges for potential HNV agriculture on these islands (Ivana Botica, Josip Grgić, Vinko Muštra, Slađana Pavlinović, Blanka Šimundić, 2016).

On the basis of this study, we were asked to complete it with a more precise fieldwork analysis of farming practices and environmental stakes in two of the islands– Korčula and Mljet - and in the second largest peninsula in south Dalmatia –Pelješac (see figure 6).

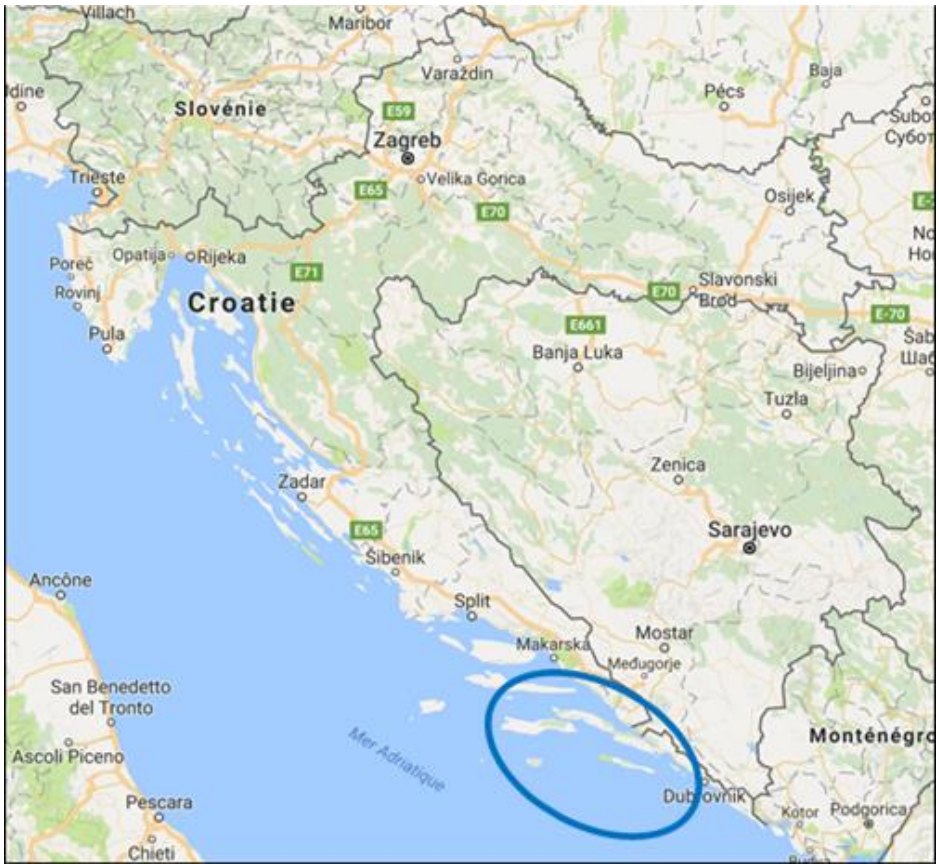


Figure 6: Our focus is on two southern islands, Korčula, Mljet, and the second largest peninsula in south Dalmatia, Pelješac (source: Google Map)

1.4 Research questions

Within this framework we were asked to investigate the following question.

“What can be the contribution of farming systems with high nature value, to conserve / improve the natural and cultural heritage of the Dalmatian Islands?”.

This interest led us to focus specifically on agricultural areas and practices, and in particular on the relationship between biodiversity and agricultural production systems from a multi-scalar perspective. We decided to analyse landscapes and spatial structures, but also practices and agricultural systems, in order to understand territorial dynamics and to identify key issues for both biodiversity conservation and agricultural practices.

However, as tourism is the main economic sector, with a dynamic growth, we decided to study this sector as well, in interaction with agriculture. Moreover, as we were asked to look at the natural and cultural heritage of the islands, we slightly broadened the focus to look more generally what could have impacts on these aspects[2]. The research developed the following steps:

- First, we decided to understand landscape dynamics on this area, to highlight historic and current territorial evolutions and associated environmental stakes.
- Then, we decided to investigate what concrete agricultural practices existed in the area, and to understand whether they could or not be classified as HNV farming ;
- Furthermore, as the conservation of habitats requires the support of complex social systems that have established a dynamic balance between farming and natural processes, we decided to analyse the socio-economic dynamics and actors strategies in the area (mainly regarding agriculture and tourism).
- Finally, and based upon this analysis, we tried to define which activities and initiatives could be supported in order to promote HNV farming on the islands ; wondering which levers of action could be triggered for that.

This report gathers the summary of our observations and interpretations following five weeks of work exclusively on this matter, three of which on the field, doing interviews and landscape analysis. After describing the main regional characteristics of the area, we focused for each island on the two major economic activities impacting terrestrial biodiversity: agriculture and tourism, each time presenting their local specificities. We then move on to a transversal analysis of the economic sectors in agriculture encountered and try to sketch perspectives that could be further explored for the promotion of HNVf in the area.

[2] Due to the environmental specificity of the student’s formation, environmental matters were studied much further than cultural ones.

2. Analysis framework & methodology

To respond to the our research questions, we used two different frameworks.

2.1 Two complementary frameworks for understanding territorial and environmental dynamics

For our study, we will use two different frameworks: the Strategic Environmental Management Analysis (SEMA) and the landscape approach.

2.1.1 Strategic environmental management analysis - SEMA

The framework analysis we chose to use for this study is called Strategic environmental management analysis – SEMA (Mermet, Billé, Leroy, 2010). This analytical framework focuses on the *environment* and puts it as a priority. SEMA is like a pair of glasses that we use to analyze an environmental concern in such a way as to answer as precisely as possible to some environmental claims raised by people who wonder how they can act on the system. It highlights the role and strategic options of the actors who work specifically for the environment.

This way of conducting a study is divided into 3 parts:

- First, we need to know what we intend to protect in terms of environment, landscapes, natural resources and biodiversity. It is the part where we define the environmental situation and the indicators to assess the results of the study. It is called the normative reference.
- Secondly, we want to understand how and why are these ecosystems threatened, and what is done or undone to manage these territories. In this part, we detail the environmental pressures, causes and effects as well as the actors' roles. It is called the effective management.
- Finally, the last step is to design some solutions. It includes analysing what has been done and what can be done in favour of the environment and identify who are the actors that promote or act in favour of environment. It is called the intentional management.

2.1.2 The Landscape Approach: a territorial analysis

The landscape analysis is a transdisciplinary approach that examines processes and spatial variation of landscapes at different scales to comprehend environmental issues (Ferraton, Touzard, 2009). By looking at ecosystems in dynamics, including anthropogenic activities, the notion of the landscape is a relevant tool to elaborate a territorial diagnosis, at the interface of environment and societies. It focus on both spatial physiognomy and associated representation of landscapes.

In this study, we use the landscape approach to territorialize a strategic diagnosis, highlighting environmental issues on the area, and understand from which socio-economic dynamics these landscapes result from. To do so, we proceeded a landscape diagnosis (Lardon, Piveteau, 2005), which consists in observations and agro-ecological data collecting crossed with qualitative methods and a strategic management diagnosis. This approach allows us to question agricultural systems regarding their inscription in the territory and problematize the observed dynamics, while taking into account the geomorphological constraints and advantages.

2.2 Methodology

The study was organized in 5 weeks.

Week 1	Week 2	Week 3	Week 4	Week 5
Fieldwork preparation	Fieldwork			Report writing
France	Croatia			France

To carry out this study, we were 18 French students and 2 French teachers from the AgroParisTech-ENGREF school in Montpellier (Institute of sciences and industries of the living and the environment). We were accompanied by 5 Croatian students of the Faculty of Economics, University of Split to ensure translation. CIHEAM researchers provided support for the landscape analysis methodology.

Before starting the field study, we presented our project in the Faculty of Economics, University of Split. The launching presentation was done in English in front of our partners such as the CIHEAM-IAMM, the LAG 5, the French embassy in Croatia, teachers from the Faculty of Split, and other interested persons.

At the end of the survey, we presented the first results in the city hall of Ston, inviting the people interviewed, LAG 5 representatives, and academics from Split Faculty of Economics. We made a second presentation in Montpellier at AgroParisTech school to share our results and experience with the students and teachers from other courses.

The data production is based on bibliography work (literature, secondary data…), qualitative interviews, and landscape analysis. We cross-cut all this data (triangulation) in order to conduct the analysis. We will describe here all this processes.

2.2.1 Bibliography

Prior the departure, we did a bibliography study of grey literature, scientific literature and statistical data. We focused our researches on different thematic: agriculture, tourism, biodiversity, rural development in the country and on our studied area. The Baseline Assessment (Ivana Botica, Josip Grgić, Vinko Muštra, Slađana Pavlinović, Blanka Šimundić, 2016) gave us a first understanding of the field.

This previous bibliography of the context of the study and the actors involved in the area allowed us to redefine the terms of the order to build a precise problematic. On the field, we completed this bibliography in order to better understand the issues as the study progressed. We also collected documents from the actors we met (institutional, experts, etc.).

To exploit this bibliography, we created a Zotero data base to make an inventory of the gathered information: articles, books, rapports, maps and reading sheets.

To understand the issues linked with the agriculture and the tourism on the territory of Mljet, Peljesač and Korčula we conducted a qualitative survey on the field to meet farmers, producers, institutions and tourism actors.

The field calendar is presented in Table 1.

Table 1: Planning of the field study

19/02	20/02	21/02 to 28/02
Flight to Croatia - Split	Split	Ston
	Launching presentation and interviews of experts/researchers	Fieldwork on the Eastern part of Peljesač & Mljet 2 days of analysis

01/03 to 06/03	07/03 to 09/03	10/3	12/3
Korčula	Korčula	Ston	Flight to Montpellier
Fieldwork on Western part of Peljesač & Korčula	First data analysis	Restitution of the field work	

The field work consisted in doing landscape description and analysis, as well as qualitative interviews to understand the dynamics and practices that built this landscape.As we needed translation between Croatian and English, five students of the Faculty of Economics joined our team for the three weeks on the field. They helped us all along the project, making calls, direct translating during interviews, post-interview translating, searching some valuable information on Croatian website.

On the field, interviews were conducted by teams often composed of two interviewers and one translator. We had seven cars which allowed teams to visit to different places each day.

Each evening , collective debriefings (2-3 hours) allowed to share all the information collected by the teams on the field. It consisted for each group in a brief, non-exhaustive summary of the main points raised during the interviews, each team presenting one after another in order to share the key information found. It allows the group members to take a step back from what they have heard so far during their interview, develop a global overview of the situation and build the strategy for the next day.



Figure 7: Daily group meeting (Ston, Peljesač, Léonard Normand)

We will now explain the methodology used for landscape analysis and for interviews.

2.2.2 Landscape analysis

To understand the interactions between human activities and their habitats, and the dynamics of both loss and recovery of agricultural lands, we have made a landscape analysis on the field.

Before going on the field, we analyzed maps in order to define interesting areas to prospect. The teams in charge of the landscape analysis have crossed the field in order to identify some specific landscape structures. Then they made transects to describe the landscape structures that are characteristic of the areas crossed. Once these data are collected, the landscape is analyzed by creating transects using Google Earth, and maps with ArcGis software.

The landscape analysis mobilised a specific standardised methodology, but it was completed with other qualitative methods of inquiry. We made interviews with farmers met in the field, focused on the evolution of practices and the evolution of landscapes in the areas of interest. During interviews, we have observed their fields and their cultures. This could guide the questions asked during the interviews or supplement the information gathered. We also asked people for old photographs allowing to retrace the history of the landscape.

2.2.3 Qualitative interviews

The interview process was based on the following scheme. After a general overview of the interviews concretely led, we will present how we found and selected he interviewees, how we built the interview guide, how we conducted the interviews and how we analyzed them.

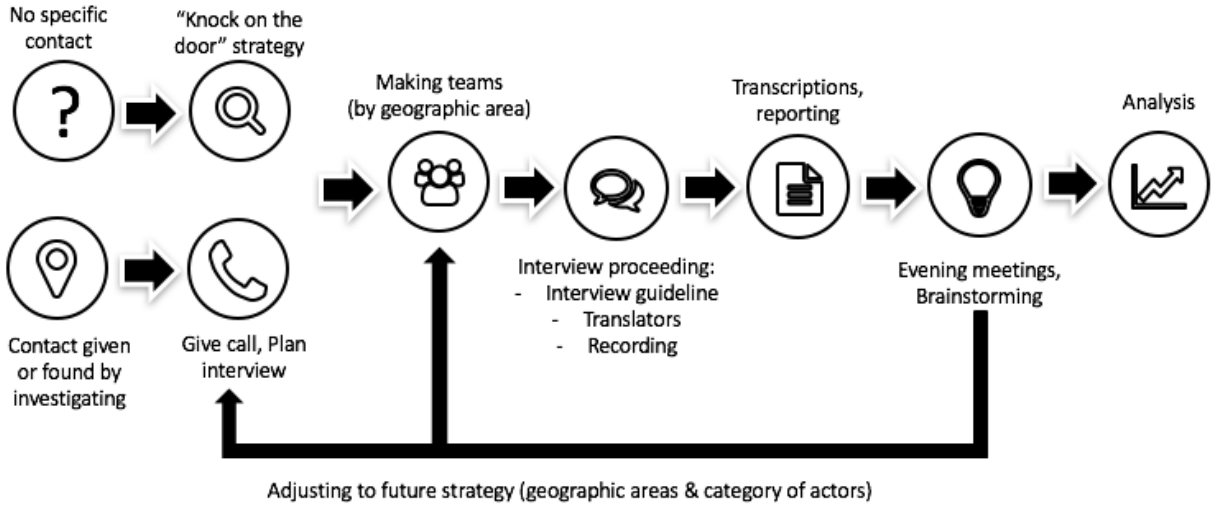


Figure 8: Methodology used for the survey

2.2.3.1 General overview

A total of 135 interviews were done on Mjlet, Korčula and Peljesač (see figure 9**Erreur ! Source du renvoi introuvable.**). In average, the interviews last for 1h15 and 165 hours were recorded in total. As we were having interviews, we were trying to reach all the categories of actors in every area (see figures 9 and 11**Erreur ! Source du renvoi introuvable.**). Those categories were created and filled considering the main activity of the interviewees. The figure 10 **Erreur ! Source du renvoi introuvable.** shows the distribution of the interviews places by the category of actors. We collected 200 contacts. The Appendices 8.1 inventories the interviews realised during the study. Also, beside the categories of actors, we manage to meet people acting at some point for the environment (see figure 12**Erreur ! Source du renvoi introuvable.**). Some were part of NGOs, others were experts, researchers or institutional members acting at the local level and the county level.

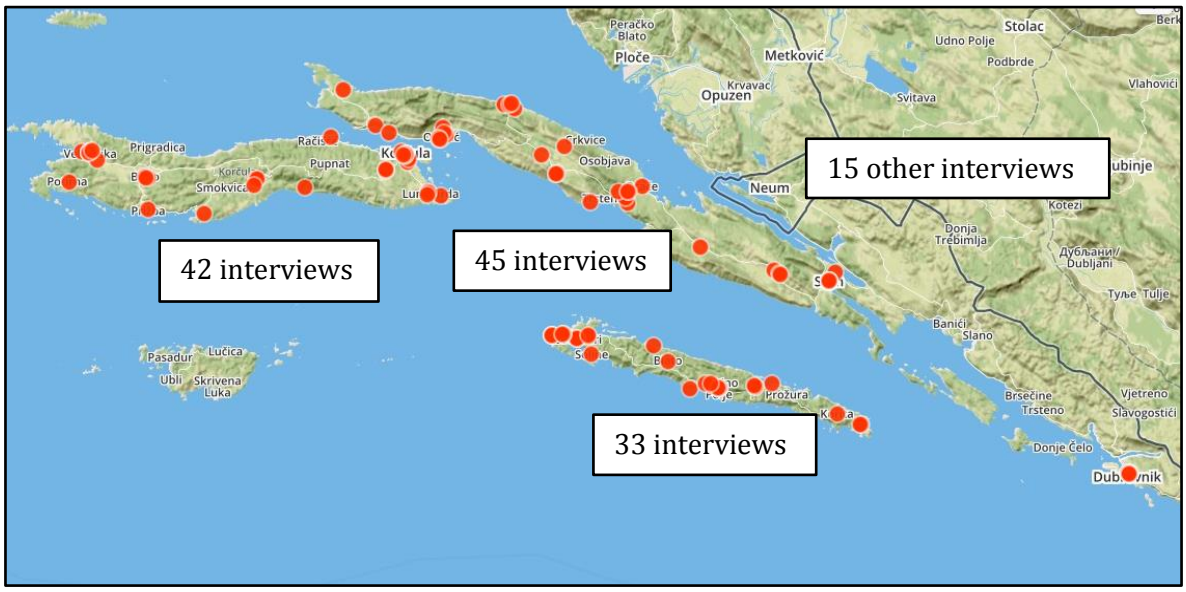


Figure 9: Cartography of the interviews (KoBoToolbox software)

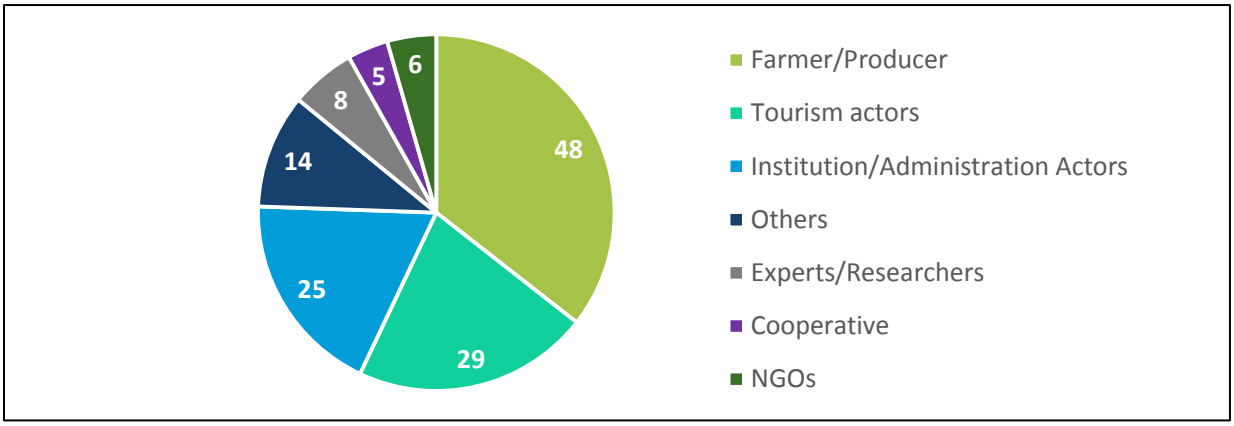


Figure 10: Number of interviews per category of actors

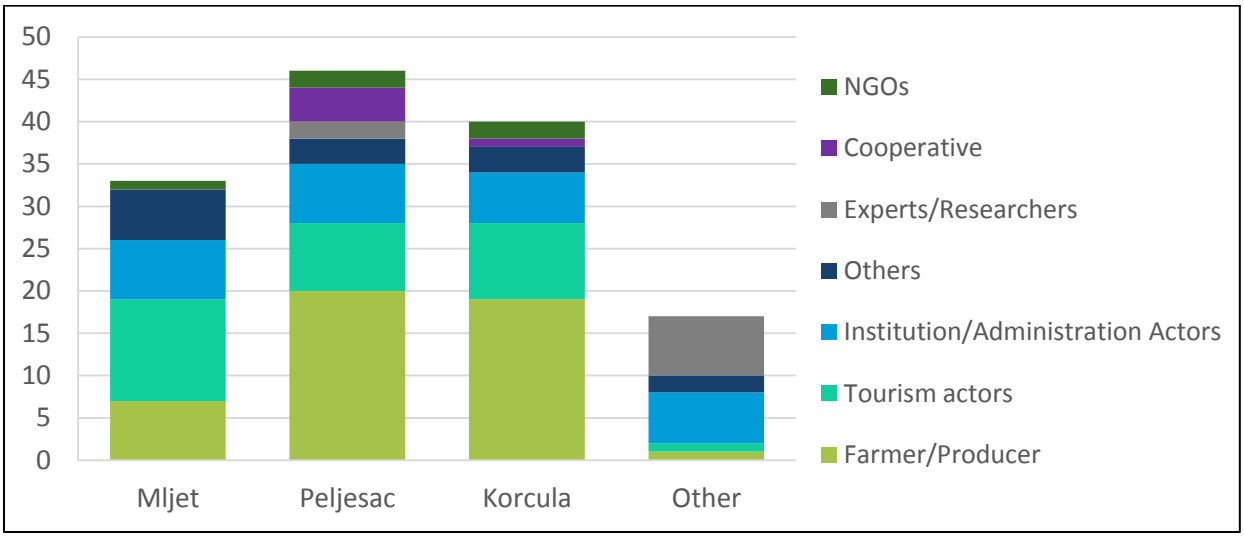


Figure 11: Number of interviews per category of actor on the different areas

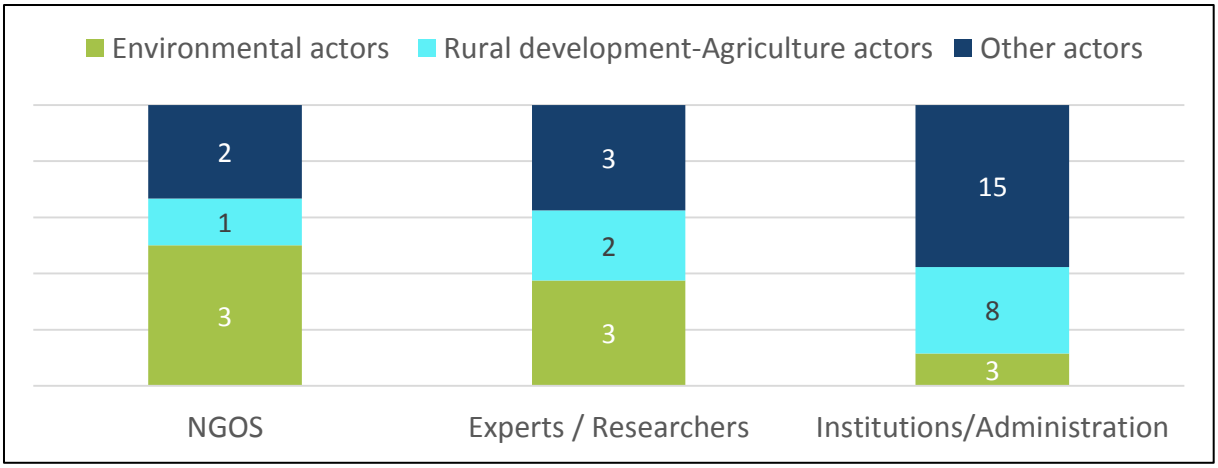


Figure 12: Part of environmental and rural development actors in our qualitative survey

2.2.3.2 Two strategies to meet people

We used two investigation strategies.

We either already had the contact of the person we wanted to interview (given by someone or found by investigating) or we have no specific contact. In the first case, we called that person to plan an interview according to their convenience; in the second case, we used a "knock on the door strategy" which means that we go directly on the field, trying to meet someone interesting for our study. We didn't interviewed random people but we tried to meet some special category of actors in a defined geographical area in order to cover the largest range of actors possible.

In Split, our survey began with interviews with the actors present at the launch presentation at the Faculty of Economics. These first interviews allowed us to understand some institutional and scientific aspects our topic. Once in Ston, we started to prospect and make appointments with the actors (by telephone, by mail, by direct contact) with the help of the translators. That's how we plan our interviews on our field days. Our research also involves a phase of prospecting directly on the field in search of actors to be interviewed. It often happened that the interview with an interlocutor leads us to meet with others or to get contacts. Some opportunistic investigations also allowed us to meet with non-targeted interlocutors at the outset. That procedure reveals some important actors whom we had not thought of at first.

2.2.3.3 Conducting the interviews

The members of the team divided the tasks: one asked the questions and led the interview while the other took notes and asked additional questions in order to make sure that the subject is very well investigated (see figure 13**Erreur ! Source du renvoi introuvable.**). The main role of the Croatian translator is to translate the questions in one way and then the answer on the other way; he is not part of the analysis process. With the agreement of the interviewee, the whole conversation is recorded with a recorder. This record keeps the exact words of the people so the whole group has access to it afterward. This allows a complete transcription of the interview and avoids the interpretation bias.



Figure 13: Interview of a tourism actor at his place (Mljet, picture taken by Marija Roglić))

As part of a semi-structured interview, the interview grid is used to reorient the discussion in order to obtain the information we are interested in, without asking too many questions. It makes us remember the main themes of the survey. The guide consists in a series of questions that allow us to get the needed information. It also makes us remember the information we have to systematically transmit to our interlocutors, such as the date of the restitution. The purpose is not to question the interlocutor but to allow an open discussion on the main themes and to redirect the course of the interview if some relevant issues have not been discussed. The important thing is to allow the greatest subjectivity of the actors: it is essential not to influence the interlocutor by giving our opinion or by asking closed questions. We want to discover what the actor believes to be important.

We designed different evolutive grids for each type of actors met, in order to get critical information for our study. We did six different grids: for the farmers, the cooperatives, the municipality, the restaurants, the church and the National Park (Appendices 8.2). It was adjusted few times at the beginning. Then we completed it in the course of the survey according to the new questions and problems revealed.

2.2.3.4 Processing of qualitative data

The data processing consists first of all in the transcription or writing of summaries of the interviews. Some of the recorded interviews are fully transcribed, which allows to have access to all the conversation, to use verbatim and avoid bias. A full transcription takes hours and that is why we have not been able to perform a complete transcription of all interviews. For those that are not, we managed to replay the recordings while seeking the key details of the interviews. Thus, nearly 165 hours of interviews were recorded which represents 550 pages of transcriptions and summaries compiled in a separate document.

We also created in parallel a complete database of all contacts we interviewed, reached on the phone, by email, or didn't have the time to get in touch with. It required quite a meticulous application as we were 18 students constantly interacting with different people.

In order to get the key data out of this amount of interviews information, organise it and analyze it, we created 3 analysis tables:

- The Actors/theme table: It gathers the information of all interviews together by thematic axes. So, we can easily have access to everything that had been said about Agriculture, tourism, subsidies, land ownership, resource management, biodiversity etc. It highly

facilitates the analysis work afterward. It also allows to link these different themes together as some information are linked to more than one thematic axe.

- The Farmers/agriculture practices table: It gathers the information of all interviews together by type of farming practises. It helps to sort out the different types of agriculture by gathering all information about what do they grow, in which quantities, how much do they sell it, to who etc.
- The HNV farmers mapping table: it gathers all information about farming practises that are related or not to HNV farming: use of entrants, pesticides, machines, biodiversity etc. It helps to realise how close each farmer is from the HNV practices.

2.2.4 Triangulation

From our previous bibliography and from our interviews, we have defined three research axes around which the processing and analysis of the data were articulated:

- State and evolution of landscapes and biodiversity
- Global value chains and chains
- Agriculture HNV (High Natural Value)

From these three axes, we have triangulated our data in order to test their relevance in regard to these different axes. This triangulation is a compilation of: our qualitative surveys, our bibliography, our field observations, and the secondary quantitative data we have produced.

The first step in triangulation was the creation of a scalable database for the qualitative survey. It was organized along the thematic lines of research. This database has been filled with the verbatims resulting from the interview transcriptions, to preserve the meaning and to avoid as much as possible the bias from interpretation. Where necessary, we have supplemented this information with new bibliographic research. Through our work, we sought to establish symmetry between the statements of actors, the quantitative data produced and all the data collected. This work provides an overall idea of each of the topic covered in this report.

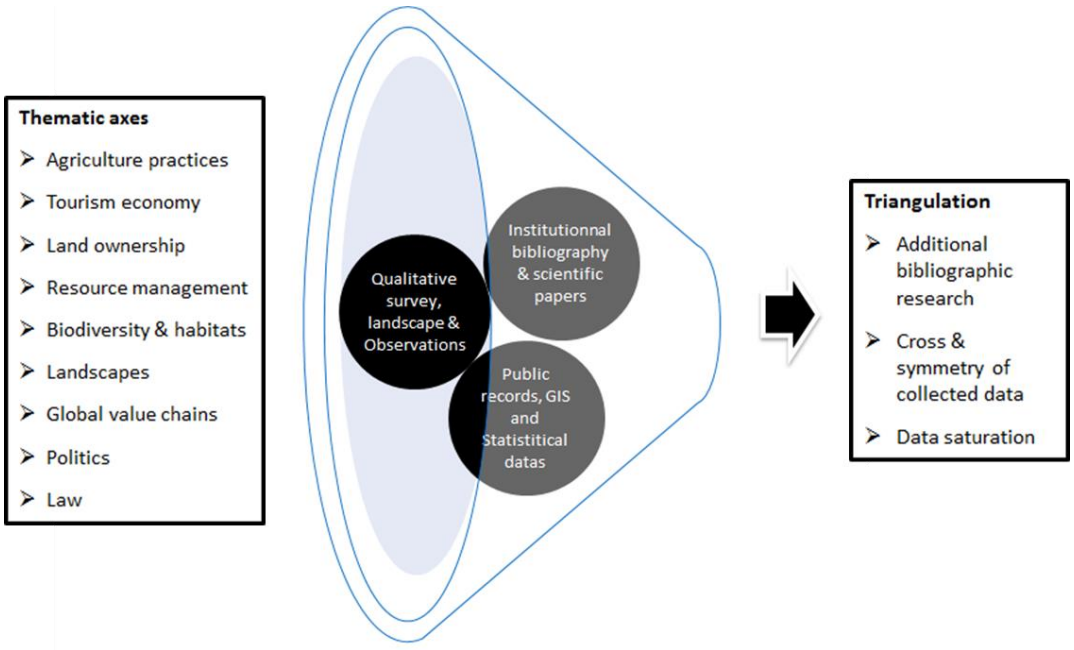


Figure 14: Scheme of the triangulation process

2.2.5 Local restitution

We returned the results of our study in the form of a restitution on Friday, March 10th, 2017, at 11 am, at the town hall of Ston (Figure 15). The objective was not only to collect inputs and comments from stakeholders in the HNV agriculture but also to present our work to the study's sponsors. This restitution also allowed the interviewed persons to understand the study and to appropriate the results, but also to have their opinion on this study and to answer their questions. Thanks to the comments, we were able to carry out our analysis further.



Figure 15: Poster of the field work restitution

We will now present the results of our analysis.

3. Main regional features

In order to study the relevance of HNVf in the Dalmatian islands we studied the characteristics of this region, its actors and dynamics. First, we will describe the environmental issues on the islands and the main demographic, economic sector and infrastructure evolutions. Then, we will characterize the agricultural activities encountered and identify agricultural systems that could potentially correspond to HNV farming.

3.1 Regional specificity

Korčula, Mljet and Peljesač identity is shaped by their physical, ecological, historical, social and economical specificity.

3.1.1 A karstic plain geomorphology

Korčula and Mljet Dalmatian islands belong to a tectonic unit called "Middle Dalmatian Islands". It is part of the Adriatic carbonate microplate, for the most part extending beneath the Adriatic Sea (Geological map, HGI CGS). Dalmatian islands are essentially composed by Jurassic carbonates layers oriented NW-SE and dipping to NE. These layers have been deformed during alpine orogenesis by anticlinal folds, synclinal folds and overlapping that are still visible. They gave the islands their current relief.

Being composed by carbonates, they have been exposed to rain alteration leading to karstic morphology that are currently visible. This karstic morphology is characterized by (Crozier, 1941):

- **Swallets**: holes formed by dissolution of carbonates rocks, which are locally named as "blatina" when they are filled with water.
- **Ouvalas**: they consist in swallets' connexion which support soil coming from sedimentation of altered carbonates. Those formation constitute cropping areas that are exploited particularly in Mjlet and Korčula
- **Karstic polje**: They represent the biggest karstic forms and are characterized by temporary and periodic floods, and small thickness alluvial plan plain in the bottom of the Polje. They form the major part of the Pelješac peninsula in the center of the island. Babino-Polje plain in Mjlet is the only polje existing in this island.

The rest of the morphology of the islands is composed of little to very steeped hills, that constitute their typical coastal relief.

3.1.2 A rich and fragile habitats and biodiversity patrimony

Our study took place on the Mljet Island, Korčula Island and the Pelješac peninsula, where the habitats are very diverse and the biodiversity very rich. We focused on the terrestrial habitats (see figure 6), as we were asked in the order for the project, and we focused on the interactions between natural habitats and human activities.

3.1.2.1 Habitats

Mediterranean ecosystems rival tropical ecosystems in terms of plant biodiversity (Vogiatzakis, Mannion, Griffiths, 2006). The habitats of the Mediterranean-type areas is very characteristic. We can find:

- Maquis, which is a dense and mostly evergreen scrub from 1m to 3m high (Vogiatzakis, Mannion, Griffiths 2006).
- Guarrigue, which is a low-growing and aromatic plants scrubs (Vogiatzakis, Mannion, Griffiths, 2006).
- Forest, which is a tree cover land (Mannion, Vogiatzakis 2007).
- Dry grasslands
- Rocks
- Sandy beaches
- Rocky beaches
- Anthropic habitats (villages, agriculture lands)

The whole Mediterranean ecosystems are susceptible to degradation and species loss due to human activities: the loss of arable agriculture, disturbance of natural fire regimes, urbanization, tourism, pollution and introduction of alien species, difficulties of implementing conservation strategies because of problems of land ownership (Vogiatzakis, Mannion 2006) and excessive exploitation of natural resources.

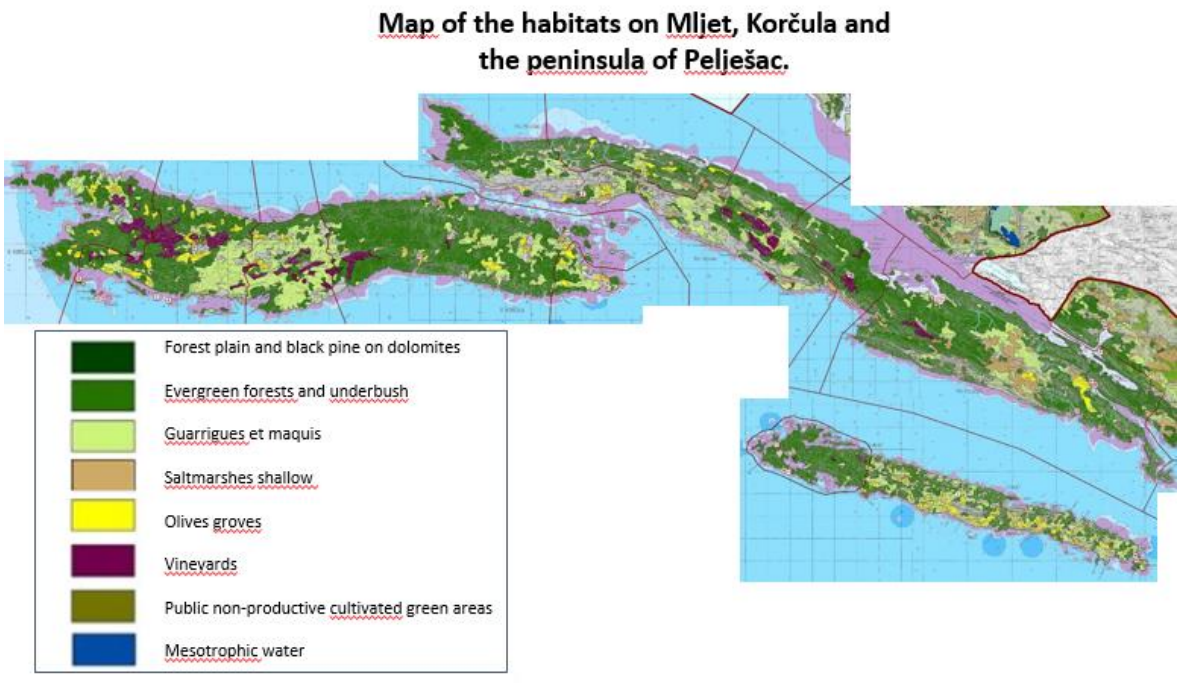


Figure 16: The habitats of Mljet, Korčula and the peninsula of Pelješac (Source: http://www.edubrovnik.org/prostorni-plan)

As shown on the map (see figure 16) the main habitats are forests and garrigues. The agricultural land – in purple the vineyards and in yellow the olive groves – are our potential HNV 2 areas.

3.1.2.2 Biodiversity

There are approximately 40,000 known native indigenous species in Croatia. The biggest threat to wild species in Croatia is the destruction of their habitats, and the change of land use ("Fifth National Report of the Republic of Croatia to the Convention on Biological Diversity" 2014).

There are 27 domesticated indigenous species in Croatia: 3 cattle, 4 horse, 3 donkey, 3 goat, 2 swine, 9 sheep, 1 turkey, 1 chicken and 1 bee (Ministry of Culture, 2014).

There is a large number of invasive alien species, especially in the islands, and in most cases they are occurring in agricultural and artificial areas National Report of the Republic of Croatia (Ministry of Culture, 2014).

3.1.2.3 Biodiversity linked to agriculture

The great varieties of cultivated plants and the great range of domestic animals are an important part of our natural and cultural history. This is an important tool for the preservation of landscapes, habitats and biological diversity (Ozimec et al., 2015).

> *"High biodiversity on the islands linked to agriculture. […] I cannot divide agriculture and nature, because this is the same. Traditional agriculture, which is balance, is beautiful. And you can still find this in Croatia."*
>
> Interview with a biologist - agronomist in Split - O14, p.530

The karst grasslands (pastures and hay meadows) are important for the landscapes but also for the biological diversity. The maintaining of the grasslands allows numerous fungi, plants and animals to subsist, but also whole plant communities. A karst grassland community has much more species than a forest community in the same region (Ozimec et al., 2015).

> *"We don't need forests, we already have forests everywhere. Agriculture promotes biodiversity. People will burn a pasture of forests and then put seeds. They were using the clear pasture of the land to have weed. After that it stops and the forests take over."*
>
> Interview with an actor of the Mljet National Park - M24, p.114

But the grasslands are disappearing as a result of natural succession, the urbanisation, and the decrease of livestock grazing which prevents the succession and maintains the grasslands opened. It is important to maintain a moderate livestock raising to maintain a greater biodiversity.

> *"Open space are richer than forest."*
>
> Interview with an ecologist in Dubrovnik - O17, p.542

The livestock can also help to disseminate seeds, fruits and other parts of the plants, it is called zoochory (Ozimec et al., 2015).

> *"Animals disperse seeds. Animals are integrated to many biodiversity phenomena."*
>
> Interview with a biologist/agronomist in Split - O14, p.530

3.1.2.4 Culture

The agriculture on terraces have been a very important part of the human history for thousand years. They have been considered as a part of the agricultural heritage since the wish to protect the natural and cultural heritage in 1980 (Larcena, 2012).

3.1.2.5 Threats

The main threats to the environment on the Dalmatian islands are the development of tourism and infrastructure, the forest fires, the opening of the forests which fragment habitats, the abandonment of agricultural lands and the reduction of land use leading to a recolonisation by the forest and the loss of the biodiversity associated to open habitats like grasslands.

Before there were a lot of goats and sheep, grazing the grasses, and maintaining open habitats like pastures and grasslands.

> *"One problem with the dry grassland because in the past [there were] sheep and goats and [it] was their food. This was [the] only condition for dry grasslands to keep as before because eating the grass."*
>
> Interview with an ecologist in Dubrovnik - O17, p.542

With the decrease of the population and the abandonment of the agricultural land, the habitats are recolonized by maquis then by the forest. This is an ecological succession.

> *"Now with the immigration and after the number of islanders dropping down most of this land has not been cultivated for 50 - 60 years. Then the succession of ecosystems are taking over, dry walls are covered with maquis and slowly the forest is taking over etc, etc... maybe in hundred, hundred-fifty years it will be a really natural ecosystem, the man made part of the ecosystem will be lost, the we will know what the natural ecosystem actually looked like."*
>
> Interview with an actor from the Institute of Economics of Zagreb in Split - O12, p.508

Another threat to the environment are the alien species. They settle easily in the fragmented habitats opened outside forests.

> *"118 species in Croatia that are aggressive. There are some tendency to be higher in the last period due to opening some more areas outside of the forest."*
>
> Interview with an ecologist in Dubrovnik - O17, p.542

The rich biodiversity and the historical and archaeological sites are an important part of the heritage of Dalmatian islands. This cultural and ecological importance are well known as they mostly are under protected areas (see figure 17).

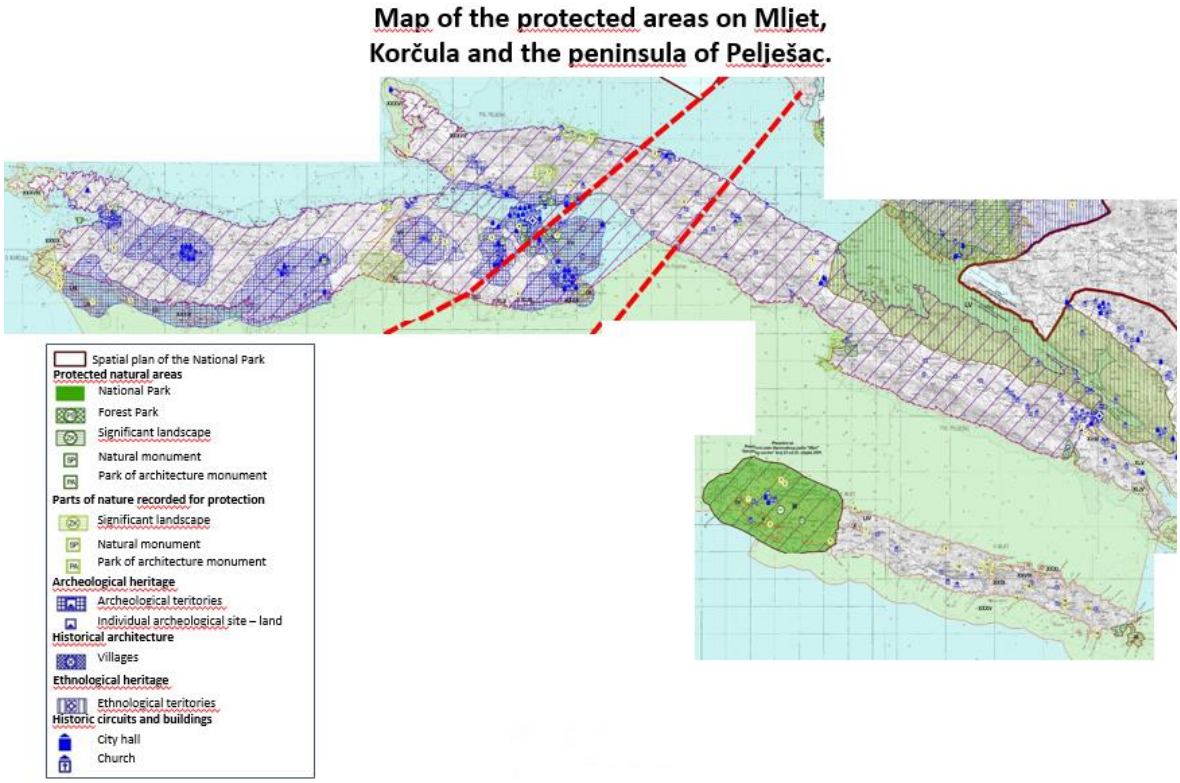


Figure 17: Protected areas of Mljet, Korčula and the peninsula of Pelješac (Source: http://www.edubrovnik.org/prostorni-plan)

To find a way to preserve the ecological and cultural heritage of these territories, we will focus on the interactions between human activities and the habitats by studying the landscapes.

3.1.3 *A history that shaped the agricultural landscape*

The current state of agriculture and livestock on the Dalmatian islands results from a rich history throughout which the practices kept evolving thanks to the different peoples that settled there.

The known story of the Dalmatian Islands starts in the 4th millennium Before Christ (see figure 18) with the arrival of the Illyrians in the territory. They came to Korčula, Mljet and Pelješac, and brought with them the first sheeps and goats to the islands (Beug, 1967). They are also the first known people that cultivated beans in the area.

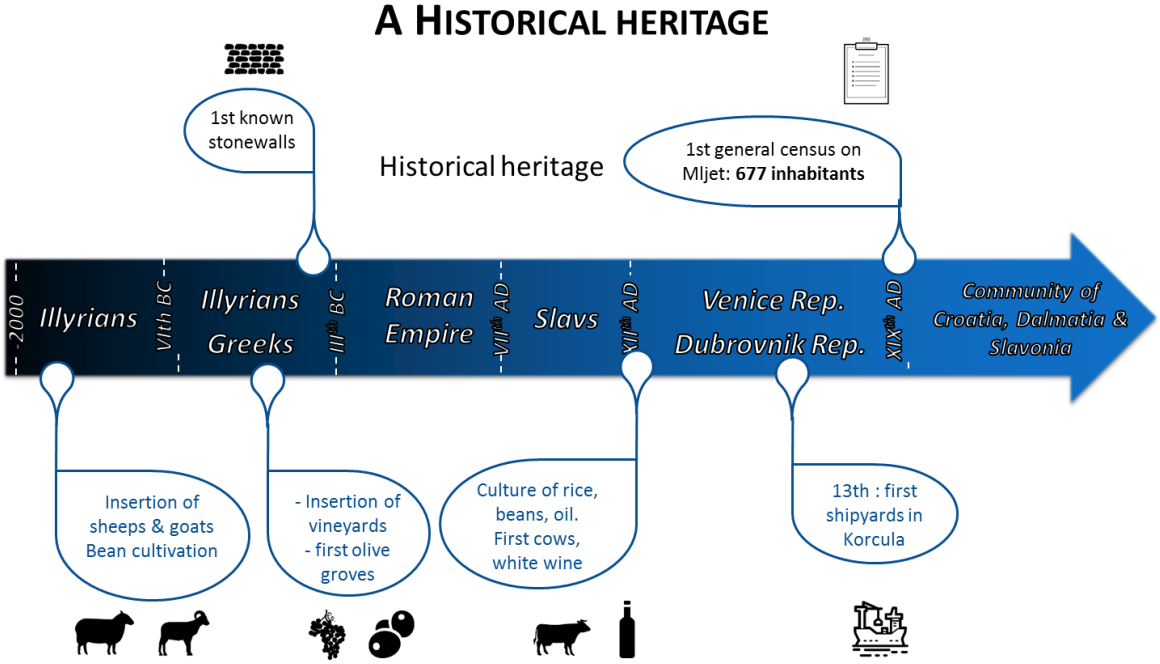


Figure 18: Historical timeline of Dalmatian Islands for ancient times

> *"8000 years agriculture here. Changes depending on the movement of the people rather than changes in the climate"*
>
> Interview with a biologist/agronomist, Split - O14, p529.

> *"They were doing a bit of livestock: sheep and goats, they had donkeys but in the history of Croatia donkeys served as transport service. And about the culture: beans, chicken, bees, and that kind of vegetables, and their common name is... Illyrians didn't have any oil and the reason of that is because the first vineyard came with the Greeks. These olive trees were on the island during all its existence but Illyrians weren't paying intention at all so they didn't produce olive oil. And there are no evidence of who planted these olives because they became popular when Greek people came, but that doesn't mean that there were the one who planted these olives. What we're sure it's that vineyards came with Greek people. Between 2500 years before Christ.*
>
> Interview with a forester/historian, Mljet - M23, p99

Then the Greeks came in the 4th century Before Christ. To understand the agriculture in the islands, this point is very important. In fact, they were the first to introduce vineyards in the islands, and the first to exploit the olive trees that had been in place for a long time Olive groves started in this period.

Another important fact, because it explains the landscapes visible in the islands, is that the first hand-made stone walls were built by the Greeks in this period, to increase the quality of the soil trapped by these stone walls in the hillsides.

After the Greeks, the Romans in the 3rd century Before Christ continued to produce wine and began a long tradition of wine production in the region. Other cultures have been imported to the islands, like rice, which is correlated with the development of irrigation system by hand-made channels in the island.

> *"So, the first irrigation system was established in [XIIe century] (1:28:24). Because of that irrigation system they planted on the rice and wool. [The water] came from a spring. Two springs. [This irrigation system doesn't exist anymore]. So the demand for the water was less than it is then so the springs they had water ever enough"*
>
> Interview with a forester/historian, Mljet - M23, p99

After the 12th century, Korčula was part of the Venice Republic, whereas Mljet and Pelješac were part of the Dubrovnik Republic, until the 19th century. In the 13th century, the first shipyards appeared in Korčula. This economic activity is still active nowadays. The first population census was in Mljet happened at that time.

> *"Mljet doesn't have lot of inhabitants, they always … The number of inhabitants were between 200 and 300. All the fields in Mljet are having a lot of soil where it's flat, and they have small size fields because they don't have a lot inhabitants, so they don't need huge crops. So according to the first list of inhabitants in the island in the XVIIe century, and then they have only 677 inhabitants. So because of that they don't have a need for the large fields. And don't have a link with the continent"*
>
> Interview with a forester/historian, Mljet - M23, p99

In the middle of the 19th century (Figure 19), the Phylloxerra crisis hit Western Europe. As a consequence, the demand of wine in Europe increased in the countries that were not affected yet by the phylloxerra. It explains why in Croatia and in the Dalmatian Islands a boost in wine activity happened in the late 19th century. The wine produced was exported to Europe, and the visibility of Croatian wine in Europe started in this period. The boost of the economy was correlated with an increase of the demography in Korčula reaching ten thousand people. All the islands space was dedicated to agriculture and a lot of stone walls were built or rebuilt during this phase.

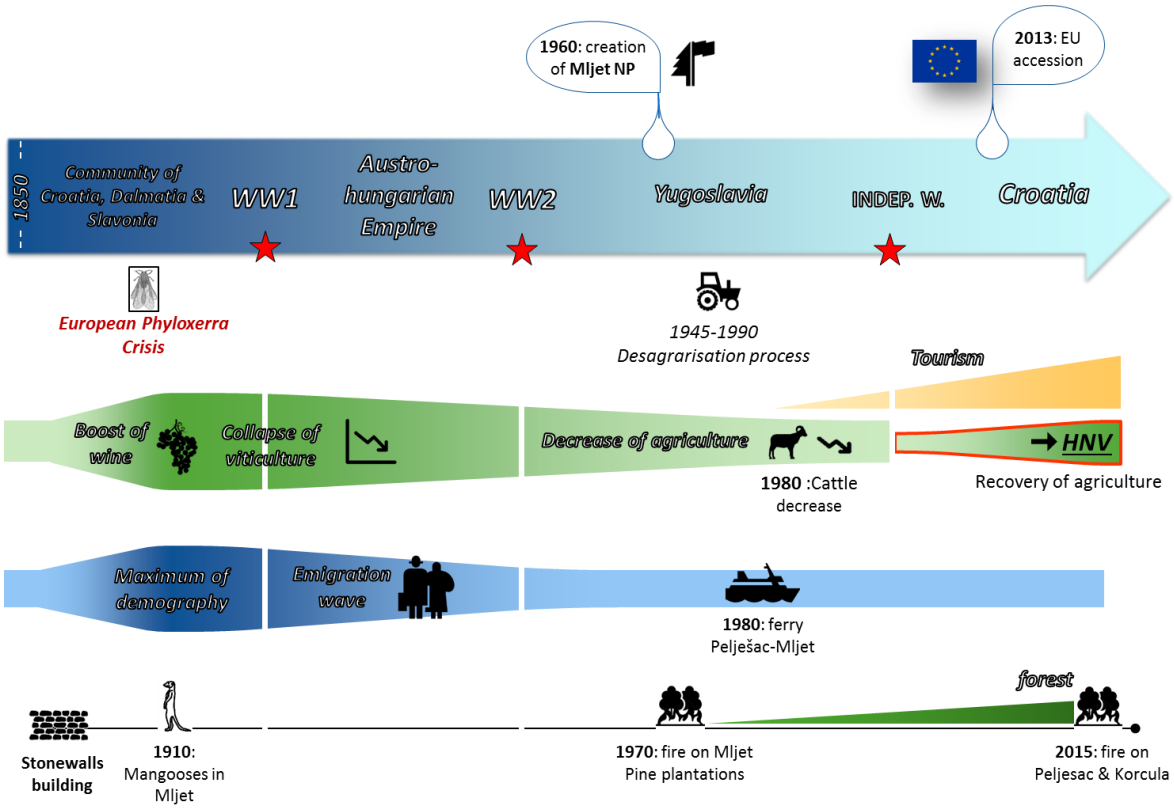


Figure 19: Historical timeline of Dalmatian Islands for recent times

"In the XIXth century, when the Phylloxera attacked French vineyards the viticultors from the Western part of Europe were exporting to the USA. So they came to this part of Europe which belonged to Austria-Hungary and bought vineyards which improved the economy on Blato. Before WW1, there were not so many olive trees because vineyards were much more profitable. The population of Blato was 10000 people, now it's 3500."

Interview with a cultural actor, Korčula - K37, p429

"The first case of Phylloxera registered was in 1912. It caused the collapse of the wine industry. After the crisis, they chose to diversify their activities to prevent a new economical collapse"

Interview with a cultural actor, Korčula - K37, p429

But at the beginning of the 20th century, phylloxerra hit the Dalmatian Islands. In Mljet, it was detected in 1912. Due to the disease, and also to the first World War, the economy collapsed in the Dalmatian Islands. It was the beginning of a big wave of emigration for the territory during the Austro-Hungarian Empire. Most of the people left to Brazil, because the fees of emigration were insured by the Brazilian government, which needed work force. Others left for Australia and New-Zealand. People who emigrated never came back until today. This is one the main reason that explains the property problems, because a lot of lands officially belong to people that have left for decades to these countries.

> *"The biggest problem is now the lack of agriculture. There used to be vulture all around the Mediterranean cost. […] The biggest changes were in the 1920-30s because at this time it was overpopulated"*
>
> Interview with a biologist/agronomist, Split - O14, p531

At the end of the Second World War, two-third of the Croatian population used to be employed in agriculture. In 1990, it was only 9%. Within the same period, the GDP had risen from 7069 to 33 458 million dollars while the part of agriculture in the GDP had dropped from 34% to 10%. The decline of the agricultural activity in Croatia has much to do with the political decisions taken by the Socialist Federative Republic of Yugoslavia after the war.

In 1945, the agrarian reform limited the surface of parcels to 30 ha for land owners. The exceeding surface was given to smallholders or State farms. In 1947, the attempt towards agricultural collectivisation failed due to the passive resistance of the population: only one quarter of smallholders joined the kolkhoz which totally disappeared in the 1960's.

In 1953, the maximal surface of lands was reduced to 10 ha which was too small to make a profitable agricultural business. The income of farmers dropped and the rural youth abandoned the land of their fathers. Moreover, according to succession laws, when a farmer died his land was divided into as many parts as his children, resulting is smaller and smaller parcels. Farming tended to be an old women's activity as the young ones and men looked for work in towns and in the industry or emigrated to Australia, the USA or Brazil. From 1957, State farms got credits to acquire smallholders' lands. Between 1960 and 1990 the part of 3 ha and less farms increased from 55% to 70%. The territory was fragmented and subsistence farming became the norm. (Jovancevic, 2017)

> *"It's hard for young people to, you know, to make progress in their careers on the island or don't have so many opportunities like you have in big towns, lot of them move to the big towns ok they can make some careers in I don't know in special parts…"*
>
> Interview with a local representative, Mljet - M21, p85

At the beginning of the 1980's, the income of farm households equalled 45% of non-farm households' income. In Korčula, the shipyard had an important role in the development of the island.

> *"I think our generation, and maybe even the former generation has forgotten how to work in agriculture. The shipyard on the island employed maybe 2000 people, and also you have a lot of hotels, a lot of tourism… We don't have the time… Everything is changed."*
>
> Interview with immortelle growers, Korčula - K22

The growth of tourism compensated the declining part of agriculture in the economy. In 1980, the first ferry line between Prapratno and Sobra allows tourists coming to Mljet. The war of Independence (1991-1995) caused a collapse of industry and tourism but the country recovered and nowadays, the most important branch of the economy is tourism, with 10 million foreign guests per year, contributing 15% to GDP. ("Croatia in Brief" 2017)

> *"Tourism now is similar than 20 years ago in Ston. In the summer season, before the Croatian war, there were about 5000 tourists because very few camps. They have hotel in the center, but it doesn't provide any kind of profits. It was very profitable before the war."*
>
> Interview with a fireman, Pelješac - P30, p.

Since 1997, Croatia is divided into 21 *županije* or counties including the city of Zagreb which has both status. According to the 2006 Act, the country has 127 towns cities and 429 municipalities. Administrative division have specific prerogatives such as the ability to grant subsidies.

> *"County is a NUT3 (Nomenclature d'Unités Territoriales Statistiques). Municipalities are LAU1 (Local Administrative Unit). Croatia is NUTS1, Northern Croatia and the coastal area are NUTS2 regions. We have 21 counties: NUT3 level. And then we have who knows how many local boards: LAU2. […] The State can own lands and houses, as well as the municipalities and private persons. A property can also be collective but appear as private ownership. The consequence of collective ownership is that you cannot sell your ideal part of the parcel unless all the other owners want to sell theirs. So, it's not an ideal situation at all."*
>
> Interview with a professor from Split Institute of Economics, Split - O12

3.1.4 Human resources challenge of HNV farming

Table 2: Demographic evolution of Dalmatian islands since 1991 to 2011 (Source: Croatian bureau of statistics)

	1991	2001	2011
Pelješac	8083	8234	7801
Mljet	1 237	1 111	1 088
Korčula	16948	16182	15522

In the studied area, the population is growing older year by year with an average age for farmers of 50 years old. It's a direct consequence of the depopulation of the islands by young people (Table 2). It is linked to a lack of infrastructures like high school and university and also hospitals (in Mljet and Pelješac) and industries. Islands appear to young people without opportunities for them. (The ESPON 2013 Programme 2010)

> *"He has 3 children and would like them to stay on the island in the future but there are no job opportunities"*
>
> Interview with an oenologist, Cooperative of Pelješac – P17, p.44

However, some young people are coming back. They are more attracted by tourism activities than by agriculture because it's more profitable and less manual work throughout the year.

> *"He always talks with young people but now young people start to think a little bit too much [...] they know they can live without agriculture."*
>
> Interview with an guesthouse owner in Mljet – M10, p.47

The majority are graduates in management or in oenology. It helps them to make their activity profitable by producing the finest products, like wine, but their agricultural practices are mostly unsustainable from HNVf point of view.

3.1.5 Statistics about agriculture and tourism

The Figure 3 sums up some statistics about population in the winter and agricultural holders in the three islands of Mljet, Pelješac and Korčula. But the population is probably less than reported by the official statistics because some people declare to live in an island to pay less taxes.

> *"Some people make fake statements to the State on where they live. Prefer to live officially on the island, but they don't really live there... Reason for that: tax advantage (no tax if you live there). Also services like water, garbage etc. are cheaper if you live here officially. And nobody checks"*
>
> *Interview with an economist actor in Pelješac - O16*

Table 3: Population statistics and agricultural holdings in Mljet, Pelješac and Korčula. (Source: Population census in 2011, National Bureau of Statistics, 2015)

Island	Population	Total agricultural holdings
Mljet	1088	105
Korčula	15522	1573
Pelješac	7801	1009

At the national scale, agriculture and tourism sectors are evolving in opposite ways as it is showed in the Figure 20. The part of agriculture in the GDP is decreasing while the part of tourism is increasing. Moreover in 1999, there was a drop in the surface of cultivated lands: it was divided by 2.5 (see figure 20). According to a Croatian economist, the reason is an economic crisis following the death of President Tuđman. This observation at the national scale can be applied to the three islands. The forest is coming back with the agriculture abandonment.

This can be explained by the evolution of the population: people moved from rural to urban areas. Also, the young ones lost interest in agriculture to the benefit of tourism. Less agriculture and more tourism can have consequences on the territory and affect biodiversity and landscapes.

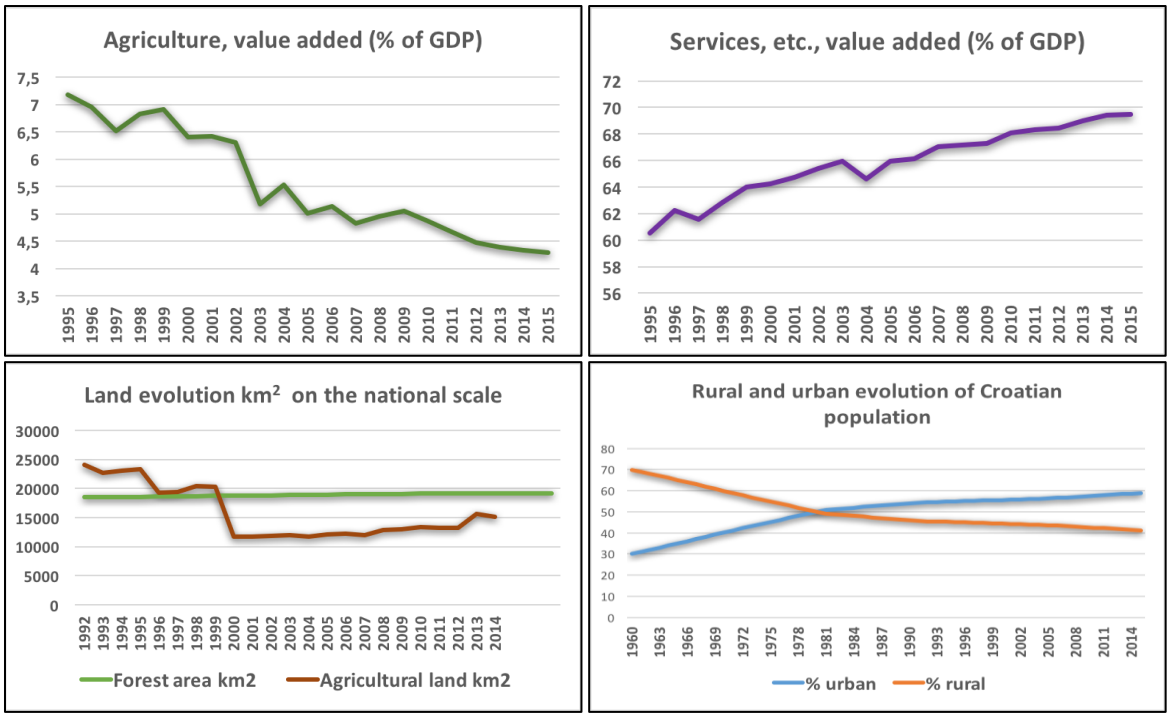


Figure 20: Graph of evolution at the national level of: a) percentage of agriculture in GDP; b) percentage of service in GDP; c) forest and agricultural land; d) rural and urban population (Source: The World Bank)

On the island scale, these observations are similar. The Figure 21 shows the evolution of land cover in the studied area between 1980 and 2012. Agriculture crops are disappearing and forest take its place.

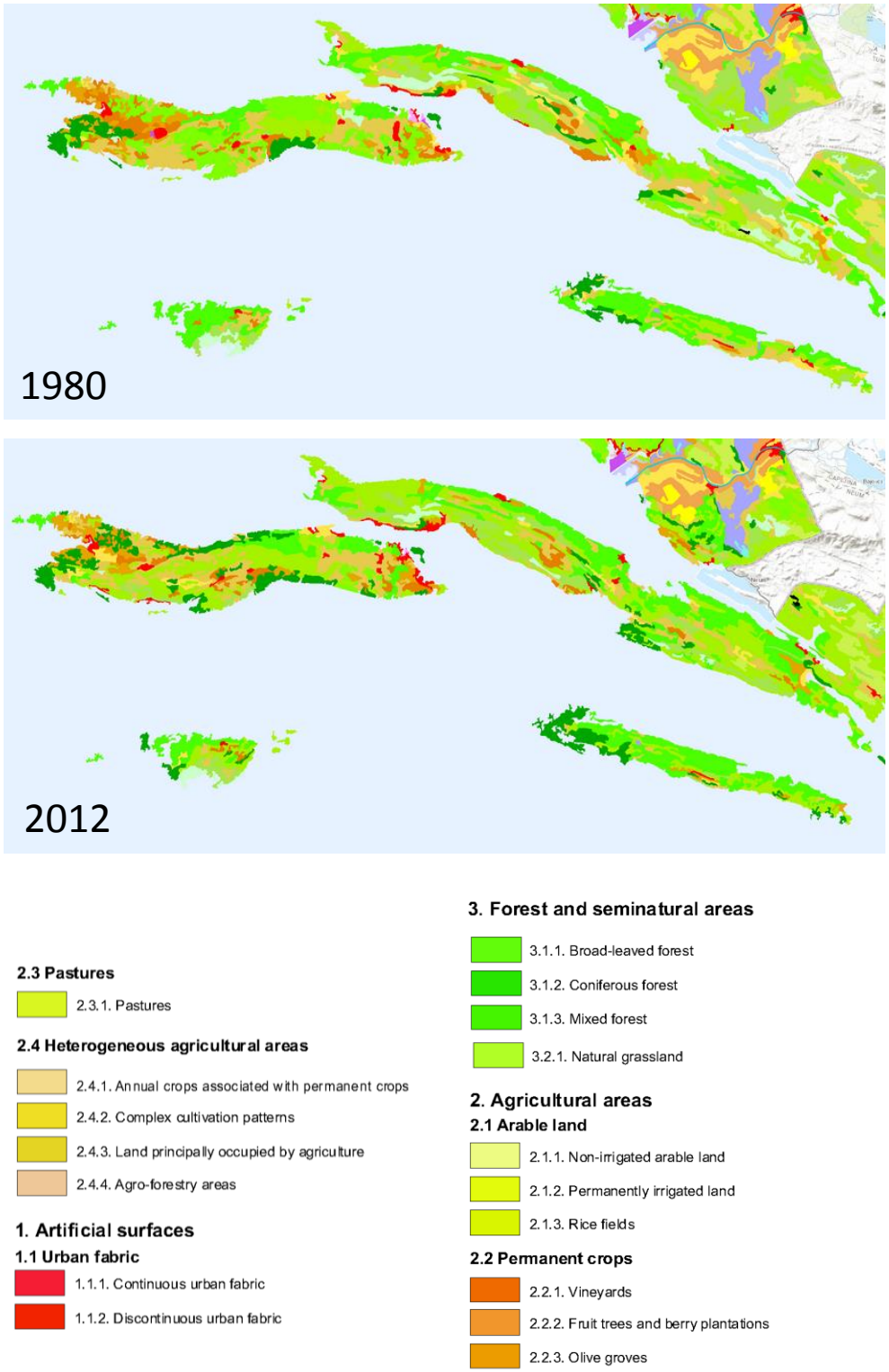


Figure 21: Land cover evolution on the study area.
Source: Corine Land Cover (Agencija za Zastitu Okolisa, http://corine.azo.hr)

Moreover, all the available lands are not used. Less than 30% are cultivated in Korčula and Pelješac, only 15% in Mljet (see figure 22).

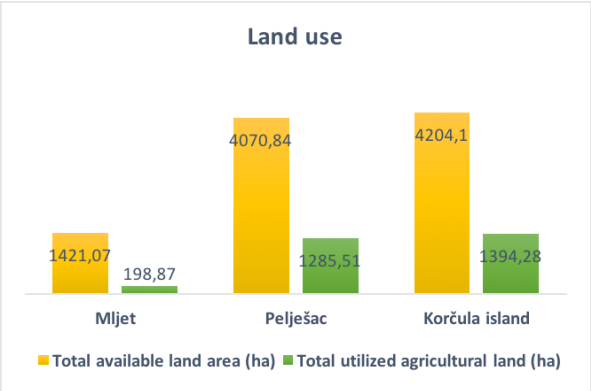


Figure 22: Chart of available land versus utilised agricultural land in Mljet, Pelješac and Korčula. (Source: Population census in 2011, National Bureau of Statistics, 2015)

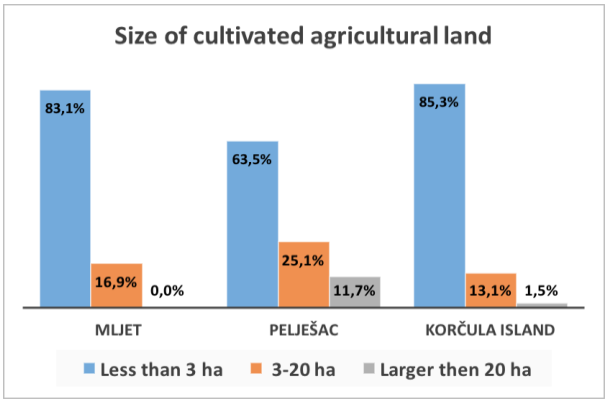


Figure 23: Size of cultivated agricultural land in Mljet, Pelješac and Korčula. (Source: Population census in 2011, National Bureau of Statistics, 2015)

On the islands, the surfaces of cultivated lands are quite small: on Mljet and Korčula, more than 80% measure less than 3 ha (Figure 23). On Pelješac, lands are bigger compared to the two others, but still 63% are smaller than 3 ha. Around 12% are bigger than 20 ha. This shows that lands are very fragmented, which is also visible in the landscape. Farmers don't have one large piece of land but many small pieces in different locations.

> *"Yes fragmented because in the past, people giving those land to children, everyone got a little piece and today we did not solve that problem in land ownership."*
>
> Interview with an administrative actor in Korčula - K15, p.418

> *"We have lots of little vineyards, and about every family has about 0.5 ha of vineyards. But these hectares are in lots of location, very fragmented because of inheritance."*
>
> Interview with an oenologist cooperative in Pelješac - P17, p.245

Vineyard, olive trees and orchards are the main types of agricultural lands as it is illustrated in the table of the Figure 8. However, the frequency of these crops are not equal between the three islands. In Mljet, the vineyards represent only 12% of the total agricultural land whereas it is 30% in Korčula and 58% in Pelješac (Table 4). The olive trees are the main type of agriculture in Mljet and Korčula with a ratio respectively of 133 olive trees and 140 per total agricultural land. In Pelješac, it is also an important crop but less than the two others with a ratio of 61 olive trees per total agricultural land.

Table 4: Table with agricultural land by category in Mljet, Korčula and Pelješac. (Source: Population census in 2011, National Bureau of Statistics, 2015)

Island	Total agricultural land (ha)	gardens (ha)	kailyards (ha)	meadows (ha)	pastures (ha)	orchards (ha)	olive trees (number)	vineyards (ha)
Mljet	198,87	0,12	5,54	43,02	3,3	122,28	26337	24,61
Korčula	1394,28	23,78	27,4	3,83	28,22	888,85	196423	422,05
Pelješac	1285,51	83,64	12,12	20,65	76,8	341,34	79185	750,95

Farmers breed mostly goats and poultry as it is illustrated in the Figure 24. They use their dejection to fertilize their crops.

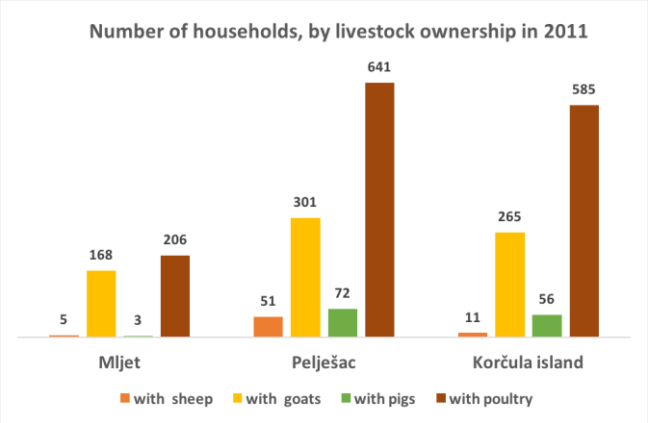


Figure 24: Number of households, by livestock ownership in Mljet, Pelješac and Korčula. (Source: Population census in 2011, National Bureau of Statistics, 2015)

3.1.6 Financial support policy

Through the Rural Development Programme (RDP), the government of Croatia wants to support a sustainable development of rural areas by ensuring adequate working and life conditions and preserving the rural natural and cultural heritage ('Rural Development Programme of the Republic of Croatia for the Period 2014-2020' 2017). The national agricultural policy is implemented in two ways; the Agriculture Act and the Act on the State Aid in Agriculture, Fisheries and Forestry. The Ministry of Agriculture, Forestry and Water Management (MAFWM) is the body responsible for their implementation.

Eligible investments within the measure of the Rural Development Programme of the Republic of Croatian for the period 2014th-2020th are co-financed mainly by the European Union through the European Agricultural Fund for Rural Development (EAFRD) while the rest is co-funded by the State Budget of the Republic of Croatian.

The program has defined 16 measures (Table 5).

Table 5: Measures for financing development in rural areas (Source: RDP 2014-2020)

M1	Knowledge transfer and information actions
M2	Advisory services, farm management and farm relief services
M3	Quality schemes for agricultural products and foodstuffs
M4	**Investments in physical assets**
M5	Restoring agricultural production potential damaged by natural disasters and catastrophic events and introduction of appropriate prevention actions
M6	**Farm and business development**
M7	Basic services and village renewal in rural areas
M8	Investments in forest area development and improvement of the viability of forests
M9	Setting-up of producer groups and organisations
M10	***Agri-environment-climate***
M11	***Organic farming***
M13	Payments to areas facing natural or other specific constraints
M16	Co-operation
M17	Risk management
M18	**Financing of complementary national direct payments for Croatia**
M19	Support for LEADER local development (CLLD – community-led local development)

In our studied area, the measures 4 and 6 are the most common measures applied for, as they are also a part of the four biggest RDP measures at national scale:

- 567 million € allocated for Measure 4
- 226 million € allocated for Measure 6

The measures are broken down into several sub-measures for different beneficiaries and types of operations. They are supporting investments into farms, processing of agricultural products (measure 4), young, start-up and small farmers (sub-measures 6.1, 6.2 & 6.3). The common requirements for all the measures are for the applicants to be registered in the Register of Farmers as they conduct agricultural activities.

As the studied area is a rural area, this programme is directly applicable and it gives also guidelines for the LAG5. The numbers of agricultural holdings are very different between Mljet, Pelješac and Korčula but more than 70% of the farmers are registered in the Register of Farmers (Table 6).

Table 6: Number of farmers on Mljet, Pelješac and Korčula (source: population census in 2011, National Bureau of Statistics, 2015)

Area	Registered Farmers	Agricultural holdings
Mljet	70	105
Peljesač	844	1009
Korčula	1309	1573

According to statistics given by Agency for Payments in Agriculture, Fisheries and Rural, the distribution of the financial support is not equal in terms of numbers of beneficiaries and amounts (Figure 25 & Figure 26).

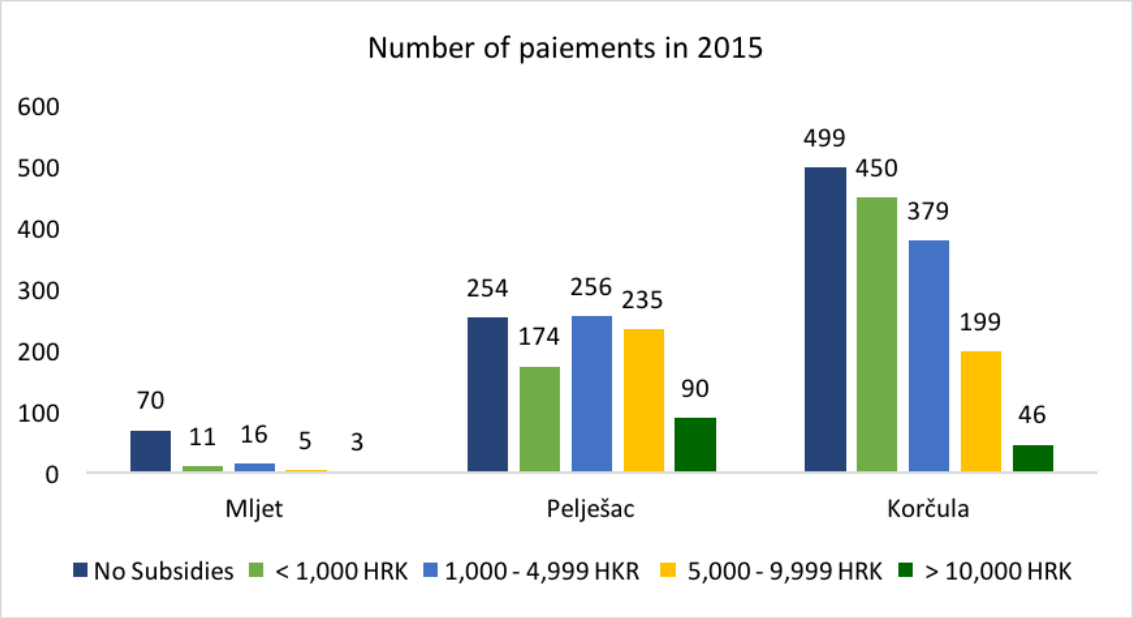


Figure 25: Number of registered members by subsidy amounts in 2015. (Source: APPRRR)

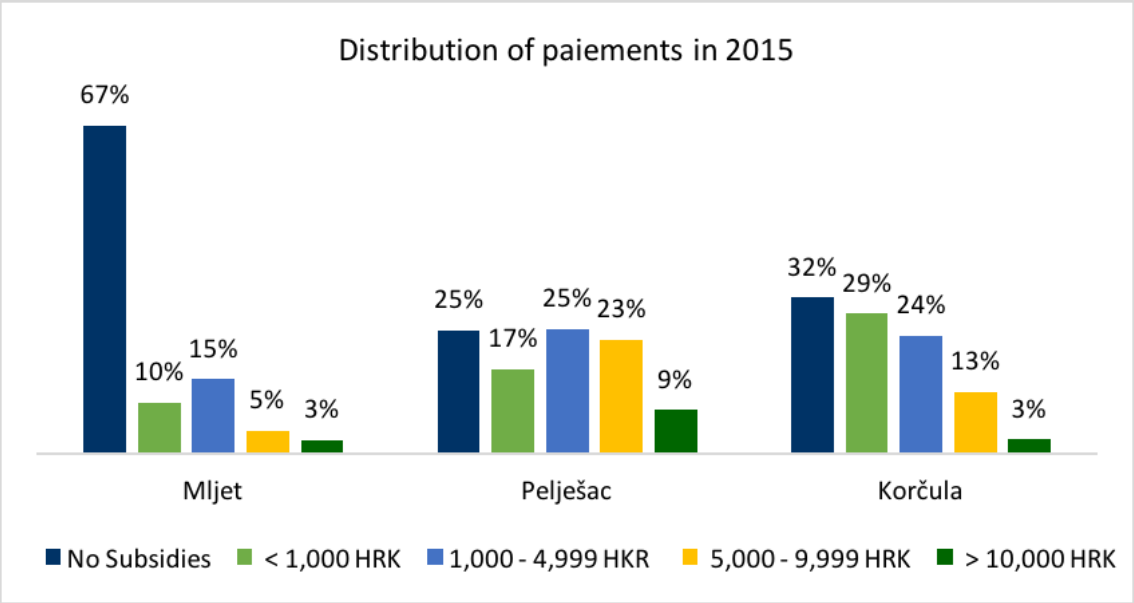


Figure 26: Distribution of registered members by subsidy amounts in 2015. (Source: APPRRR)

In Mljet, 67% of the farmers get a financial support and most of them get a small amount per year. On Pelješac, a bigger part of the farmers (30%) obtain a bigger amount of financial support (more than 5000 HKR) than farmers on Korčula (15%), who are more numerous.

One of the common issue that the farmers don't get any subsidies come from the land size and the ownership problems. Also, the amount of time spending and the complexity of the application forms stop some of the farmers from asking for them.

> *"Too many owners on one piece of land, and we cannot collect the European money"*
>
> Interview with a fireman in Mljet – M29, p.150

3.1.7 Water and waste pressure due to agriculture and tourism

3.1.7.1 Access to water

Water is a big issue during the summer. Indeed, the population increases due to tourism. Pools, very demanding in water, are built and subsidized by the state. Also, agriculture needs more water during the same months.

> *« Generally, there is no such big water problems, but during the summer there is a lack of water because of a lot of tourist (around 20 000 in July and August) and because of drought. »*
>
> Interview with the regional water supply director - P29, p307

Water comes from different origins. People collect rainwater for irrigation or for domestic use but during the summer, the rain is insufficient. Korčula and Pelješac are connected to the coast by a pipeline coming from the Neretva river (Figure 27). But all the villages are not connected to the pipeline, so people buy water from the firemen. The two first trucks of 8 m3 per household are subsidized by the municipality and the price is 200 kunas per truck. Then, the price is not subsidized anymore and the cost is greater, depending on transportation.

The pipeline is getting old and apparently, there are many leaks and the loss of water represents around 50% of the water, according to a water supply director in Pelješac.

> *"There are problems of low pressure in places that are high in altitude. The problem will be fixed when they change the pipes (that date from the Austria-hungarian times). They have too much loss - 50%."*
>
> Interview with the regional water supply director - P29, p.305

> *"In Lastovo there is a problem, they can`t drink water because some of the pipes are ruptured and the sea comes into them."*
>
> Interview with the regional water supply director - P29, p.307

In Mljet, there is no pipeline at the moment. It is built but still not connected in Žuljana area. However, water is easily available thanks to the 3 desalination plant, municipality and the firemen.



Figure 27: Map of water management system

3.1.7.2 Waste water management

The waste water is filtered by a mechanical system and released in the sea. There is no biological treatment. Waste water can also be collected in septic tanks because some houses do not have any sewage system.

3.1.7.3 Waste management

By developing tourism, the islands produce more solid waste. It is an issue because nothing is recycled. Garbage are collected and sent to a landfill. A part of the waste is sent to Bosnia in a waste disposal. (Figure 28 and Figure 29). The Dubrovnik and Blato landfills will be closed next year but there is no visibility as to where the trash will be taken. There was a plan to build a recycling and composting plant. EU financed it about 80% but in fact it was never completed, according to the regional water supply director – P29.

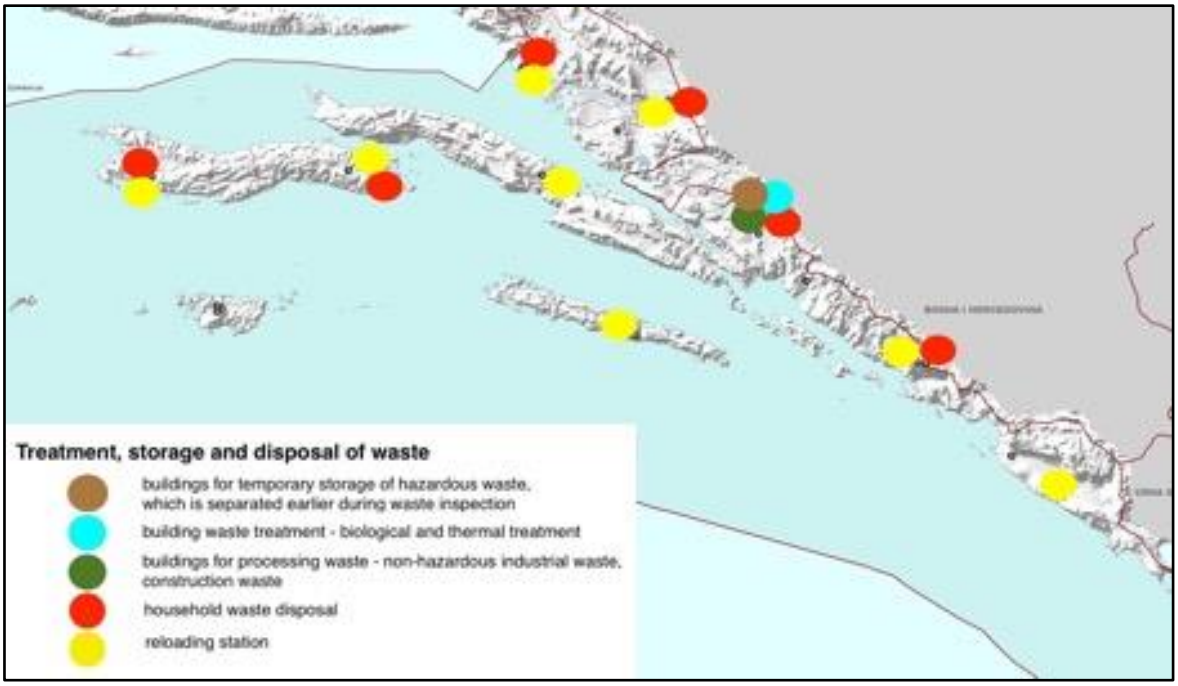


Figure 28: Map of waste disposal in Mljet, Korčula and Pelješac (source: County Institute for Regional Planning)

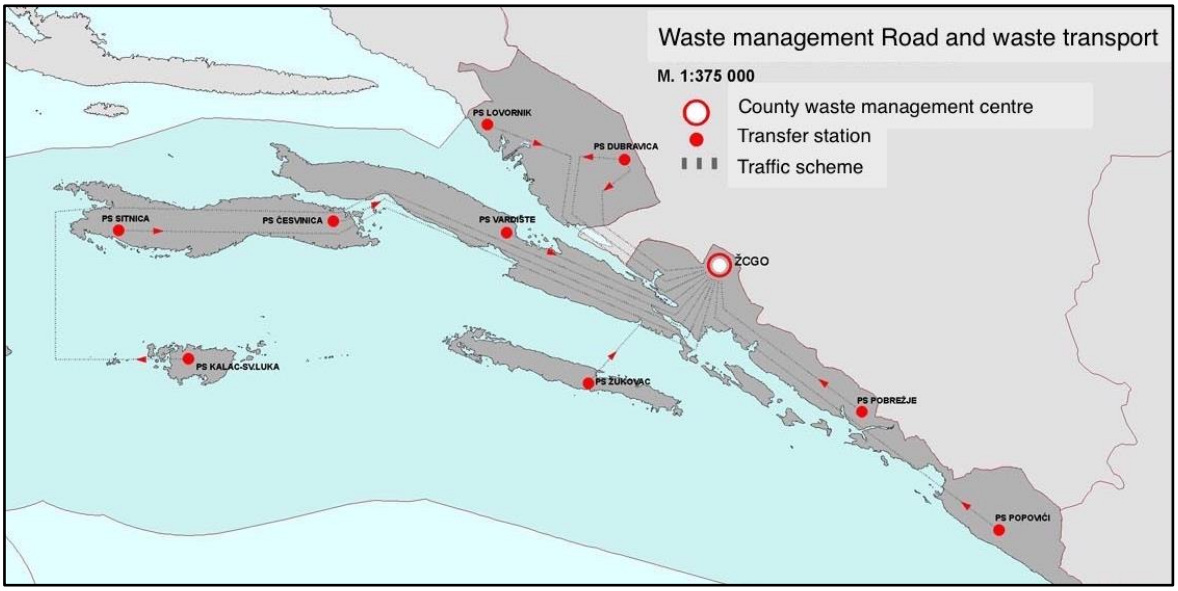


Figure 29: Map of road and waste transport in Mljet, Pelješac and Korčula (source: County Institute for Regional Planning)

Tourism puts pressure on water resources. Some structures were built to answer to water. Concerning to the waste water and solid waste, the problem is more serious. It can create pollution and be dangerous for biodiversity. It can also be an issue for HNV farming and organic practices.

With this part we learned that agriculture shaped Korčula, Mljet and Pelješac, but that it at been reseeding due to social, economical and demographic change. We will now see how those dynamics affect HNVf.

3.2 HNVf in the region

For LAG5, HNVf could be an opportunity to preserve natural and cultural patrimony while generating a more sustainable development than mass tourism. During our study, we focused more specifically on the concept of HNV and its definition, in order to define whether it is actually present on the Dalmatian islands, and how these agrarian systems could be sustained.

3.2.1 Identifying HNV farming on the Dalmatian Islands

Identifying HNV farming in the technical, economic and social functioning of production systems is essential for effective policy implementation.

The concept of HNV can be translated into an indicator for monitoring biodiversity and assessing rural development policy. Indeed, scientific researches in ecology and agronomy suggest a link between agricultural practices and biodiversity. As illustrated in the graphic below (Figure 30), both complex mosaic landscapes with low inputs and intensity, and landscapes dominated by semi-natural elements, coincide with high level of biodiversity.

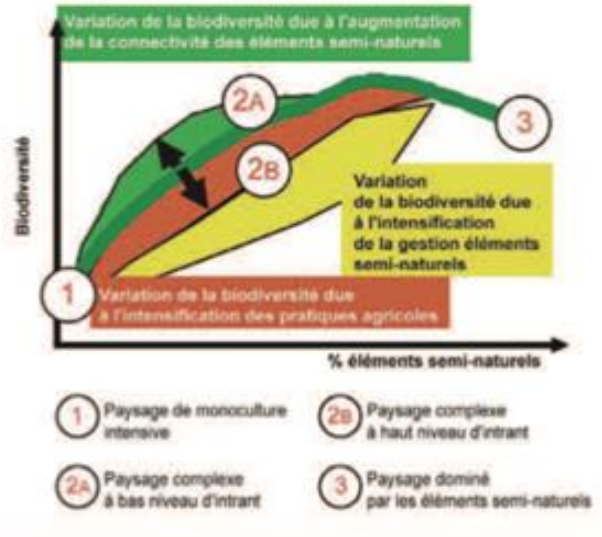


Figure 30: Relationship between biodiversity and semi natural elements (Source: Le Roux et al, 2008)

HNV farming systems are present across European countries, with a high diversity of types and extents. Beaufoy G., D. Baldock & J. Clark identified key characteristics of HNV farming systems (Beaufoy et al., 2008):

- Well established management practices -transhumance, mowing, hay making;
- Low use of fertilizers and agrochemicals inputs;
- Low degree of mechanization and rather high level of labour input;
- Breeds adapted to the local environment;
- Small scale farms, characterized by subsistence and semi-subsistence practices.

As explained in the introduction of this report, from the 3 types of HNV categorized at the European level, we predominantly observed HNV type 2 in our area of study. This type of HNV farming consists of a mosaic of low intensity farming mainly composed of small fields of arable plots, vegetable gardens, olive groves, orchards and vineyards, usually on terraces or surrounded by stone walls, which is a typical landscape pattern in the area. Indeed, Orchards and olive groves with large, old trees and a (semi-)permanent spontaneous understorey indicate

type 2 HNV farmland (Figure 31). To a lesser extent, some vineyards could be included if managed with low intensity.

Given that the identification of Type 2 HNV farmland is not without its difficulties, we focused our observations on the presence of semi-natural vegetation and understorey, the land use and farming practices that foster biodiversity, and the presence of a landscape mosaic at a broader scale.



Figure 31: Old olive groves, example of Type 2 HNV (source : European forum on nature conservation and pastoralism, http://www.efncp.org/)

Several researches underline the positive relationship between agricultural practices and features, and a high level of biodiversity. We can note for instance that dry stone walls provide suitable habitats for insects, reptiles and small mammals as well as floral diversity. Indirectly, these features also prevent soil erosion and improve water infiltration (CRPF PACA, 2012; Larcena, 2012). Furthermore, biological network are fostered by semi-natural elements such as hedges or boccages. Regarding practices, manual mowing instead of mechanical tillage significantly contributes to the overall biological and landscape diversity (Simoes et al., 2014).

In our area of study, low-input traditional olives groves are typical of HNV farming type 2, especially when coupled with grazing for sheep or goats, and limited use of fertilizer. With as much as 37 native varieties in the Dalmatian islands, the agricultural and biological diversity of olives groves is significant (UNDP, 2009). This pattern is essentially observed among subsistence and semi subsistence farmers who have orchards (olives, almonds, figs…) for their own consumption or occasional selling, rather than commercial. In these cases, the variety of crops is noteworthy, and typically found in the backyards of houses. These farming patterns still prevail on the islands, although dynamics of abandonment and rural exodus have been identified as having a negative impact on HNV farming. For example according to the EFNCP, in 2011, 93% of the families in the islands grow olives as their main or secondary work (Yanka Kazakova et Vyara Stefanova, 2011).

There are three ways of looking at HNV farming: through land cover, farming and biodiversity characteristics. Understanding all three at landscape and parcel scale is important for effective policy implementation, as well as actors' strategies and potential levers of action. Further studies need to be accomplished in the area in order to defined indicators for HNV farming and meet the challenges and obstacles faced by HNV farming systems.

3.2.2 The impact of the access to agricultural land on HNVf

We just saw that HNVf can be observed at the scale of a parcel, it is also based on a comprehensive network of landscapes related with human agricultural activities, and therefore the question of land ownership and land use are central to the existence of HNVf.

3.2.2.1 An unreliable land ownership system

During our interviews, we learned that access to proper land ownership is a huge problem not only in the islands but throughout Croatia.

> *"According to him land ownership issues is the main obstacle to development in the region. The government is managing land ownership poorly."*
>
> Interview with a restaurant owner - M 16, p 65

Since the 19th century, land ownership has been managed through the cadastre and the land registry. The cadastre determines the limits of the land and it is used for taxes. It is handled by municipalities and is now digitized. The land registry reflects ownership tittles and transactions. It is managed by municipal court. The court of Dubrovnik is responsible Mljet land registry.

After 1945 and during Yugoslavia both cadastre and land registry were neglected. It lasted until 1953 were the administration tried to update the cadastre for tax purpose. After the independence and Croatia joining the European Union some attempts, relying on municipalities, were made to update both cadastre and land registry but due to lack of willingness and means it had little effects (Cetl, Roic, and Ivic 2013)

A 1999 law planned for a cadastral survey for all municipalities (Official Gazette of the Republic of Croatia, 1999. Law on State Survey and Real Property Cadastre. 128) but by 2008 only 30 over 3 300 had been completed. Today there is a unified electronic "real property cadastre" but it still needs to be homogenized with actual ownership and the land registry. It is not rare that the last known owner immigrated more than a century ago in Australia or America. It also happens that the inheritance was never settled because it costs money and the land has several owners.

> *"The village knows that your land was divided between us two, and it's enough. No one claims the land, we know where the boundary is, and it's enough! But after three generation of such practice, we leave for Australia and leave everything there ..and whom has the land to ? The last entry is from 19th century... And it's a problem, it's a huge problem! Because I can disembark in the island and I want to start some agriculture, and I have enough money to buy the land or to rent the land, but I cannot do it because there is no one than I can buy the land."*
>
> Interview with a scholar, Split - O12, p. 509

> *"You can't do it because this is on private lands. We should make agreements with the owners to act on their land, but some are in Australia, some in Europe, you don't know exactly the owners."*
>
> Interview with an ecologist from Mljet National Park, Mljet - M24, p. 113

A new law was passed in 2007 (Official Gazette of the Republic of Croatia, 2007. Law on State Survey and Real Property Cadastre. 16) promoting a gradual homogenization, meaning both cadastre and land registry are updated and regularize when needed by the owner. However, it takes time and money to update the status of lands on these administrative tools. The owner needs to go in front of the court. (Cetl, Roic, and Ivic 2013) The regularization might take more than ten years.

"In Croatia you buy land, you pay the tax and then you go to the tribunal to regularize it."

Interview with a farmer based in Mljet - M8, p. 42

Leading people to rely on common knowledge of whom is the legitimate owner to access the land in an informal way.

"It is his land but the name of his grand-father is on the papers. He is dead so it is too complicated to change the papers."

Interview with a farmer in Korčula - K10, p 365

3.2.2.2 With consequences for farmers

The difficulty to get proper ownership on agricultural lands has a big impact on farming. In order to get subsidies, including European funds, to gain access to some labels or certifications, or to be registered as an OPG (a legal status for small family farms that leads to a specific tax regimen and subsidies), the farmer needs to have proper rights on its land, may it be by owning or by renting it.. To do so the land needs to be registered on the ARKOD (Land Parcel Identification System, LPIS) which is "the national system of agricultural parcels identification which register the agricultural use of land in the Republic of Croatia" (Tomić et al., 2016).

"The land is his according to the cadastre but not to the land registry, because some people died, some moved away. To him it is a disaster. He went to the tribunal to regularize the situation but it takes a lot of time, for one of his lands 12 years. It is very problematic. It prevents him to apply to EU funds because the land is not his on paper. It is his biggest problem."

Interview with a farmer based in Mljet - M8, p 42

In 2015 only 33% (10 679 km^2) of Croatian agricultural lands were designated as "active" according to ARKOD. The lack of security in land ownership and of available lands, combined with the reluctance of owners to sell or rent their lands, generates a very tight agricultural land market. (Budanko Penavić, 2008).

"It is hard to get bigger here as all lands belong to some people and sometimes some of them are dead. You need thousands of papers to make if you want to buy lands." It takes about 30 years according to him to buy a land.

Interview with a farmer and wine maker - P3, p 191

3.2.2.3 Public policies to easing the access to agricultural land

Municipalities have tools in order to deal with these issues but they seem to seldom use them as none of the people interviewed mentioned it happening. In Dalmatian islands, it might be due to a lack of demand for agricultural land.

"There are legal ways: nationalization, confiscation, so called sequestration… So, municipalities could do that you know, take possession of the land and then rent to someone. And then if the owners shows up all of a sudden, then a system would be done to compensate him. In a way that the municipality takes possession of the land, rents to someone and this money is put on a special account. And if the owner shows up all of a sudden from Australia, then the money is waiting for him because it's his

land you know. As if he rented the land. So, it is feasible but municipalities do not do that…. Lack of political will, lack of economic policy, and also lack of demand. No-one wants to do agriculture. If there was enough people showing up on the islands with some capital and attending to do agriculture, the municipalities may respond. But in this way no-one wants it. The municipalities do not bother and you need a very active municipality that have decided to activate the land but I don't know any example."

Interview with a scholar, Split - O12, p. 509

To address this issue, there was a string of laws in 1991, 2001 and 2008 (Act on Agricultural Land (Official Gazette No. 152/2008, 21/2010 and 63/2011)). They dealt with the disposal of state owned lands, the regulation of private land market, land consolidation and in 2008 there was a try to manage the issue of land abandonment. The first two laws encountered issues, including lack of implementation by municipalities and confused landownership, that prevented them to reach their goals, especially when it comes to state owned land (Hartvigsen, 2013). In 2015, 30% of agricultural land (738 126 ha) were still state owned (Mičević, 2015). Confused land ownership status remained a major obstacle for the implementation of those laws.

The Agricultural land Act from 2008 created an Agricultural land Agency with the sole purpose to manage agricultural land challenges. However, none of the people we interviewed mentioned its action. For the moment it seemed mainly focused on agricultural lands in Slavonia where there is more intensive farming and the demand for agricultural lands seems higher as it can be seen with the land consolidation pilot project launched in 2015 (Mičević, 2015).

However, the Agricultural land Agency advertises on its website that 11 000 ha of state owned land are available to use in the Dubrovnik-Neretva County a pretty big surface when compared with the 9 364 ha officially farmed in the county. They can be returned, leased, sold, designated for concession. We met a few farmers who gained access to these lands. Which leads us to the different ways farmers can access to agricultural lands.

3.2.2.4 An access to agricultural lands heavily relying on heritage

By analysing our interviews, we identified six different ways to access agricultural land: heritage, renting from the state, concession from the state, renting privately owned land, purchasing and informal use.

Table 7: Access to land per farming activity in Korčula, Mljet and Pelješac

Type of farming activity	Access to land in Korčula	Access to land in Mljet	Access to land in Pelješac
Self-consumption and agro-tourism	Heritage : k4, k5, k18, k23, k34	Heritage : m12, m13, m2, m5, m6, m1, m3	Heritage : p2 (can't find land to buy)
Farming as a side activity	Rent from the state : k22 Concession : k26 Heritage (mother still the owner) : k24	Purchasing : m8	Informal use and private renting : p13 Heritage, some land still owned by his wife's mother : p15 Heritage : p14, p7
Farming as a main activity	Concession : k1, Purchasing : k9 Heritage (grand father still the owner) : k10		Heritage : p10, p11, p12, p16, p6, p9, p8 Heritage, concession, rented from state : p3 Purchased: p37

Heritage

Getting agricultural land through heritage and family is the most prevalent way to access it. Some farmers have formalized registered ownership, when others have an informal access by farming the land of a relative. In this case, they usually have an agreement that formalizes the access in order to get access to subsidies, to certifications and the OPG status. Within the people we met, it is the only mode of access to land for farmers doing self-consumption and agro-tourism. The reason might be that the land was already farmed when the commercial activity was created, requiring no, to very little investment.

> *"In Vela Luka, it's a heritage of olive gardens from my mother. The land here comes from the family of my husband."*
>
> Interview of a farmer, Korčula - K4, p 342

> *"Legally they rent them, without paying them anything. It is just to legally justify their production."*
>
> Interview of a farmer, Korčula - K7, p 353

The inheritance process can lead to land fragmentation as every sibling get an equal part of the heritage.

Purchasing and renting privately owned land

It is seldom that farmers access agricultural lands through renting or purchasing. One of the reasons is that the market is not fluid because of confused land ownership and owner reluctance to sell or rent. We observed that purchasing and renting tends to be associated with more intensive and mechanized farming, vineyards and olive.

> *"People don't want to sell or rent their lands because of the cultural heritage that's come with it."*
>
> Interview at DURA, Split - O8, p 488

Renting or long term concession from the state

One of the farmers rented a land from the state to grow immortelle. It was a 15-year rent. We met three farmers with 50 years long concession from the state. They tended to have intensive and mechanized practices farming vineyards, olive trees and fig trees. Concession are associated with reopenings and several hectares land plots. In Korčula, they were granted by the Forest Department on degraded forest lands. The farmers had to cut the forest before planting. If several people are interested in the land the highest bid wins the access to the land. There are no requirements when it comes to agricultural practices or activity if it remains an agricultural one. 5-year concessions exist but we have not met anyone doing it.

> *"It took two years to get the concession from the State with a lot of paperwork. At the beginning, he wanted to do olives, then changed his mind, because everybody: was doing it. So he thought of figs. There is no need to present a business plan to get a concession. It cost him 200 HRK/ha per year."*
>
> Interview with a future fig producer, Korčula, k26, p 381

> *"They have a 50 years concession by the government to use this land. It is the 6th year now. They hope to be able to buy it in the future."*
>
> Interview with a wine maker, Korčula, K1, p 333

We are aware of one farmer trying to purchase land from the state but it seems to be a long and complicated process rigged with land evaluation mistakes. (see interview with a farmer, P2, Kuna, p 182)

Informal use

With a difficult access to land some people turn to informal use. It can be settled within their family or acquaintances or by farming an abandoned land nearing a plot they farm. This informal use is well tolerated, but it does not open right to subsidies because of the lack of proper papers allowing the access to agricultural land.

> *"For his 50 sheep, he is a using 3 ha lent to him by his neighbours. He fences them to keep the animals from running away. No contract was signed."*
>
> Interview with a farmer and agriculture advisor, Ston, - O3, p 470

> *"Some neighbours they cannot rise grass, so to clean the grass they call him and he cleans it (with his goats)."*
>
> Interview of a goat owner, Ston, P13, p 218

"No private person will rent. Here it's really often when older people give you their own vineyards to work in, and you give them some percentage of the production. But we don't do like that because we don't need more vineyards because we have our own, we need space for vegetables and grass, these things."

Interview with a farmers and restaurant owners, Pelješac - P2, p 174

3.2.2.5 *The consequences of difficult access to agricultural land on HNVf landscapes*

It is our sense that the access to agricultural land in the Dalmatian Islands has an impact on HNVf related landscape. Through interviews and landscape analysis, we identified four ways in which it might foster or disadvantage those landscapes. However, in order to establish more accurately the actual impact of difficult access to agricultural land when compared to the impact of demography and/or tourism some more investigation is needed.

Immobilized lands

A consequent portion of privately owned lands are immobilized due to confused ownership and unresolved inheritance. But we were not able to find an evaluation of the surface affected by this issue. Land restitution after nationalization under Yugoslavian state is also an ongoing process immobilizing agricultural lands that are not farmed. Finally, state owned land often lay unmanaged and the process to access them, such as concession, are long.

Those immobilized lands affect agricultural land market fluidity making the access to land difficult and leaving some arable lands unkempt. At the moment, neither land ownership reforms, nor the Agricultural Land Agency were able to fix this issue. Administrative and regularization process remain long, costly and fastidious, letting people to rely on heritage, family and informal land use to access agricultural land.

"With a 1997 law, some land was given back to the Diocese. Now 50% is still missing and under a restitution process in front of the court. Additionally, there are 3 districts on Mljet who are trying to get back some land too. Meanwhile, those lands should be under the responsibility of the municipality and they "should" take care of it. But they have interest only in the land that they get advantage from. Also, they don't have much money. When it is forest anyways, you can't do anything. The problem is where there is agriculture and houses."

Interview with a representative from the diocese, Split, O10, p 496

From a HNVf perspective this immobilization prevents urbanization and intensive agriculture. However, it also prevents smallholders to get access to agricultural lands and it leaves a lot of formerly farmed lands unkempt.

Abandoned lands

Land abandonment is one of the effect of land immobilization. It is also due to the island demography and economics with fewer people able and willing to farm. Interviews and landscape analysis showed that this phenomenon is widespread (see our landscape analysis). It is one of the Agricultural Land Agency prerogative to fight land abandonment, but its action seems very discreet. Inertia toward land abandonment is also related to the lack of demand for agricultural lands. It leads to pine forest recolonizing open landscapes, which make HNVf landscapes disappear.

> *"Also the problem with the forest is that there are mainly pine forests, and the worst kind of pine. It's not a good forest for a lot of animal species to live in."*
>
> Interview with an actor of tourism, Vela Luka, Korčula - K11, p.404

> *"This is the land of his brother but he has passed away, so this land is one of his children's. He doesn't know if he sell. So nobody is farming this land."*
>
> Interview with a farmer, Mljet, M1, p 9

Land fragmentation

The inheritance system is responsible for land fragmentation. The inherited land is divided in equal parts between all the beneficiaries. A land consolidation policy addresses it, but as for now it is not implemented in the islands. Farmers who need more land tend to purchase or to rent land, or apply for concession. From what we observed few farmers do it and there active tend to be intensive and mechanized. Informal use is also a way to access to more land. From a HNVf point of view land fragmentation is compatible with Type 2 mosaic landscape. Therefor land fragmentation is not an issue when it comes to HNVf.

> *"It is not possible to have 5 ha of land on Island, it is a miracle. It has 30 owners"*
>
> Interview with and agroecologist, Split, O13, p. 527

Competition for lands

Competition for lands with urbanization was an issue mentioned by several scholars and people working for development agency, however it was never mentioned by farmers. From what we were able to observe urbanization concentrates in cities and seashores. Actual competition with farmland seems to be limited and there is a national policy implemented by the Agricultural Land Agency to prevent agricultural land conversion to tourism. However, we did not investigate land prices and their evolution. We are inclined to say that competition for land has little to no impact on HNVf landscapes.

> *"On islands, the price is high because of the possibility to convert land on construction land."*
>
> Interview with and agroecologist, Split, O13, p.527

> *"All he knows it's still an agricultural place so it's the same price. But if there was a chance to build something, the price would go up but not for agricultural place. Nobody would buy it because it's just to do agriculture. The price is 3€ and it would still be 3€ for the land."*
>
> Interview with a farmer and wine maker, Janjina, P1, p.162

3.3 Conlusion

Learning from Korčula, Mljet and Pelješac characteristics, we have a better understanding of Dalmatian Islands as a territory and its dynamics, the way they influence agriculture and incidentally HNVf. HNVf landscape tend to disappear due to demography, a difficult access to agricultural land and tourism being more lucrative than agriculture. However, considering the islands biodiversity, culture and landscape, HNVf could be a relevant possibility for sustainable development. Building from this knowledge and our fieldwork we will now look at HNVf in the context of each of these territories in their specificity.

4. Territorial approach

This 4th part analyzes the HNV farming with a territorial approach. For each island, the field and a landscape analysis is presented. Also, the economy and activities are highlight, regarding to the HNV farming. The different interviews were compared to understand the farmer practices and the trends for each island. All the information let to interpret the actor strategies in order to understand their role. Then, the challenges for future are presented concerning HNV farming.

4.1 Mljet

We studied first the Mljet Island. After a presentation of the field, we will make a landscape analysis. We will then describe the practices of the farmers regarding the HNV farming and analyze the tourism sector. With all these data, we will propose an understanding of the role of actors and suggest some propositions for the promotion of the development by implementing the HNV farming.

4.1.1 Presentation of the field of study

The island of Mljet is the most preserved island in Dalmatia The Figure 32 illustrates the main cities and the National Park in Mljet.



Figure 32: Map of Mljet Island

4.1.1.1 Habitats

The predominant habitats in the island of Mljet are guarrigues and macchias. The plant species characteristic of guarrigues are Cisto-Ericetea (Alegro et al., 2004). Because of the geomorphology of the Croatian coast, the sandy shores habitats are very rare, moreover endangered by tourism (Alegro et al., 2004). The freshwater lakes of Mljet are moderated eutrophicated ecosystems (Benović et al., 2000). There are also sea lakes, opened on the sea.

The area of 31 km^2 in the west part of the island was proclaimed for the national park in 1960. (Alegro et al., 2004). The western part of the island (Saplunara, Blace) has the status of a protected landscape (Nikolić et al., 2009).

4.1.1.2 Biodiversity

Mljet has a stratified vegetation: the coast to 350m, there is a mix of evergreen forests (*Quercus ilex*), pine forests (*Pina negra spp. dalmatica*) and Aleppo pine. At the Dalmatian coast no pine species are native except Pinus nigra ssp. Dalmatica (Beug, 1967). Above 350m, oak forests (*Quercetalia pubescentis*) and holm oak (*Quercetea ilicis*) are distributed. Above 1200m, there are beech forests, and sometimes subalpine forests (Beug, 1967). The vegetation in the dry grassland is from the class Thero-Brachypodietea (Alegro et al., 2004).

Some of the interviewed people have raised some problems with Aleppo pine trees. Apparently they can't provide a good soil, they acidified it, so the people considered them as non-wished forests.

> *"We'll get rid of Aleppo pine. There is nothing of useful from this kind of forest."*
>
> Interview with an actor of the Mljet National Park - M24

But some others couldn't find any problem with them as they are a part of the natural ecosystem.

> *"No problem from Aleppo pine trees."*
>
> Interview with an ecologist in Dubrovnik - O17

The vegetation that belongs to the class Ammophiletea is distributed throughout the south-east part of the island and is developed on the deposits of silicate sand. This is the most intact in the whole Croatian part of the Adriatic (Alegro et al., 2004).

Regarding the species, the most frequent are Cistus salviifolius, Calycotome infesta, Petrorhagia saxifrage, Brachypodium retusum and young Pinus halepensis. A total of 716 vascular plant taxa have been recorded (Alegro et al., 2004). There are also some endemic species of plants in the mountains of Babino Polje.

> *"[In] Babino Polje you have some mountain where there is endemic species."*
>
> Interview with an ecologist in Dubrovnik - O17

4.1.1.3 Land use

Regarding the land use of the island of Mljet, most of the area is occupied by a protected forest of Aleppo pine (*Pinus halepensis*) and holm oak (*Quercus ilex*). Then come tourism and recreational use of the land, they have a medium intensity with the visitors of the National Park or the summer tourists. Agriculture, which is a mixed use, have a small importance on the land use because they are quite a few gardens, vineyards and olives groves (Nikolić et al., 2009). However, according to an employee from the National Park, the National Park plans to clean 500 ha of forest to promote agriculture.

4.1.1.4 Threats

The main threat to the environment on Mljet is the development of tourism. On Mljet, most of the tourists want to visit the National Park.

> *"One EU program said tourism was the biggest problem in biodiv. I'm not sure it is but we need balance. And we still need measurement to get balance. Each of our national park have more and more and more tourists. And everybody wants to come*

during the summer so you have a peak. And we need balance. You make tourism on the base of natural value and you make shit and destroy nature to welcome tourists."

Interview with a biologist/agronomist in Split - O14

On the coastal sands in Saplunara bay and Blace (Nikolić et al., 2009), the tourism is also a big issue because of the wish of some investors to build a resort on the beach. The abandonment of lands and the reduction of land use are also threats to open habitats.

"The biggest problem is now the lack of agriculture."

Interview with a biologist - agronomist in Split - O14

The reducing of grazing areas leads to the recolonization of open habitats by the forests and to a loss of associated biodiversity.

"Because if you loss habitats you lose richness."

Interview with an ecologist in Dubrovnik - O17

Then, the development of infrastructures and transports like roads can affect some vulnerable habitats by facilitating their access. They are a lot of invasive species, but their intensity is not known. However, people talked about conflicts with wildlife, especially with mongooses and wild boars.

"The vines have been destroyed by the wild boars [...]. The mongooses have killed her chickens because they no longer had snakes to eat."

Interview with a farmer in Mljet - M3

One person mentioned a problem with the domestic wild goats lost by their owners in the maquis. They actually are a threat to the plants because they eat their leaves, so they can damage them. On the contrary, sheep are good because they eat only grasses, without damaging the existing tree, but just maintaining opened the habitats.

"The main problem is the domestic wild goats. [...] Those goats eat the vegetation and they are making herds. [...] Goats are not good for habitats, the sheep is good because he is grazing, the goats are eating the leaves, so they destroy the vegetation, they are not grazing the grasses."

Interview with an an actor of the Mljet National Park - M24

The fires are also a big problem regarding the very big forests of Aleppo pine. The Aleppo pine forests on Mljet have a size and a high they would never have in an unprotected area. It will be a problem if they is a fire.

"[Fire] it would be a disaster here. The forest of Aleppo Pine tree, in a natural situation would burn every 20-30 years naturally, that's the way this kind of forests regenerate itself. The last big fire [was] in 1917. Those forests are very old, you wouldn't find them in a natural conditions."

Interview with an actor of the Mljet National Park - M24

All the threats and problems mentioned have to be put in regards of the context. Mljet is one of the most preserved Dalmatian island.

"I think that Mljet is the island with the minimum of problem general the pressure is very low."

Interview with an ecologist in Dubrovnik - O17

In the study, we will focus now on the interactions between the human activities and the habitats. To achieve that we will study the inhabited agricultural lands.

4.1.2 Spatial analysis and components dynamics

Regarding our problematic about the contribution of HNV farming systems to conserve the natural and cultural heritage of the Dalmatian islands, we need to define the agrarian systems at landscape scale.

First we will define a typology of agrarian landscape. Then, we will decompose for each type their components to see if the HNVF type 2, a mosaic of low intensified farming with permanent crops, is really important on the field. Moreover, we will analyze these components dynamics in terms of closure. This because of the environmental threat of open habitats colonization by the forest and loss of its associated biodiversity.

Geomorphology and agricultural activities permitted to define two types of agrarian landscape present on Mljet Island. Those types are Karstics units, divided into Doline and Polje, and Coastal villages (Figure 33 ; Figure 34).

Then on the western tip of the island we can find the National Park. Its area presents the same landscape typology, but as it presents a more important forest cover and different agricultural dynamics we wanted to treat it separately.



Figure 33: Agrarian landscape typology, North part of Mljet

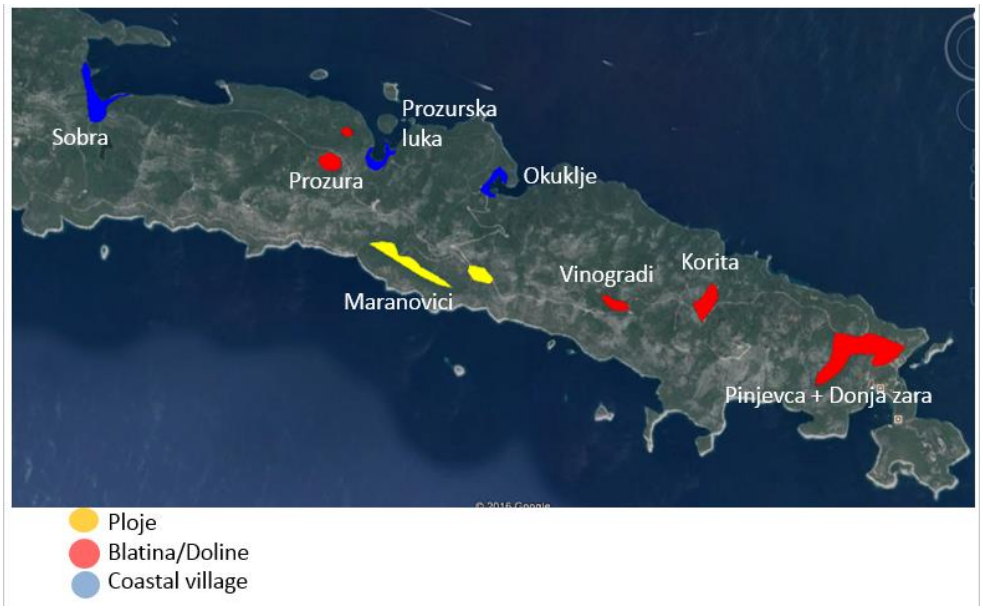


Figure 34: Agrarian landscape typology, South part of Mljet

4.1.2.1 Karstic units, main agrarian landscape of the island

Karstic formation is a term designing limestone formations from North-West Balkans uplands. By extension it designs all relief presenting the same topography (Crozier, 1941).

The following formations are all karstic units, more or less big, with common structuration and land use.

Doline

Dolines are the elementary karstic forms. Closed limestone depressions, they present a plain bottom, sometimes in cup shapes or flared (Crozier, 1941). Below the sea level, some of the dolines on Mljet island are full of brackish water, they are thus called “blatina” or “slatina” (Figure 35).

The city of Blato is an example for Doline formation.

Components

According to the Figure 35, the landscape structure is composed with:

- The village at middle height of one of the doline slopes
- Overlooking a large cultivated plain below. It's an equivalent to Ager, it means ploughed lands (Poux, 2013)
- Going up on slopes, there is the forest.

DEFINITION LANDSCAPE COMPONENTS
AGER: Cropped land
SYLVA: Woodland
HORTUS: Gardened land
SALTUS: Uncultivated lands, can be used for grazing

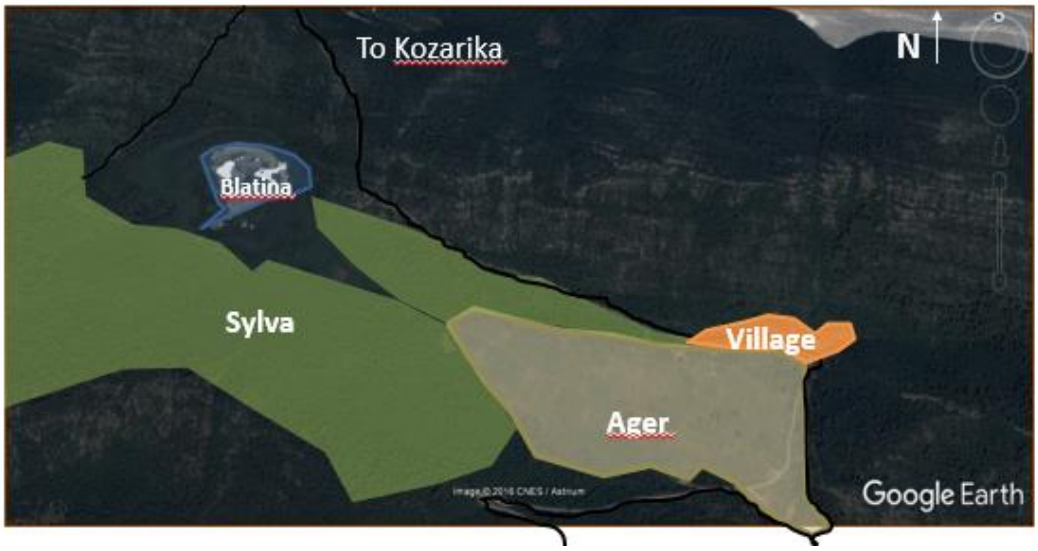


Figure 35: Blato spatial structuration, the doline example



Figure 36: Blatina of Blato



Figure 37: Agricultural plain of Blato

Topography and dynamics

The topographic scheme shows the cup shape of the doline (Figure 38)

Fallow plots on the plain shows some dynamics of agricultural lands abandonment mixed with maintain on the other plots. On the other hand, we don't see closure dynamics by forest recolonization, as there is no signs of semi-naturals elements as bushes or abandoned orchards coming close to the village.

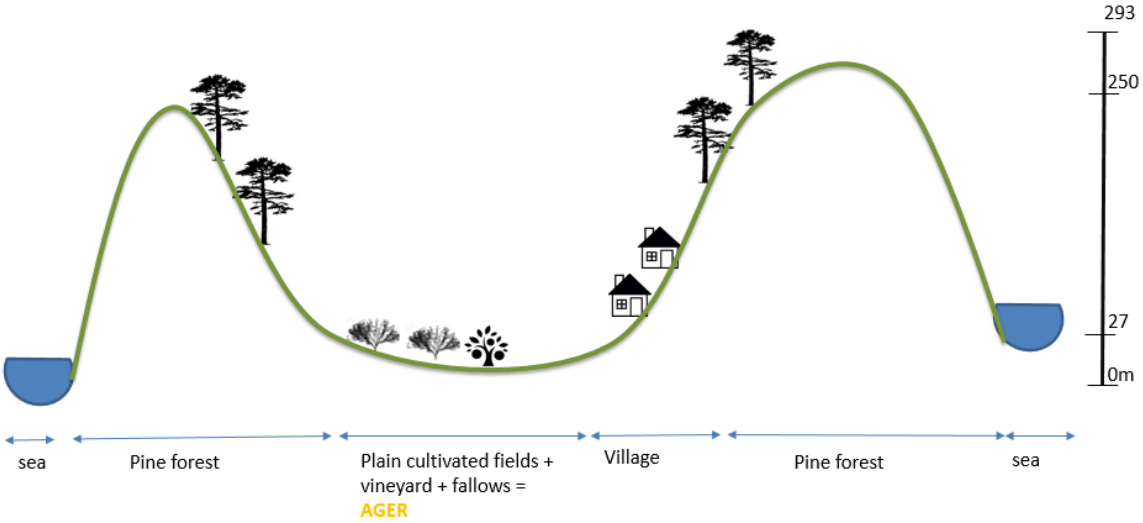


Figure 38: Blato's transect

Polje: inland plains

Of superior dimension, poljes are the biggest kartic units. They present limestones benches below the slopes, forming very flat and thick alluvial plains. There are two of those plains on Mljet island: Babino Polje and Maranovici. The last one will be taken as example to illustrate this type of landscape.

Components

There are the same components in similar position than the doline case. Differences are:

- On the cultivated plains, more fields are abandoned.
- There is a Hortus, as semi natural elements (Poux, 2013). Next to the village and going down the slope until the plain, they are permanent crops: orchards of olive trees and almonds trees on terraces, more or less bushy (Figure 39)
- Some terraces are recolonised by maquis and forest on the slopes on the coastal side.



Figure 39: View of Maranovici

Topography and dynamics

As it's also a karstic depression, poljes are quite similar to dolines in terms of topography and morphology (Figure 40). The difference is that the polje doesn't have a cup shape as the doline.

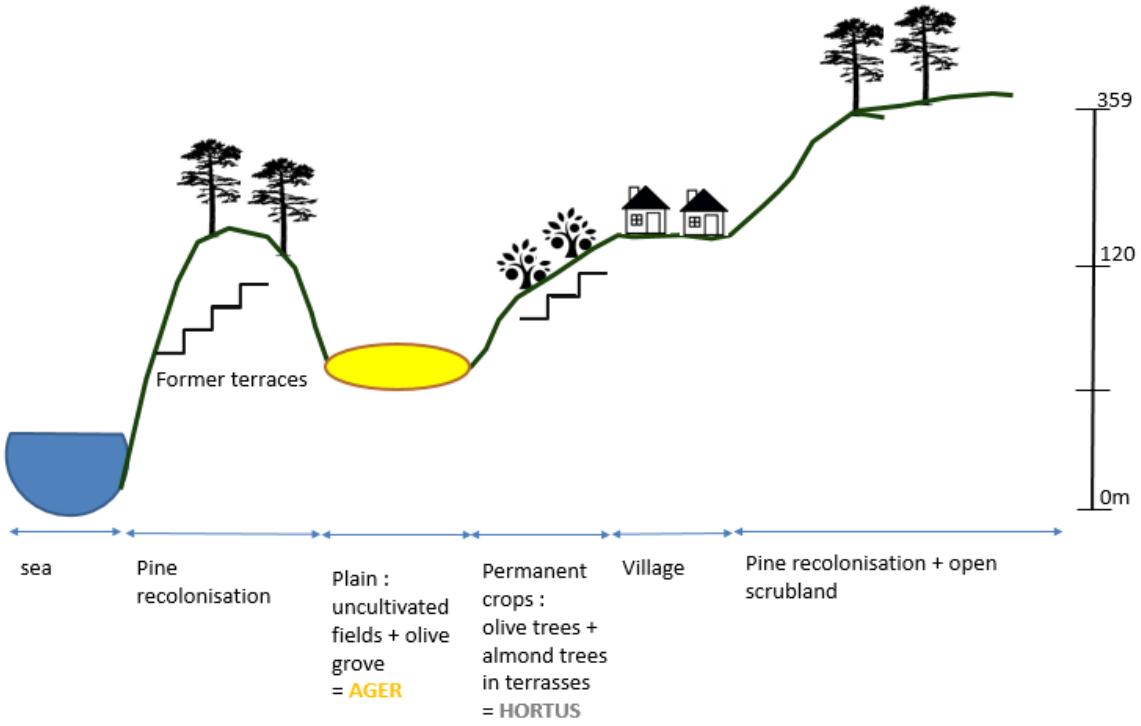


Figure 40: Maranovici's transect

We have here a more important dynamic of closure, translated by former terrace recolonization and abandoned fields. The old orchards belting the village more or less cultivated, may be seen as an area at a time of closure also, as it's a little bushy. However, it can also be an opportunity for biological networks and biodiversity habitats in a context of agricultural activities.

4.1.2.2 Coastal village with small agricultural surfaces, mainly dedicated to tourism

Mljet is also composed of numerous coastal villages. Their dynamic is different compared to the previous one. Often coupled with an inner village, these coastal villages used to be seaboard, like Kozarica for Blato. Protected by a crevice, the village is in front of the sea with its harbour (Figure 41).

From one side, there is the Ager, composed mainly by vegetable growing and orchards on special wetland made for irrigation. From the other side of the village (up on the slope), there are olive groves on terraces recolonised by scrublands (Figure 42).

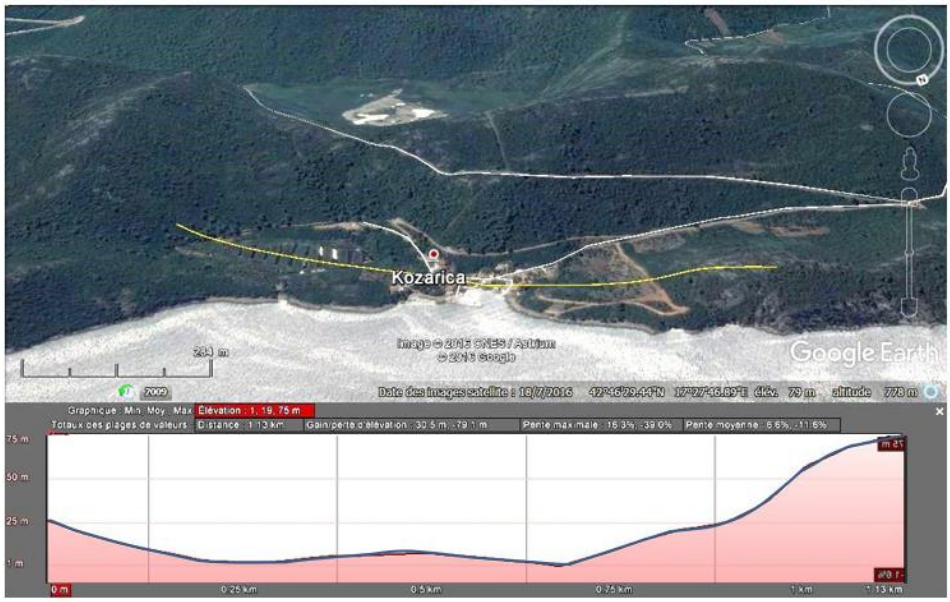


Figure 41: Kozarica : general view and contour line

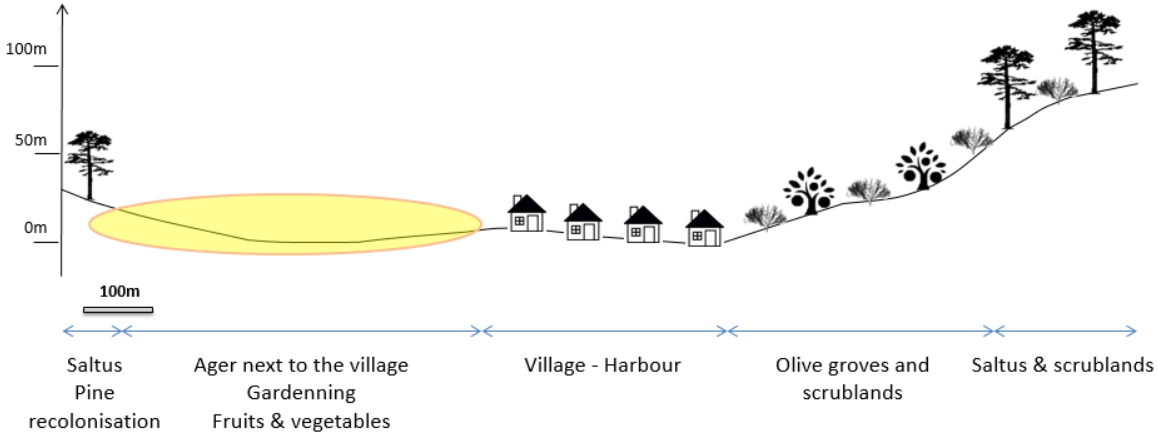


Figure 42 : Kozarica's transect

4.1.2.3 National Park, agricultural reopening's

Specific to Mljet, the western tip is managed by a National Park, with a more important forest cover than the rest of the island. The question is to know if the presence of this Park has an influence on agriculture dynamics. We found the same typologies in the National Park but their dynamics are quite different.

Agrarian landscape in Mljet National Park

We saw two agrarian landscapes on Mljet Park from the karstics type. Govedari seemed to be a good example. In fact, we still have the structure and components of the doline, like it is explained before (cf. p 63): the village is implanted on the main road, on bottom of the slope, with western orientation. Here, the Hortus is composed of olive trees in terraces returned to production. The cultivated plain is mainly made of vine, olive trees and vegetables (Figure 43).

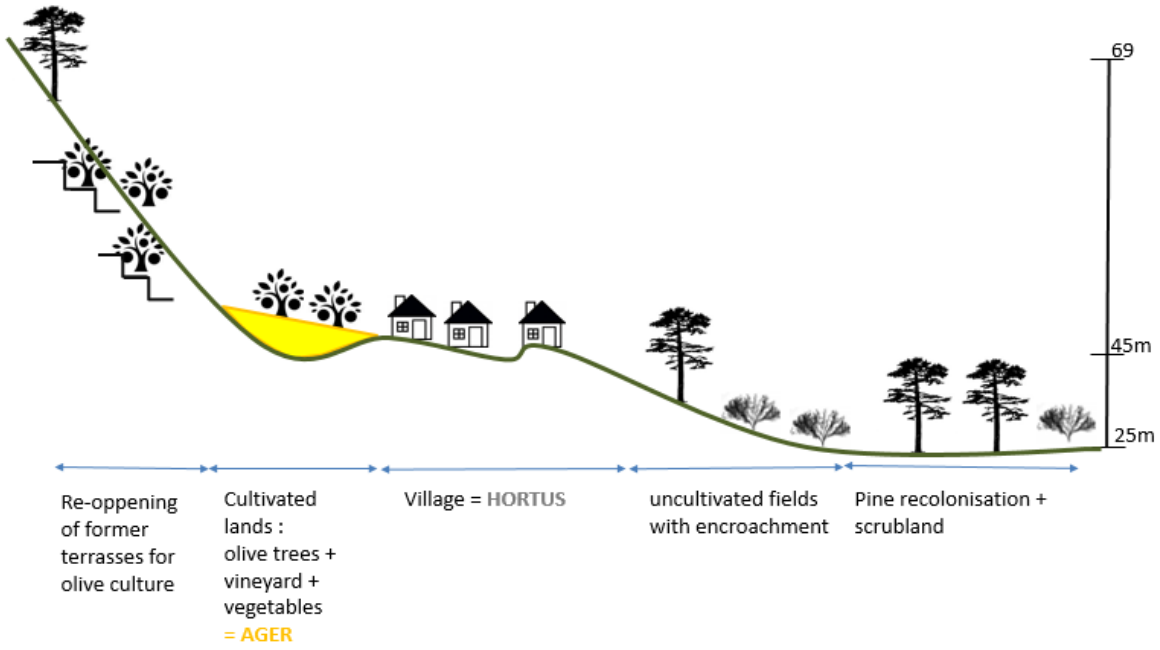


Figure 43: Govedari's transect

Coastal villages in Mljet National Park

There are also three coastal villages on the area of the National Park. But contrary to the ones we have describe before, the agriculture on those villages is resumed to small gardening, not quite the same size and importance. Here coastal villages are more dedicated to the sea and its products (fishing, shellfish farming…) and to tourism, as we saw more apartments for renting and restaurants.

To sum up on Mljet island, in term of agrarian landscape, we have units coupled to villages:

- On the inland karstic units with dolines with maintain of agricultural dynamics and less abandonment than Polje. These show closure dynamics by forest recolonization on formers agricultural lands
- On the coasts, villages are more submitted to closure dynamics. They are less dedicated to agriculture (less agrarian lands than the previous category) even if vegetable farming and orchards activities are still present.
- At the west, the National Park has influence on the dynamics of those two types. The karstic types have a more important reopening dynamics there. The coastal ones on the other hand are more dedicated to tourism with more gardening than agriculture.

HNVf issues enlighted at landscape scale are:

- A complex mosaic landscape
- Domination of semi natural elements on those landscapes
- Indeed, those elements are related to a high level of biodiversity. Those elements are on the field in Mljet:
- Crops diversity on agrarian plains and coastal gardening
- Semi natural elements as old orchards belting inner villages
- But there are threatened by closure dynamics with mainly forest recolonization on the slopes' terraces and abandoned plots on the plains. But those closure dynamics seem to be less threatening on the area of the National Park.
- After having seen the territory translation of agrarian systems present on Mljet Island and how it can be reconciling with HNVf concept, we will focus on the farmers and their concrete practices that support this agriculture.

4.1.3 Homogeneity of agricultural actors

4.1.3.1 Polyactivity

In Mljet, agriculture is very present in people's life but it is combined with tourism. Indeed, renting apartments, offering homestays or selling cooked food in a restaurant are more profitable than just producing crops. Few of them live thanks to agriculture only, but their customers are the local people or the tourists. Some of the Mljet farmers also have a job at the municipality or the National Park since agriculture or tourism alone are insufficient.

> *"I cannot live only as fireman, I cannot live only from tourism because tourism is only 70 days. I have job, fields and knowledge."*
>
> Interview with a fireman in Mljet – M29, p.157

The main cultures are olive trees and vegetables. Most farmers grow both, using vegetables mainly for their own consumption. They also cook for the tourists they host. They sell their olive oil on the side of the road to locals and tourists. Most farmers stopped growing vineyards because it is labour demanding and time consuming.

> *"Olives is not so much job. I'm working today, and coming after one month. And with vineyard you must be working everyday, everyday."*
>
> Interview with a farmer and local counsellor in Mljet – M1, p.10

> *"In history, vineyards, there were more than olive trees. Today it has reverse: there is more olive trees than vineyards. Olive tree is easier to work because you work one or two day per month. In vineyards you must be all day."*
>
> Interview with a farmer and National Park employee in Mljet – M3, p.20

4.1.3.2 Some farmer practices regarding the HNV farming

All the farmers told us they did not use chemical pesticides but organic ones. They also use manure from animal dejections or compost. Few of them use synthetic fertilizers, mainly for young trees because they are more vulnerable.

> *"The biggest fertilizer is homemade from the goats. And sometimes [I] use just a small amount of minerals for fertilizers, but just few percents"*
>
> Interview with a farmer in Mljet – M5, p.37

Some farmers told us they preferred to use a flower called Buhač (latin name: *Tanacetum cinerariifolium*) as pesticide: it is a natural insect repellent. These practices are in adequacy with the HNV farming ones to encourage biodiversity.

> *"I use Buhač, a natural pesticide, we have lavanda."*
>
> Interview with a fireman in Mljet – M29, p.157

One farmer was so proud of his practices and the quality of his oil, that he took part in an international competition to promote his olive oil.

> *"There is a kind of competition who will do better. So the quality is always good…They also have a lot of diploma… It's Nocnjak competition"*
>
> Interview with a farmer in Mljet – M4, *p.27*

Their organic practices can be explained by their own consumption of the food. They don't need to produce a lot because it is not for commercial purposes. Indeed, organic production is more depend on weather. So they don't have the pressure to be regular in their production.

> *"Just for myself because when you sell you have to put chemical on the trees because there are not enough for you if you are doing everything natural."*
>
> Interview with an accommodation owner in Mljet – M12, p.51

However, their organic practices are not valued by any label. Most farmers don't have any certification because they don't need it to sell their production. Labels are expensive and require a lot of paperwork and controls.

> *"No, they don't have a label] […] because we sell everything."*
>
> Interview with an oil producer in Mljet – M4, p.35

People are attached to their traditional practices and the way they grow their food. We met some farmers who were worried about the seeds being controlled by few international firms. These new rules came with the entry of Croatia in the European Union.

> *"Our government sign the treaty of EU. And EU has contract with Monsanto… You must buy seeds with certificate. If you don't, you cannot sell the product […] My products are much tasty and that seeds can live in dry summer. And seeds with certificate cannot. We must put water, we must have herbicide, pesticide, everything. They teach us how to control these poisons."*
>
> Interview with a fireman in Mljet – M29, p.157

4.1.3.3 Under subsidized farmers

Most farmers inherited their land but they officially share it with few dozen owners. Only 35 farmers receive subsidies for their agriculture, ie 33% of them. There are two reasons: the very small size of lands and the problem with the cadastre. Farmers can't prove they are the owners.

In Mljet, farmers can have few subsidies if they grow their crops in the National Park. They can receive 10 kunas per olive tree per year. (M9 interview with a farmer in Mljet).

With low subsidies, the production is scarcity profitable and the market opportunities are small.

4.1.3.4 Market opportunities

Farmers don't produce enough food to export outside the island. They sell their surplus to tourists with a high price, as high quality local products (olive oil in side road). There is no green market in Mljet. It illustrates that people are growing vegetables for themselves mainly.

> *"During some manifestation in the summer, the boats come and they sell local products because the quality is incredible."*
>
> Interview with an oil producer in Mljet – M4, p.33

> *"What is produced on Mljet represents maybe only 5% of what is needed on the island in tourist season. But for vegetables: owners produce maybe 95% of their food."*
>
> Interview with a water and waste manager in Mljet – M28, p.150

4.1.4 The local economy: more and more intertwined with tourism

4.1.4.1 Tourism gaining momentum

Although agriculture still is important and has been historically a major economic activity, previous studies made on this area showed the growing importance of tourism, which has become the most significant economic activity, slowly replacing agriculture (Ivana Botica, Josip Grgić, Vinko Muštra, Slađana Pavlinović, Blanka Šimundić, 2016) (Croatian Bureau of Statistics, 2011). Our interviews reflected this trend, showing that tourism is the main source of income of most people. Of all the people we interviewed, almost all were actually involved in farming, but the majority of the people lived from tourism.

> *"- Do you earn more from agriculture from agriculture or from renting from the flats?*
> *- From apartments.*
> *- How much percent?*
> *- About 20% olives and 80% apartments. About. Maybe 90 or 100. This is my hobby (olive trees)."*
>
> Interview with a farmer in Mljet, M1, p.10

> *"He rents 5 or 6 apartments in the village, which represents about 90% of his financial in-flows. He rents out his apartment for 60€/day."*
>
> Interview with a farmer in Mljet, M2, p.15

Rather than a sudden boom of tourism external to agriculture, there seems to have been a progressive shift from agriculture to tourism. We met several people mentioning this idea that agriculture is something from the past, and that farmers are converting themselves to tourism, abandoning partly or completely their agricultural activity. In other words, people's behaviors have changed – it's not some 'agriculture actors' being replaced by 'tourism actors' that would be distinct from them, but the same actors doing less agriculture and more tourism. A lot of people actually are involved in both.

> *"- So, any kind of agriculture will be a good thing, but people don't want to do it anymore, why would they?*
> *- They prefer open a house near to the sea and rent apartment."*
>
> Interview with an ecologist, M24, p.115

> *"Everyone on the island has a job in tourism and do agriculture."*
>
> Interview with a guesthouse owner, M10, p.47

> *"In the past people most grow some grapes and olives and they make wine and olive oil now they are lot abandoned agriculture and now they are living of the tourism and renting house and that's theirs."*
>
> Interview with a member of the city administration, M21, p.84

Historically, it seems that the form of tourism that developed first was very integrated to agriculture. We met some farmers who saw very early on the potential of tourism to develop their activity.

> *"They started selling fruit and vegetables in 1955 for the first tourists. From 1955 to 1980, they were the biggest producers of fruit and vegetables on 6ha in Blatina and Slitena"*
>
> Interview with guesthouse owners - M17, p.71

Now, this seems to have become more common, or even standard in some areas. We have a lot of examples of such activities, where people sell their products on the side of the road, or open a little informal home restaurant, and then even sometimes open a form of guesthouse or rent out apartments.

> *"He sells a few of his vegetables to tourists if they come ask him at home."*
>
> Interview with a guide in the National Park - M9, p.46

> *"So, in 80's the tourism started to rise. The tourism started when the National Park open in the 60s but in the 80s it was good. And in 80s arrived pensions, they were good guests because people slept, then we prepared food for them and then they will go with us fishing. So we do with them our activities. It's agritourism."*
>
> Interview with a villager - M27, p.130

Notice that all areas are unequally involved in this trend. The National Park seems to attract a great number of people, as well as some cities on hiking paths, where tourists can stop on their way. Still the growing momentum of tourism is clear.

> *"- Do you serve food in your place for tourists?*
> *- No. But most of the people do. For example, in Pomona there are 20 houses and 16 of them are restaurants."*
>
> Interview with a guesthouse owner, M12, p.51

> *"- How many locations are there for tourism. There are some all over the island?*
> *- Babino Polje was the only place without apartments, but now they have 6 with the pools.(…) Tourism is increasing of 10 to 15 % per year."*
>
> Interview with a community agent, M25, p.125

4.1.4.2 The main drivers for tourism and their link – or not – with agriculture

We observed two main logics behind this conversion to tourism. The first reason to switch from agriculture to tourism is because it is more profitable for less work. Working in tourism enables you to live a more comfortable life.

> *"Without tourists, the population would decrease on the island. Not a lot of people want to work on the land, it's too hard."*
>
> Interview with a farmer in Mljet - M2, p.15

> *"In the past it was really difficult to live in the island, now with tourism, you can earn money in summer and live the whole year."*
>
> Interview with farm & guesthouse owners, M14, p.61

The second reason is because tourists are the main constituents of the demand for food for export, when markets beyond the island would be very hard to reach (the transportation costs being decisive deterrents). Tourism is indirectly a good way to make more revenue from agriculture, which would otherwise just aim at self-consumption – like in the past. We met a lot of people who spend most of their time in their farming work, but use tourism as a side activity that brings them a significant part of their revenue from agriculture.

> *"- And do you sell your olives?*
> *- A little bit. Not so much. For France, for my guests.*
> *- Only oil?*
> *- Only oil. For my guests, for my friends, and for my family. My children help my sell olive oil."*
>
> Interview with a farmer, M1, p.10

> *"Without tourists, there is no access to the market. Tourism is the only way for this island."*
>
> Interview with a farmer, M2, p.15

> *"- His idea, he's old man but he thinks perfect. He want to connect the agriculture with tourism and also the quality product.*
> *- Do you receive some tourists here?*
> *- Yes. They want to build some kind of part of building to taste the oil and also eat the cheese. […] 100m from the cave, the tourists in the season they walk here, lots of people, so they stop here to buy and eat the cheese. They opened a kind of tastery."*
>
> Interview with a farmer, M4, p.32

4.1.4.3 *Environmental and social impacts of tourism*

These two drivers for tourism that we mentioned have opposite consequences on the existing agriculture system. The first trend – for easier money – appears to have weakened agriculture systems to some extent, because people just quit their farming activity and put little care in the origin of their products.

> *"- And environmentally, how do you think agriculture and / or tourism could be made better? What can be improved?*
> *- I think a lot could be improved. Let's say… now we have a lot of restaurants that buy vegetables from the mainland without question about quality, and I think a lot of that could be improved on the island. The tourists come in the summer months when we should have these products on the island. But the problem is that there is not so many people who would… You know there's many people who do other things."*
>
> Interview with a waste & water expert, M28, p.149

> *"Some mistakes have been made by the government and the municipality after the war: they didn't protect this place. They didn't put some « level of quality ». (…) You mustn't cheat on your guests and give them some wrong food"*
>
> Interview with restaurant & apartments owner, M20, p.80

The second trend – for some kind of agriculture-friendly tourism, or agrotourism – rather resulted in an improvement of the overall image of agriculture, which appeared as a strategic lever for profitable quality tourism. In a nutshell: tourists appreciate traditional agriculture.

> *"- Can I ask you a last question? Are the tourists who rent you flats interested about the history of the island, your work here, the agriculture and consuming your products?*
>
> *- Vineyard no. And for olives oil yes, they are very interested. And for fish also."*
>
> Interview with a farmer in Mljet, M1, p.13

This even makes people who wanted to move on away from farming activities get back to it. Young people settling down on the island also see this connection between tourism and agriculture as the most strategic one, to appeal to people in the tourist season, and even potentially to extend the tourist season.

> *"But now things are changing people understand that for the health reason they are going back to the fields but even for tourism. Because the tourists are demanding these products."*
>
> Interview with a National Park employee in Mljet, M23, p.109

> *"On the island you need implement both tourism and agriculture so season will be whole year not only 5-6 months. It would attract a lot of tourist because they will be interested to feel how traditional life on island looks like."*
>
> Interview with a restaurant owner, M16, p.64

However, tourism can create pressure on the water resource, even at a small scale, which not only generates extra costs, but may also cause competition with farming activities.

"It is very expensive. We need to build septic and these tank for the fresh water tanks it is very expensive. When we build a house, or an apartment, we have to build to concreate water tank and each of them cost like 1 apartment. We have 5 apartments and 3 tanks."

Interview with a waste & water expert, M28, p.142

"- I have vineyards also. I forget. But in summer the water is a problem.
- Why?
- There is no water! (…) Usually we buy water for the apartments."

Interview with a guesthouse owner, M12, p.51

At a bigger scale, the pressure can get even more problematic.

"[The waste water system] is quite problem. For example, in Pomena, place is near water and everything is going into the water. There is tanks under the houses and tourism overflowing so everything goes into the bay. (…) Water leaks in the top when there is too much water. 80-90 % of the sewage is water. In summer for example in Polace, you can smell it and it is terrible to sit in a restaurant. In Pomona it is only when the south wind blows. After, you can call a truck from mainland and it pumped it out."

Interview with a guesthouse owner, M12, p.52

4.1.4.4 Perspectives

The evolution to a more agriculture-friendly form of tourism is considered as an opportunity for a revival in agriculture, which would revitalize the island's economy, foster more environmentally-friendly practices, and as a consequence improve the quality of life of farmers.

"The people are only motivated if they see the financial benefit of some action. And we are here to help them understand the financial benefit of that action. We need to upgrade agriculture because it will provide us good quality tourists."

Interview with a National Park employee in Mljet, M23, p.109

"[We] want to connect his activities to tourism. [We] want to keep traditional (hundred years ago practices) today and share with tourists."

Interview with young farm & guesthouse owners, M14, p.59

However, people who are involved in this kind of tourism seem to be a minority.

> *"There are the only one in the village. And they are the only one to propose such activities (goats, cows and everything). (…) He doesn't want to do that just to be rich. He just want to live. He wants to have four cows for making milk and cheese for his family and few tourists."*
>
> Interview with farm & guesthouse owners, M14, p.60

> *"He opened this restaurant in 1986. It is the first restaurant that opened on the Island that offers specialities from the Island. 95% of the ingredients in my restaurant come from the Island. I get meat from the continent, a small producer. Fish from Mljet, or really close, and all the other ingredients are organic : all the vegetables come from a guy in Babino Polje. (…) He is 50% more expensive than the guys that offer pizzas, but he makes high quality food, with many specialities."*
>
> Interview with restaurant & apartments owner, M20, p.79

There are actually discussions on the role tourism should play on the island. On the one hand, some people seem preoccupied by the growth of tourism, and would not like to see it expend too much.

> *"The big industry is not good for the village. I love tradition."*
>
> Interview with a farmer in Mljet, M6, p.40

> *"It's a good thing for everybody. Although there need to be an equilibrium so that the area doesn't finish like Spain. But these things are decided by the politics."*
>
> Interview with a guide in the National Park, M9, p.45

On the other hand, some people are more favourable to an unlimited expansion of tourism on the island, to the extent that it could cause major competition for water and land use.

4.1.5 Strategic actor analysis

After analysing local actors and their strategy, we understood that, on Mljet, some actors, like for instance the National Park of Mljet and the LAG5 could be the driver of an HNV farming project, whereas, some other actors should be involved to reach the target of such projects. We chose to sum up our analysis in the following table (Table 8).

Table 8: Strategic actors' analysis - Mljet

Actors	Weight in negotiation / Influence on land management	Interest and objectives	Role in HNV strategy
Municipality	Medium / High	Economic development through tourism Infrastructure development Development of local employment (Interviews with Mayor of Mljet, M21, with LAG5 01)	To be involved in set up process to solve historical land management conflicts.
National Park (NP)	High	Budget: 20M Kunas Willing to preserve nature and endangered species Willing to support sustainable tourism development and linked infrastructures Creating cultural identity Development of economic activities that rely on the sustainable management natural and cultural heritage Development of local employment (Anon, s. d.) Solve land ownership issues (Interviews with NP Director–M23)	Environment actor, driver of HNV Need of translation of environmental stakes into economic development objectives.
Private actors : Hotels / restaurants (alien owners)	Low	Company development Infrastructure development (roads, pipeline) (Interviews of tourism actors in Mljet – M18, M19)	Control their development Support local sourcing
Private actors : Local accommodations	Low	Preserve their landscapes and their quality of life (For some of them) : Develop tourism activities with NP as a brand name for their business They use their agriculture production for tourism activities (Interviews of tourism actors of Mljet – [M9;M20])	Target for HNV strategy
Diocese of Dubrovnic	Limited to their own lands	Take back their land from communist period Manage their lands and have a share of NP entry fees They rent their land for agricultural activities at a very low price. (Interview of church employee on Mljet, M30 ; Diocese of Dubrovnic,	Actor to target to encourage HNV farming on their lands.
LAG 5	Mediator	Organize negotiation Avoid conflicts Find trade-off between parties Preserve cultural and natural heritage (Interviews of LAG5 : O1; M25)	Mediator

"Progress in tourism can't rely on apartments and small [...] apartments, small houses, hostels. They need to bring some hotel that have 50 more rooms 5 stars to bring some rich client who will spend their money in tavern."

"Investors have money and they are very interested in building some hotels here but the problem is lot of the land on the island is nationalized by the government you know, government is owner of lot of land here."

"The problem now is with the National Park and the municipality because they are separated you know. National Park has his own borders and his own policy and there are some people who live in the National Park, so municipality can't help those people they don't have jurisdiction in the National Park."

Interview at Municipality of Mljet – M21

"By the law, our municipality of Mljet, we tried, as a National Park to made some notes, we wright to them, we tried we tried, and, you know, we can use all the influence we have. We used it to reopen the books [land ownership], we used it to explain to the people who are on the state level how important that is, but we just can't use our influence locally."

"Yes [We have more influence than the municipality] because we succeed in reopen the books. Yes because, you know, you have a National Park, and ministry."

Interview with an employee of the National Park of Mljet – M23

"You have different types of informal meetings. We have of course the mayor and the national park have meetings where they are… one is advocating for his needs and demands and he's actually representing his electorship, and the national park which is representing the … let's say the interests of the environment, with this environmental mission, and well, they were all doing trade-offs. So it's all about doing trade-offs, compromises and finding a middle solution."

Interview with LAG 5 – O1

In the particular context of land management of Mljet, the key driver of HNV projects would be the national Park, and the targeted actors will be the local farmers who have side activities as we saw earlier. But the municipality and the diocese of Dubrovnik should be involved in the projects to reach the main part of targeted actors and tackle the historical land conflicts, by translating environmental stakes into economic development goals.

4.1.6 HNV farming challenge

4.1.6.1 Human resources' challenges

Table 9: Demographic evolution of Mljet from 1991 to 2011.
(Source: Croatian bureau of statistics 2011)

	1991	2001	2011
MLJET	1 237	1 111	1 088

In 20 years (1991 to 2011), the population of Mljet decreased by 12% (Table 9). The average age of the population is getting older with today an average of 50 years old.

No hospital, no high school and even more no university: the lack of infrastructures leads to a depopulation of the island by the young people. They move to the nearest big cities to study in the universities, like in Split or in Dubrovnik.

> *"When he was child, there were 200 people in that village, now they are only 30 people. All houses are empty. But they like it. The people from Karita moved near the beach and young people went to university."*
>
> Interview with an accommodation owner in Mljet – M14, p.39

> *"The other people left the village and went to the city."*
>
> Interview with a farmer in Mljet – M6, p.40

Because of this, the future of agricultural activities and land uses are unknown. Small family land owners don't know what will happen to their land because none of their children want to continue their activity and so they need to make them come back (from the interview of the wife of a farmer in Mljet – M2, p.15). They say they will earn more in cities like Dubrovnik without doing hard labor work.

> *"It's hard for young people to you know, to make progress in their careers on the island ou don't have so many opportunities like you have in big towns, lot of them move to the big towns ok they can make some careers"*
>
> Interview with the mayor of Mljet - M12, p.43

> *"He always talk with young people but now young people start to think a little bit too much … they know they can live without agriculture. … He hopes that young people will recognize they can leave with olive and agriculture."*
>
> Interview with an oil producer in Mljet – M4, p.31

> *"All the young people went out of the island"*
>
> Interview with a guesthouse owner in Mljet – M10, p.47

Even more, a part of their land will be abandoned because of the lack of labor force leading to forest recovery.

> *"Old people dead, young people escape so less agriculture more forest."*

Interview with an accommodation owner in Mljet - M14, p.59

For the same reason, cattle activity has to be stopped whereas it's very important in the HNV system and now meat has to be imported to fulfill the high demand during touristic season.

The depopulation put in danger the future of agriculture in Mljet and also the conservation of traditional sustainable agriculture practices.

4.1.6.2 *Water and waste management*

In Mljet, water comes from different origins for domestic use and agriculture. People collect rainwater in tanks and use it for irrigation or in the house. They also buy water from the three desalination plants built in 1998. During the summer, there is more pressure on water because the population is multiplied by three due to tourism.

> *"They usually use the rain during the winter, and in the summer from desalinator."*
>
> Interview with an oil producer in Mljet – M4, p.33

> *The two first 10 m^3 per household are subsidized by the municipality and the price is 200 kuna per truck of 10 m^3. Then, the price is not subsidized anymore and goes up to about 700 kuna / 10 m^3. There are also two springs, which are mainly used by firemen in case of forest fire but some people have an access to them. During the summer, the level goes down and the water can get salty (Biondic et Biondic, 2003). Thereby water is available but expensive and it can be a problem to produce vegetables, mainly in the summer.*

> *"The water, the water is the main problem. Where it's not raining, the land is dry. The main issue is the water."*
>
> Interview with a farmer in the National Park of Mljet – M3, p.20

> *"In the summer period, when there is no rain, there is no agriculture here. So everything what we plant, we replant in autumn or in winter, so it is all done till summer period, and then we are done, and during the summer for three summer months, there is nothing green here"*
>
> Interview with a water and waste manager in Mljet – M28, p.135

Water is more easily available thanks to the desalination plant, so its consumption is increasing. And we can forecast further increase in water supply when the pipeline will be connected. The pipeline project consists in bringing water from the Neretva River to the coast. Most of the pipes have been built already, only 3 km of pipes are still missing in Žuljana. The project has been put on hold since the intervention of a local environmental NGO who denounced the negative and destructive impact that the pipeline construction was having on the biodiversity and the environment in Žuljana.

> *"People are using more and more water. In the past, they knew they have to… they know the quantity of water they in their tank. Then in 1998, the desalination plant was built, and they saw they can order water, when they need water."*
>
> Interview with a water and waste manager in Mljet – M28, p.144

More consumed water means more wastewater that goes untreated. Some houses have septic tanks and in the National Park the water is collected by a sewage system. The wastewater is filtered by a mechanical system and released in the sea. There is no biological treatment.

> *"Waste water? That's also a problem. Now, we are making a system for treat National Park. But still in another part of the island, nothing is done."*
>
> Interview with a water and waste manager in Mljet – M28, p.137

> *"80 90 % of the sewage is water. In summer for example in Polace, you can smell it and it is terrible to sit in a restaurant. In Pomona it is only when the south wind blows. After, you can call a truck from mainland and it pumped it out."*
>
> Interview with an actor of tourism – M12, p.54

By developing tourism, the island produces also more solid waste.

> *"In the winter, it is like 10 tonnes a week. And in the summer, 10 tonnes more."*
>
> Interview with a water and waste manager in Mljet – M28, p.142

The island doesn't sort the waste. Nothing is recycled. The problem is solved by collecting and sending the garbage to Dubrovnik. There is a disposal site there but it will be closed next year and there is no visibility as to where the trash will be taken.

> *"We collected the waste here on the island and we transport it to Dubrovnik."*
>
> *"Also have a big problem with waste in Dubrovnik. They just dispose waste in a pile in a very big area, now they have to close it."*
>
> *"There is also another option, to dispose it in Bosnia, because they are very dirty."*
>
> Interview with a water and waste manager in Mljet – M28, p.140

We observed some rubbish on the beach especially on the National Park because the sea brought them back. Wastes are a potential problem for terrestrial biodiversity and soil quality.

4.1.6.3 Conclusion for Mljet regarding the HNV farming

Farmer practices are environment-friendly: most people said not to use pesticides and fertilizers. There is a lack of breeding because of depopulation and disinterest of young people. Farmers compensate by buying animal dejections to fertilize the soil and they use some herbs as a natural pesticide. This is a very positive point for HNV farming and biodiversity. A major problem is linked to the water. There is a pressure on this resource during the summer, especially since tourism is also water demanding. The pipeline could solve the problem but the infrastructures are inexistent to treat the wastewater. So the danger is to release some pollution in the sea, creating problems with undersea biodiversity.

4.2 Korčula

4.2.1 Field Presentation

The Island of Korčula Island is the most populated in Dalmatia (Nikolić et al., 2009).

4.2.1.1 Habitats

The pine forests of Korčula make the island one of the woodiest in the Adriatic (Krklec et al., 2011). We can distinct two zones of vegetation:

- A vegetation zone of wild olive (*Oleo-Ceratonion*) on the southern slope of the island, mostly represented by Aleppo pine (*Pinus halepensis*) forests (Nikolić et al., 2009; Krklec et al., 2011).
- A vegetation zone of Holm oaks on the northern slope of the island, mostly dominated by Holm oak forests and macchia (*Myrto-Quercetum ilicis*) (Nikolić et al., 2009; Krklec et al., 2011). Holm oak (*Quercus ilex*) are the most important forest species on the island (Nikolić et al., 2009).

The sandy shore (Pržina at Lombarda) is very important as we can find psammophyte types, and many are classified by the IUCN Red List as critically endangered or threatened species (Nikolić et al., 2009).

4.2.1.2 Biodiversity

On Korčula Island, we can find a lot of species characteristic from each habitats. For each habitat some species are threatened, to different levels, according to the IUCN Red List (Jeričević et al., 2014):

- Dry grasslands: Briza minor (NT), Trifolium mutabile (SP)
- Dalmatian black pines forests: Cephalanthera damasonium (NT; SP)
- Olives groves: Consolida brevicornis (CR; SP)
- Ruderal habitats: Cynanchum acutum (EN; SP)
- Along roads and paths: Marrubium peregrinum (EN, SP)

A total of 990 taxa of flora have been recorded on the island of Korčula (Trinajstić, 1998) with 945 taxa of vascular plants (Krklec et al., 2011).

4.2.1.3 Biodiversity linked to agriculture

The agricultural areas are threatened, since they are abandoned, by the spread of Aleppo pine that brings an increasing risk of fire. As tourism development strategy in Croatia wants alternatives to the "sea and sun" attraction, the traditional agriculture is integrated, with modern tourist facilities, to the tourist offer in Korčula (Krklec et al., 2011). This is an important way to preserve the cultural heritage as well as the natural one.

4.2.1.4 Land use

Regarding the land use of the island of Korčula, the territory is approximately well divided into three uses: the agricultural lands (mainly olive trees and vineyards), forestry and tourism (Nikolić et al., 2009).

4.2.1.5 Threats

The main threats to the environment of Korčula Island are the urbanization, but also the development of tourism, recreational activities, infrastructure and transports. The intensification of the way of farming can also be a threat to the biodiversity. The come the natural phenomena like fires, that can severely destroy the forests (Nikolić et al., 2009).

4.2.2 Spatial analysis and components dynamics

Bigger than Mljet and with a more important production of wine and olive oil, Korčula Island possess agrarian landscape forged by those activities in adaptation of its geomorphic context.

Thus, in type of agricultural landscape we can see internal plains more or less diversified, at the East coastal slopes of olives trees on vines on terraces and at the West the tip of Vela Luka covered of olives trees (Figure 44).



Figure 44: Agrarian landscape typology, Korčula

4.2.2.1 Plains

More or less all oriented East-West, the agrarian plains on Korčula look quite the same.

With the village in the middle of the slop, below the arable lands. But the plains are like divided in two parts:

- One with more diversified plots, making mosaics between olive trees, vine, fallows, ploughed lands and trees,
- While another part is exclusively covered of vine with bigger plots. That's the case in Blato and Cara, the 2 biggest plains of the island (Figure 45: Structural elements of the plain in Korčula, the example of Cara).

Then the slopes are covered by olive trees on terraces, in state of abandonment the more you goes up further from the plain (Figure 45 & Figure 46).

About this last point the area between Blato and Cara made exception. It's a hilly area where each deep is an agricultural plain, and here the terraces are reopened to grow olive trees.

In this area cultivated lands are not associated to one village but to several houses dispersed alongside the plain.

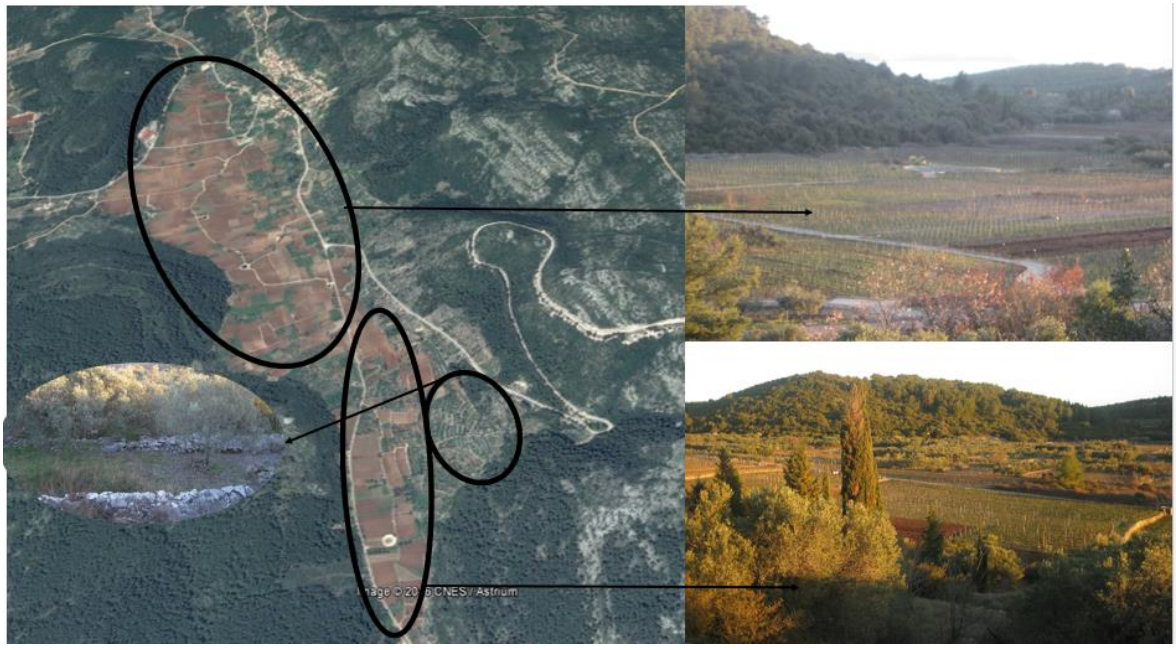


Figure 45: Structural elements of the plain in Korčula, the example of Cara

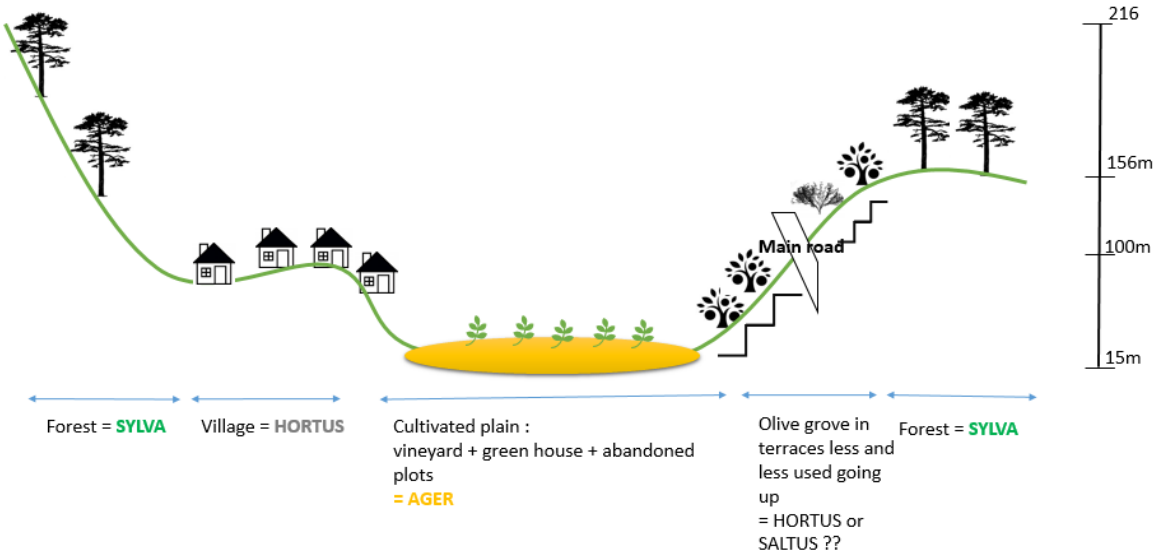


Figure 46: Topographic profile and dynamics in Korčula plains, Blato's transect

4.2.2.2 Coastal slopes

On the Eastern tip of the Islands, the Lumbarda area is characterized by steep coastal slopes covered by olives trees on terraces.

It's a dynamics area with opening of new cultivated fields by young farmers, mainly in olive trees and vines (Figure 47).



Figure 47: Lumbarda area sky view

4.2.2.3 Olive trees hills

The Western tip of the islands is almost exclusively made of hills covered by olives trees on terraces. Wider and bigger than the ones on coastal slopes or plain ones (Figure 48).

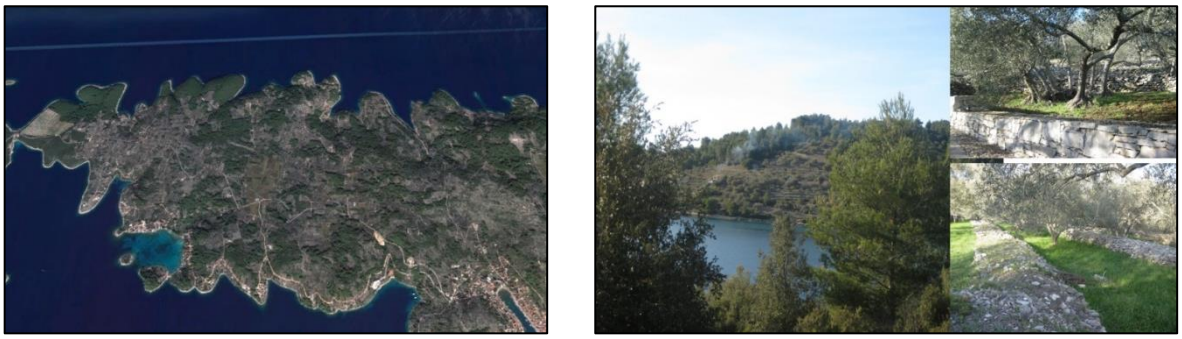


Figure 48: Vela Luka tip

From the maintenance of the drystone walls and under the trees, we can see this area isn't confronted to abandonments. We could even see big opening of new cultivated lands on former forests cover.

4.2.3 Farmers' Typology

The island of Korčula has known many evolutions through the past years that bear strong similarities with the ones of the neighboring islands when it comes to depopulation or abandonment of agriculture as main source of income. But the characteristics that contributed to this situation on the island are not completely identical to the ones of neighboring areas, many differences arise.

There are 15 thousand people continuously living on the size island (2011 census) making it one of the most populated islands in our field of study. The presence of multiple industries on the island such as chalk, electronic equipment and the most famous one, the ship industry; are one important explanation to this situation. Nowadays many of these industries have slowed down or gone bankrupt, leading to the disappearance of many jobs that represented the hope for the retention of the inhabitants.

> *"No, last year, our last big industry bankrupted, the shipyard, and let something like 120 people out of work. And in a town of 1000 people, it's a lot."*
>
> Interview with tourism actor in Korčula - K11, p.401

Education is also a key element; the island has high school,

> *"I went to school in Korčula. Ferry every day for free."*
>
> Interview with farmer in Pelješac, P16 - p.233)
>
> *"They have 3 high schools on the island"*
>
> Interview with a farmer in Korčula - K2, p.338
>
> Interview with farmer in Korčula - K8, p.356

And technical and professional education, a feature that is not often present in the surrounding islands and peninsulas. This favors the stay of the islanders' children on the island for a longer time before having to send them to universities in big cities, (Interview with farmer in Korčula - K8, p.356), (Interview with farmer in Korčula, p.416), thus increasing their probability of coming back.

Despite these two elements, some people are nevertheless permanently leaving the island.

So, industries and education are key to the development of the Korčula's economy. This reduced the migration that hit the entire region and was accelerated by Phylloxera a grape disease.

> *"A lot of people are leaving, constantly, but in the last 10 years we had a population drop in Vela Luka of about 7 to 8%, something like that. But it's a lot better than when I was a kid."*
>
> Interview with tourism actor in Korčula - K11, p.401

Like the other two islands in our study (Mljet and Pelješac), Korčula's economy was first relying on agriculture, mostly olives and vines. The depopulation has been accompanied by a loss of the agricultural practices that used to prevail. So with the Phylloxera and the globalization, Croatian island products lost their competitiveness and farming became unattractive. Lands were abandoned and pine forests took over reducing the 60% of cultivated areas.

> *"When the agriculture was intensive, 60-70% of the island was cultivated."*
>
> Interview with tourism actor in Korčula - K11, p.404

People re-oriented towards tourism which represented easier money and less physical work.

But even though it is not the major activity or source of income on Korčula, agriculture remains present in people's lives. Almost everyone owns parcels of lands with olive trees or vines and gardens with vegetables and fruit trees exist in front of every house.

The main cultivated species remain olive trees and vines to produce olive oil and wine. The island has always been famous for its extra virgin olive oil produced from endemic olive species (LASTOVKA, DROBNICA and ORGULA) as well as its local wine, Posip and Grk (white wines). This has been accentuated for touristic purposes.

Olive trees and vines are still the most important plantations on the island. Their importance differs from one region to another on the island.

Vegetables are also very present but mostly for personal consumption, each inhabitant plants and cultivates a big part of his own food in his garden. Every person who owns land and who still lives on the island seems to still be using this land for farming but the usage and finality of this activity can strongly differ from one actor to another depending on specific characteristics.

We were able to identify three different types of actors that lead to different land usage as well as some of their characteristics.

The established types of actors are the following; small farmers with a relatively small land and who mainly uses his products himself or sells them occasionally to tourists. The cooperatives, and finally the big farmers who produce as a main activity.

4.2.3.1 The small farmers

In the category of small farmers, we have included three different actors;

There are the ones for whom farming is not the main job; these people usually work in tourism, in the industries present on the island or also in fisheries or local institutions (municipalities) or public services.

Then we have the ones who do it as a side business to sell it to tourists (Interview with farmer in Korčula - K7, p.353) or just locally, but who rely on farming as an important financial complement. They either do this with traditional types of crops (vines and olive trees) or with more innovative species (figs, helichrysum…) (Interview with Farmer in Račišće, Korčula - K26, p.380), (Interview with Farmer in Žrnovo, Korčula - K22, p.367).

But all the small farmers cultivate their land/garden to satisfy their own needs and consume the vegetables, fruits and olive oil or wine they produce.

> *"And can you produce your own food? When it comes to plants, vegetables and fruits, maybe something like 50-70% of the stuff we eat."*
>
> Interview with tourism actor in Vela Luka, Korčula - K11, p.402

Many often use their products to feed their tourist guests or for their restaurants (Interview with farmer in Blato, Korčula - K18, p.383), (Interview with farmer in Lumbarda, Korčula - K34, p.391).

And some commercialize what is left from their production and manage to get high prices for their quality and local products.

> *"Tourism is very good for Korčula because we can sale our products."*
>
> Interview with farmer in Žrnovo, Korčula - K4, p342).

It seems like almost all of the island population has a small garden next to the house, where vegetables are usually grown. The olive trees and vines are often on parcels of land who have been in the family for generations.

This is a characteristic of the small farmers, they all inherited the cultivated land.

> *"It's a heritage of olive gardens from my mother. The land here comes from the family of my husband."*
>
> Interview with farmer in Žrnovo, Korčula - K4, p.341
>
> Interview with farmer from Blato, Korčula - K18, p.383
>
> Interview with farmer from Vela Luka, Korčula - K31, p.386

And almost none of them planted new trees or more vines (they could replant vines as replacement to the non-viable existing ones) for extra production since they don't really have the time for that, but they usually do take care of the existing ones. However, this does not apply to the innovative professional side businesses who make it their purpose to buy or rent the land and cultivate it with new plants such as helichrysum (everlasting) or figs.

Similarly, to all islands, land ownership is a complicated issue to tackle and a lot of inhabitants face cadastre problems.

> *"Do you have the cadastre? Yes, but we have problems with that because it's not updated."*
>
> Interview with institutional actor from municipality in Vela Luka, Korčula - K15, p.419

With their land still the property of a deceased parent.

> *"So, the owners are still people who died 100 years ago."*
>
> Interview with institutional actor form municipality in Vela Luka, Korčula - K15, p.418

This represents an important barrier to access farming subventions that are based on legalized land ownership.

Another characteristic of these small farmers is land fragmentation.

> *"Yes, fragmented because in the past, people giving those land to children, everyone got a little piece and today we did not solve that problem in land ownership. It's a very big problem"*
>
> Interview with institutional actor from municipality in Vela Luka, Korčula - K15, p.418

There is barely anyone of them who has his entire land in one defined geographical location, there are often multiple small parcels distributed around an area.

In the gardens, as mentioned earlier there are multiple sorts of vegetables (tomatoes, eggplants, potatoes…) growing together along with some fruit trees (almonds, figs…), so it is never just one kind of culture since it needs to satisfy a big part of the nutritional needs of the household.

When it comes to vines and olive trees, there are rarely other species planted along in the land, even though some people try to experiment and plant potatoes (Interview with farmer from Vela Luka, Korčula - K8, p.355), (Interview with farmer from Korčula - K23, p.372) or helichrysum (everlasting) (Interview with farmer in Račišće, Korčula - K26, p.381) for example in between the rows of olive trees or vines but this is not a common practice.

We have already discussed earlier the different uses of the cultivated products (own consumption, tourist consumption, sales to tourists, and local sales (in the case of more

professional farmers)) but it is important to mention that this all depends on the season's productivity and the quantities produced and harvested. So when the output is low due to bad conditions, the production is usually kept for a household consumption, it is only when the year has been really productive that people use the extra production to commercialize to tourists. Nevertheless, it is unsure whether this commercialization is legally done or just in an informal way.

Usually the small producers of wine and olive oil are members of cooperatives. Indeed, due to their small size and the fact that farming is not their main professional activity they do not own their oil or grape mill so if they wish to produce their wine and/or oil they need to use the cooperative's mill and machines.

Usually people who rely on their production for extra money and not only household consumption do not sell their entire production to cooperatives because of the delay in payments that it faces. They go to private firms (who have mills) who are more reliable in terms of payments and whose way of functioning is basically the same as cooperatives.

One other advantage of being part of a cooperative resides in the fact that members can easily exchange knowledge, know-how and have also access to chemical entrants. This also done within associations that are quite present on the island. For example it is an olive oil association, Udruga Mashinara in Vela Luka, which managed to get the AOC label for local oil produced on the island allowing the people who get it to benefit from a 20% to 30% price increase in the sales of their products.

> *"It can be to 20 to 30% more than the standard olive oil, and there are people who have organic production and the price is even more 200 kuna/L. The normal price for a bottle of oil is 80 kuna/L"*
>
> Interview with institutional actor from olive oil association in Vela Luka, Korčula - K17, p.437

> *"So having a label to get high quality products to sale with a higher price is good.*
>
> Interview with a farmer in Zrnovo, Korčula - K4, p.344

Subsidies

Most small producers do not have any labels, it is too expensive.

> *"Is it expensive to get the label? Yes, it cost a lot for the process for the European Union, 3000 kunas"*
>
> Interview with a farmer in Zrnovo, Korčula - K4, p.345

It is time taking.

> *"I had to wait for 10 years to have this label because I had to prove the characteristic of the oil"*
>
> Interview with a farmer in Zrnovo, Korčula - K4, p.344

And too much of a hassle for them especially for an activity that they don't live out of, it is also considered useless by some (Interview with farmer in Korčula - K35, p.394). It is also unsure whether they would qualify for them, for example the ones using pesticides and chemical inputs could not get the EKO label.

The recent AOC label for olive oil is not easily accessible to small producers because of its price and its multiple technical requirements that make it even more costly.

4.2.3.2 Cooperatives

Moving on to the second category of actors, the cooperatives. There are two sorts of cooperatives on the island the ones that deal with wine production and the others with olive oil. Often the wine cooperatives have an oil mill at the disposal of their members as well as external producers in exchange of a usage fee.

The number of cooperatives has varied throughout the years with the changes in political landscape and the fall of the Yugoslav regime. Many have gone bankrupt but some are still viable and profitable even though they face a lot of challenges and difficulties such as an ageing population and thus less and less quantities received (Interview with an oil cooperative in Blato, Korčula - K25, p.379) or a fierce competition from private companies (Interview with farmer in Korčula - K6, p351). There are currently 2 oil cooperatives in Blato and 4 in Vela Luka (Interview with an oil cooperative in Blato, Korčula - K25, p.379) and a wine cooperative in Lumbarda "Grk Lumbarda Cooperative" (Interview with farmer in Lumbarda, Korčula - K10, P.366)

The members of the cooperative are as mentioned in the earlier section mostly small farmers who only need the mill to produce their wine and oil for consumption or small scale sales or are just looking for extra income through the sales of their grapes and olives. But we also find big producers who take part of the cooperative, not to use the mill and tools and machines but to benefit from the network as well as the knowledge exchanged among the members.

Regarding the organization, cooperatives can function in many ways, they can buy the product from the members and take care of the transformation and sales themselves. The members are paid once the cooperatives receives the money from the final buyer. Another deal could be to give back the final product to the members instead of cash so that they can use it as they prefer (own consumption, sales, guesthouse...). (Interview with oil cooperative, Blato, Korčula - K25, p.379). Prices for the grapes are set depending on their percentage of sugar, the sweeter they are, the higher the price. As for the olives, people are paid depending on the oil quantity produced and not the amount of olives brought (Interview with oil cooperative, Blato, Korčula - K25, p.379).

For olive oil, there is a third way of functioning, people can bring their olives and press them into oil themselves in exchange of a fee per kilo of olives and cleaning the mill after usage.

Members are in no way engaged in giving the entirety of their production to the cooperative and they often sell a part to private companies and this represents another threat to the profitability of the cooperative.

> *"He goes to the oil factory, some kind of private company that does that, they buys from people who produce olives"*
>
> Interview with farmer in Vela Luka, Korčula - K2, p.337

The production that the cooperative keeps is either sold locally to tourists through shops, to locals through supermarkets or nationally in Dubrovnik, Split or Zagreb. Some also export to the USA or Europe (Interview with oil cooperative, Blato, Korčula - K25, p.379).

No conditions are imposed on the members, once you are part of the institution you can cultivate your land in any way you find suited as long as you bring some of your "good" production and accept the prices offered by the cooperative.

Aside from the machines and tools, (Interview with oil cooperative, Blato, Korčula - K25, p.379) cooperatives make available some products and chemical inputs such as pesticides or fungicides to their members. That way farmers can access these products for cheaper. Their cost of what the member uses is subtracted from what he is owed.

Cooperatives are not entitled to subsidies. It is their members who deal with that on their own.

Most cooperatives the Croatian island product label (Interview with oil cooperative, Blato, Korčula - K25, p.378) but none of them can pretend to the EKO label since they do not control their members' practices and many of them use chemicals.

Cooperatives have some links to tourism, they all consider it in a positive way and try to take advantage of the presence of tourists on the island.

4.2.3.3 Big farms

The last identified category of actors on the island is the rarest one and it represents the big farmers whose production is the main source of income. These big actors can be found in every farming sector, vegetables, olives and vines. Nonetheless they also have links with tourism.

> *"Is it linked to tourism then? Without tourism, he wouldn't even work"*
>
> Interview with a farmer in Korčula – K2, p.335

Since they sometimes combine their output with the restaurant where they sell their products or they make deals with the big hotels on the island to sell them their production.

> *"Supplier of hotels from Vela Luka to Korčula"*
>
> Interview with a farmer in Korčula - K2, p.334

They are also present on the local market especially for the vegetable producer who is the only big one in Korčula.

> *"Also he sells to the city market"*
>
> Interview with a farmer in Korčula, K2 - p.334

The ones producing wine often sell on a national scale in big cities and also export to nearby countries.

Some of them even have their own museums where they have tourist visitors to whom they sell their production (Interview with farmer in Korčula - K8, p.356)

These farmers can be the owners of their land inherited from their family, or just rent it from the government for a period of at least 15 years.

They practice an intensive form of agriculture on their parcels that are usually at least 10 ha big. They use machines, tractors… and a lot of inputs to maximize their production yield. They also produce all year long regardless of the season and use green houses in order to do that. Their practices do not seem to entitle them to any sorts of EKO label even though they mention that they could have access to them if they wish to but do not need them.

> *"The reason why he doesn't have EKO certificate? He could. The process is a bit complicated but he could, no problem. But he doesn't need to do that. He is known on this market, people know him"*
>
> Interview with farmer in Korčula - K2, p.336

They also employ a certain number of workers, often more during the summer season (high season) since their businesses are closely tied to tourism (like most of the other sectors on the island).

Big producers get subsidies from the Ministry of agriculture as well as from the European Union for equipment.

4.2.3.4 *Common features*

The three categories of farmers have some common features regarding their practices.

Cattle ownership

There is almost no cattle left on the island.

> *"There are a lot less domestic animals (donkeys, goats, and sheep)…"*
>
> Interview with a tourism actor in Korčula - K11, p.401

Very few inhabitants still own a couple of goats, sheep and some chicken or pigs (Interview with farmer in Korčula - K18, p.383). People sold their animals because there was a lack of workforce to take care of them, a problem accentuated by the exodus and ageing of the population.

Chemical inputs

Most farmers use chemical pesticides, herbicides, fungicides.

> *"But we gathered quite a lot of entrants are used? Yes, A lot of them use pesticides"*
>
> Interview with tourism actor in Korčula - K11, p.404

> *"Type of products to avoid diseases, even at a low level, when necessary? It's hard to number all that products because there are too many but they are market products what he uses."*
>
> Interview with farmer in Korčula - K2, p.336

> *"How do you protect your grape from disease or insects? Normally 9 times protect by pesticide. By rule it is regulate. Copper must be 2 times."*
>
> Interview with farmer in Korčula - K24, p.374

The agricultural advisor of the municipality advises them to do so in some situations to protect the plants.

> *"**How can you protect them?** By using pesticides. **What type?** Usually copper sulfate, synthetic organic fungicide"*
>
> Interview with institutional actor in Vela Luka, Korčula - K16, p.426

Even if he favors organic practices. Prices of such products are expensive so people apply them only when necessary and in limited quantities. It seems that everyone uses them regardless of the category of farmer and the usage he will have of his production. But obviously the big

producers who also have more means tend to use more. There are also some of them who use synthetic mineral fertilizers.

> *"And the two bags there? That's for olives. We use the fertilizer NPK."*
>
> Interview with farmer in Korčula - K22, p.370

> *"The mineral fertilizers that's NPK 72030. The other one is NPK 151515. The organic is from the animals"*
>
> Interview with agriculture advisor in Vela Luka, Korčula - K16, p.426),

> *"Two ways mechanical way and chemical way. What do you mean with chemical? Herbicide, glyphosate"*
>
> Interview with agriculture advisor in Vela Luka, Korčula - K16, p.425).

Organic fertilizers, manure

A lot of farmers seem to be using manure as fertilizer. They either collect the dejections of their own animals or buy the product from a person who owns some cattle or from shops inland (Interview with farmer in Korčula - K34, p.391),

> *"Do you use fertilizers? We are not using this kind of bad fertilizer. We are using compost of oil: maslinova komina. That combines weeds, goat manure. It is bio-composter combined with the manure."*
>
> Interview with farmer in Korčula - K4, p.341

> *"Fertilizer: sheep manure? I think it is good. 1 sheep gives 600 kg of fertilizer per year."*
>
> Interview with farmer in Korčula - K22, p.369

> *"There is fertilizer from the island but they also import it from the coast, from sheep and cows"*
>
> Interview with agriculture advisor in Vela Luka, Korčula - K16, p.426

They also sometimes use humus before planting their production. This is an element we were not able to observe often since most people have inherited a land that was already cultivated and the plants were already present. There are very few new farmers who decide to get started with this activity (even if just as a side business) on the island.

4.2.4 A tourism sighted economy

Korčula is an island where tourism plays a big role in local economy.

> *« 362,000 nights spent in Korčula last year (73,000 tourists, plus others who are not accounted for because statistics don't include cruisers or sailors). »*
>
> Interview with tourism office - K12

The tourism activity is mainly for foreign people who come for short stays.

"86% of tourists are foreigners. Croatians stay 5.89 days on average (foreigners 4.88 days)."

Interview with tourism office - K12

"A lot of cultural events (St Martin's Day on Sept 11th, a lot of dance events that occurred once in the summer now take place once or twice a week in the tourist season. Also Grk festival 3-4 times a year."

Interview with tourism office - K12

4.2.4.1 An emerging luxury tourism conducive to Korčula.

Korčula is the only studied area (among our 3 areas Mljet, Pelješac and Korčula) that offers luxury tourism through the Lešić Dimitri Palace which now belongs to the famous « Relais & Château » chain. Luxury tourism is expected to further grow in the future years.

"Last year they began a Croatian luxury hotel association with 15 other hotels. It will allow them to do joint promotion and advertising as Croatia still needs to be identify as a luxury destination."

Interview with an actor from the tourist sector, K28

Nevertheless, luxury tourism is still missing institutional help and support and events, especially cultural and traditional ones, need to be further developed.

"According to her there is a lack of institutional help for luxury tourism. The keep helping mass tourism more."

Interview with an actor from the tourist sector, K28, p.414

"Now there a baroque music festival and national triathlon but not much else happens during the year. It is especially important for luxury tourism, because this kind of customers are well educated and are interested in culture, tradition and history. […] There is a great need for more quality events."

Interview with an actor from the tourist sector, K28, p.413

Active tourism could thus be a driver for luxury tourism, bringing in a whole new type of field activities that luxury tourism aims to deliver.

"She believes in the development of active tourism. They are already working with Backroad (luxury cycling travel)."

Interview with an actor from the tourist sector, K28, p.414

4.2.4.2 Active tourism: a driver for sustainable development

Agro tourism

Agro tourism is a touristic activity focusing on two main elements:

- Offering local food in restaurants, hotels or directly from the producer cooking for his hosts
- Visiting local farms where this food is produced

It corresponds more and more to an eco-food production because of the increasing willingness and desire of tourists to consume healthy food produced with respect to the environment. On Korčula, this local eco-food production especially concerns honey, olive oil and sometimes cheese and wine.

> *"Tourists, I am selling my production here in the house and at a market which belong to family. I don't export. I want to be independent."*
>
> Interview with a farmer, K35, p.342

> *"Organizes tours in his farms (cooperation with Korčula tourist board and cruise agencies from Australia)."*
>
> Interview with a farmer, K35

> *"There are about 70 restaurants in Korčula, about 18 of which are sustainable (growing their own foods, etc.). All restaurants try to have at least local wine. This trend for local production started 5-15 years ago"*
>
> Interview with tourism office, K12

But it remains complicated to supply restaurants and hotels with different types of local food particularly fruits, vegetables and meat. The quantities produced are often not sufficient and the prices might not be competitive.

> *" They tried to propose locally grown and seasonal food. [...] They have difficulties to find locally grown quality fruit and vegetables because people who grow then tend to keep them for their own activity. This is what their former chef does at Konoba Mate."*
>
> Interview with an actor from the tourist sector, K28, p.414

Eco tourism

Ecotourism focuses on outdoor often physical activities highlighting the local natural and traditional wealth of the island.

> *"The adventure activities are very good for the territory: they attract people that are both (1) rich, and then will spend quite a large amount of money in local infrastructures and (2) curious and respectful toward the local culture and nature of the territory, and will try to protect it and will be really interested in ecotourism."*
>
> Interview with an actor of the tourist sector, K27

But, it is still not enough developed in regard to the island's potential. Indeed the nature diversity, whether it is inland or coastal and marine, that can be found on the island is a great potential for such outdoor activities.

> *"He believes that Korčula has a great potential for adventure sports, and it may become wonderful if good choices are made. So far, according to him, Korčula is rather taking the good path: except some wrong choices (big ugly building in some natural places), tourism is rather on the "good way" (good for the natural and cultural patrimony and for the people)."*
>
> Interview with an actor of the tourist sector, K27, p.412

There is also an increasing demand for such tourism, with tourists more and more curious about the natural and cultural heritage of the places they visit.

> *"We noticed the demand for that type of tourism is actually growing to an extend"*
>
> *"And they are more interested in everything, they really want to know about where they come, about traditions, about history, about the plants, about the animals, about everything."*
>
> Interview with tourism actor in Vela Luka, Korčula - K11, p.397

Moreover, it seems that there is not enough administration support for the development of this sector.

> *"He faces many difficulties because of bureaucracy: there are many licenses, authorizations to get. And he doesn't feel supported by the administration."*
>
> Interview with an actor of the tourist sector, K27, p.411

Volunteering

There are two farmers on Korčula who propose to people to come and help them for free with their crops in exchange for food and accommodation (Woofing). But this practice is still quite rare and could represent an interesting form of tourism allowing people to have more workforce as well as sell their products and share their local culture and practices, especially that it is becoming more and more popular with younger people nowadays all over the world.

4.2.4.3 Other (negative) types of tourism

Mass tourism is very bad for Korčula on an environmental but also social level because it leads to disorganized and random urbanization as well as a lot of issues with waste and water management.

> *"Tourism was pretty much devastating to both environment and society. It changed the island, it changed the coast. […] Because if you have all inclusive formulas, 90 to 95% of income goes back to the investors […] it makes no sense that a town of 3000 people has 15000 people in the summer. […] The infrastructure can't hold it. There are problems of water, electricity…"*
>
> Interview with an actor of the tourist sector, K11, p.398

Mass tourism can lead to big differences between summer and winter activities for people living there.

> *« He is a bit sad about Hvar, and the type of mass tourism that has established, with huge amount of people only coming for the beach and the nightlife during the summer. During winter many shops, bars and restaurants are closed»*
>
> Interview with an actor of the tourist sector, K27, p.412

4.2.5 Strategic actor analysis

Municipalities are fragmented on the island of Korčula but the economy is dynamic (Figure 49). For instance, a development agency was created inside the municipalities of Korčula to support demands for subsidies from agriculture and tourism. (Interview with the LAG5 president – O2)

There are two markets driven by different types of tourism.

The luxury, active and eco tourisms drive the development of a local market, based on quality. But the distribution network is fragmented and not coordinated: greenmarkets, individual shops (generally owned by producers), cooperatives, high quality hotels and restaurants, often local restaurants that try to source their products locally (especially the wine that has experienced a production rise during last years).

> *"[I sell to] Tourists, I am selling my production here in the house and at a market which belong to family. I don't export. I want to be independent. [...] I sale olive oil directly to some elite restaurants."*
>
> Interview with a farmer of Korčula, K4

This local and qualitative market support also the development of projects, infrastructures that aim to valorize traditions and nature, such as museums, events, cultural centres, guided tours…

> *"[Tourists are] interested in everything, they want to know everything about traditions, history, plants, animals…"*
>
> Interview with an actor of the tourist sector of Korčula, K11

Whereas, the "negative type" of tourism (mass tourism, middle class), results in cheap and standardized products sold in supermarkets and fast food restaurants. (Interview of LAG5 president – O2)

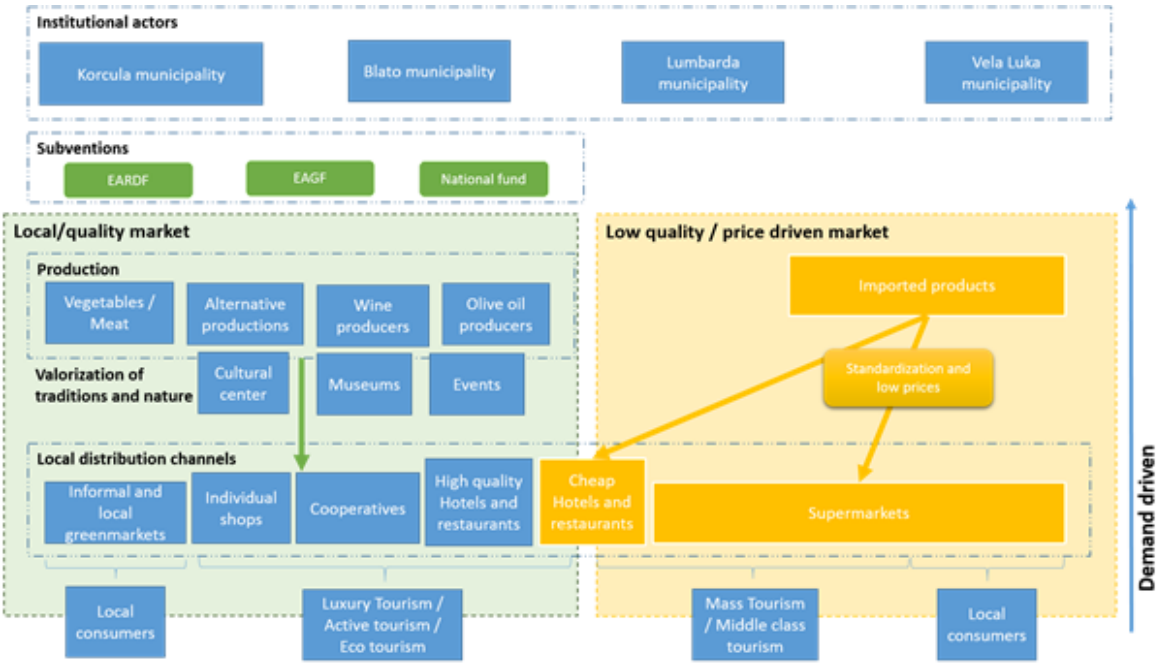


Figure 49: Strategic actors' analysis of Korčula - a demand driven market

A lot of Korčula lands are under national protection (Interview of LAG5 president – O2). Indeed, we can suppose that there will be no risk of destruction of natural habitats by urbanization, but

from conversion of lands from a sustainable agriculture into an intensified/ standardized and low quality agriculture if the market is driven by low quality tourism.

Indeed, one of the identified key driver for targeting local producer and possible HNV farming is developing the local and quality market by coordinating and empower distribution channels and encourage high quality tourism.

4.2.6 Issues for HNVf

4.2.6.1 Impact of tourism on the environment

Solid Waste

Tourism, as mentioned earlier, is putting a lot of pressure on the environment through water, soil and air pollution. It is also endangering people's health. The already bad practices of the island are enhanced during the touristic season as it is the case with garbage.

> *"1750 tons per year. Only for Vela Luka. Blato is another municipality and together they have 3500 tons of mixed garbage together. In summer at least 3 times more garbage"*
>
> Interview with an institutional actor in Vela Luka, Korčula - K17, p.438

Garbage is a main issue. Trash is not sorted or recycled except in some areas such as Vela Luka where plastic, paper or tires are sent to recycling companies inland.

> *"Yes tires, paper, plastic and textile and motor oil.* ***Is it recycled in the mainland?*** *Yes"*
>
> Interview with an institutional actor in Vela Luka, Korčula - K17, p. 438

The rest of the waste is thrown into an open dump between Blato and Vela Luka. This practice has been adopted for years endangering the surrounding populations especially during summer when the dump catches fire and takes months to turn off.

> *"Yes fire, it's dangerous it's easily to have fire on the dump but it's hard to extinct. This summer there was a fire and there is still smoke coming from there. It's dangerous for the area, the trees, the woods but also dangerous to breathe toxins"*
>
> Interview with an institutional actor in Vela Luka, Korčula - K17, p.439

The dump is supposed to be closed soon but there is no visibility as to where the garbage will be stored afterwards, it is expected to be taken inside the country to Dubrovnik

> *"**Where will you bring the garbage then?** I hope on the land, but we still don't have a general plan for garbage in the country. People from Dubrovnik will maybe transport it to Zupanja but we don't know what they will do with it"*
>
> Interview with an institutional actor in Vela Luka, Korčula - K17, p.439

There are multiple dumps on the island, almost one for each municipality and they all face more or less the same issues and challenges.

Waste Water

Another problem on the island and that is enhanced with the tourist population in summer is the treatment and disposal of used water. There is currently no sewage system, people use septic tanks that are emptied in the same dumps mentioned earlier.

> *"The septic tanks when they are emptied are they brought to the dump? Now with the sewage system we will stop doing that."*
>
> Interview with an institutional actor in Vela Luka, Korčula - K17, p.439

A sewage system has been built in Vela Luka for testing and it is now under expansion, but the filter used to treat the water before discharging it in the sea is only a mechanical filter, meaning it doesn't really clean the water from the polluting particles in it the way a biological filter would. There are no plans for changing this mechanical system any time soon (no space or money).

> *"Now with the sewage system we will stop doing that. The system is working in some area and now we will expand it.* ***This sewage system do you know if there is a filter at the end?*** *There is a mechanical filter."*
>
> Interview with an institutional actor in Vela Luka, Korčula - K17, p.439
>
> *"Yes. This is the softer system the first. The 3rd one is the best and maybe we will try to apply for the 2nd. 2nd is biological and the 3rd is micro-biological. But it's too expensive compared to the number of people living in Vela Luka"*
>
> Interview with an institutional actor in Vela Luka, Korčula - K17, p.439

Water supply is also an important issue, especially for the western part of the island, which isn't connected to the pipeline.

> *"Right now, the water is actually a bit better, but in the beginning of 2000s there were shortages every year, there were restrictions on water use and now, no restrictions but lower quality. »*
>
> Interview with an actor of the tourist sector, K11, p.398

The tourists who come have no knowledge of these problems and they use the water and throw garbage extensively contributing to the destruction of multiple ecosystems (marine and inland) and threatening the environment and pushing the island to reach its limits in terms of nature degradation.

Increased Food Demand

Another element where tourism could have an impact on the development of agriculture is the increasing need for food following the rise of tourism. This could translate in two opposite and different ways:

- Favourable to maintaining and supporting sustainable practices linked to HNV practices
- Or create a switch from self-consumption to commercial agriculture with an intensification of farming methods. The difficulties of territoriality and land access mentioned earlier could also be a factor accentuating this problem.

All these issues are summed up in the Figure 50.

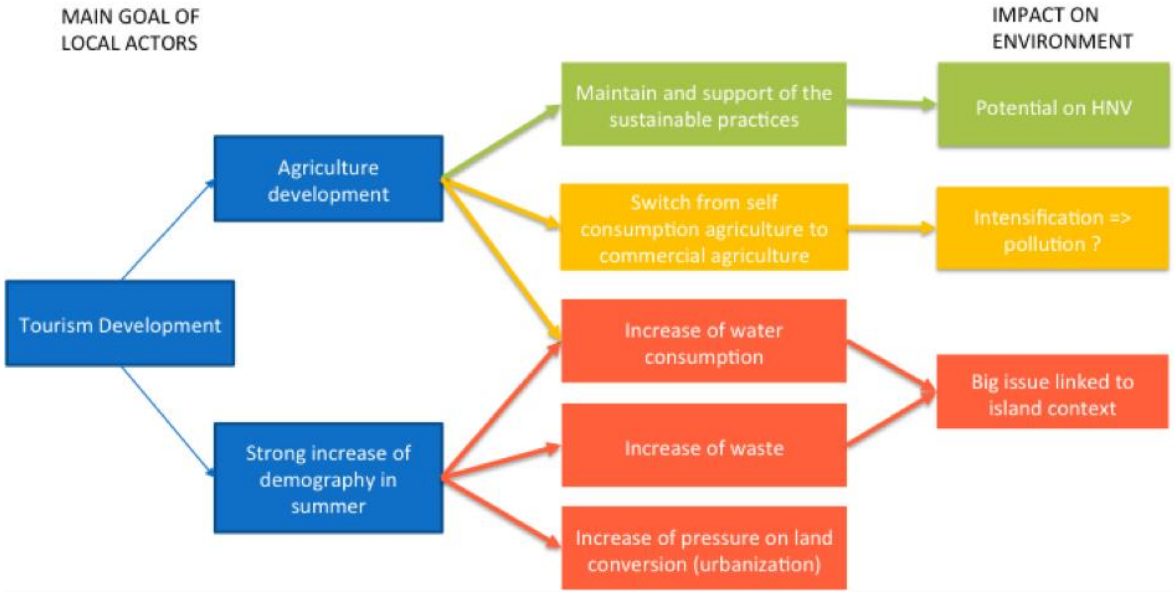


Figure 50: Scheme of possible impacts of tourism development on Korčula

For all these reasons, the main challenges to raise for Korčula and the other studied areas is to determine the number of tourist these islands can handle that would still preserve the natural and cultural patrimony and heritage.

> *"I think the most important thing that should be decided for pretty much every place that has tourism as an important part of its income, they should decide what number of visitors they can sustain in the long term."*
>
> Interview with an actor of the tourist sector, K11, p.403

4.2.6.2 *Types of agricultural openings*

On Korčula, the forests cover about 60% of the island, which represents 16 700 ha. They are mostly private properties (Krklec et al., 2011). As shown on the map below, the coastal lands often belong to the Croatian administration.

(Concession map)



Figure 51: Agricultural opening seen on Korčula hip (source: Google Eart, photo: G. Graziella)

The lands which belong to the Croatian government can be divided into several concessions.

These can be leased for short or long term periods. Usually, the administration prefers to rent land with low or degraded forest.

Short term leasing lasts for 5 years. The land is rent for agriculture or tourism purposes. Only temporary objects can be used because everything must be taken away at the end of the leasing and the land restores as it used to be before.

For the long-term leasing, up to 50 years renewable, lands can be used for long-term plantations such as vineyards and olive trees. The Croatian ministry of agriculture and development designates the concession and selects the tenant. The latter will have two years to cut the forest and plant.

Regarding private lands, there are some farmers who wish to improve the land they own but don't use yet.

> *"From these 4 hectares. There is 1, 2 hectares of non-arable land. It is on purpose (we) will do something with it in the future."*
>
> Interview with a farmer in Korčula – K4, p.340

Nothing can be said about practices and the way they will use the land.

> *"No stone wall because it would be too much work, and too difficult!"*
>
> Interview with a farmer in Korčula – K26, p.382

4.2.6.3 Depopulation

Table 10: Demographic evolution in the Island of Korčula (Source: Croatian bureau of statistics)

Town or Municipality /year	1991	2001	2011
KORČULA	6240	5889	5663
BLATO	4107	3680	3593
VELA LUKA	4464	4380	4137
LUMBARDA	1102	1221	1213
SMOKVICA	1125	1012	916
Total	16948	16182	15522

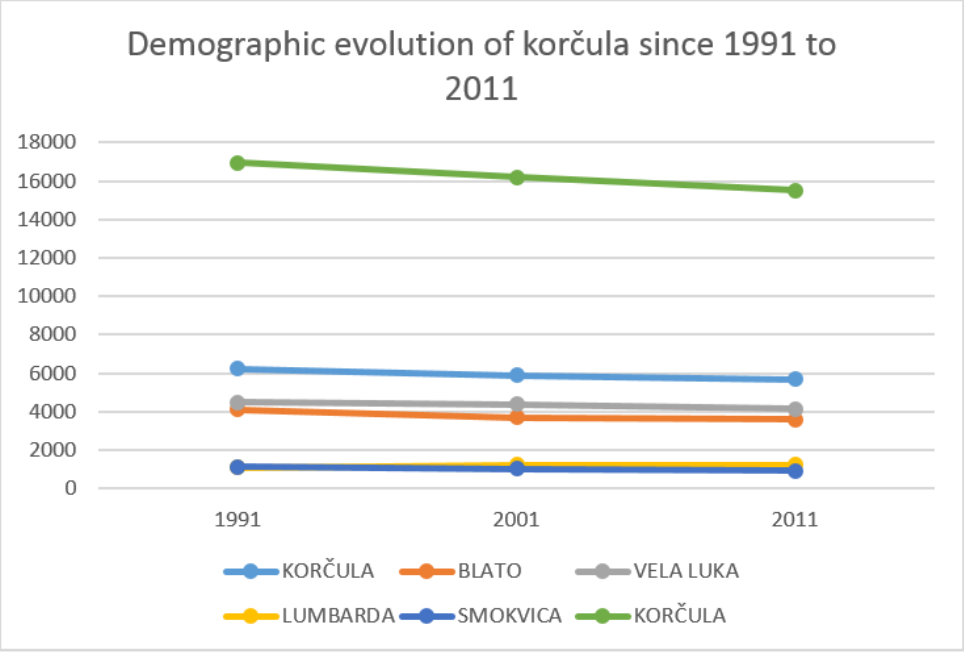


Figure 52: Recent evolution of the demography in Korčula (Source: Croatian bureau of statistics)

For the past 20 years, Korčula has been facing a general depopulation with a demographic decrease of 8.41% representing 1,426 people less in 2011 than in 1991. The difference with the two other studied areas is that Korčula has more infrastructures with a secondary school and a hospital. However, this is not sufficient to keep youngsters because there is no university. It

leads to an unknown future for agriculture with abandoned land and activities such as cattle raising.

In Korčula some youngsters are coming back after having graduated (oenology, management…) more interested by tourism activity than agriculture because it's an easier way to make money and it requires less labour force.

> *"Yes, but they [young people] come back. I am an example. People think that living in the city is easier but a period pass and then they come back."*
>
> Interview with a farmer in Korčula – K4, p.346

Also, in majority, the ones who go into agriculture do top class wine without sustainable practices. They even export it. HNV practices are threatened both by depopulation and the abandonment of the land as well as by the agriculture activity of the repopulation.

4.3 Pelješac

Our third field of study was Pelješac peninsula. We studied the Southern part first, from Ston; then the Northern part, from Korčula. As we did for Mljet and Korčula, here under we will focus on Pelješac, its specificities and what we learnt there. We will discuss the ecological characteristics of the peninsula, study the landscape, describe the farmers we met, analyze the stakes and actors, and finally link our study to High Natural Value farming.

4.3.1 Introduction of the field study

To present the field of our study in Pelješac we will describe its habitats and biodiversity, and sense the main land use before briefly describe the main threats on the environment.

4.3.1.1 1.1.1 Habitats

The peninsula is mostly covered by forests with holm oak and Aleppo pine (*Querco ilicis, Pinetum halepensis*), with macchias holm oak and black ash (*Fraxino arable, Quercetum ilicis*), and with clean evergreen holm oak maquis (*Myrto, Quercetum ilicis*). The dry grasslands are mostly on the northern part. There are some forests of the highly endemic Dalmatian black pine (*Querco ilicis-Pinetum dalmaticae, Erico-Pinetum manipuliflorae dalmaticae*), they developed mainly in the southwestern part of Pelješa**c.** Due to the altitude, the northwest part is important for the Dalmatian black pine.

> *"The most interesting feature on Pelješac is endemic Dalmatian black pine because it has area only on Pelješac […] above the highest peak there is on the west of the peninsula, in the village of Orevič, 1000m above sea level in the top of the mountain there are very nice forest of Dalmatian pines."*
>
> Interview with an institutional actor in Dubrovnik - O17

There are also significant crops, which are mainly vineyards and olive groves (Nikolić et al., 2009).

4.3.1.2 1.1.2 Biodiversity

A total of 1 100 plant species have been recorded on the peninsula: 9 are critically endangered, 14 are endangered and 18 are sensitive. A total of 41 species are endemic, 126 are strictly protected (SP) and 96 are protected (Nikolić et al., 2009).

> *"Pelješac have different habitats: Dry grassland, guarrigue…maquis, grable beach, rocky and the sandy beach."*
>
> Interview with an ecologist in Dubrovnik - O17

In the Pelješac peninsula, we can find a lot of species characteristic of each habitats. Some are threatened according to the IUCN Red List (Jeričević et al., 2014):

- Dalmatian black pines forests: Neottia nidus-avis (SP), Epipactis microphylla (SP), Epipactis helleborine (SP)
- Along roads and paths: Stachys menthifolia Vis (SP), Marrubium peregrinum (EN ; SP)
- Ruderal habitats: Arundo plinii Turra (DD; SP)

Regarding the alien species, data show that jackals are present throughout the peninsula (Krofel, 2007).

4.3.1.3 1.1.3 Land use

Regarding the land use of the peninsula of Pelješac, most of the arable land is used for agriculture and gardens. Some are agricultural land with a mixed use, and some are cultivated lands like vineyards, olive groves, fruits, vegetables, and sometimes medicinal plants (Nikolić et al., 2009).

4.3.1.4 1.1.4 Threats

The main threats on the environment of the peninsula of Pelješac are the development of tourism and recreational infrastructures like the construction of tourist facilities and family homes near the sea, in the coastal area. A high impact is also the intensification of the way of farming, especially between Trstenik and Orevič, in the northern part of Pelješac, where large forest areas are cut in order to plant vineyards.

> *"Habitats are destroyed every day to create vineyards."*
>
> Interview with an ecologist in Dubrovnik - O17

The water is also a big issue because of the land reclamation and the channels: an inappropriate concrete channel in the fields near Ston leads to a loss of biodiversity. Then come the abandonment of agricultural lands and the reduction of land use, but only in the interior of the south-eastern part of Pelješac (Nikolić et al., 2009).

As we will study the interactions between the human activities and the habitats, we will now focus on the landscape analysis.

4.3.2 Spatial analysis and study of habitats

In the Pelješac Peninsula, the agrarian landscapes consist of specialized or diversified Doline, associated with the local names “blatina” and “polje”, or Karstic plains, coastal villages with agriculture that are called “huertas”, hills slopes, coastal slopes, and olive trees’ hills.

4.3.2.1 Western part of the Peninslula: from Loviste to Žuljana

In the extreme east of the peninsula at Loviste, the agriculture is specialized for olive groves (Figure 53). The landscapes mainly consist of ager where mechanization let people reopen the terraces by a non-traditional way. Locally, urbanization takes place (Figure 54).

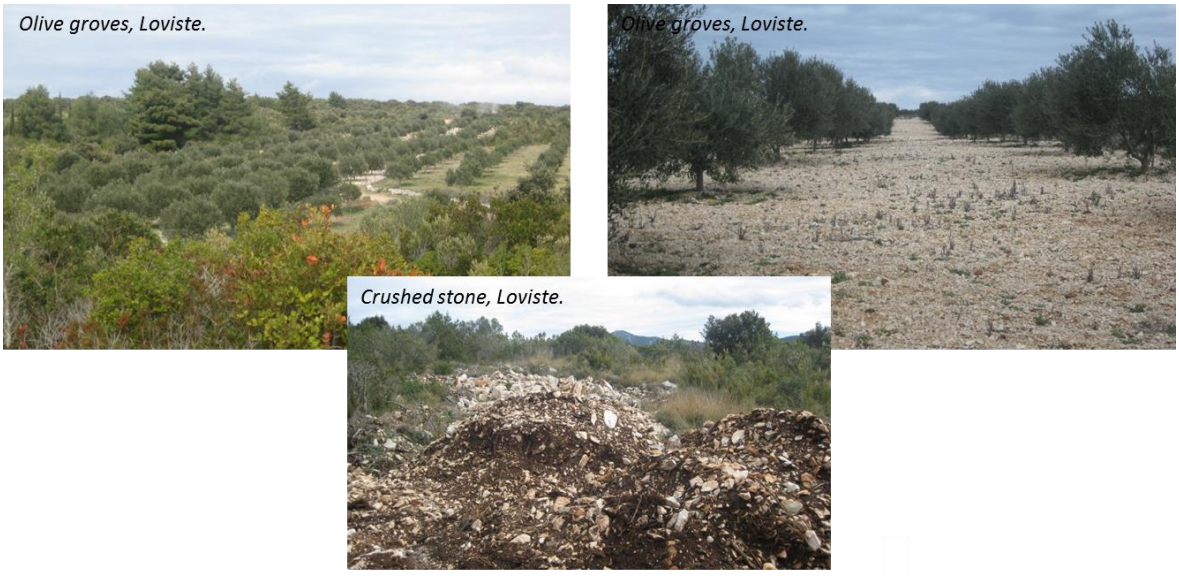


Figure 53: Intensive production of olives in Loviste. The crushed stones provide olive trees plantation (photography: M. Graziella)

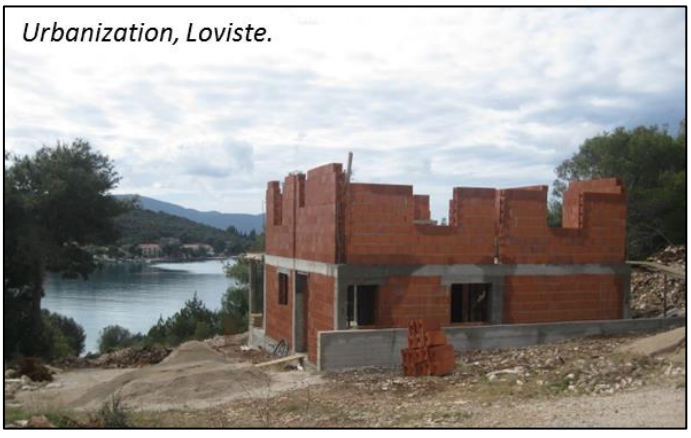


Figure 54: House building in Loviste in front of the sea (photography: M. Graziella)

In the western part of the Peninsula, the agriculture is locally specialized for the wine and olive oil production. The Dingač wine is produced from the vineyards located in the Potomje karstic plain and more in the south in the coastal hillsides. The Postup wine is produced from the vineyards located in the coastal slopes of Kuna (Figure 55 and Figure 56). The presence of famous wine here reflects a true specialization of agriculture in this part of the peninsula. About

the population, there are other villages located on hill slopes, like Donja Vrucica, and Donja Nakovans.



Figure 55: Vineyards specialization in the coastal slopes of Postup, in South-West part of the peninsula (photography: M. Graziella)



Figure 56: Vineyards specialization in the plain of Kuna, in the west part of the peninsula (photography: M. Graziella)

The typology shows internal and coastal hills, coastal slopes, and karstic plains. More locally, there are non-agrarian landscapes. In Vigank, the parcels of land are residential (Figure 57).



Figure 57: Residential lands in Vignanj (photography: M. Graziella)

4.3.2.2 Eastern part of the Peninsula: from Žuljana to Ston

In the Eastern part of Pelješac Peninsula, between Metohoja and Ston, the agriculture is located in a plain. It mainly consists of small parcels of vineyards (Figure 58). The average size of the parcels cultivated seems to be less than one hectare. Here the agriculture is quite specialized, but it is small.



Figure 58: Vineyards in terraces near Ston (photography: M. de Rochegonde)

Between Metohija and Dubrava, in the East of Ston, the agriculture is more diversified. In the plain, there are essentially vineyards, olive groves, and scrublands, but also crops of vegetables. This is the probably the plain that had been used to grow cereals, such as corn or wheat. The parcels are small, with a surface of less than a hectare. In this area, there are also more rocky soils that could have been used in the past as pastures for sheep and goats. This a patchwork type of landscape.



Figure 59: Patchwork of agriculture in the plain, east part of Pelješac Peninsula (photography: M. de Rochegonde)

In the south, a strong geological constraint prevents the agriculture. It consists of rocky soil on a highly sloppy land, with only a very few vegetation in place, no habitats, and almost no activity even for tourism.

The coastal villages are organized as "huertas" with ager (Figure 60). The coastal villages are Trpanj (more in the Eastern part of the Peninsula), Brijesta, Zuljana, and Ston. The population is located in the middle of hillside. There are also tourist accommodations that are located in the coastal villages' areas. This urbanization is still in progress. The landscapes and the agriculture are more diversified. There are some vineyards, and olive groves on the hillsides, in terraces. They are oriented to the South/South-West. Some older vineyards and olive groves located in terraces are been replaced by natural vegetation. There are orchards with citrus fruit trees, which is possible because of the micro-climate due to the proximity with the sea. There are also olive groves located in fields of terraces, and vegetables. In the sea in front of the village of Brijesta, there is a production of oysters.

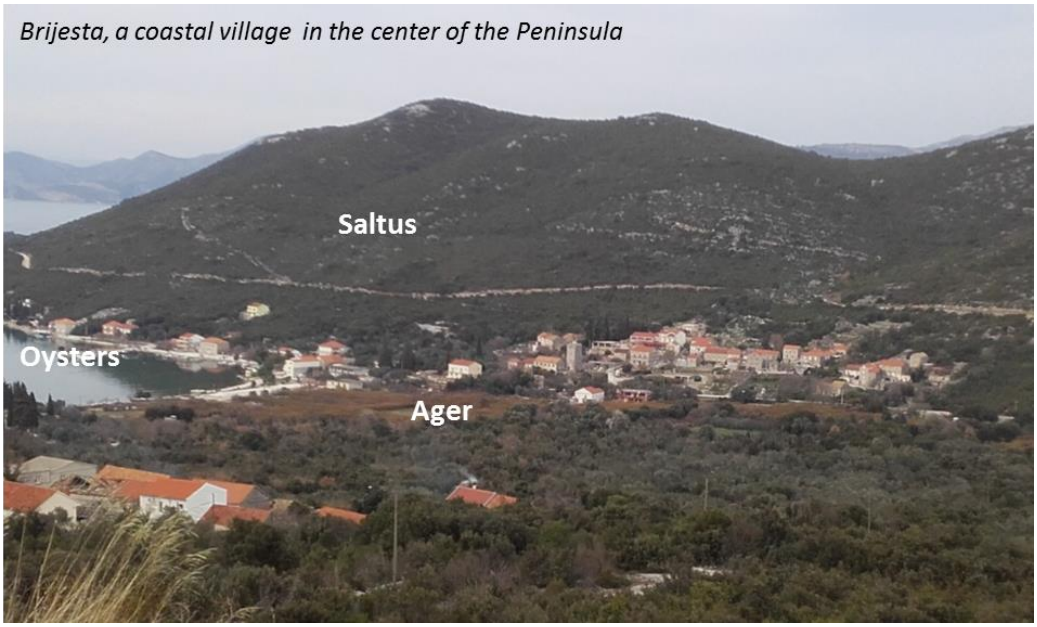


Figure 60: Brijesta, a coastal village in the center of the Peninsula (photography: M. de Rochegonde)

To finish, there are also others landscapes visible in this part of the island which are not associated with agriculture: pine forest, mixed forest with scrublands, evergreen forests. These areas could be used as pastures.

4.3.3 ***Farmers' types***

Pelješac is not actually an island, but it sort of functions as if it were one. The peninsula faces Bosnia, and people living there wish for a bridge that would connect them to the northern mainland without crossing any border. They are connected to the pipeline, so they have less water problems than islands such as Mljet, though some villages, mostly the remote and non-touristic areas, are still not connected and have to buy water to fireman. Pelješac people often feel the typical isolation of islanders: things are more complicated than on the mainland; cities, the government, shops, national and international clients and even friends are far away.

> *"Sometimes feel isolated, during the winter…"*
>
> Interview with a young farmer in Potomje, P16, p. 233

On Pelješac peninsula, we met different types of farmers with a diversity of practices. We decided to describe two main categories, depending on their distribution channel: big producers with an access to the national market and exportation (individuals, companies and cooperatives), and small producers, oriented towards their own consumption, the local market, or selling their production to the big ones.

4.3.3.1 *Large wine producers*

Most large grapes producers also cultivate olive trees, but they talk much more about the wine. Indeed, Dalmatian olive oil is not competitive on the international market, and the national market would rather import cheaper products than buy local ones. As a consequence, olive oil is locally distributed: people use it for their own consumption and to sell to tourists, as such or in meals. Even though wine is also directly sold to tourists, farmers who produce enough can also sell it in Dubrovnik, Split or Zagreb, and it's not rare that they even send it to the US, to Western Europe, or to neighbouring countries such as Montenegro *(see winery P34, p. 235)*.

> *"They export to US", said a farmer in Ponikve, P3, p. 190. "I know someone who export wine in Germany, France and Switzerland […] I export to the Austria, to the Belgium, and now with start with UK", confirmed another one in Janjina, P12, p. 211-213. A cooperative in Putnikovic "export to the UK, USA and Germany", P18, p. 251.*

These farmers have access to the national and international market. They produce wine themselves from the grapes they grow and / or buy to surrounding farmers. We met a farmer who had only 3 hectares and bought more grapes from other farmers to produce 25 000 litres of wine per year *(Farmer P12)*. They produce 7 000 *(Farmer P7)* to 500 000 *(Farmer P36)* bottles per year and generally use some chemicals, mostly copper sulphate, to secure the production. The use of machines in the fields depends a lot on the landscape: some PDO (Protected Designation of Origin) like Dingač demand a very steep location which prevents the use of any machine. As for the chemicals, they can get synthetic mineral fertilizers (as NPK Nitrogen, Phosphorus, Potassium), herbicides (the main one is Cidokor composed of glyphosphate), and a wide variety of pesticides (from famous international brand such as BASF or Syngenta), from a shop in Orebić *(P33)*. All these chemical substances ease their hard work.

> *"With no pesticides, he would need to plough, to cut the grass by hand and everything. A lot of hard work. And the price wouldn't be that much better. Not profitable."*

Interview with a farmer in Janjina - P1, p. 169.

These big grapes and wine producers often have several parcels of land in several places. As most inhabitants of the islands, they can stumble on ownership issues as the cadastre is not up to date. If quite a big surface of land is devoted to grapes culture, they always have a few additional cultures, at least for their own consumption: mainly olives but also vegetables (mostly potatoes, then greens), almonds, figs... However, none of them told us they sold vegetable, fruits or nuts at a large scale, therefore their practices in terms of vegetables production and distribution are the same as small producers'. The vegetables on the peninsula are imported and sold in supermarkets.

In 2015, 75% of farmers got subsidies (source: APPRRR) for their production and/or to invest in more equipment. This help comes either from the ministry of agriculture of from the European Union through the Croatian government. The LAG 5 helps farmers in filling documents to apply for those funds. Most farmers get help, but they never know when they'll get it. They can have difficulties to plan and organise, as subsidies can arrive a year and a half later than it was supposed to.

> *"The problem here is you never know when the supplement will arrive, you can't organise [...] With the law, it's still the end of June. But we received for 2015 at the end of last year, in December"*
>
> Interview with a farmer and restaurant owner in Kuna - P2, p. 176

Most cooperatives can be considered as big producers: the advantage of unifying many little producers is indeed to access a wider market. There are 6 or 7 cooperatives (according to a farmer in Drace, P17, p. 243) on the peninsula, doing mostly wine even though some of them also have a mill for member to press their olives in exchange for a fee (1 to 2 kuna / kg). Small farmers bring their grapes to the cooperative, and the cooperative produces the wine. Their main issue is related to payment: they can always find a buyer for their bottles but less easily get paid for their sales. Payment often arrives very late – or not at all, which prevents the cooperative from fairly paying its members, which in turn tempts the members to sell their best grapes (with higher sugar rate) to private companies. This practice can quickly lead the cooperative to bankruptcy. As small producers have no guarantee they'll be able to sell all their grapes to private companies, don't know for how long private companies will be interested and can't access the market on their own, this outcome threatens their farming activity. For example, retired people who still grow vine as a "hobby" *(for example an old farmer in Janjina, P4, p. 192)* cannot sell their production without a cooperative – but may find it difficult to wait more than a year to get paid by the cooperative. Cooperative also can provide pesticides, herbicide and fertilizers at a lower price than the market.

Labels appear as too expensive or complicated to most farmers in Pelješac, so they generally only use the "Croatian Island Product" stamp. For EKO or organic labels, after adapting the methods to the label rules, it is necessary to invest a lot, to fill in many documents and papers, to undergo controls and inspections, to pay for the label. On the other hand, they don't need a label to sell. Even worse: buyers seeking wine for a good price might stop buying if a label was there to raise the price.

> *"We don't have certify to be organic production. [...] The cost is a little bit more, because you need more physical labour, you can't use a tractor, and the price of the most organic, not just the wine, like healthy food or cereal, is not so high to justify all this. Because you can sell like 10% 20% higher. And I don't think it is enough".*
>
> Interview with a farmer in Janjina - P12, p. 211.

4.3.3.2 Family production

We encountered a lot of people who declared practicing a farming activity "as a hobby", for their own consumption and short distribution channels. For a large majority of farmers on Pelješac, agriculture is not a good enough business to live on. Their parcels are typically under one hectare. They often own a few, but their total land surface remains under 3 hectares.

A small family exploitation is called an "OPG". Among these small producers, we can distinguish between the smallest, who either are retired or have another (or several other!) professional activities and possess a few hundred thousand square meters of land, from larger farms with a few hectares and diverse crops.

The smallest tend to grow only vine (a few thousands plants), in a very traditional way. They don't use machines, and they generally protect the vine only with copper sulphate – because it is the traditional way of doing it, they trust the product and it's cheap enough. They buy the powder in a shop and then prepare it at home and apply it a few times a year. They don't irrigate.

> *"There is more pesticide that do some protection but he always buys this one because it's cheaper and he does not know the other products.[…] If it rains it rains. It's god's will."*
>
> Interview with a farmer in Janjina, P4, p. 193.

If they use fertilizers, it's mostly manure, but there is less and less cattle on Pelješac due to a lack of workforce, and importing manure can be costly so they don't always do so.

Their distribution channel is mostly through the cooperative which buys their grapes 5 to 15 kunas per kilo. They don't produce wine themselves, and don't have another option than selling their grapes production anyway, either to a private wine maker or to the cooperative. Older people don't necessarily know about subsidies (let alone labels), barely know if they pay taxes and their amount, and don't seem to care much: they keep traditions going, and they do what they always did and saw others do. The land they work on can legally be owned by their ancestors, even if the latter died a century ago, which becomes a problem if they decide to sell it.

> *"Thousands of papers to make if you want to buy lands (takes about 30 years according to him to buy a land)"*
>
> Interview with a farmer in Ponikve - P3, p. 190

Families who own enough land grow some olive trees, some vegetables and sometimes some fruits for their personal consumption, in addition to grapes to produce wine. When they have enough production, they can also sell the surplus on the side or the road, and/or use potatoes, vegetables, olive oil, fruits, cheese, in the meals they cooked for tourists in restaurants and guest houses.

> *"During summer, tourists buy vegetables from him, from his house near the road. Before he wanted to sell to the market in Dubrovnik but the price of transport was too expensive, so he stopped"*
>
> Interview with a farmer in Ston - P6, p. 200.

As for the grapes they produce, they sell most of the production to wine makers, keeping only what they need for their own consumption. The ones who produce their own wine to sell the

bottles are big producers, we met only one farmer who had 4 hectares and sold some wine he produced *(P5)*.

4.3.4 Infrastructure development

Economic development is a stake through tourism infrastructure projects. For the municipalities, one of the main challenges to tackle is infrastructure development linked to tourism (ports and marinas, hotels, Ston's walls restauration), water management (pipelines, sewage systems). (Interview of mayor of Ston, Janjina, Trpanj – P24 P27 P30, official communication of municipalities of Orebić, Potomje).

Indeed, as infrastructure development was a common point of every municipality strategy, we identified it as a big stake for Pelješac peninsula. Those infrastructures are mainly set up by local or foreign investors willing to implement big tourism development projects (hotels, apartments…). Tourism and agriculture are closely linked to each other since tourism provide an important share of business opportunities for agriculture production. (Interviews of agriculture actors – P5, P7 ; interviews of tourism actors – P20, P21). The tourism office make an efficient link between tourism and agriculture, advertising the quality of productions, the cultural centers and possible visits. In the municipality, a technical advisor is quite often active to organize workshop and trainings for local farmers.

4.3.5 Strategic actors analysis

We studied the dynamics of infrastructure development (Figure 61) and identified breaks and levers to set up of such projects. First, we understood that it is included in municipalities' strategies (as water management development) notably to develop tourism activities which give business opportunities to agricultural production. Those projects are launched by local or foreign investors.

They can sometimes be in contradiction with the urbanization plan defined at the county level or even the land register at the court scale. In such case, the municipality will play the role of facilitator, but it can last very long.

> *"If some investors want to build tourist resort, that isn't planned at that moment. You can do whatever you can to make it faster to enter the plan and so total investment can start earlier. Of course you have to follow the rules and you mustn't do anything against the law. For example to modify the urban plan, sometimes it can take 10 years."*
>
> Interview of Ston's mayor – P24

The second step is to make the project public, and this can bring some conflicts between the municipality, and local people who has different opinions.

> *"Projects are publicly displayed and people are showing their opinion on that occasion. They are prepared, they have usually somebody able to make some written statements against."*
>
> Interview of Ston's mayor – P24

The infrastructure development can also be stopped by environmental considerations such as, Natura 2000 or protected areas and the involvement of well-documented environmental NGOs. Those NGOs are sometimes supported by LAG5 in developing sustainable tourism development projects for example.

"Another project on Maliston bay protected by natural national institution. This is a big problem. Anything connected with buildings of anykind including, water, garbage etc which can go into the sea. And this is well known by local green association who use it to scare the people and they are pretty effective in that."

Interview of Ston's mayor – P24

"General world politics is not eco-friendly, it even affects the entire area. Here [Pelješac] we are under Natura 2000 because of the birds, […] and we are really fighting to keep that safe."

Interview of environmental NGO – P33

The peninsula has also a very important archeological patrimony that can be postponed constructions.

"For example if you want to build something in Ston, you will have to stop your work, call conservators and they will come with their toothbrushes during two years to put everything out and give names and after that, put back the ground on."

Interview of Ston's mayor – P24

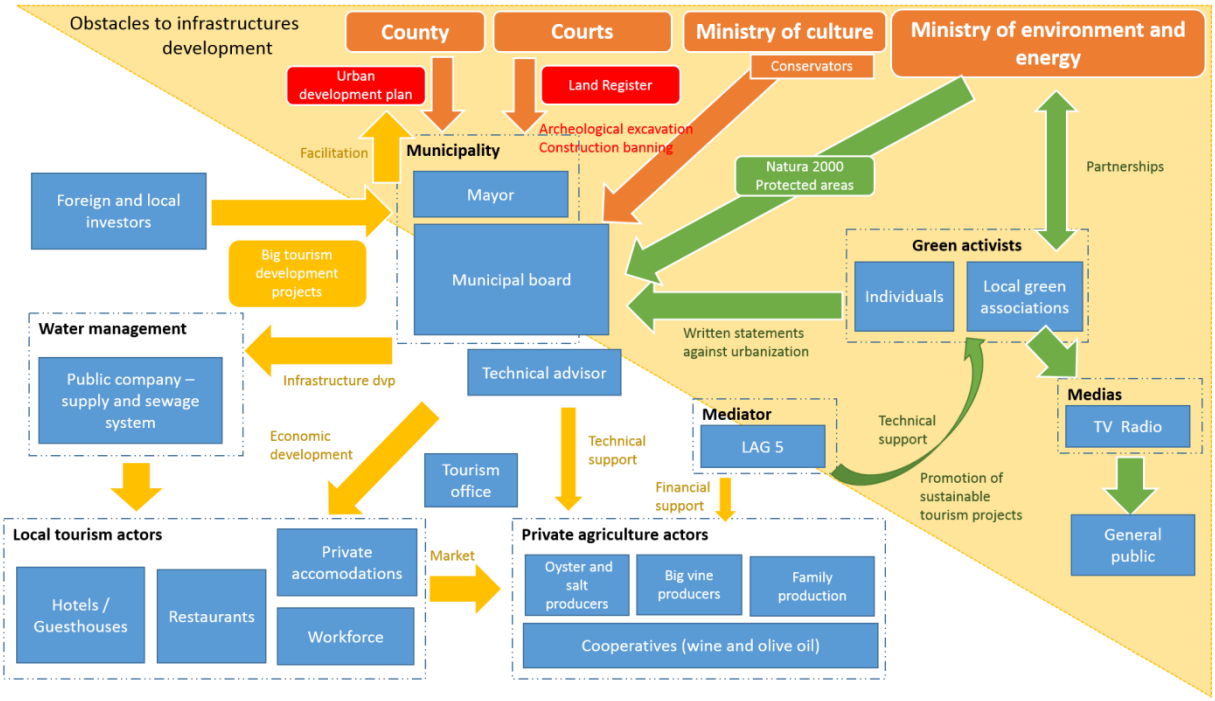


Figure 61: Tourism infrastructure development dynamics in Pelješac

According to such context, and to our categorization of farmers in Pelješac, we can now define big wine producers as targets to change their practices and family production with good practices as a target to valorise through tourism.

The drivers of HNV in Pelješac, will be actors who are already aware about environmental stakes: environmental NGOs and LAG5. And with the help of the tourism office and local tourism actors, they would empower the farmers with good practices through advertising about their production.

In the other side, the help of the municipal technical advisor could be needed to train other producers about HNV farming.

4.3.6 *High Natural Value farming: state and stakes*

After we discovered Pelješac and its specificities, we were able to link it to High Natural Value farming best practices. Could there be such farming on the peninsula? Did it already exist? Which obstacles could it meet, and how could it be favoured?

4.3.6.1 *Tourism impact on the environment*

Due to tourism, population level differs greatly between summer and winter on the islands. On Pelješac, there are 7801 inhabitants in the winter, and 20 000 tourists come in July (according to regional water supply director, P29, p. 309). For example, in Janjina, there are 583 inhabitants but 2000 to 3000 people during the summer (Interview with Janjina municipality, P12, p. 296). All these people need water and generate waste, during a season when water is scarcer and in an area where waste management is an issue.

People collect rain water during winter, and save it in tanks for the summer, to give to the animals when they have some and sometimes irrigate their land (garden, mainly, as wine and olive trees can generally manage without irrigation). They are also connected to the mainland pipeline, and receive communal water. Finally, they can buy water from the fire station, which has access to a source in Ston. These three ways of accessing water combined prevent having too much trouble with water scarcity. During some dry years, public authorities forbid the usage of water for unnecessary purposes such as garden irrigating or car washing, but most of the time people can use the water as much as they need it. Yet, this comes at a cost:

> *"It's expensive… In winter now, it's 100 euros per month for water. In summer, it's double. Double and more. 200 to sometimes 300 euros per month that we need for water."*
>
> Interview with a farmer and restaurant owner in Kuna - P2, p. 178.

Wastewater is then left untreated and just thrown into the ocean, disturbing and endangering marine ecosystems and species. Pelješac peninsula is famous for its oysters and mussels that are farmed in the "small sea" visible in the Figure 62 (as they call the sea on the mainland side, interview with Janjina municipality, P12, p. 296). The coastal and sea area between Brijesta and Sreser at the center of the peninsula is law-protected in order to preserve oyster and mussel cultures, but people still throw their garbage into the water and the streams bring them back into the bay.

> *"Some people from Herzegovina… They throw garbage into river Neretva and through the river the garbage comes […] and the sea currents bring garbage here so all this part here is full of garbage"*
>
> Interview with Janjina municipality - P27, p. 304

This endangers the shell production, and the environment. On Pelješac, there is no recycling plant or incinerator. They don't have the means to treat waste adequately – or at all. There were European Funds to deal with this issue, but it still hasn't been sold:

"Waste is a big problem. It costs 170 000 Euros per year. It could be solved. There was a plan for recycling and composting. EU fund even financed 80% but in fact it was never done."

Interview with regional water supply director - P29, p. 308

People pay a fee for waste to be removed from their houses by a municipality service. The truck that comes and picks up garbage to dispose of it in Bosnia. The fee must not be too high, or the people may just dispose of their trash into the sea

"It's a big problem for the country because if you give people big price they will throw garbage no in a place where you must [...]One big problem here in Croatia there is garbage in the Pacific Ocean."

Interview with a garbage truck driver in Janjina - P13, p. 119.

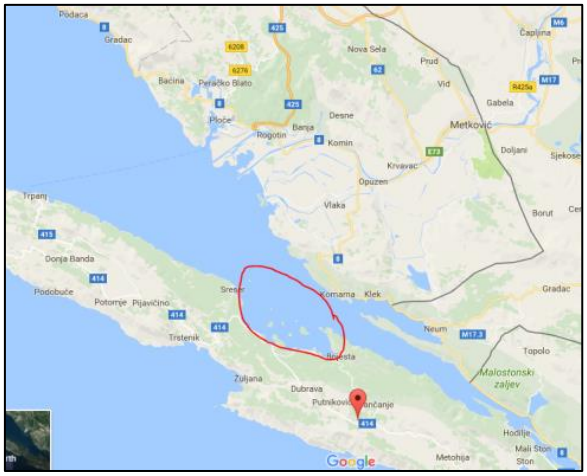


Figure 62: "Small Sea", Pelješac

4.3.6.2 Farming trends: opening in the West and closing in the East

In the western part of the peninsula, the agriculture is very profitable for the producers because of the specialization of the fields and the quality of their products, as the wine which is well-known abroad. The dynamic of agriculture reflects the willingness of producers to maintain their activity in the areas where wines are produced, like in Potomje. There is also a dynamic of reopening abandoned lands to grow olives trees in Loviste. In the eastern part of the peninsula, where the agriculture is more diversified locally, the dynamic of agriculture is different. In central plain, there are abandonments of some agricultural lands (Figure 63).



Figure 63: Closure dynamics

4.3.6.3 *Vine culture practices*

We identified and chose a few key criteria that represent practices that, in our opinion, foster more biodiversity on agricultural land. We applied them to all the interviews we did on the entire field of study (Pelješac, Korčula and Mljet) in order to see how it matched with the main farming activities. In the graph below, we used mean values per type of production. We decided to look at fertilizers, pesticides and machines because it is common knowledge that more chemicals and engines have a negative impact on biodiversity. The "mosaic" criteria was a bit more subjective, as we tried to assess the diversity of plants on the parcels: variety of cultures but also proximity of "saltus", such as forest, bushes, or other non-agricultural plants. Finally, we found that terraces had a positive impact on biodiversity, because they prevent the use of large machines and allow a lower use of inputs (diseases don't develop as fast, water flows better…) (CRPF PACA, 2012; Larcena, 2012).

For each criterion, we gave a grade from 1 (negative impact on the biodiversity) to 4 (positive impact on the biodiversity) to farmers, relying on what they had told us during the interviews. Then we computed the mean value per type of production.

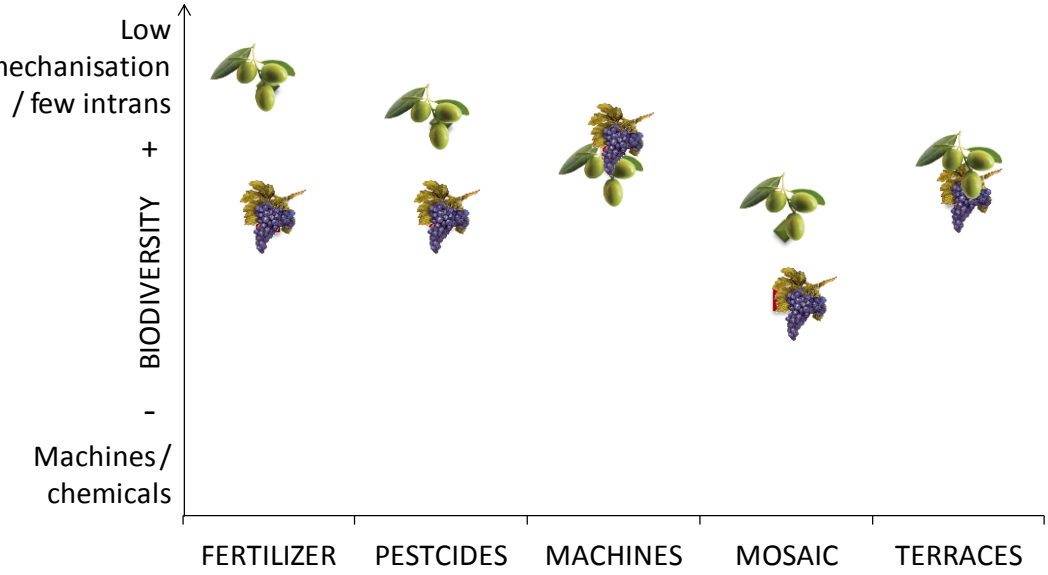


Figure 64: Declared Practices of Grapes and Olives Culture

On this graph, it seems that olive trees farming is more favourable to HNV-farming than vines agriculture. This can be explained by multiple factors, the main one being the smaller usage of chemicals, maybe because olive trees are more resilient to diseases and thus require fewer pesticide applications. Olives are also doing better in terms of biodiversity when it comes to fertilizer, possibly because people use more organic manure. Machines and terraces are logically linked: tractors cannot pass on terraces. The two productions are on the same level, with a small advantage for the vines justified by the techniques used in steep locations such as Dingač, where it is almost impossible to use any machinery. To give more sense to this analysis, it would be interesting to differentiate between the practices of producers specialized in olives or wine growing and producers who do both.

4.3.6.4 Human resources challenges for HNV farming

Table 11: Demographic evolution of Pelješac since 1991 to 2011 (Source: Croatian bureau of statistics)

JANJINA	555	593	551
OREBIĆ	3855	4165	4122
STON	2802	2605	2407
TRPANJ	871	871	721
Total	8083	8234	7801

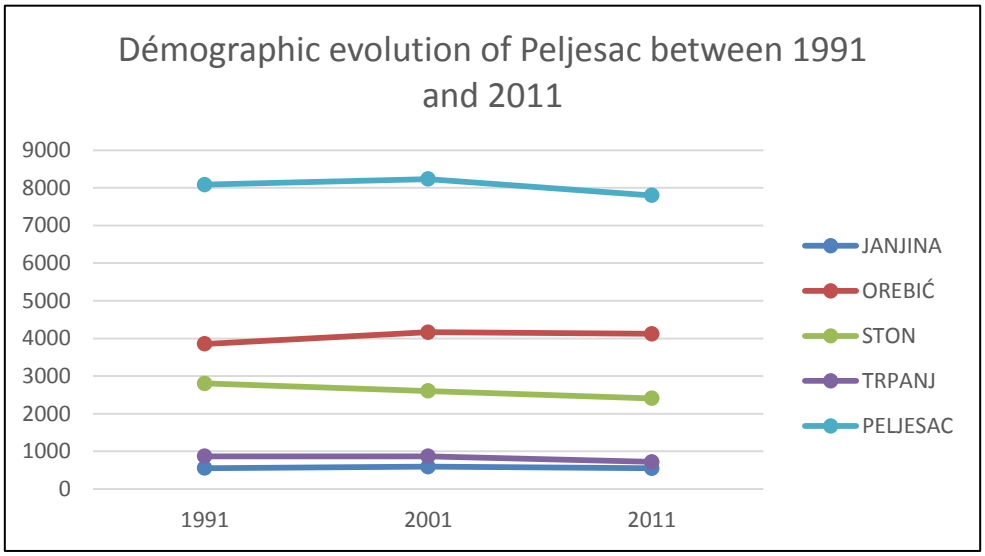


Figure 65: Demographic evolution of Pelješac since 1991 to 2011 (Source: Croatian bureau of statistics)

Pelješac face the same demographic issue than the 2 previous studied area with a decrease of its population in 20 years (1991 to 2011) in almost every municipality, except in Orebić (Figure 65 and Table 11). The city growth can't compensate the global depopulation of the peninsula facing a population decrease of 3, 48%. Like the others, the lack of infrastructures (university, school…) is the main reason.

> *"In the future, it will be less and less people in this area and also in all Croatia, because from my generation, in the university we were 80 from the year, 40 are now outside of Croatia: from Australia, New Zealand, to Germany, Austria, and all over, Italy…"*
>
> Interview with a farmer producer and restaurant owner in Pelješac - P2, 183

Also, the grapes farmer who sell to cooperative have difficulty to be paid. Furthermore, labour work is too hard. These facts aren't motivating young people to stay in such activity.

"[Future of agriculture] It's not god because for the last year, for the last grapes that he brings to the cooperative, he didn't get money. He didn't get money for the last year."

Interview with a grape farmer in Pelješac – P1, p170

The future of agricultural activity is unknown due to the flee of young people. Land are abandoned. The one staying is not attracted by labour work. Some activities like cattle have to be stopped, leading to forest recovery on arable land. To practice agriculture again on these areas will need a lot of work.

"For this, a lot of people ask the possibility to ride with the donkeys and to go outside in the vineyards, in the field, to work with them. But we can't give our animals without anyone of us. And for now we have no time, because in summer we have a lot of work here, then it's not possible to be in two places at the same time. But we spoke about this a lot of times, but it's difficult to find people to work. This is also one of our main problems. We can produce more, and we can do more with the farm, but our only 4 + 2 [people] it's too difficult to…"

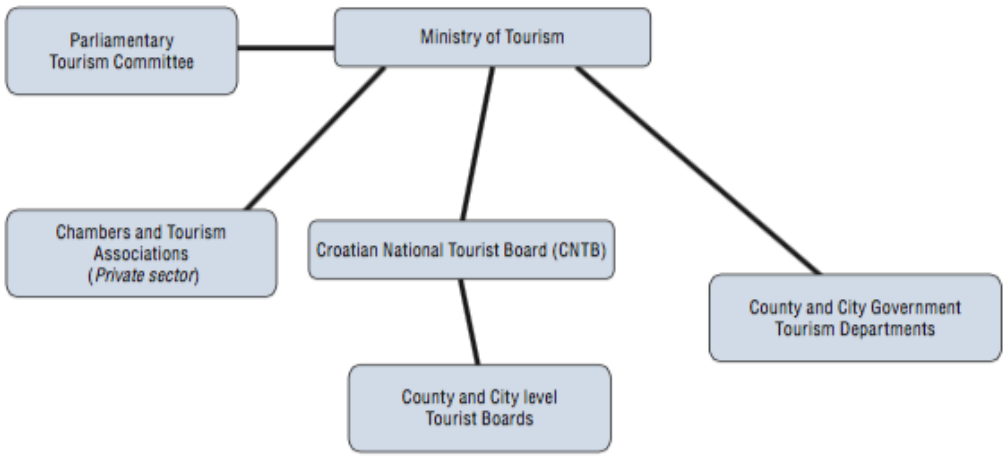
Interview with a farmer producer and restaurant owner in Pelješac - P2, 186

They are more attracted by tourism activity because it's more profitable. There are also few industries and their development is hard due to land ownership issues. This isn't motivating young people to stay or even come back to develop their own business.

4.3.6.5 *Urbanisation*

One of the main priorities of the Croatian Tourism Development Strategy 2013-20 is the improvement of the quality of touristic accommodation. The Ministry of Tourism provides financial support for SME development, with grants aimed at small businesses, rural homesteads and private individuals." (OECD, 2016).Support is given to the renovation of old stables into houses and the construction of swimming pools. The grants allocated to swimming pools are around 40 000 to 50 000 Kuna and concern swimming pools that are bigger than 25 square meters.

The tourism offices of municipalities are helping with writing of projects to submit to the Tourism ministry for the grant – see the organization of the tourism body in the chart below (Figure 66).



Source: OECD, adapted from the Ministry of Tourism, 2016.

Figure 66: Croatia: Organisational chart of tourism bodies

The development of tourist infrastructure on old stables and the construction of swimming pool is expanding a great deal, especially in the inland part of the peninsula and islands where construction is encouraged with grants higher than ones on the coast. According to our interviews, last year, the tourism office in Orebić has written 10 proposals for swimming pool grants.

> *"This little villages is great for the peaceful (…) now people renovate with the pools because now people need the pools (…) the government has money for the pool and for the rebuilding ; 40 to 50 thousand Kuna, for the pool and there is also the subsidies for the old houses (animal houses=stables), depend on how many bed you have. For swimming pool they give money to all the same. In houses in the rural part of the island you have more subsidies than on the ones on the coast"*
>
> Interview with a tourism actor in Potomje - P31

4.4 Conclusions

The contrast between Mljet, Pelješac and Korčula is important. Each island has specificities, organization and threats. However, the main common points are a trend to land abandonment and an aging of population. Agriculture is less popular for young generation in favour of tourism. In Mljet, agriculture is more traditional and family dimension, which is favourable biodiversity. This island is a showcase for HNV farming. In Pelješac and Korčula, farmer profiles are less homogenous. Some big farmers are highly mechanized to produce olive oil and wine for national and international exportation. Combining with pesticides and fertilisers, these types of farming do not promote biodiversity so well as traditional farming. A warning concerns waste and water management: the pollution risks will increase with the tourism frequentation if wastewater and rubbish are not treated properly. This is a danger for biodiversity and human health because pollution could contaminate the food production.

5. Transversal Approach

After having closely examined the data we collected through analysis on the different parts of the territory, we have now to draw a synthesis for the whole area. Indeed, our work stressed the differences between the islands, but it also allowed us to identify common trends and practices. In this part, we will thus walk through this trends, and through some conclusion we were able to draw. We will notably emphasize the most important economic value chains of agricultural products that structure the studied area in a first time, and secondary agricultural activities in a second time. We will analyze how they work, how they are organized and how they evolve. Then we will try to identify how HNV farming finds its place within them, and how it can be supported in the future.

5.1 Wine

5.1.1 Value Chain

In this part we are going to try to draw a synthesis of the wine value chain (Figure 67), and define homogeneous categories of actors on studied area tackled as a whole (taking into account the repartition of the actors on the two Islands and on the peninsula).

As a general introduction, we have here divided the wine value chain into three steps:

- Vine-Growing: The agricultural part of the chain, which consists in growing the grapes
- Wine-making: To process the grapes into wine.
- Distribution of the wine

The first broad category we can identify on the studied area is the wine-growers that process their wine by themselves. But this category encompasses very diversified actors. We can divide it into two groups that are much more homogeneous (even if the frontier between the two is sometimes blurred).

5.1.1.1 Independent winemakers as first source of revenue

The studied area is broadly known for its wine, and those actors can be defined as *flagship* of this reputation. Indeed, another definition point for this category is “wineries that access national and international distribution networks”.

We have found those wineries in a vast majority on Pelješac *(Farmers P3, P12, P16, P34, P36 and P37)*, but also one on Korčula *(Farmer K1)*.

It is important to mention that due to the Communist system in the past decades until the beginning of the 1990’, all the production system worked through cooperatives. No private wine-making was allowed. However, some families have a very old tradition of vine-growing and wine-making, up to several centuries, and kept hiding a little private production even under the communist system (Interview with a winemaker, Pelješac - P3). Some of them are more recent projects that started after the liberalisation of the production, and even thanks to foreign investments like Korta Katarina winery, that was created by a couple of American investors in 2001 (Interview with a winemaker, Pelješac - P37).

Those wineries own between 1ha to 15ha. Their productions are comprised between 25 000 bottles (Interview with a farmer P34) and 500 000 bottles (Interview with a farmer P36). Only a few of them produce more than 100 000 bottles, the average is rather 20 000 to 50 000 bottles.

The price of their wines is basically comprised between 5 euros per bottle to 100 euros per bottle. Most of them focus on high-quality wine, and the average of the producers we interviewed was between 20 and 30 euros.

Some of them, like winemaker P36 or P34, buy high quality grapes from small vine-grower families, at prices comprised between 20 and 35 Kn per kg (Interview with a winemaker, Pelješac - P3).

Their clients are diverse:

- Tourists directly at their place. The sales to tourists directly at the winery represent a significant part of the total sales, from 10% (farmer P37) to 50% in value (farmer P3). An important part of those sales are concluded with foreign tourists, and the winery can offer to send big sales directly to their home (farmer P3), what can be counted as « export ». The origin of the tourists is very diverse as well, with an important share from North America and Europe.
- Local restaurants and wine-shops.
- Distribution companies that sell their wine to restaurants and hostels in whole Croatia (winemaker P34).

They also export to foreign countries, in Europe, but also in North America, notably through international distribution companies (Farmer P16).

5.1.1.2 Wine-makers as second source of revenue.

As mentioned before, the limit with the first group is not completely clear, notably because many actors that produce wine as main activity also have side activities (in tourism or agriculture mainly). Nevertheless, we can draw the contour of this group with actors that have similar characteristics, not from Mljet but either from Korčula or Pelješac.

The majority of the main source of revenue of those actors is touristic activities like a restaurant (farmers K34 or P2). The second possibility is agricultural activities, mainly like growing olives for oil, or vegetables. And then other types of jobs like sailor (farmer K24).

Logically, those actors have small lands, usually smaller than 4ha. They also have much more limited production, from 600 to 8000 bottles.

Their distribution channel is predominantly focused on local area. When they own restaurants, they represent by far their first outlet, up to 90% or 100% of the production except own consumption (farmer P2). If they don't have restaurant, they can also sell their wines to tourists who visit their winery (farmer P5).

They distribute their wine also in local restaurants, but other distribution channels like wine-shops or national distribution firms are not an option to them because they are too small (farmer K24).

What seems interesting to us in this category is the tight and strong relationship actors have developed with tourism and tradition. Indeed, they sell their products in a vast majority to tourists through really short channels, what enables them to capture a significant part of the value created. What's more, they want to value their traditions and their lands. They implicitly (or sometimes explicitly) try to differentiate vis-à-vis mass tourism.

> *"We have this plus in our production that we sell directly all our products. Because of that, we can be alive here, like farmers. […] We are lucky because we are near the sea and it's a lot of tourists and a lot of people also from Croatia who travel around and want to taste domestic products and the traditional way of making food. And this is our plus. Because of this place here, the farm can exist."*
>
> Interview with a Farmer on Pelješac - P2

The other value chain for wine on this territory is made by two types of actors that do each one step of the production: Cooperants that grow vines, and cooperatives that buy them the grapes,

make the wine and distribute it. This model exists on Pelješac with 6 to 7 cooperatives (farmer P17), but also on Korčula with 4 to 5 cooperatives (farmer K24). There were big cooperatives on Mljet (especially) but they almost disappeared in the late 1980s, and today there is apparently no more wine exportation from Mljet (only self-consumption).

The cooperants are really numerous on Korčula and even more on Pelješac. On average, they have 0.5ha of vineyard (cooperative P17).

Their vine-growing activity is thus clearly not a sufficient source of revenue for them. Therefore, they need to have other activities or source of revenues, and actually, many of them seem to be retired (Farmers P4 and K23).

They sell their grapes to cooperatives at a pretty low price, between 5 and 15 kn, and predominantly between 5 and 7 kn (farmers P4 and K23, and cooperatives P17, P19 and K10). However, they don't sell all their production to cooperatives, because the prices are too low and especially because there are big delay of payment. They thus can sell part of their production to independent wineries on the Islands but also on the lands (what the cooperatives try to prevent).

> *"They don't have any kind of obligation for the members to give all their grapes to the cooperative but now they are trying to make some contracts for the members so they give all their quantities to them and maybe keep a small quantity for personal consumption."*
>
> *"About 90% of habitants here are connected to cooperative and if they don't receive money for they wine they sold they still try to give money to the members even if lower price because it is their source of income. And if they don't get money they will have no source of income."*
>
> Interview with a Cooperative on Pelješac - P18

The cooperatives are much less linked to tourism than the other wine-makers of the area. They distribute their wines mainly at the national (and a little international) level, through more massive distribution networks, like to national or international distribution companies (cooperative P18) and massively to supermarkets (cooperative P18). They also sell their wine at a small scale directly to tourists at the cooperative, to local restaurants.

Those channels impose much tougher sale conditions in term of price and of time of payment. This is why cooperatives face difficulties that are replicated on the cooperants.

> *"We are just above the sea. If we are looking at complete situation we should be satisfied it's an ok situation for us.. Regarding profitability, if there are no delay in payments the cooperative will be profitable but now we are just trying to live from year to year. We only have little profit. We also export to the UK, USA and Germany."*
>
> Interview with a Cooperative on Pelješac - P18

Moreover, on the mass market, they face an increasing competition from foreign wines with easier and more industrialised growing conditions. So, their future may be complicated.

> *"Main issue is import of the wine because the import of wine in Croatia has increased so it lowers down their prices and in future it will be difficult to stay profitable. This wine is mostly coming from countries around, Spain, Italy and Montenegro. The problem is that the imported wine doesn't need that's stamp on the bottle and there is no control is they are good or not and now the ministry is trying to find a way to*

force people who import wine to pay for that stamp so it will probably decrease the quantity of imported wine."

Interview with a Cooperative on Pelješac - P18

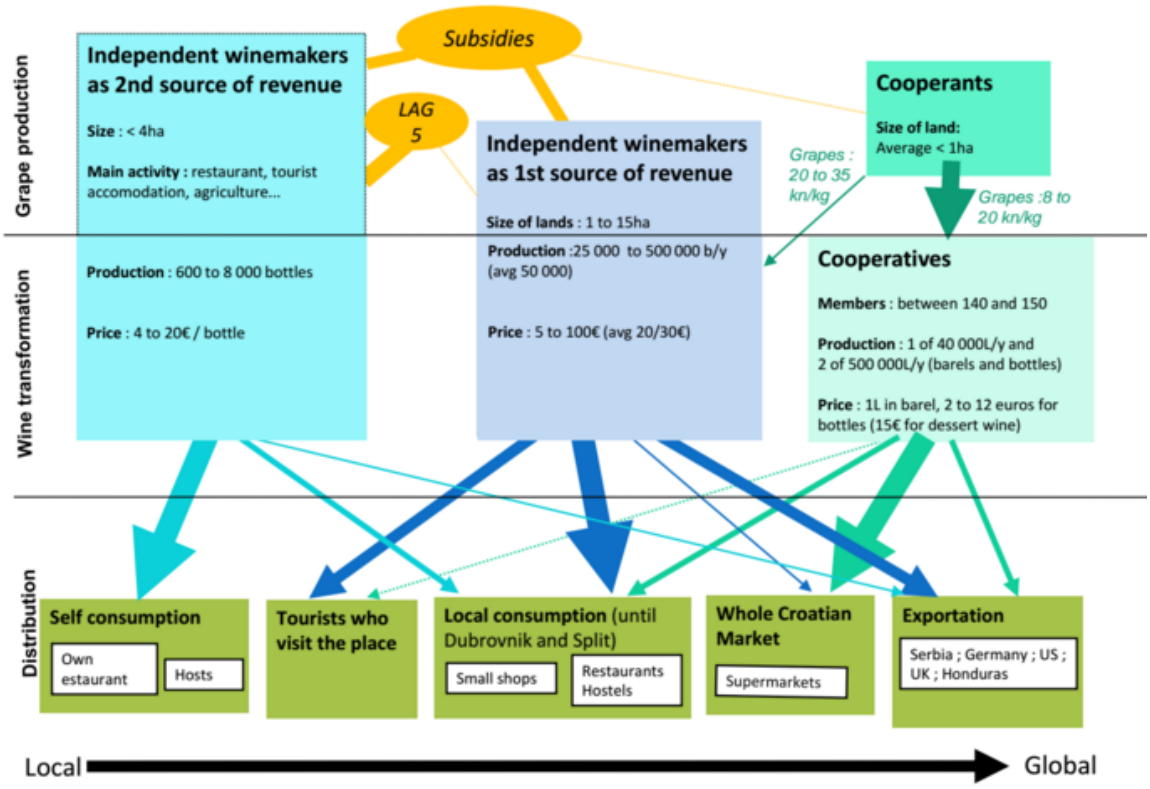


Figure 67: Wine value chain and potential key actors for HNV Farming

5.1.2 Labels and certifications

The wine producers don't use often labels because they don't testify the quality of the wine. It's no use for selling more.

> *"No, we don't have (labels) … because we sell everything."*
>
> Interview of a wine producer in Mjlet – M4, p.26

The investments needed to be organic won't be reported in the price of the wine.

> *"We don't have certify to be organic production. We make on the way of naturies. We have very good area to grow it. But people are pretty sceptical about organic. The cost is a little bit more, because you need more physical labour, you can't use a tractor, and the price of the most organic, not just the wine, like healthy food or cereal, is not so high to justify all this. Because you can sell like 10% 20% higher. And I don't think it is enough."*
>
> Interview of a wine producer - P12, p.211

When possible they prefer to use Protected Designation of Origin (PDO, Figure 68, Table 12). It identifies the region and the characteristics of the wine due to natural and human factors. Quality can be distinguished on the domestic or international market because of the PDO.

PDO wines can bear the following logo:



Figure 68: Label of Protected Designation of Origin

Like it is mentioned in the Law on Wine, adopted by the Croatian Parliament in 2003[3], practices are not very detailed. The only consideration is the non-alteration of the taste and sensibility of the wine, like shown in the extract below:

> *III. Production of grapes and wine and other grape and wine*
>
> *Article 27th*
>
> *(1) The grapes should not be processed, nor the wine and other products to be produced, or developed further nurture procedures or means which may worsen the physical, chemical, microbiological and organoleptic (sensory) properties of wine and other grape and wine.*
>
> *(2) prohibited the resources and procedures that can be harmful to human health and the environment.*

[3] http://narodne-novine.nn.hr/clanci/sluzbeni/2003_06_96_1219.html

Dingac and Postup PDO seem to be environment friendly because of a matter of facts. For Dingač region, like the neighbouring Postup region, the land is 45 degree slope, which limits the use of machines.

> *"Everything here is done by the hand. The Dingac and Postup are very steep so you can't use any machine, so it's handmade."*
>
> Interview of a wine producer in Pelješac - P16, p.230

Table 12: Protected Designation of Origin (PDO) - Comparison

	POŠIP (since 1967)	**POSTUP**	**DINGAČ (since 1965)**
Where ?	Korčula	Pelješac 50 ha 9 wine producers	Pelješac 60 ha 17 producers
Controls ?	Verification of the conditions laid down in the product specification; Organoleptic and analytical analysis; 3 systems: 1) Systematic; 2) Random check based on a risk analysis (minimum of producers subjet to the control shall be precised); 3) Sample (number, nature and frequency of the controls shall be foreseen).		
Results ?	Economic support Price increase up to 200 kunas per bottle	Economic support Price increase up to 400% Environmental ?	Ecnomic support Price increase up to 400 kunas per bottle Environmental ?

In vineyards, labels can't be drivers to improve HNV farming.

5.1.3 Relation with HNV farming and suggestions

The "traditional" practices related to vine-growing on the studied area (before the communist period) are really low intensive, don't involve a lot of chemical and are quite labour intensive (farmer P3). However, the communist system of cooperatives, that is still important today, tends to enhance an agriculture that is more supported by chemicals. But actors like cooperatives that try to compete on the wine market with a "mass strategy" face growing foreign competition and increasingly struggle to be profitable.

On the other side, we found on one hand actors with heterogeneous land practices that have managed to build the reputation of the territory around wine that attract tourists ("wine-makers as primary source of revenues"), and even more interestingly, a rising category of actors that

make wine by themselves as a second source of revenue and that massively rely on agro-tourism.

Those actors from this second category often rely on different crops (olive and even vegetables), and have better practices regarding chemicals and bio-diversity, notably in order to offer tourists a very "traditional" gastronomic experience. They represent clearly the category of actors that show the best model regarding HNV practices.

Those actors from this second category often moved recently from the cooperative model, what is often complicated (because they have to invest in equipment and because the size of the production is not large and doesn't offer access to large markets...). However, supporting small vine-growers to move from the cooperative model to a model in which they will make their wine by themselves, and treat directly with tourists (that will more tend to value traditional and eco-friendly practices than cooperatives) appeared to us to be a really interesting idea in order to protect and develop the local agricultural and bio-diversity patrimony.

5.2 Olive Oil

5.2.1 Value Chain

The Olive Oil Value Chain (Figure 69) on the Island is much more homogeneous than the Wine value-chain.

As for the wine, the value chain is divided into three steps: growing the olives, squeezing the olive into oil and distributing the oil. However, process of transformation of the olives into oil is incomparably simpler than for the wine: it takes only a few hours with a mill, and doesn't need a specific expertise (compared with the wine-making expertise).

The mill is thus the key of the olive oil process chain; however, it doesn't structure the value chain the same way wineries do for the wine chain.

Indeed, most of the olive oil produced on the studied area is made by small olive growers that rent a mill. On the two islands and on the peninsula, those actors represent a vast majority. They are too small to own a mill: they have about 40 trees on average (average number of trees of the cooperants of the cooperative mill P45).

To rent a mill, they have two options. They can rent the mill from big independent olive oil producers that want to value their equipment by renting it. Nevertheless, the option is quite rare (except on Mljet were it is more common), and most olive growers use cooperative mills. Those two solutions offer slightly the same conditions: olive growers can rent the mill for a price per kilogramme of olive squeezed, around 1,5 kn/kg (cooperatives P19 and P45 and independent olive producer K8). They bring their olives, squeeze them into oil, take the oil back home, and manage the distribution.

This olive-growing activity cannot offer them a sufficient source of revenue. It represents thus a side source of revenue for them. Many actors even describe this activity as a "hobby" (Farmers M1 or K2). We can divide them into three main groups:

- The ones that produce olive oil only for them own consumption (like farmer M5)
- The ones that rely on ultra-short distribution channels and local agritourism (that are the most numerous). They sell their oil to local shops or restaurants (Farmer P11), and even more often to tourists they host in apartments they rent (Farmers M1, M2, K6) or through restaurants they own (Farmer K24), or to tourists that simply visit their farm (Farmer K7).

- Those who rely on other distribution channels (much rarer). They can sell to companies in Zagreb for pharmaceutical uses (Farmer P10) or to organic distribution companies (Bio Bio – Farmer M8)
- Those who process it further into more sophisticated product, for example into cosmetics, (like farmer P14, that distribute his products through his own shop).

A significant part of the production of those actors is certified EKO, (up to 50% according to ooperative P19). The Eko certification allows to significantly increase the price from 60 – 80 kn/Liter up to150 Kn/Liter Eko oil (Farmers P10, K7 and cooperative P19). But in general, even if they are not certified, this group of actors produce a very high quality oil, and offer high prices (compared with the market). We can also mention that those actors tend to have rather virtuous agricultural practices, notably regarding biodiversity.

Another category of actors, which develops but remains much rarer, is made by independent olive growers that own a mill, and thus internalize the oil production process. We found them a little on Mljet and on Korčula. For most of them, it is thus their main source of revenue. They also rely on tourism, selling a significant part of their production in situ (for example, farmer K8 has built a museum at his place to welcome tourists), but the size of their production enable them to more easily access larger markets (national or international)
It is however difficult to draw an homogeneous category of actors here: they are too few (we have met one in Mljet and 2 in Korčula) and too diverse in terms of size, age, philosophy and distribution channel. A constant is that none of them has EKO certification so far.

The last category is made by only one actor: the olive oil cooperative of Blato (K25). The cooperants use the mill and have two choices. They can get their oil back in exchange of 2 to 7% of the quantity produced; or they can let the cooperative keep all their production and manage the distribution, and then get paid regarding the quantity of their oil sold. Most members let the cooperative manage the distribution for them.

The cooperative sells most the oil produced to supermarkets, but also to restaurants and shops, some of them are owned by the cooperative in Split and Zagreb. The cooperative sells the oil from 55kn per liter to supermarkets (that distribute it 85kn), to about 80kn/L in shops, and give 40 to 50 kn/L back to the cooperant that produced it. The cooperative doesn't mix the oils of the different cooperants, and there is a impact of 20% on average on the price between Eko and non-Eko oils.

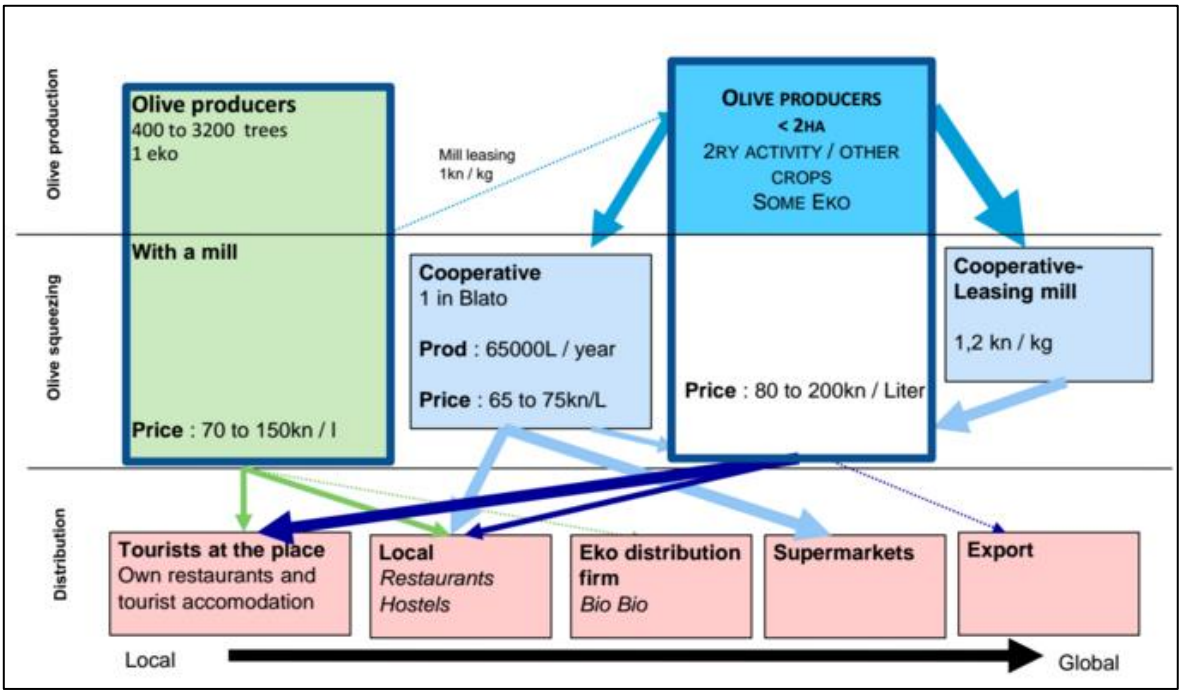


Figure 69 Olive oil value chain and potential key actors for HNV Farming

5.2.2 Labels and certifications

Olive oil producers use label if there is an economic issue with tourism or export because they can sell their products with a higher price.

> *"The price are higher. I am a small producer. I am aware that I can't produce too much. So having a label to get high quality products to sale with a higher price is good. The price is 100% higher than the regular one."*
>
> Interview of an oil producer on Korčula, K4, p. 344

There are several labels used as Croatian Island Product since 2008 on the one hand or as EKO on the other hand for organic product.



Figure 70: Label of Croatian Island Product

Concerning, Croatian Island Product, the criteria are only geographic. They never refer to traditional practice[4].

> *"Sooner or later you are going to run into something called Croatian island product, it is something defined by the island act. The Ministry in Charge of Island development can issue a certificate that you can put on your agricultural product. It is supposed to put you in a special place in the market because you cannot get the certificate if you don't feel criteria of quality and uniqueness, which is not hard to fulfil because of this endemic character. They is already a long list of products that deserves this label."*
>
> Interview with a professor from The Institute of Economics Zagreb, Department for Regional Economics, Sustainability and Governance - O12, p.508

For organic products, several labels could be used.

> *"If someone give you certification, you have 3 names in Croatia. You have organic, biodynamic, and you have like eko. It is very popular to be eco production, eco efficiency."*
>
> Interview of a wine producer on Pelješac - P12, p.211

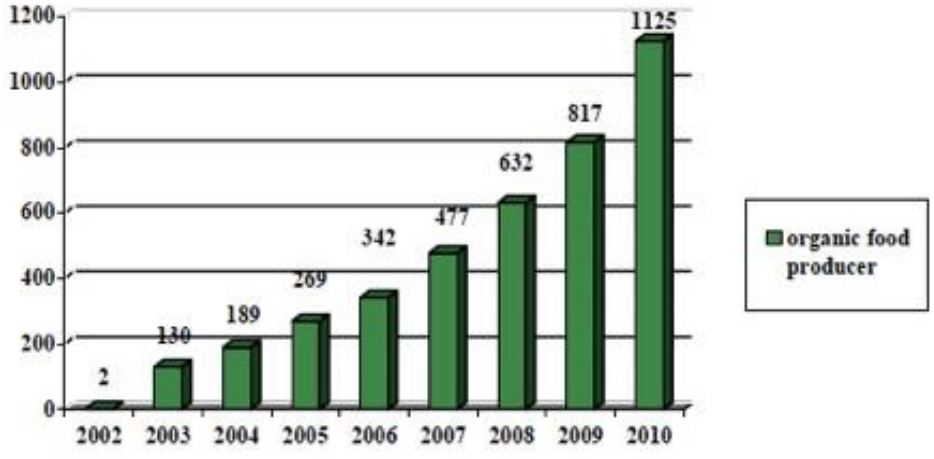
[4] http://www.otocniproizvod.hr/hr/

Figure 71: Label of EKO

In fact, differences aren't well known by the farmers.

> *"(the differences between the 3 labels) It's for experts. I'm not expert. I learn a lot about it. It is very hard to explain it. You have a lot of grey area…"*
>
> *In organic, you can use something that you cannot use in biodynamic but it is so mess. It is not clear, and the European Union is not so clear."*
>
> Interview with a wine producer on Pelješac - P12, p.211

For organic food, EKO (Figure 71) seems to be the most popular. Organic food answers to a demand. That's why organic food producer registered increase from 2008 and 2010 (Figure 72). It was in 2008, for the first time, that a organic food producer (Figure 72) was registered in Dubrovačko-Neretvanska County. (Petljak, 2013)



Source: *Ministry of Agriculture, Fisheries and Rural Development (2012), Organic agriculture. Available at: http://www.mps.hr/default.aspx?id=6184, 11 March 2012*

Figure 72: Organic food producers entered in the Register of producers in organic production in the period from 2000 to 2010

Because of the respect of nature regarding the practices, like not using pesticides, EKO specifications could match the requirement to improve HNV farming[5].

[5]http://www.agribiocert.hr/

The process seems quite tough. It could be the only brake for farmers.

> *"The reason why I don't have EKO certificate? I could. The process is a bit complicated but I could, no problem. But I don't need to do that. I am known on this market, people know me."*
>
> Interview with a farmer on Korčula, K2, p.336

Table 13: Comparison of two labels

	Croatian Island Product	**EKO**
Who delivers it?	Ministry of Regional Development - Departement of Island	Ministry of Environmental protection and Nature
Price of certification/controls?	NC	"For the other (AGRIBIOCERT ONISALS - EKO) … 3000 to 4000 kunas this year." (interview of a olive oil producer, K4, p.345)
Results?	Economic support	Economic and Environmental support

5.2.3 Relation with HNV farming and suggestions

As we mentioned earlier, small olive growers, who represent the vast majority of the olive growers on the studied area, tend to have rather good practices notably regarding biodiversity.

A very interesting point is the close relationship they have with tourism, through short to direct distribution channel. And we can add the fact that the EKO certification enables the oil to be sold at a significantly higher price. There is a demand for traditional and eco-friendly products. This means that agritourism can really drive an agriculture with virtuous practices. Olive oil production is not the main source of revenue for them, and will not become their main source of revenue. However, it can be a significant side source of revenue, and what is more, it can be the reason why tourists come and can pay for other products (in restaurants or apartments). Olive oil production, even more than wine (which is more complex and perceived as less traditional), is directly linked with the tradition, with the (terroir), it is symbolic.

> *"Agriculture has a symbolic role for this development of tourism. It is very important but will never be significant in terms of money."*
>
> Interview with the president of the Lag5 - O2, p.466

Supporting those short distribution channels, maybe notably through certification or through subsidies to specific agritourism structures, could be an interesting way to develop and protect the territory and its rich agricultural and bio-diversity patrimony.

5.3 Less developed, but existing agricultural activities

Even if olive and wine are the predominating forms of agriculture in the region (although to a different extent in each specific island and sub-area), it is also interesting to mention and analyze the dynamics of other agriculture activities, because these could foster either the re-emergence of semi-natural ecosystems (hence HNVf type 1) in the case of breeding, or the development of a diversified, mosaic-form of agriculture (HNVf type 2).

5.3.1 Milk and cheese

According to different farmers, there are less and less people producing milk and cheese on these islands as it is linked to the breeding activity. In Mljet, there are not enough labour on the island to maintain this activity and it almost totally disappeared nowadays. However, one farmer mentioned someone doing a small production of cheese, mainly for his self-consumption but this activity seems very small on the island.

> *"This person has a goat. He produces the cheese also for family and also he sells to someone if he has more."*
>
> Interview with a farmer in Mljet - M4, p.30

In Pelješac, it seems like there is a small sector of donkey milk production. Indeed, one of the farmer and restaurant owner we interviewed owns about 100 donkeys that he uses for the milk. Donkey milk is consumed as a natural remedy for respiratory disease and according to him, it represents a good amount of money. However, it seems like making cheese is a complicated process that can be risky as the production can be wasted if there is a mistake in the process.

> *"But it's more difficult to make cheese than to make wine. Because for cheese, everything has to be really clean. And if you miss something, you can't do something good. When something is bad with one cheese you can't solve the problem. You have to put it away. With the wine, except when it becomes vinegar, everything else you can fix."*
>
> Interview with a farmer and restaurant owner in Kuna (Pelješac), P2, p.181

We don't have much information about the production of milk and cheese on the island of Korčula but when we asked to an agronomist if these activities could help to preserve a certain kind of biodiversity, he answered very positively giving the example of the island of Brač as a good model:

> *"The island Brač is a very good example on the matter. They have a lot of sheep, cows, horses, which are left in prairies or forest lands framed by fences. In the past, there were more animals in Korčula, like donkeys, cows, sheep. It was a good way to fertilize the soils."*
>
> Interview with an agronomist in Blato (Korčula), K29, p.446

According to these interviews, it seems like these activities are interesting because they can be profitable as well as having a positive impact on the environment. However, they are not so represented on these islands because this type of production needs more labour and high level of knowledge and skills.

5.3.2 Vegetables

Most of the farmers we met during this study grow vegetables as a side activity. It is something that most people do but they do it for self-consumption and they sometimes sell it on the side of the road to tourists in summer to make extra money. It is quite the same situation in all the 3 islands: everyone grows vegetables but nobody does it as a main activity as wine and olive oil production are considered more profitable. Some farmers that want to export vegetables can't do it because of EU regulations about seed certification.

> *"We have problem because our government sign the treaty of EU. And EU has contract with Monsanto. They say you can buy seeds only seeds with certificate. You must buy seeds with certificate. If you don't, you cannot sell the products. But product are not tasty as mine. My products are much tasty and that seeds can live in dry summer. And seeds with certificate cannot so if I use these I will need more water, pesticides and herbicides."*
>
> Interview with a villager, M29, p 155

Moreover, because of the quite dry and warm climate in the Dalmatian islands, vegetables farming needs good irrigation systems, especially for the ones that are not adapted to this type of weather. This situation where farmers need great amounts of water to grow vegetable species that are not adapted to this climate is quite far from the HNVf practices. We also observed some situations where farmers were using fences to protect their vegetables from wild animals which can be a threat to the natural development of biodiversity.

However, a few farmers told us about interesting practices that mix vegetable agriculture with olive trees or wine yards which can be quite close from HNVf type 2.

> *"We plant some types of beans around olive trees and salad and cabbage."*
>
> Interview with a guesthouse owner - M12, p.54

5.3.3 Fig and other food trees

The production of figs, almonds, carob and other fruit trees is similar in some way to vegetables farming in this area. Many people do it but always as a side activity for self-consumption. Most people make rakija out of it but also dry fruits, jus or jam.

> *"We have fig trees, one almond tree and some other fruit trees. This is enough for eating for my family and make rakija."*
>
> Interview with a guesthouse owner - M12, p.54

However, we have met no farmers that use water systems or any chemicals to grow their trees so these practises have very small impact on the environment and even help to diversify the species of trees in that area.

5.3.4 Honey

The production of honey used to be quite important in Mljet but not anymore today:

> *"All along history there was a lot of honey in Mljet. There are some speculation and even proof that for a long time Mljet was exporting honey. The name of Mljet comes from the Latin for honey. But now there is no more honey. There are just two people that are having bees these days but they are not selling. There are no more bees*

because there are no fields anymore. The main problem we identified in our strategical plan on biodiversity is to maintain the field".

Interview with a National Park employee in Mljet - M23, p.108

The only honey producers we found were based in Korčula. One of them told us that this is a very difficult activity because it needs very high level of skills and knowledge. This is why most young honey producers that start this activity give it up during their first years.

5.3.5 Immortelle

Immortelle is a medicinal herb that is mainly used to make essential oil. We managed to interview 2 of these farmers and one essential oil producer, all in Pelješac and one producer in Korčula. According to them, this activity is highly profitable as one kg of oil is sold 1000€. This farmer and essential oil producer claims that he makes a 1.5 million kuna turnover every year and employ 200 people to work on his field. His only competitors are in Split and Zagreb but not on the islands (according to an interview with an immortelle producer in Pelješac, P40, p.242).

It also seems like this type of agriculture is close to HNV farming practices as it doesn't need any irrigation system, organic fertilizer are enough for a good productivity, the harvest is done by hands and its yield is maximized when combined with sheep or goat pasture (according to an interview with an immortelle producer in Pelješac, K22, p.369).

"We have several parcels of lands and a group of 6 sheep. Where the sheep are, there is none of this grass. They don't eat the immortelle, just the grass."

Interview with an immortelle producer in Pelješac, K22, p.369

However, immortelles sometimes need some environmental impacting activities to maximize the production such as the use of chemicals to protect from processionary caterpillars or the need to break the rocks and plough the land before planting.

5.4 Forest activities and fire management

5.4.1 Hunting

Hunting is an attraction for foreigner tourists as well as a local tradition. Rabbits, faisans and deers, boars and birds are among the most looked for wild animals on the islands. Wild boars are particularly common on Pelješac and Korčula due to the lack of natural predator. It is believed that they swam from the continent to the island. They also could have been brought to Korčula for food. Farmers complain a lot about the damages they cause to crops and livestocks and use automatic gas crackers to frighten them and keep them away from their land.

"- Ok. They were imported?
- Yes, there are two versions or something… that they swim from Pelješac to Korčula. but the more reliable story is that they were imported for hunting. And then they got out of the control. And now it's a huge amount of boars and wild boars in Korčula, and also in Pelješac, and also in other islands, particular northern islands. They menace really. In the northern islands they eat sheeps now. […] Boars eat everything. They do a lot of damage to agriculture, and particular to sheep growing. And it's an open season of hunting. You can kill as many boars as you can all year around. But still they don't have natural enemies, so the number just grows, and no one knows how to stop that."

Interview with a professor of the Institute of Economics Zagreb - O12, p.512

On one hand, hunters kill too few boars during the open season according to farmers and on the other, they endanger some birds species hunted for sport.

"- Hunters do that and most of them are Italians and Austrians. They come here, pay a lot of money to hunt. And since they pay a lot of money, those game keepers keep the eyes close, you know. So the birds are the most endanger
- Because in the country the regulation is different for these birds?
- Yes, and the control is much hard. So they come here, there is no control at all. So if they poached the boars they will be more welcome but they don't! They kill birds."

On Mljet, the hunt of wild animals is forbidden in the National Park. The consequence being an overall displacement of animal populations from the eastern part of the island to the park.

"On the national park area, wild animals you cannot kill, wild animals. In the other side island you can kill them. So it's trouble because the hunters came shoot the wild animals. So, the wild animals came in the park and it's problem in this region of the island."

Interview with an employee of Mljet National Park - M3

5.4.2 Wood

A public organization, Hrvatske sume, covers all Croatia in order to manage the national forests. On the island of Korčula, Sumarija Korčula subsidiary of the main office, is in charge of forests cultivation and protection.

On the island, the forests on the island are of minimal economic importance (Krklec et al., 2011).

For the national income, the timber economic interest is low. They only sell 100 to 200 m^3 per year (interview with the forest department in Korčula, K40). The woods can be used:

- As firewood: pine trees because of tradition sold to local people who prefer to buy wood rather than to cut it themselves from their own land. Usually, the timbers are sold only after sanitary cuts or clearing the forest;
- For Shipbuilding: oak is mainly used on the east part of the island.

"In general, you cannot cut trees, even on your own land you need a special permission."

Interview with a farmer in Korčula - K26, p.382

For other species like Beech or Horne Bearn, they are imported from north Croatia.

The price is different (interview with the forest department in Korčula, K40). They distinguish if:

- people cut the woods by themselves: 70 kn/m^3
- the forest department cuts the woods and leaves it near the road for local people to pick up: 180 kn/m^3

Total income from timber production does not cover the basic maintenance and protection costs of the Forest department (Krklec et al., 2011).

5.4.3 Firemen

Fire has always been a huge threat on the islands. Mljet burned 1911 and 1979. In 1970, the oak forests of Mljet burned the deciduous trees were replaced with pines that spread rapidly and now cover the whole island.

> *"National Park encourages agriculture to stop potential fires in the pine trees. The island burned in 1911 and 1979 but it was stopped before it entered the national park (by setting a fire at the limit to push away the fire)."*
>
> Interview with a tourist guide from the National Park - M9, p.46

> *"So, hundred years ago, 1970, it was a great fire, so that's the time the forest on the National Park become and look like this, before that it was mostly oak. Because the pine is aggressive and it spreads fast, and it took over the oak. So, hundred years ago, 1970, it was a great fire, after the fire the pine took over. So, from that time, our forest looks like this."*
>
> Interview with forester/historian - M23, p.102

According to the chief of the fire station of Korčula, 3 firemen are employed in winter time when the fire hazard is at its lowest. 30 join them during summer, as well as 60 volunteers. The fire station of Ston employs 3 men, plus 10 on summer time and 10 volunteers (Interview with chief of the fire station of Korčula - K41). On Ston, there are 3 men in the fire station during the winter, plus 10 volunteers. During the summer, they employ 10 firemen for 4 months. (Interview with a fireman in Ston - P30)

Firemen have two main responsibilities:

- Prevention of forest fires;
- Supply populations not connected to the water system with fresh water.

The decrease of agriculture is an issue for them since they cannot prevent forest from growing again on abandoned lands with landscaping works because of the land ownership. Harvested lands are less likely to burn. (Interview with a fireman in Ston - P30)

> *"- It has just started to make some projects that need…. The big issue with the money from EU is ownership of the land, when you need to get some money you need clean ownership of the land and here it is complicated to have.*
> *- Why do you use this money for?*
> *- Half million of euros is going to fire department. They protect the whole island from fire and they are helping with distribution of water."*
>
> Interview with the mayor of Mljet - M21, p.87

5.5 Conclusion

As we just saw, many different agricultural activities, and activities related to nature (like hunting) exist and have existed on the studied area. Those activities structure the territory. They evolve due to many different drivers that can be demographic (the workforce), ecologic (diseases, fires, droughts...), cultural, technical or economical (the stucture of the value chain, the demand...), at a local or at a global scale. Olive oil and wine clearly dominate the agricultural practices on the islands today, but many other activities are still important . Even if most of them tend to be less important than before, they can rise again. And even more than for wine and olive, some of the practices related to those agricultural activities can be significantly beneficial for the environnement and biodiversity of the islands. In addition to the ones we identified for wine and olive, they could thus represent very interesting tracks to explore in order to support virtuous practices related to biodiversity.

6. Ideas and thoughts for further actions

In order to give an open out to our results and analysis, we decided to think about some ideas and thoughts of actions that could be done to maintain and also develop the HNV farming practises.

6.1 Financial support for HNV Farming

An important number of farmers don't get any financial support and if they get some, it is in the objective of development. The measure 10 about Agri-environment-climate and the measure 11 about organic farming are quasi not applied in the area. Those measures answer to the need 16 of the RDP which is the conservation of landscape and biodiversity. As mentioned in the RDP, the measure 10 and its sub measures allow a financial support those 11 following operations:

- Tilling and sowing on the terrain with slope for arable annual plants (141€/ha)
- Grassing of permanent crops (331€/ha)
- Preservation of high nature value grasslands (mountainous region, 147 €/ha and the Mediterranean region 102 €/ha
- Pilot measure for the protection of corncrake (244 €/ha)
- Pilot measure for the protection of butterflies (up to 326 €/ha)
- Establishment of field strips (up to 346 €/ha)
- Maintaining extensive orchards (385 €/ha)
- Maintaining extensive olive groves (804 €/ha)
- Preservation of endangered autochthonous and protected breeds of domestic animals (a maximum height support of 200 €/UG)
- Preservation of dry stone walls (0.74 €/meter of dry stone walls)
- Preservation of hedges (0.36 €/meter of hedges)

Lot of those operations could easily be supported for the measure 10 in the studied area. As we saw on the field and according to the interviews, many farmers could get financial support considering their actual practices. But in order to be eligible, farmers have to be registered in the Register of Agricultural Holdings and use the land registered in LPIS. Also, the local development agencies should be informed and aware of all the conditions in order to promote the measure and help the farmers to get the associated funds.

6.2 Developing certifications

It was mentioned during interviews that the procedures for EKO were not well known and seemed too complicated for farmers to obtain. The money spent to get the certification is reimbursed at 100 percent. As EKO has practices that are good for the maintain of biodiversity, therefore coherent with HNV farming, it would be relevant to promote and develop EKO certification amongst farmers in our region of study – for olive production but also alternative sectors such as honey or almonds.

Firstly, there could be promotion and communication to farmers about the advantages of EKO certification, in terms of biodiversity but more even in terms of economy: products that are EKO certified are sold at a higher price. The market is not very important yet but it is developing like shown in the table below and is believed to develop much further in the coming years.

Table 14: Areas (ha) under organic agriculture in Croatia from 2002 to 2010 (Source: Ministry of Agriculture, Fisheries and Rural Development)

Year/Area (ha)	2002	2003	2004	2005	2006	2007	2008	2009	2010
arable land	49.50	2,494	2,386	2,214	2,957.92	2,915.69	2,800	9,766	17,066
orchards		27	34	84	200.93	574.72	792	1,264	1,770
vineyards		43	30	30	31.93	74.84	212	191	400
olive-groves		2	3	26	36.98	82.83	100	228	322
meadows and pastures		940	146	740	2,620.10	3,495.81	5,603	1,998	2,452
fallow land	2.29		3	27	101.80	40.15	100	84	156
forests (uncultivated land)			52	60	58.58	86.94	82	315	444
vegetables						92.17	95	68	284
medicinal plants						214.14	226	279	388
Total	51.79	3,506	2,386	2,214	6,008.24	7,547.23	10,010	14,193	23,282

Secondly, in order to be more familiar with some EKO practices, there could be some testimony done by the farmers who are already EKO certified, so they could share their experience.

Thirdly, because there are many agencies in charge of following and controlling EKO certification, a suggestion to ease the procedure would be to work with solely one specific agency in this region. This agency could then become familiar with the region and local methods of production; visits could be done at once and might cost less. Additionally, the agency could even become a link between EKO certified farmers.

In our opinion, the relevant actor for conducting these three steps would be the LAG 5.

6.3 Facilitating access to agricultural land for HNVf

Difficult access to agricultural land and confused land ownership are among the main reasons we identified for land abandonment and the lack of young farmers. Major actors of land ownership in the islands might be good allies in order to facilitate access to agricultural land for farmers having HNVf friendly practices.

6.3.1 The Church

The diocese owns large surface of land in the islands some of them used to be farmed when others are forests. One of its representatives expressed the church interest in fostering young farmers with sustainable practices. He had not heard about HNVf before but seemed to be interested in it, as well as in LAG5 action. To work with them on easing young farmers, adopting HNVf friendly activities and practices, access to church owned land could be an option. This approach could also work towards the districts.

"Some (people we rent the land to) get subsidies and have eco-production. Beautiful story. People make the demand and there is a council to select the projects. The diocese is a non-profitable organization. We try to get money only for the functioning to make the land affordable for people to farm. We are not looking into economics. We try to help people. Later, when people get some money from that project, they can give some money back. Usually the price is under the market price."

Interview with a representative from the diocese, Split, O10, p.496

6.3.2 ***Advocate for sustainability criteria in state-owned land***

As for today, there are no sustainability criteria for state-owned land given up for renting or concession. To advocate for a tighter monitoring of the management of those lands in order to preserve agricultural landscape patrimony and to foster biodiversity could be a way to help develop HNVf. Another option would be to develop a specific HNVf program for state-owned land that would help farmers with HNVf friendly project to get access to those lands.

6.4 HNVf awareness raising and best practices towards small holders and families

Family and small-holder farming play an important role in the mosaic landscape that constitutes HNVf Type 2. During our study, we realized that most of the people farming the land do not know about HNVf and that farming practices differ highly from one person to another. LAG5 could work to raise awareness on HNVf linking it to biodiversity and islands agricultural patrimony and organize workshops to promote best practices.

6.5 A deep connexion between HNV farming and agro / eco-tourism

Developing agro and eco-tourism could foster people to follow traditional farming method that correspond to HNV farming standards. This type of tourism is not yet enough promoted but could lead to economy development if combined with other economic sector such as agriculture (Šulc 2015). Local people have already seen these opportunities and many small producers begin getting into tourism holding.

"She does see that more and more people are involving themselves in tourism (especially having small restaurants where they sell their home-grown food to tourists)."

Interview with an agronomist and permaculture producer in Korčula - K29, p.442

"Link between tourism and agriculture is important, more and more people who have OPGs and households are becoming hosts to the tourists so they offer them everything from food to accommodation, it's like full pension where they offer accommodation and food from their land."

Interview with a municipality employee of Vela Luka, Korčula - K16, p.421

Also, this type of tourism combined with agriculture could be a good way to attract people on the islands and stop the depopulation problem.

"Maybe we can attract some people from mainland to come and live here and do agriculture and tourism. It's more and more popular this active tourism we have the nature and the environment and resources for that."

Interview with a municipality employee of Vela Luka, Korčula – K15, p.415

This far, travelling agencies and municipalities have a big role to play to emphase this connexion between agriculture and tourism. For example, municipality must help creating new hiking, biking, climbing routes and promote in the same time, agencies that offer these activities.

"He feels a little alone to do them (the municipality doesn't help him), even though they are not that expensive (climbing & hiking routes) and would give a big return on investment (by promoting ecotourism)."

Interview with a tourism agency employee in Korčula - K27, p.407

Finally, big holding places like hotels should propose to tourists to consume local food production. It would be really important for local producer who currently don't have places where selling their production.

"Would like to have a shop in front of the house to sell products. Would also work with hotels."

Interview with a fig producer in Korčula - K26, p.337

Creating a short supply chain between producers, hotels and customers would lead to more added values for everyone.

"They (producers) would have a place to sell their products and it would be an added value for the customers of the hotels as well. It just has to be worked on a lot."

Interview with an entrepreneur in Korčula - K11, p.394

6.6 Reintroducing animals

We got the idea from several interviews that animals are an important part of the tradition of these three islands – most people in the past had some animals, which were an integrated part of the agriculture system.

"- What about the traditional way to farm the land?
- It was based on ecosystem. It has water. It has animals for the manure. It had weed, wine or olive and beans."

Interview with a National Park employee in Mljet - M24, p. 108

"- Coming back to the animals. Okay, donkeys for each family and then, was there cattle? Sheep? Goats? What was the …?
- Goats, sheep, chickens, bull.
- And the most important cattle was goats?
- Mostly sheep and goats.
- And mostly means 100? How many animals in the village?
- One family could have 10 to 12 sheep and they mostly lived in the fields."

Interview with a villager in Mljet - M27, p. 131

This tradition of breeding at a family scale turns out to be crucial in the preservation of some ecologic balance. It seems, in particular, that animals play a role in fertilizing the soils and preserving abandoned land from biodiversity loss and exposure to wild fires.

"- Can animal breeding help preserve a certain kind of biodiversity?
- Absolutely. The island Brač is a very good example on the matter. They have a lot of sheep, cows, horses, which are left in prairies or forest lands framed by fences. In the past, there were more animals in Korčula, like donkeys, cows, sheep. It was a good way to fertilize the soils."

Interview with an agronomist in Blato, Korčula - K29, p. 446

"Here, we need more agriculture because the agriculture, if it's done rationally, saves the ground around, and also the forests with the animals, because we have all these wild fires and problems in summer because forests are not clean and it's a lot of possibility of wild fires and problems."

Interview with a farmer and restaurant owner in Kuna (Pelješac), P2, p. 185

Although there is a potential for breeding to enhance the biodiversity of the area, there are still two main problems to the realization of this potential – lack of funds on the one hand, and lack of workforce on the other.

"They need more money to start the cheese business. They are not working. Everything they are doing is pension and agriculture but it is not enough to invest."

Interview with farm & guesthouse owners in Mljet - M14, p. 58

"We try to find some extra people to work with us, but no one wants to work with the animals…"

Interview with a farmer and restaurant owner in Kuna, Pelješac - P2, p. 185

Following the example of what was done in Bulgaria and Romania to protect traditional forms of breeding (WWF-DCP/EFNCP, 2008), it seems that more could be done by national authorities in Zagreb to create legal and other incentives for the preservation of these practices. In this case, it could take the form of facilitation in use of abandoned land, status for shared herds (as it exists e.g. in France). This would maybe require some lobbying effort from local entities, which could include the LAG-5, but also actors involved in these activities, even indirectly – like tourism actors working with animals, in actuality or potentially.

6.7 Developing volunteering tourism

Building up on what was mentioned previously, one of the key issues that prevents the perpetuation of traditions is workforce shortage. Considering the emerging trend of volunteering tourism, or voluntourism (Wearing et al., 2016; Molz, 2016), we thought of two aspects to explore in order to foster HNVf by addressing this issue.

The first idea has to do with workforce in agriculture. It seemed particularly interesting to us to notice that, although the WWOOF network has been expanding dramatically since its creation in the 1970s, even to countries like Bulgaria and Romania, which have their own WWOOF platforms, it is still relatively unknown in Croatia, where there are less than 50 hosts, and listed as "independent" (hence with no common platform and less visibility). In our area of study, these practices do exist, but less than 5 hosts are listed, when the potential would be much higher – if you consider that all the people involved in family farming could resort to it. The potential of WWOOF could be great, in particular in herd management of restoration / maintenance of terraces – case studies from Australia (Deville et al., 2016) and Canada (Ord, 2016).

"In the summer, they have few small garden for tourists, to grow their vegetables to eat. In winter, they use it for vegetables. Tourists are also Shepherd for them, they take cows and goats in their land. They also go fishing with tourists. They want to be family with tourists."

Interview with farm & guesthouse owners in Mljet - M14, p. 59

The second idea is about cultural heritage restoration in a broader sense. A lot of networks organize international volunteering work camps to restore old buildings, or other facilities, among which stone walls or terraces that could enhance the biodiversity potential in our area. Examples in France are organizations like Association REMPART, Concordia, UNAREC, which organize trips internationally – none of which to Croatia, from what we found on their websites. On the field, we only came across one actor using this source of workforce – and the tourists even paid to participate in the restoration, showing real interest of some tourists for this kind of work and contribution.

We think interesting projects could be developed by LAG-5 or other community members to develop more connections with the networks mentioned above.

6.8 Promoting HNVf in agriculture schools and universities

On another note, talking with an agronomist, we realized the potential for HNVf that could be used in university or other school networks. In the same way that some companies can teach classes, maybe HNVf showcase project owners could promote their approaches academically, and make it, if not popular, at least known to all.

"People don't do permaculture because they are ignorant. […] In schools of Agronomy, chemical lobbies are not too present. There is room for critical thinking. They just teach you different diseases and possible ways to treat it."

Interview with an agronomist in Blato in Korčula - K29, p. 446

Potential interventions could include: real life in-class case studies, conferences, seminars, participation in career fairs, internships, study trips, etc. The LAG-5 could use its network to facilitate such connections.

6.9 Sharing of good farming practises

One of the obstacles to HNV farming we observed in the field is a lack of knowledge around farming practices respectful of biodiversity. To address this issue, we think that capacity building should be provided to farmers. This capacity building should be associated with information about subsidies for HNV farming. Firstly, farmers would feel more involved if they know the activities could be supported by some funding. Secondly, training is an obligation farmers have when they receive subsidies.

We thought of different formats to acquire knowledge for instance:

- workshops with agronomists and experts in HNV farming to teach about the impacts of chemicals and HNV farming practices to maintain biodiversity
- workshops with exchange of practices amongst people growing the same products
- field visits of successful HNV farmers in the region

We also thought of other supports that could exist to exchange knowledge, such as a group in Facebook, Viber or WhatsApp or even develop an app.

Workshops of this sort were organized in a 3-year successful HNV farming project in Romania, in cooperation with WWF and other organizations. (Fundaţia ADEPT Transilvania, WWF-Romania, ProPark Foundation, 2016).

Additionally, we were told that workshops and other means of communication about crop practices are organised by chemical firms such as CROMOS, HERBOS, AGROKREM in the region.

Promoting good practices could balance the mainstream thinking which is the use of chemical intrants.

> *"There is chat loops on Viber where people can share their specific problems and get advice on how to solve them [shows us a loop called Syngenta zastita where people post for ex pictures of sick tomato leaves and people send their recommendations on products to use."*
>
> Interview of a salesperson in chemical store, Orebić - P33, p.321

6.10. Conclusion

There are many ways to support HNV farming practises in this area and in this part we decided to talk about 10 of them. We think that providing a large range of ideas and thoughts can be a way to show how diverse are the number of opportunities to develop agriculture and tourism while having a positive impact on the environement.

These ideas also cover a large range of actions at different scales. We talked about the efforts that have to be made in term of administration (financial support, certifications, land ownership), in term of agriculture and toursim linkage (Eco-tourism, agro-tourism, volunteering tourism) but also in term of education and sharing of knowledgs (HNV in universities, raising awareness, sharing of practises). All of these ideas have been inspired by the information we got from the interview, from what the locals told us. We also know that these solutions worked out in different parts of the world with different contexts and it would be interesting to try it out in Dalmatia.

7. General conclusion

All in all, it turns out, from our bibliographic references and field observations, that the natural and cultural heritage of the three islands considered are closely intertwined with one another, and that anthropic activities played a great role in shaping the current ecosystems in the area to what they are today. Moreover, the current terrestrial biodiversity is characterized by an exceptional richness, which does have to do that practices related to HNVf, making it a relevant scheme to address the preservation challenge in the region.

Looking closely at each island in their specificities, we found out that the dynamics are slightly different in each case. A lot of the dynamics observed in Mljet have to do with the dual monitoring of the island by the National Park and the city administration, although most actors we met were willing to play an active role in the preservation of their environment and traditional agricultural ways. In Korčula, tourism activities were much more developed and impactful, from what we observed, and also more integrated in the agricultural system, which leaves way for a couple of breakthrough initiatives combining sustainable farming and tourism – although agriculture is mostly oriented towards wine and olive. Lastly, Pelješac appeared to us as a much more contrasted territory, with more scattered, little developed forms of agriculture in the South-East, mostly for self-consumption, and certified quality wine production in the North-West, appealing to a certain form of high-class tourism.

Our transversal analysis of the main economic sectors encountered in agriculture (olive, wine and other) enabled us to identify key actors for the development of economically integrated HNVf practices, as well as underdeveloped sectors of activity (either because they are being abandoned or because their potential has never been exploited) that could be HNVf-compatible.

In the end, we identified a wide range of different levers that could be activated at different levels to apply HNVf techniques in a way that would help preserve better the natural and cultural heritage of the area.

In continuation of or complement to our work, further studies could:

- apply the same qualitative methodology to other Croatian islands;
- update the quantitative data available for this region;
- explore the human / Nature interactions in a broader sense (eg through the waste or water problem, including marine ecoystems, etc.);
- analyze more in-depths the biochemical impacts of some agriculture techniques on the local ecosystems.

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8. Appendices

8.1 Interview data base

Code	Date	Category of actor	Interview Place	Translation	Duration (min)	Transcription
MLJET						
M01	22/2	Farmer/Producer	Saplunara	Yes	35	Retranscription
M02	22/2	Farmer/Producer	Saplunara	Yes	48	Notes
M03	22/2	Farmer/Producer	Goveđari	Yes	46	Retranscription & Notes
M04	23/2	Farmer/Producer	Mljet	Yes	2h	Retranscription
M05	24/2	Farmer/Producer	Blato	Yes	1h	Retranscription
M06	24/2	Farmer/Producer	Babino Polje	Yes	30	Retranscription
M07	27/2	Farmer/Producer	Babino Polje	Yes	45	Debriefing notes (French)
M08	27/2	Tourism actor	Dubrovnik	Yes	1h 30	Listening notes
M09	23/2	Tourism actor	Polače	Yes	1h	Notes
M10	23/2	Tourism actor	Soline	Yes	1h	Notes
M11	23/2	Tourism actor	Pomena	No	1h	None
M12	23/2	Tourism actor	Pomena	Yes	1h	Retranscription
M13	23/2	Tourism actor	Pomena	No	1h	Debriefing notes (French)
M14	24/2	Tourism actor	Korita	Yes	3h	Listening notes
M15	24/2	Tourism actor	Sobra	Yes	30	Debriefing notes (French)
M16	25/2	Tourism actor	Polace	Yes	2h	Listening notes
M17	25/2	Tourism actor	Kozarica	Yes	2h	Notes
M18	27/2	Tourism actor	Babino Polje	Yes	30	None
M19	27/2	Tourism actor	Pomena	Yes	1h	Notes
M20	27/2	Tourism actor	Sobra	Yes	1h 30	Listening notes
M21	22/2	Institutional/Administration	Babino Polje	Yes	43	Retranscription
M22	22/2	Institutional/Administration	Babino Polje	Yes	1h	Retranscription
M23	22/2	Institutional/Administration	National Park	Yes	2h30	Retranscription & Notes
M23	23/2	Institutional/Administration	Goveđari	Yes	1h	Retranscription & Notes
M24	23/2	Institutional/Administration	National Park	No	1h 30	Listening notes
M25	22/2	Institutional/Administration	Babino Polje	No	1h30	Retranscription
M26	24/2	Other	Babino Polje	Yes	45	Debriefing notes (French)
M27	22/2	Other	Goveđari	No	30	Retranscription
M28	23/2	Other	Sobra	Yes	1h 30	Retranscription & Notes
M29	23/2	Other	Mljet	No	1h15	Listening notes
M29	23/2	Other	Mljet	No	1h15	Listening notes
M30	24/2	Other	Goveđari	Yes	1h	Debriefing notes (French)
M31	27/2	NGO	Babino Polje	Yes	35	Listening notes

Code	Date	Category of actor	Interview Place	Translation	Duration (min)	Transcription
PELJESAČ						
P01	21/2	Farmer/Producer	Janjina	Yes	1h	Retranscription
P02	21/2	Farmer/Producer	Kuna	Yes	2h 30	Retranscription
P03	21/2	Farmer/Producer	Ponikve	Yes	1h	Listening notes
P04	21/2	Farmer/Producer	Janjina	Yes	45	Retranscription
P05	22/2	Farmer/Producer	Potomje	Yes	2h	Notes
P06	22/2	Farmer/Producer	Ston	Yes	1h30	Notes
P07	23/2	Farmer/Producer	Ston	Yes	1h	Listening notes
P08	23/2	Farmer/Producer	Ston	Yes	1h	Debriefing notes (French)
P09	23/2	Farmer/Producer	Ponikve	Yes	1h	Retranscription
P10	23/2	Farmer/Producer	Ston	Yes	2h30	Debriefing notes (French)
P11	23/2	Farmer/Producer	Ston	Yes	1h 30	Debriefing notes (French)
P12	24/2	Farmer/Producer	Janjina	Yes	1h	Retranscription
P13	27/2	Other	Ston	Yes	30	Retranscription
P14	23/2	Farmer/Producer	Ston	Yes	30	Retranscription
P15	2/3	Farmer/Producer	Orebić	Yes	1h30	Listening notes
P16	3/3	Farmer/Producer	Potomje	Yes	43	Listening notes
P17	24/2	Cooperative	Janjina	Yes	1h	Retranscription
P18	28/2	Cooperative	Putniković	Yes	1h	Listening notes
P19	28/2	Cooperative	Ston	Yes	1h	Notes
P20	22/2	Tourism actor	Ston	No	1h	Retranscription
P21	23/2	Tourism actor	Ston	No	1h	Retranscription
P22	23/2	Tourism actor	Ston	No	1h	Retranscription
P23	25/2	Tourism actor	Mali Ston	Yes	1h	Notes
P24	27/2	Institutional/Administration	Ston	Yes	45	Retranscription
P25	27/2	Institutional/Administration	Ston	Yes	40	Retranscription
P27	24/2	Institutional/Administration	Janjina	Yes	1h30	Retranscription
P29	2/3	Institutional/Administration	Orebić	Yes	1h15	Listening notes
P30	27/2	Other	Ston	Yes	1h	Listening notes
P31	25/2	NGO	Orebić	Yes	2h30	None
P32	3/3	NGO	Žuljana	Yes	3h	Retranscription
P33	3/3	Other	Orebić	Yes	1h	Retranscription & Notes
P34	4/3	Farmer/Producer	Trstenik	Yes	2h	Notes
P35	6/3	Farmer/Producer	Orebić	Yes	15	None
P36	4/3	Farmer/Producer	Potomje	Yes	1h	Notes
P37	2/3	Farmer/Producer	Orebić	Yes	2h	Listening notes
P38	6/3	Tourism actor	Trpanj	Yes	30	Debriefing notes (French)
P39	4/3	Tourism actor	Viganj	Yes	2h	Debriefing notes (French)
P40	6/3	Farmer/Producer	Lovište	Yes	1h	None
P42	6/3	Tourism actor	Trpanj	Yes	45	Debriefing notes (French)
P43	6/3	Institutional/Administration	Trpanj	Yes	45	Debriefing notes (French)
P45	4/3	Cooperative	Orebić	Yes	2h	Debriefing notes (French)
P46	6/3	NGO	Orebić	Yes	1h30	Debriefing notes (French)

/	2/3	Institutional/Administration	Orebić	Yes	10	None

Code	Date	Category of actor	Interview Place	Translation	Duration (min)	Transcription
KORČULA						
K01	2/3	Farmer/Producer	Lumbarda	Yes	4h	Listening notes
K02	1/3	Farmer/Producer	Vela Luka	Yes	1h 15	Listening notes
K04	2/3	Farmer/Producer	Žrnovo	Yes	1h40	Retranscription
K05	2/3	Farmer/Producer	Žrnovo	No	1h	Notes (French)
K06	4/3	Farmer/Producer	Čara	Yes	30	Notes
K07	3/3	Farmer/Producer	Žrnovo	Yes	45	Notes
K08	3/3	Farmer/Producer	Vela Luka	Yes	1h30	Notes
K09	20/2	Farmer/Producer	Split	No	2h	Retranscription
K10	3/3	Farmer/Producer	Lumbarda	Yes	1h	Listening notes
K11	1/3	Tourism actor	Vela Luka	Yes	1h 15	Retranscription
K12	2/3	Tourism actor	Korčula	Yes	1h30	Debriefing notes (French)
K13	3/3	Tourism actor	Korčula	Yes	1h15	Notes
K14	6/3	Tourism actor	Lumbarda	Yes	1h	Debriefing notes (French)
K15	2/3	Institutional/Administration	Vela Luka	Yes	1h	Retranscription
K16	2/3	Institutional/Administration	Vela Luka	Yes	1h 10	Retranscription
K17	2/3	NGO	Vela Luka	Yes	1h	Retranscription
K18	4/3	Farmer/Producer	Blato	Yes	1h15	Notes
K19	4/3	Tourism actor		Yes	1h	Notes (French)
K20	4/3	Other		Yes	1h	Listening notes
K21	4/3	Other		Yes	1h	Notes
K22	6/3	Farmer/Producer	Žrnovo	Yes	1h	Retranscription
K23	4/3	Farmer/Producer	Čara	Yes	30	Notes
K24	4/3	Farmer/Producer	Brna	Yes	1h30	Retranscription
K25	6/3	Cooperative	Blato	Yes	1h 30	Notes
K26	6/3	Farmer/Producer	Račišće	Yes	1h	Listening notes
K27	6/3	Tourism actor	Korčula	Yes	1h	Notes
K28	6/3	Tourism actor	Korčula	Yes	1h	Notes
K29	6/3	Farmer/Producer	Pupnat	Yes	1h	Listening notes
K30	6/3	Farmer/Producer	Prizba	Yes	40	Debriefing notes (French)
K31	3/3	Farmer/Producer	Vela Luka	Yes	1h30	Notes
K32	3/3	Farmer/Producer	Čara	Yes	1h30	Debriefing notes (French)
K34	6/3	Farmer/Producer	Lumbarda	Yes	1h	Notes
K35	3/3	Farmer/Producer	Korčula	Yes	1h	Debriefing notes (French)
K36	6/3	NGO	Vela Luka	Yes	1h	Debriefing notes (French)
K37	6/3	Institutional/Administration	Blato	Yes	50	Notes
K38	3/3	Institutional/Administration	Korčula	Yes	45	Notes
K39	6/3	Tourism actor		Yes	10	None
K40	7/3	Institutional/Administration	Blato	Yes	2h	None
K41	6/3	Tourism actor	Potirna	Yes	1h	Notes
K42	8/3	Other	Korčula	No	45	Notes

Code	Date	Category of actor	Interview Place	Translation	Duration (min)	Transcription
OTHER SCALES						
O01	23/2	Institutional/Administration	Korčula	No	1h	Retranscription
O02	3/3	Institutional/Administration	Korčula	No	1h	Listening notes
O03	27/2	Institutional/Administration	Ston	Yes	1h 30	Retranscription
O04	27/2	Expert/researcher/Professor	Ston	Yes	1h	Retranscription
O05	27/2	Institutional/Administration	Dubrovnik	Yes	1h	Retranscription
O06	28/2	Institutional/Administration	Dubrovnik	Yes	30	Listening notes
O08	28/2	Institutional/Administration	Dubrovnik	Yes	50	Listening notes
O09	28/2	Institutional/Administration	Dubrovnik	Yes	2h	Retranscription
O10	27/2	Other	Dubrovnik	Yes	1h	Notes
O11	20/2	Institutional/Administration	Split	No	1h	Retranscription
O12	20/2	Expert/researcher/Professor	Split	No	2h 15	Retranscription & Notes
O13	20/2	Expert/researcher/Professor	Split	No	2h	Retranscription
O14	20/2	Expert/researcher/Professor	Zagreb	No	2h 15	Notes
O15	20/2	Expert/researcher/Professor	Split	No	15	Debriefing notes (French)
O16	21/2	Expert/researcher/Professor	Split	No	2h	Retranscription
O17	28/2	Expert/researcher/Professor	Dubrovnik	Yes	2h	Retranscription
O18	20/2	Expert/researcher/Professor	Split	No	30	Retranscription
O19	20/2	Farmer/Producer	Split	No	45	None
/	27/2	Other	Dubrovnik	Yes	1h	None

8.2 Interview grids

8.2.1 Farmers

Useful contacts	FARMERS	
Special instructions		
	To be specified if particular issues are identified on each islands	
Main themes	Land ownership	Cultural aspects / will ?
	Economics / Finance	Tourism
	Production / Ressources management	HNV LAG 5
Particular questions		
Land ownership		
Property (rent, price) ?	Since when ? Exact size (cultivated/not cultivated land) ?	Localisation ?
Heritage ?	What is around your land ?	
Localisation (pour cartographie) ? Historical landscapes ?		
Economics / Finance		
Subsidies ? From who ? How much ? Procedures ?		
Taxes ? How much and what for ?		
Range of price ? Best product ?		
Profitability of the farm ? Where do you sell ? How do you transport it ?		
Exportation ? Which final markets ?		
Other activities ?	Who are your competitors ?	
Biodiversity		
Any interactions with wild animals ? Any problems ? Wild pigs ?		
Do you use fences or other protections ?		
Do you know if there are many hunters/poachers around ?		
Production / Resources management		
Uses & Practices on the lands (also on abandon lands)? Type of crops ? Innovations ?		
Transformation, processing ?		
Soil management ? Water management ?		
Exact types of intrants : Fertilizers / Pesticides (herbicide/fungicides) / seeds ? Who sell them ? How much ?		
Labels and certifications ? Reglementations ?		
Main difficulties ? Advantages ? Why are you a farmer ?		
Cultural aspects / Will		
What are traditional practices ?		
Link with the continent ? with the other islands ?		
How do you see the future of agriculture in the islands ?		
Tourism		
What is your link with tourism ?		
What do you think about tourism ? Advantages / Pressures of tourism ?		
How do you see the future of tourism in the islands ?		
HNV / LAG 5		
Have you heard about it ?		
What do you think ?		

8.2.2 ***Cooperatives***

Useful contacts	COOPERATIVES		
Special instructions	**Specified issues by island if necessary**		
Main themes	Land ownership	Cultural aspects / will ?	
General data	Economics / Finance	Tourism	
	Production / Ressources management	HNV LAG 5	
Particular questions			
General data			
Creation date ? Number of members ?			
Where ?			
Functions ? Type of production ?			
Land ownership			
Members ownership ? Criterias to enter the cooperative ?			
Other type of ownership of lands ?			
Economics / Finance			
Subsidies ? From who ? How much ? Procedures ?			
Taxes ? How much and what for ?			
Profitability of the farm ? Where do they sell ? How do you transport it ?			
Other activities ?			
Production / Ressources management			
Innovations ?			
Type of crops ? Practices ? Innovations ?			
Water management ?			
Soil management ?			
Fertilizers / Pesticides / seeds ?			
Labels and certifications ? Reglementations ?			
Cultural aspects / will			
What are traditional practices ?			
Link with the continent ? with the other islands ?			
How do you see the future of agriculture in the islands ?			
Tourism			
What is your link with tourism ?			
What do you think about tourism ? Advantages / Pressures of tourism ?			
How do you see the future of tourism in the islands ?			
HNV / LAG 5			
Have you heard about it ?			
What do you think ?			

8.2.3 ***Municipality***

Useful contacts	MUNICIPALITY			
Special instructions				
Main themes	Island stakes and trend	CONTACTS		
Functions	Land use and ownership			
Support and meetings	Resources management			
Particular questions				
Functions				
What is the role of the municipality?				
What is your role in the municipality?				
What are your priorities / stakes for next years? Programs?				
Support and meetings				
What links between municipalities, agriculture, tourism, environment sectors? Financial, technical support? Who is in charge?				
Is there meetings between actors? What type? Frequency? Who (main actors, contacts)?				
What is discussed (stakes)? Who has the last word? Who take the last decision?				
Subsidies on agriculture ? From who ? Why ? Procedures ? How much ? Control ? Monitoring ?				
Island stakes and trends				
What are the stakes of the island for next year? If difference between municipality stakes: Why?				
How will you deal with it?				
Demography ? Impacts ? Population in winter/summer (figures) ?				
Land use and ownership				
What is the history of land use in the island?				
What is the regulation about land use, land conversion, land ownership? (ask for CADASTRE) What is controlled, how and by who?				
Are there infrastructures projects?				
What influence has the municipality in those projects?				
Ressources management				
How do people manage water on the islands?				
What influence has the municipality on water management?				
How do people manage waste management? What influence do you have?				
How do people manage forest (Mljet)?				
Contacts				
Regional level? Who is in charge of agricultural management / tourism management / environment?				
Who give you guidelines?				
Agriculture 1st job here?				
Youngsters?				
Cooperative? Is there one here? Number of members? Are they taxed?				
Kind of crops?				
Innovations in agriculture				
Number of people: Low season / High season				
Decentralization? (Plan management) How conflict between the Government and the local one are settled?				

8.2.4 ***Restaurants***

Useful contacts	RESTAURANTS			
Special instructions				
Main themes				
Particular questions				
General data				
When was the restaurant created ? Have you been the owner since the beginning ?				
Heritage or buy ?				
Are you from the island ?				
Sourcing				
Where do you buy the food ?				
From whom ? How much ? What type ?				
What are your criterias to buy ? (Labels, certifications)				
Activities				
Is it a profitable business ?				
Do you have a side business ? What is the share of restauration				
Do you have land ?				
Island evolution				
Do you feel an evolution in the tourism sector since 10 years ?				
How do you think it will evolve ?				
Demography on the island ? Impacts ?				
Main threats of the island ? Why ?				
Infrastructures building plan ?				

8.2.5 Church

Useful contacts	CHURCH				
Special instructions					
Main themes	Island stakes and trend	CONTACTS			
Functions	Land use and ownership				
Support and meetings	Resources management				
Particular questions					
Functions					
What is the role of the church?					
What is your role in the church?					
Land use and ownership					
What about national park on your land? Do you recieve money for the use of your lands?					
How much land do you have? Do you exploit them? For what?					
What are you planning to do with the land which are not exploited?					
(selling them to private companies for urbanisation, develop agriculture, for tourism purposes, new place of sacrifice....)					
Past and future					
History of the church and its influence in Croatia?					
How did politics and wars affect church and believers and your funds (land)?					
Development/Evolution of the church?					
What is your opinion about agriculture, environment and biodiversity?					
Special treatment					
How are your relations with the local government (municipality) and the central one?					
Do you have special treatment? (priority in land acquisition, taxes...)					
Do you have subsidies? From who? (National, EU...) For what?					

8.2.6 ***National Park***

Useful contacts	NATIONAL PARK		
Special instructions	**To be specified if particular issues are identified on each islands**		
Main themes	Conflicts with local people	Role in the island (economy…)	
	Main threats to the environment	Information on biodiversity	
	The place of agriculture	HNV LAG 5	
Particular questions			
History, status and management of the Park			
When ? By whom ? How ? Public consultation ?			
Statut ? What its means practically ?			
Where ? What size ? How many people ?			
Future of the park ?			
Economics / Finance			
How is it funded ?			
Share of the different sources of funding ?			
Trend in the funding ?			
Biodiversity and habitats			
What kind of habitats ? Are they changing ? What about the fire ? Do you have any maps ?			
What kind of biodiversity ? Databases and indicators ? What are the main threats ?			
Role in the island			
Rôle in the island ?			
Relationship with people and municipalities ? Conflicts ?			
Role in the development of the island ?			
Economic activities allowed in the park ? Relationship with people running them ?			
Evolution and future of the rôle ?			
Tourism			
What is your link with tourism ? Number of tourists ? Price of the entrance ?			
What do you think about tourism ? Advantages / Pressures of tourism ?			
How do you see the future of tourism in the islands ?			
Agriculture			
Allowed in the park ?			
Who ? Since when ? What kind of activity ?			
Contract ?			
Good or bad ? Change needed ?			
Challenges for the park			
Fires ?			
Illegal construction in the Park ?			
Poaching ?			
Illegal farming ?			
Land ownership ?			
Drought ?			
HNV / LAG 5			
Have you heard about it ? Relationship ?			
What do you think ?			



Ova stranica izrađena je u sklopu mjere 202 "Priprema i provedba lokalnih strategija ruralnog razvoja" financirane iz EU pretpristupnog fonda IPARD. Sadržaj ove stranice je isključiva odgovornost LAG-a 5 i ne odražava nužno stajališta Europske unije.

Predstavljanje strateške analize upravljanja okolišem, 10.03.2017. Ston

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Predstavljanje strateške analize upravljanja okolišem, 10.03.2017. Ston

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11.					
12.					
13.					
14.					
15.					

Ova stranica izrađena je u sklopu mjere 202 "Priprema i provedba lokalnih strategija ruralnog razvoja" financirane iz EU pretpristupnog fonda IPARD. Sadržaj ove stranice je isključiva odgovornost LAG-a 5 i ne odražava nužno stajališta Europske unije.

Predstavljanje strateške analize upravljanja okolišem, 10.03.2017. Ston

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ABSTRACT

Within the European research program on High Nature Value farming, CIHEAM-IAMM and the LAG 5 wish to identify and support High Nature Value farming systems and communities, and foster biodiversity and agriculture as an alternative to the current seasonal touristic economic development. This study led by French students from AgroParisTech and Croatian students from Split Faculty of Economics aims at providing a territorial analysis in south Dalmatian islands (Mljet, Peljesac, Korcula), using the analytical framework of "strategic environmental management analysis" (SEMA) and based on a qualitative field survey.

It appears that the natural and cultural heritage of the three islands are closely intertwined with one another, and that anthropic activities played a great role in shaping the current ecosystems in the area to what they are today. Moreover, the current terrestrial biodiversity is characterized by an exceptional richness, which does have to do with practices related to HNVf, making it a relevant scheme to address the preservation challenge in the region.

Looking closely at each island in their specificities, the dynamics are slightly different in each case. A lot of the dynamics observed in Mljet have to do with the dual monitoring of the island by the National Park and the city administration, although most actors met are willing to play an active role in the preservation of their environment and traditional agricultural ways.

In Korčula, tourism activities are much more developed and impactful and also more integrated in the agricultural system, which leaves way for a couple of breakthrough initiatives combining sustainable farming and tourism – although agriculture is mostly oriented towards wine and olive.

Lastly, Pelješac appears as a much more contrasted territory, with more scattered, little developed forms of agriculture in the South-East, mostly for self-consumption, and certified quality wine production in the North-West, appealing to a certain form of high-class tourism.

The transversal analysis of the main economic sectors encountered in agriculture (olive, wine and other) enables to identify key actors for the development of economically integrated HNVf practices, as well as underdeveloped sectors of activity (either because they are being abandoned or because their potential has never been exploited) that could be HNVf-compatible.

In the end, the study presents a wide range of different levers that could be activated at different levels to apply HNVf techniques in a way that would help preserve the natural and cultural heritage of the area.