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**Diachronic analyses of the development of historical landscape in Northern Adriatic islands between last millennium BC and the early Middle ages – settlement development models, connectivity (route network) and economy**

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## Summary

This territorial project aims to study historic landscapes of island Rab in order to explain the evolution of said landscapes and propose new approach to protection of historic landscapes through restoration of the commons.

The study started with gathering of available published and unpublished data and, since the study of HL is inherently interdisciplinary, study of geology, geography, forests, agrarian sciences and ethnology largely contributed.

Geographic informational system was formed with ArcGIS software and used as the main tool for the analyses of HL. Different types of historic and modern maps were gathered as well as ortorectified historic and modern aerial photography and layered with information about archaeological topography. Within this system specific formations and patterns within landscape were identified following the retrogressive method, in which recent sources, maps, aerial photography and other are used to study earlier times and the focus is on a past landscape. Following this method, a stratigraphy was realized and thus a sequence of the evolution of these landscapes since the protohistoric times until the 20th century. Parallel to realizing a stratigraphy, spatial and quantitative analyses were conducted in order to calculate subsistence strength of the community.

Preliminary hypothesis on the evolution of historic landscapes were drawn as follows:

1. Prehistoric sites (Bronze and Iron Age) mainly occupy higher ground – top of the hill.
2. Roman period and Late Roman period sites occupy coastal ground.
3. Early medieval sites also occupy higher ground, mainly top of the hill, but lower (in meters above sea level) than prehistoric occupational levels
4. Later medieval occupation spread along the limits of arable land, but also along the coast
5. Hills, higher ground of Kamenjak ridge was always used for animal husbandry

The study that followed, identified and analyzed conspicuous patterns in the landscape (landscape units) results of which largely backed the aforementioned hypothesis. The arable land of southern part of the island, villages of Banjol and Barbat, is in some parts a relict historic landscape formed during the Roman period and used as it was until 1960s. Similar landscape patterns are found in North West part of the island, village of Kampur, supporting the hypothesis of predominantly coastal use of land during the Roman period.

Several landscape units, in Lopar, Kampur, Gonar, Barbat and Banjol, present top of the hill occupation that is of medieval origin. This is clearly presented with the dynamics of the parcel distribution, and supported by archaeological finds and place-names.

It was also concluded that the most characteristic feature of landscapes on Adriatic islands in general, not only of Rab, the prominent, long, linear dry-walls are very recent.

It was the most important change in the economy of the island after the Roman times and also contributed largely to the evolution of historic landscapes. At this moment, the vast area of what was once common pastures or large privately owned pastures were simply divided within the families that tended and used this land.

The last chapter of the thesis explores the possibilities of participative approach to research and protection of historic landscapes. The legislative possibilities are explained for the participatory research as well as for the reinstatement of the commons as a way of protection.

## Riassunto

Questo progetto territoriale ha lo scopo di studiare paesaggi storici dell'isola di Rab in ordine di spiegare l'evoluzione di suddetti paesaggi e proporre un approccio nuovo alla protezione dei paesaggi storici tramite il ripristino dei demani (ingl. commons).

La ricerca è cominciata con la raccolta dei dati pubblicati e non pubblicati e, siccome lo studio dei paesaggi storici è sostanzialmente interdisciplinare, anche gli approfondimenti nei campi di geologia, geografia, selvicoltura, scienze agrarie e etnologia hanno contribuito in gran parte.

Il sistema d'informazione geografica (Geographic informational system) è stato creato con ArcGIS software ed usato come strumento di base per l'analisi del paesaggio storico. Sono stati raccolti diversi generi di carte geografiche storiche e moderne, carte storiche ortorettificate e carte aeronautiche moderne stratificate con informazioni su topografia archeologica. All'interno di questo sistema sono state individuate specifiche formazioni e specifici motivi nel paesaggio. Infatti, è stato usato il metodo retroattivo nel quale si usano fonti contemporanee; carte, fotografie aeree e altro per lo studio del passato - in particolare del paesaggio storico. Seguendo questo metodo, è stata riprodotta la stratigrafia, quindi la sequenza dell'evoluzione di paesaggi dal periodo protostorico fino al ventesimo secolo. Parallelamente alla stratigrafia è stata condotta l'analisi quantitativa e ambientale per calcolare la forza sussistente della comunità.

Le ipotesi preliminari sull'evoluzione dei paesaggi storici sono state le seguenti:

1. I siti preistorici (età del bronzo, età del ferro) occupavano posizioni elevate – sommità delle colline
2. I siti dal periodo romano e tardo-romano occupavano posizioni costiere
3. I siti del Basso Medioevo occupavano posizioni elevate, per lo più le sommità delle colline ma inferiori alle posizioni dei siti preistorici (in metri sul livello del mare)
4. I siti dell'Alto Medioevo occupavano i confini della terra arabile, ma anche posizioni lungo la costa
5. Le colline, il terreno più elevato della cresta di Kamenjak è stato sempre usato per l'allevamento di animali

Lo studio seguente ha identificato e analizzato motivi cospicui nel paesaggio (unità paesaggistiche) i risultati del quale hanno in gran parte confermato le ipotesi summenzionate. Il terreno arabile della parte meridionale dell'isola, i villaggi Banjol e Barbat, è in alcune parti un paesaggio relitto modellato durante il periodo romano e usato in forma originaria fino agli anni '60 del 20.sec. Paesaggi simili sono stati ritrovati anche nella parte settentrionale dell'isola, il villaggio Kampur, confermando l'ipotesi sulle posizioni costiere durante il periodo romano.

Alcune unità paesaggistiche, a Lopar, Kapor, Gonar, Barbat e Banjol, presentano le posizioni alle sommità delle colline di origine medievale. Il ciò si manifesta nella dinamica della divisione di particelle e viene convalidato da toponimi e reperti archeologici.

È stato anche concluso che il fenomeno più caratteristico dei paesaggi insulari adriatici in generale, non soltanto quello di Rab; i lunghi prominenti muri a secco sono molto recenti. Questo era il più grande cambiamento nell'economia dell'isola dopo tempi romani ed ha in gran parte contribuito all'evoluzione dei paesaggi storici. In quel momento, vaste aree di pascoli comuni oppure grandi pascoli privati sono stati semplicemente divisi tra famiglie che usavano la terra.

L'ultimo capitolo della tesi esamina le possibilità di un approccio partecipativo nella ricerca e protezione dei paesaggi storici. Sono esposte possibilità legislative per le ricerche partecipative così come per la reintegrazione dei demani considerando ciò un metodo di protezione.

Diachronic analyses of the development of historical landscape in Northern Adriatic islands between last millennium BC and the early Middle ages – settlement development models, connectivity (route network) and economy

## **List of figures:**

**Figure 1.1:** Island Rab, 1968 aerial orthoimagery

**Figure 5.1:** LU Barbat 1 drawn in ArcMap 10.6 and layered over DOF 2011

**Figure 5.2:** Area of LU Barbat 1 on historic cadaster (1828)

**Figure 5.3:** Parts of LU Barbat 1

**Figure 5.4:** position of LU Barbat 2 within the island

**Figure 5.5:** Geological map for the area of LU Barbat 2 and 3 (Mamužić 1969)

**Figure 5.6:** LU Barbat 2 on historical aerial photography, RAF 1941

**Figure 5.7:** LU Barbat 2 with terraces drawn in ArcMap 10.6. Zones in purple and yellow are Roman period sites

**Figure 5.8:** LU Barbat drawn in ArcMap 10.6 layered over 19th century cadaster. Terraces occupy one parcel each but are not presented

**Figure 5.9:** LU Barbat 3 layered over historic cadaster. Vineyards of the village are drawn in pinkish red and the extent of LU is drawn in strong red line. This presents how the village spread over previous agriculture land. Purple and yellow are sites (id: 60, 97, 98).

**Figure 5.10:** Area of LU Barbat 3 on 18th century map (source Mapire.eu)

**Figure 5.11:** LU Barbat 3 with geometric order of parcels drawn in ArcMap 10.6 in strong red. Historic roads are drawn in green.

**Figure 5.12:** The church of St. Stephen in Barbat on historic cadaster from 19<sup>th</sup> century.

**Figure 5.13:** The church of St. Stephen in Barbat, 2016, Archives of the Conservation department in Rijeka, photographed by D. Krizmanic

**Figure 5.14:** Hamlet Grpe with its surroundings on historic cadaster from 19<sup>th</sup> century.

**Figure 5.15:** Castello – mansion of the landowners, the Cernota family, on historic cadaster of the 19<sup>th</sup> century

**Figure 5.16:** plan of family Cernotat's castle (Archives of the parish of Rab)

**Figure 5.17:** Cernotta castle in 1972 (photo Archives of the Conservation department in Rijeka)

**Figure 5.18:** LU Barbat 4 layered over historic aerial photography (RAF 1941). Clearance cairns are in red. Green square is the position of the castle and the hamlet that formed around it. Blue lines present orthogonally shaped terraces of vineyards. In the lower left corner is the church of St. Stephen.

**Figure 5.19:** LU Barbat 5 presents the evolution of a landscape in relation to the remains of prehistoric hillfort.

**Figure 5.20:** LU Banjol 1 on aerial orthoimagery from 1968. The path leading to the hillfort is in green, terraces in the slope of the hill in orange and the perimeter of the hillfort is in red. LU Barbat 1 is in pale blue.

**Figure 5.21:** LU Kampor 1 on historic cadaster of 19<sup>th</sup> century. Both salterns are presented as well as freshwater systems related to salterns.

**Figure 5.22:** LU Kampor 1 layered over DOF 1968 in ArcMap 10.6



**Figure 5.23:** LU Kampor 3 on historic cadaster, 19<sup>th</sup> century

**Figure 5.24:** LU Kampor 3 layered over DOF 1968 in ArcMap 10.6

**Figure 5.25:** LU Kampor 4 presented on historic cadaster

**Figure 5.26:** LU Supetarska 1

**Figure 5.27:** Church of St. Peter and remains of the monastery in its historical surrounding (Archives of Conservation department in Rijeka, cca. 1946)

**Figure 5.28:** Monastery of St. Peter and its estate, as described in the foundation chart. Presented on historic cadaster.

**Figure 5.29:** Spatial distribution of Roman / Late Roman finds in relation to ex-monastery of St. Peter. The complex of the monastery is in pale violet while the finds are in red.

**Figure 5.30:** Roman period spolia underneath one of the columns of the church of St. Peter (Archives of Conservation department in Rijeka, 1971)

**Figure 5.31:** Roman period wall in one of the side aps (Archives of Conservation department in Rijeka, 1978)

**Figure 5.32:** Roman period wall in one of the side aps (Archives of Conservation department in Rijeka, 1978)

**Figure 5.33:** Northern wall of the church of St. Peter, older wall is visible protruding in the lower part (Archives of Conservation department in Rijeka, 1974)

**Figure 5.34:** LU Supetarska 4 presented on DOF 1968

**Figure 5.35:** LU Rab 1 presented on DOF 1968

**Figure 5.36:** LU Frkanj 1 layered over DOF 1968. The border of the ancient forest is in purple, cultivated land in 19<sup>th</sup> century is in yellow, parcels of pastures belonging to different families are in green, clearance cairns are in red.

**Figure 5.37:** LU Frkanj 1 layered over historic cadaster. The extent of the ancient forest is seen in the upper right.

**Figure 5.38:** Centripetal development of the landscape, visible on historic cadaster LU Lopar 1.

**Figure 5.39:** LU Lopar 1 (in the center) depicted on DOF 1968 in relation to LU Lopar 2 (in the upper right) and Lopar 3 (in the lower left). Together they present the development of medieval Lopar

**Figure 5.40:** LU Lopar 2 presented on historic cadaster of the 19<sup>th</sup> century. Notice the place-name Ivanic.

**Figure 5.41:** LU Lopar 3 presented on historic cadaster of the 19<sup>th</sup> century.

**Figure 5.42:** LU Lopar 1, 2 and 3 on an areal photography from the 1980s by an unknown author. The picture is taken from the west, presenting the main field, landscape units and its relation to one another and to the field and forested pastures in the north.

**Figure 5.43:** Disposition of the rural settlement – narrow paths connecting various features (Archive of the Conservation department in Rijeka, 1972)

**Figure 5.44:** Disposition of the rural settlement – narrow paths connecting various features (Archive of the Conservation department in Rijeka, 1972)

**Figure 5.45:** Abandoned traditional rural house within the hamlet of LU 1. Ground level is reserved for economic purposes (keeping livestock, tools, supplies), first floor is for living purposes (often including several generations of one family) (Archive of the Conservation department in Rijeka, 1972)

**Figure 5.46:** Disposition of the rural settlement (LU Lopar 2). Houses with gardens is at the top of the hill, terraced arable land organically evolves respecting the relief, communication is organically woven into the landscape (Archives of the Conservation department in Rijeka, 1972)

**Figure 5.47:** Relation between the main field of Lopar and the hamlet above it (LU 1). Buildings at the foot of the hill are modern addition, encroaching the terraced land previously cultivated (Archives of the Conservation department in Rijeka)

**Figure 5.48:** Photography taken from the hill above village Lopar, in the south, presenting in the back terraced slopes adjacent to LU 2 (Photo archive of Matica Hrvatska, branch Rab, author: M. Marojevic, 1930s)

**Figure 5.49:** Cultivated land on DOF 1968. Terraces and parcels are organized in a geometric order.

**Figure 5.50:** LU Lopar 4 drawn in ArcMap 10.6 and overlaid with historic cadaster. Only a small portion on land is cultivated.

**Figure 5.51:** The supposed position of a saltern in green square.

**Figure 5.52:** Lu Lopar 6, remains of prehistoric hillfort.

**Figure 7.1:** Solin, excavations conducted by volunteers, photo: Museum of maritime history of Croatian coast, Rijeka

**Figure 7.2:** Participative restoration of Premužićeva trail, photo: M. Rizner

List of tables:

**Table 1:** Use of cultivated land for each cadastral municipality, quantity given in hectares

**Table 2:** Use of uncultivated land for each cadastral municipality, quantity given in hectares

**Table 3:** Percentages of various land use types for cultivated land for the whole island

**Table 4:** Monthly activities in cultivated and uncultivated land

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Table of Contents:

Title page.....	i
List of figures.....	i
List of tables .....	vii
Acknowledgments .....	viii
Dedication .....	ix
Chapter 1: Introduction.....	1
1.1 Context of the project .....	1
1.2 Thesis aims and objectives .....	1
1.3 Thesis outline.....	1
1.4 Conclusions .....	4
Chapter 2: History of research	
2.1 Introduction.....	4
2.2 First explorers.....	4
2.3 Mid20th century till 2000 .....	6
2.4 Recent research 2000 till today.....	6
2.5 Other scientific fields relevant to the study of historic landscapes.....	9
2.6 Concluding remarks .....	9

## Chapter 3: Geography of the island

3.1 Geological origins .....	10
3.2 Geography and characteristics of the environment.....	11
3.3 Characteristics of water availability.....	12
3.4 Characteristics of the coast.....	12
3.5 Climate.....	13
3.6 Vegetation.....	14
3.7 Pedological characteristics of the soil.....	15
3.8 Conclusions .....	16

## Chapter 4: Building the narrative: theory, data, tools

4.1 Introduction and theoretical overview.....	16
4.2 Geographical Information Systems (GIS).....	17
4.3 Cartography .....	18
4.4 Defining archaeological data .....	18
4.5 Historical sources .....	19
4.6 Conclusions .....	20

## Chapter 5: Patterns in the landscape

5.1 Introduction and methodology.....	21
---------------------------------------	----



5.2 Landscape units .....	22
5.3 Conclusions .....	83
Chapter 6: Understanding the evolution of historic landscapes on island Rab	
6.1 Quantifying the landscape .....	84
6.2 Changes in ownership and its influence on landscape .....	104
6.3 Conclusions .....	107
Chapter 7: Participative approach to research and protection of historic landscapes	
7.1 Introduction.....	114
7.2.1 Legislative background for participative research approach in Croatia.....	114
7.2.2 International legislation pertinent to participative action in heritage and its application in Croatia .....	120
7.3 Case studies presenting heritage project involving participatory action .....	124
7.3.1 Kostrena, Solin, archaeological excavations.....	124
7.3.2 Gorski Kotar, mountainous region of the Primorje – Gorski Kotar county, heritage inventory .....	125
7.3.3 Island Rab, Premužićeva trail restoration.....	127
7.3.4 Bakar, Bakarski prezidi – Takala restoration.....	128

7.4 Conclusions on participatory research.....	128
7.5 Reinstatement of the commons as approach to heritage protection.....	129
7.6 Conclusions on reinstatement of commons.....	134
Chapter 8: Conclusions	
8.1 Original contribution to knowledge.....	135
8.2.Future research avenues .....	136
Bibliography.....	137

## Chapter 1: Introduction

### 1.1 Context of the project

The research conducted for the purposes of writing this thesis is incorporated within project PRIN directed by prof. A. Chavarria Arnau. It is also part of an international project whose main partners are Department of cultural heritage of University of Padua and IRCLAMA of University of Zagreb.

### 1.2 Thesis aims and objectives

The thesis aims to study historic landscapes of island Rab in order to explain the evolution of said landscapes and propose a method of research that could be applied not only to historic landscapes of Rab but also to other Adriatic islands. One chapter of the thesis is dedicated to participative research and protection of historic landscapes and a suggestion of new approach to protection through restoration of the commons.

### 1.3 Thesis outline

The thesis contains eight chapters.

The first chapter is introductory laying out thesis aims and its outline.

The second chapter is covering geography of the region and of the island itself; geology and climate of the island.

The third chapter is covering history of archaeological research from the early explorers to the ongoing projects and research in other disciplines that is pertinent to the topic.

In the fourth chapter geography, geology and soil quality are described.

In the fifth chapter a description of the process is laid out: methodology, theoretical background, sources that were used like cartographic, topographic and historical sources, archival photography and the extent of archaeological data.

The sixth chapter explains major ownership relation changes through history. Further it lists landscape units – patterns in the landscape significant and determinant for the explanation of the evolution of historic landscapes.

The seventh chapter will explore the possibilities of participative approach to research and protection of historic landscapes. The legislative possibilities are explained for the participatory research and for the reinstatement of the commons as a way of protection.

The final chapter will summarize how the research met the aims and objectives of the thesis, highlighting the major original contributions to science and landscape studies of Adriatic islands. It will also evaluate the limitations of the research, and propose future avenues for investigation.



Figure 1.1: Island Rab, 1968 aerial orthoimagery. Numbers roughly represent areas of villages and the town is named with its historic name Arba. 1 – village Barbat, 2 – village Banjol, 3 – village – Mundanije, 4 – village Palit, 5 – village Kampor, 6 – village Supetarska Draga, 7 – village Lopar

## Chapter 2: History of research

### 2.1 Introduction

The island was always in focus of researches of different fields: from first travel writers or bishops visiting through early conservationists to archaeologists of the 20<sup>th</sup> and 21<sup>st</sup> century. A brief history of research pertinent to this study is presented; it covers not only archaeological but also natural history and geology research.

### 2.2. First explorers

Revision of history of research for the island has to start with the travel writers of the 17<sup>th</sup> and 18<sup>th</sup> century, who wrote about their journeys along the Croatian coast. These are well renowned authors like Alberto Fortis (1984, original 1778), Vincenzo Coronelli or Daniele Farlati (1775). Their travel logs included descriptions of the island: its geography, geology, people, politics, economy. While maybe not being preoccupied solely with heritage or strictly with it, these descriptions sometimes prove themselves as very useful for interdisciplinary research such as the study of historic landscapes. The attractiveness of island's heritage drawn the attention of researches of material heritage rather early. Important studies were brought by Daniele Farlati in his work on history of church Illyricum Sacrum. Slightly younger but in align with the characteristic of the aforementioned were the travel writers and researchers of the 19<sup>th</sup> century: T.G. Jackson (1887), Rudolf von Eitelberg-Edelberg (1884) who wrote about Rab inside wider studies on eastern Adriatic. Step in a different direction took Mijat Sabljar (1852-54) who in the role of museum's advisor travelled around the country and the Primorje – Gorski kotar County and during

these travels did several field trips to Rab between 1852 and 1854. Manuscripts of this researcher, collector and curator brought valuable information listing and sketching heritage of the island. The work describes ruins, churches that are today lost, transcriptions and sketches of Roman period epigraphic monuments, detailed sketches of early Christian mosaics, Roman steles, Renaissance polyptychs, statues' descriptions and even lists of books. The common characteristics of aforementioned researchers, geographers, travel writers, is the predominant interest for the town of Rab, a trait shared with researchers of the early 20th century: Dagobert Frey and Wilhelm Schleyer. Frey (1911) published scientific discussion of St. John the Baptizer's church in the town while Schleyer (1914) brought an extensive monograph on Rab's heritage. Rarely would their interest shift to the two monasteries in Supetarska Draga and Kampo, staying within the parameters of architecture and objects of fine art. Different approach to the study of the island had Vladimir Brusic (1926). Franciscan friar in the monastery of St. Bernardine in Kampo where he wrote his book: Otok Rab: geografski, historijski i umjetnički pregled sa ilustracijama i geografskom kartom Kvarnera i Gornjeg Primorja in 1926 (Island Rab: geographical, historical and artistic overview with illustrations and geographic map of Kvarner and Upper Coastal area). Although he wasn't trained in professions traditionally occupied with heritage, he wrote a comprehensive piece not only on the history of the island but also on the culture, ethnography and heritage. Bearing many mistakes from today's point of view, this was a first thorough research into the territory and still a prized companion to researchers of the island.

### 2.3 Mid-20th century till 2000

It wasn't until the mid-20th century that the first archaeologists started researching the island. One of the earliest excavations (1952) were on the site of monastery of St. John Evangelist in the town of Rab.

During the late 1960s water supply system has been built for the village of Lopar. The construction work revealed a prehistoric burial cairn. The rescue excavations were conducted by regional museum and (at the time) Regional conservation department. The research revealed nine inhumations adorned with jewelry and weapons, finds are kept in the regional museum in Rijeka (Matejčić 1968).

Extensive excavations of an Upper Palaeolithic site and its surroundings in Lopar in bay Siće were conducted over several years by Yugoslavian Academy of Arts and Science, managed by Mirko Malez (Malez 1974). In the early 1980s Šime Batović of University of Zadar surveyed prehistoric sites that were known at the time (Batović 1985, 1987).

### 2.4 Recent research - 2000 until today

Unfortunately, some of the potentially most interesting excavations were poorly conducted, sometimes without qualified archaeologists on-site and the results remained unpublished. Such is the case with ex-cathedral which was going through serious restoration process in the late 1990s and early 2000s. Extensive excavations were done, in major parts without archaeologists, and subsequent reports were scarce or missing.



The little part of the results that was published is presenting authors idea of the finds not the in-situ situation. Thus, even though extensive excavations were done, little is known about the early Christian cathedral.

Similar situation occurred with the excavations in the basement of Palace Cassio, the report is scarce and not really giving information other than the fact that an excavation occurred (Novak, Matešić 2003). Sadly, because adjacent backyard (in the street Dinka Dokule) has been excavated by the University of Padua, Department of cultural heritage, and would the aforementioned excavations in Palace Cassio have been done correctly, combined results would significantly improve knowledge about archaeological heritage of the town.

Roman / Late Roman period site in Lopar, Punta Zidine was excavated in 2004. During the same campaign geophysical research was done and underwater survey and excavation was done with the objective to find maritime infrastructure (Skelac 2004, Skelac, Radić Rossi 2004).

University of Zagreb, International research center for late Antiquity and early middle ages in association with Department of cultural heritage at the University of Padua and University of Lille did extensive research of the villa in Kampo, site Kaštelina from 2005 through 2007 (Arce et al. 2008, Jurković et al. 2012). The association of Universities in Zagreb and Padova brought several fruitful research campaigns, surveys and excavations with focus not only on the strict archaeological topics but also historic landscapes, ethnography, art history and historical architecture, in the town of Rab but also throughout the territory. Especially useful was excavations in street Dinka Dokule

which revealed rich urban stratigraphy. In 2017 the same team did a test excavation on site of sacral architectural complex above bay of Gožinka.

Roman pottery kiln from the site Podšilo in Lopar was excavated in 2009 by the Institute of archaeology (Lipovac Vrkljan and Šiljeg 2010).

In 2014 the site of Lukovac in Lopar was studied by archaeologists from Croatia (through NGO aIPAK from Omišalj) and France (CNRS Dijon). Elevated walls were documented, DMR of the whole island of Lukovac was made and several test pits were excavated (Čaušević-Bully, Bully 2013, 2014, 2015).

Conservation department in Rijeka started a topography project for the territory in 2013. It was fully managed by the Institute of Archaeology in Zagreb. Over the course of four years this project extensively surveyed the island and mapped the finds. The result was rich GIS database. As the result of the surveys sites in Lopar, Banjol and Barbat were excavated, many public archaeology small actions and educational workshops for people of the island were organized. Subsequently, excavations and nondestructive research, joint project with the University of Warsaw, in Lopar at the site Bili Grad and wider area of Podšilo started in 2015 and is in continuation (Konestra 2016).

Joint research of the Institute of archaeology, University of Padova and University of Zagreb in the garden of the Benedictine nuns in the town of Rab was organized in 2016. Nondestructive research (Ground penetrating radar, Konestra and Mušić 2016) combined with excavations was conducted (Jurković, Brogiolo, Chavarria 2016).

Preventive excavations in front of the church of St. Peter in Supetarska Draga of former monastery of the same name, were conducted in 2016 and 2017 by Maritime and History

Museum of the Croatian Coast, Rijeka in collaboration with University of Zagreb, International research center for late Antiquity and early middle ages.

Sadly, until some 15 years ago preventive archaeological excavations in the town of Rab were rarely or never conducted. Massive construction work has been made that should have been preceded by archaeological excavations like new paving of major town's streets and squares.

## 2.5. Other scientific fields relevant to the study of historic landscapes

Study of historic landscapes is inherently interdisciplinary therefore research in disciplines other than archaeology. For these purposes invaluable data was provided in the research of the geology of the island conducted by Mamužić et al. (1966) from the Institute of geological research. This research mapped the geological layers and sediments and explained their origin.

Detailed description of vegetation cover, its history and changes to it caused by intensive shepherding or other forms of over exploitation was given by Ž. Španjol (1995).

Soil quality for most parts of the island was studied by Miloš and Bensa (2012). Pedological map is available on-line and the data it bears proved to be of immense value ([http://tlo-i-biljka.eu/iBaza/Pedo\\_HR/index.html](http://tlo-i-biljka.eu/iBaza/Pedo_HR/index.html)).

## 2.6 Conclusions

Past 15 to 20 years have been interesting for the archaeology of the island. It might relate to opening of the country with the dismemberment of Yugoslavia, as a lot of the projects are international. Certainly, the focus shifted from the town towards the territory which

revealed other historical focal points such as site in Podkućine in Lopar or the extensive Roman / Late Roman rural complexes of Barbat.

## Chapter 3. Geography and environmental factors

### 3.1. Geological origins

Rab is an island situated within the Quarner bay in the Northern Adriatic. The area is part of the Adriatic plane. Geomorphologically the Adriatic plane is an intra-mountain plane surrounded by mountain massifs of Dinarids, Apennines, Alps and Helenids which today encompasses the seabed of the Adriatic Sea. During Paleogene the plain was flat and above the median sea level and it was gradually filled with alluvial deposits. The plane (including the Quarner area) was flooded during the climatic changes of the late Pleistocene (the Ice age) Around 18000 years ago with the onset of global warming which started the process of deglaciation which subsequently caused the sea level rise. It rose very fast approximately between 17000 and 6000 BP, whereas afterwards the rise was slower (Benac and Juračić 1998). The rise was altogether approximately 96 meters forming today's coast line including most of the islands of Croatian Adriatic (Rogić 1990, Benac and Juračić 1998, Riđanović 1993; 2002).

### 3.2 Geography and characteristics of the environment

The island encompasses surface of 90 square kilometers, and together with additional smaller islands (Dolin, Goli, Sv. Grgur, Maman, Pohlib, Lukovac, Laganj and administratively also Trstenik) forms its archipelago. Administratively it belongs to Primorje – Gorski kotar county, and is divided into two municipalities: Rab and Lopar. There are seven villages / administrative units on the island: Barbat, Banjol, Mundanije, Supetarska Draga, Lopar, Palit, Kapor and the town of Rab. Rab is stretched along its orographic axes, following typically Dinaric course, with three ridges. The main and highest ridge – Kamenjak is in the north east, and two other ridges are parallel to the south west, progressively lower. The ridges are formed of lower Cretaceous limestone and limestone breccias with pockets of dolomite and dolomite breccias. In between ridges are valleys covered with Quaternary sediments and Eocene flysch and marl. Springs and wells are well present because of the combination of flysch, Eocene and Quaternary sediments. Flysch, the least water permeable sediments retain water that leaked through Quaternary layers. Springs are mainly found along the foot of the hill and wells in the valleys (Mamužić 1966). These valleys rich in water are fields of villages Kapor, Palit, Lopar and partially Supetarska Draga, the soil of highest quality (in the agricultural sense) on the island. Marl and sandstone make the field of village Mundanije, connecting in its northern part with field of Supetarska Draga. Reddish brown sand and gravel is present in the southern part of the island in the synclinal of the main ridge, stretching through whole of village Barbat and partially of Banjol.

### 3.3 Characteristics of water availability

The richness of water of the island is reflected in the quantity of springs, in 1976 (Tomic) there were 67 springs and 187 wells registered on the island. The water gathers in three underground collectors: limestone collector under ridges of Kamenjak and Kalifront, collector inside the flysch layers above impermeable marl, and inside the Quartar sediments above the flysch layers. These last ones are positioned in valleys of Kampor, Lopar and Supetarska Draga / Mundanije (Crnolatac 1974). Besides springs, sporadic waterflows appear and disappear in times of severe draughts. These are Veli potok, flowing from Banjol to the bay Supetarska Draga; creek Snuga in Banjol; Veli potok Kamporski or Valanga, as the name suggests in Kampor; the lower stream of this creek called Pidoka runs towards bay of St. Eufemia; in the field of Lopar stream Veli potok runs. Some sporadic streams also appear in Palit. The valley of Kampor / St. Eufemia, area of Palit and to some extent Lopar are partially of alluvial origin and thus contain clayey sediments that easily form swamps. Because of this these fields have been subject to extensive hydraulic works in order to meliorate the soil in the past (Rogić 1969).

### 3.4 Characteristics of the coast

The coast is relatively indented, and of two kinds: accumulative or abrasive type. Abrasive coasts appear under the hard influence of the sea, waves, currents and tides. Accumulative coasts formed by drowning of valleys formed in soft rocks (these are the valleys of Kampor and Supetarska, bays of Lopar and St. Eufemia). In its north east part Rab's coast is divided in two morphologically different parts: shallow highly indented coast

of Lopar and steep and un-indented coast of Kamenjak ridge. Coast of Lopar is accumulative type, low, easily accessible, with shallow bays made of fine flysch sediments. The shallow sea stretches far away from the coast making tidal changes dramatical because as the sea retreats the surface of the beach enlarges multiple times. The coast under the Kamenjak ridge is almost a straight line of steep limestone cliffs sinking deep into the sea to about 50 – 65 meters. The western coast of villages Kampor and Supetarska Draga, stretching between peninsula of Sorinj to cape Gornja Punta on peninsula of Kalifront. This coast is characterized by rhythmic exchange of limestone fairly steep and shallow bays made of flysch sediments. Southwest coast is stretching between Gornja Punta cape to Glavina cape in Barbat and can be divided in the coast of Kalifront peninsula, coast of town of Rab and village Banjol and coast of village Barbat. It is low and rocky in limestone, while submerged valley of St. Eufemia is made in clastic sediments with shallow sea and weakly indented coast made of gravel.

### 3.5. Climate

Rab in its majority fits into Koeppen climate type Csa – Mediterranean climate. The thin strip of north – north east part of the island fits into type Cfa – Submediterranean climate (Filipčić, 2001). Type Csa is characterized by hot, dry summers and mild wet, winters. Major feature of the climate on Rab is the katabatic wind *bura* which blows mainly during the winter, but also sometimes during the transitional periods. The wind is fiercely strong and, as it is coming from the Velebit mountain, cold. Precipitation regime is maritime, which means that the warm part of the year is relatively arid, especially the summer months, while more precipitation falls in the winter months.

Mediterranean climate has a direct influence on the quality and characteristics of the soil. The area of Mediterranean climate, as well as northern Quarner, is characterized by red and brown soils and vast areas covered with rocks (stony areas, as addressed by Chapman et al. 1996) – soils of lower quality because of the thinner layer of hummus. Common characteristics of the soils in this area is influence of high temperatures during summers and low levels of humidity, which impede the development and growth of plants and plant coverage, and as the direct consequence the production of organic matter.

### 3.6 Vegetation

Mediterranean vegetation is mostly xerophytic consisted of species adapted to summer draughts, high temperatures and intensive insolation. Original vegetation is coniferous holm oak (*Quercus ilex*) and other coniferous plants such as Pines and Cypresses. Original forests of this type are extremely rare today as they were over exploited for millennia with over grazing, slash and burn clearings and simple cutting. As a result of degradation of original natural forests, underbrush vegetation, called macchia forms. Further degradation of macchia forms vegetation of Mediterranean rocky terrains. Degraded form of Mediterranean vegetation, both macchia and rocky terrains, are a negative result of human impact on the environment. Understanding these processes is important in order to fully understand the evolution of historic landscapes of Rab.



### 3.7 Pedological characteristics of the soil

Soil quality is important when a territory is, or in case of Rab was, predominantly rural. The research in pedology of the island listed soil quality onto four categories, listed here from top quality to lowest quality: valuable arable land, valuable arable land/ other arable land, other land and other agricultural land (Miloš and Bensa 2012).

Valuable arable land is most common and present in the fields of Kampur, Supetarska Draga and Lopar.

Complex land category; arable land/ other arable land is also rather common. Although it does not cover such extensive areas such as those fields listed above it is present in the field of Mundanije which is extension of Supetarska field.

Other arable land is present in the agricultural land outside of village Barbat, some patches in Kampur, Banjol and along the edges of Supetarska Draga. It is obvious that this type of soil was present in much larger quantities until the major over-building of the island that appeared with the development of tourism in the late 20th century.

Other agricultural land is of lowest quality and is present in village Barbat covering patches between other arable land and pastures in the hills.

Island's favorable natural conditions, especially the diversity and soil fertility are great potential for organizing a variety of agriculture (Miloš and Bensa 2012).

### 3.8 Conclusions

Rab is relatively small island. Its geomorphology and geology is diverse and dynamic. The combination of carst and limestone with water impermeable flysch and marl provided the island with generous water availability. There are four categories of agricultural land present which offers a good potential for diverse agricultural activities.

## Chapter 4: Building the narrative: theory, data, tools

### 4.1 Introduction and theoretical overview

Research of historic landscapes involves taking into account many different variables, interrelated in many different ways and in different points in time. Such an approach must be inter- or trans-disciplinary in order to yield results. It involves archaeological record, archival data, ecology, ethnography, environment studies etc. as it is basically a holistic approach to a complex system. Therefore, a suitable theoretical background for such a research is the theory of complex systems that originated with the work of Ludwig von Bertalanffy (1968), and is introduced in archaeology in the 1960s with the work of Sally R. Binford & Lewis Binford and Kent V. Flannery. Capra and Luisi (2014) offered useful more relatable handbook on the systemic understanding of the evolution, one that aims towards greater knowledge of human relations with the environment. Deriving from this theoretical perspective the study of an historic landscape must be diachronic, complex and relational (Brogiolo 2015) and those are the guidelines on which this work was build.

## 4.2 Geographic Information System (GIS)

For the purposes of this thesis a GIS platform was built. GIS is a topic of discussion for many archaeologists nowadays, some find it useful other find it limiting and being incapable of representing experiential aspects of the world (Thomas 2004). Others consider it a tool easily customizable and thus providing great potential for the analysis of archaeological record, and with capability of framing it into different, more interpretative theoretical approaches (Llobera 2012). During the course of the work on this thesis GIS was conceived as a tool for the archaeological research. It was used as a database suitable for spatial information like topographic archaeological data and its spatial analyses tools were used in a structural – processual approach to the landscape studies. GIS' inherent spatial nature enables it with the best set of different capabilities used in studies of historic landscapes (or any landscape studies), as it allows for a dynamic view of the archaeological data in juxtaposition with other pertinent data and at different scale of analysis depending on the need, it is therefore in alignment with the objective of the research which is to understand and interpret the many facets and complexities of human society's history. Geographic informational system was formed within ArcGIS software. Different cartography was gathered and layered and paired with archaeological topography. Within this system specific formations and patterns within landscape were identified – specific agrarian parcel forms, particular delimitation shape, specific pattern of cadaster parcels in relation to relief morphology, road network, production sites (mills, salterns) etc.

### 4.3 Cartography

Different cartographic sources were used when forming the GIS database as none of them provide the same datasets. Sources that were used can be divided into modern and historic. Modern cartographic sources are: orthophotography from 2011, 2014, 2018 made by Croatian geodetical office, as well as Croatian topographic map (scale 1:25000), Croatian basic map (scale 1:5000) and cadaster maps.

Historic cartographic sources: digital orthophotography from 1960s made by then Yugoslav army, Austro - Hungarian cadaster maps made during 1820s, topographic maps from 1940s and 1850s, and 17<sup>th</sup> century map (available online at [mapire.eu](http://mapire.eu)).

Aerial photos from 1940s made by Royal Air Forces were orthorectified and used.

### 4.4 Defining archaeological data

Defining archaeological data used during the course of the work on this thesis is challenging. It would be easiest to conclude that all the available data about the archaeology of the island was used, but this is not the fact. Approaching the study of historic landscapes is generally done using different tools of which GIS environment is a basis, which is also the case with this study. The data that entered the GIS environment was basically topographic archaeological data. The topography was established based on results of personal research and different projects by other researchers. The topography of the island is well researched, but most results are obtained by a project started by the Conservation department in Rijeka in 2013 and conducted by the Institute of Archaeology in Zagreb (leader of the project was PhD Goranka Lipovac – Vrkljan, and

her job continued PhD Ana Konestra) . Intensive surveys were made for several seasons of field work and the results were presented in a GIS environment. Further research continued from this project. Finds were categorized and those that are clearly sites or have high possibility of being a site (due to the density of movable finds) were used for site distribution maps. Finds were also dated, when possible of course, to following periods: Prehistory (Paleolithic, Mesolithic, Neolithic (early – Impresso, middle, late), Eneolithic, Bronze Age (Early, middle, late), Iron Age (older, younger)

Roman period (Hellenism, Early Imperial, Late Imperial, Late Roman – Early Christian)

Middle Ages (Early, High).

Sporadic small finds were not taken into account, only as part of the wider description in the text. Entering the position of every small find would create different, fake picture and would obfuscate the results.

Finds whose origin is unknown were also not taken into account. Such are most of the finds that are kept in the collection of the Monastery of St. Bernardine in Kampor or the cippus found in Banjol.

#### 4.5 Historical sources

The research of historical landscapes of the island demanded extensive use of historic sources. Probably the most useful source, for an archaeologist, was the Great Chronicles of Kampor given in six books, thousands of pages. This chronicle was written by Odoriko

Badurina, who was a monk at the Franciscan monastery of St. Bernardine in Kampor during the 1930s and 1940s. Badurina meticulously noted the life on the island in real time but at the same time he spoke to the people about the history, tradition and particular subjects. At the same time, he compiled archival data for the island, going through the archives of his monastery, archive of other monasteries, archives of the diocese and notary public archives (medieval). He transcribed most of the documents, particularly the older ones. He then commented on some of them, when he found relation to other documents or when the topic related to another event. He also added a lot of comments regarding older literature about the island, sometimes rectifying the data from the books, other times complementing the data from the books. In the last two books he writes about his time and here he lists archaeological finds from that period, many of them lost, taken to foreign countries or, in case of immovable finds, often forgotten and overbuilt. His legacy is incomparable to anything similar. The Chronicle is sufficient as it is or, in case when a deeper research is needed it is a good starting point for other sources.

#### 4.6 Conclusions

The amount of available data pertinent to the study of historic landscapes of island Rab is fairly good. The cartographic sources are offering many possibilities, though some of the following, important, data is lost. Such are the operative information for the historic cadasters. Historic sources for the island are abundant for medieval period, less so for older periods. But archeological data fills the missing information. Combining all of the available data in a GIS environment provided truly complex approach with respect to relations, and diachronic in nature.

## Chapter 5: Patterns in the landscape

### 5.1. Introduction and methodology

During the early study of the available data: historical and modern cartography, archival photography and most important, archaeological data, several preliminary hypotheses surfaced. These are:

1. Prehistoric sites (Bronze and Iron Age) mainly occupy higher ground – top of the hill.
2. Roman period and Late Roman period sites occupy coastal ground.
3. Early medieval sites also occupy higher ground, mainly top of the hill, but lower (in meters above sea level) than prehistoric occupational levels
4. Later medieval occupation spread along the limits of arable land, but occasionally also along the coast
5. Hills, higher ground of Kamenjak ridge was always used for animal husbandry, since prehistory until today

In order to confirm these hypotheses, the retrogressive method of landscape studying was followed. This method is well explained in the recent publications (Brogiolo 2012, Rippon 2008, 2015, Antonson 2018). Retrogressive landscape analyses is a technique that unravels the physical and chronological relationships between different elements in the historic landscape, by studying the relationships of „horizontal stratigraphy“ between

cultural features such as field boundaries and pathways to establish the order in which they were created. The study starts from “now” and follows a landscape feature further in the history. The feature is observed in cartographic sources of different age, listed previously in the text. Following this method, a stratigraphy was realized and thus a sequence of the evolution of these landscapes since the protohistoric times until the 20th century. Parallel to realizing a stratigraphy, spatial and quantitative analyses were conducted in order to calculate subsistence strength of the community, especially in relation to land-ownership changes that occurred throughout the history.

To present the case a series of landscape units were identified and analyzed.

## 5.2 Landscape units

In order to facilitate the description and understanding of the evolution of historic landscapes of island Rab, a series of distinctive features within the landscape were isolated and analyzed. As the approach to the landscape follows the principles of stratigraphy these features are referred to as landscape units. Each is given a simple code – name based on its affiliation to the territory of a given settlement and bearing a number as a distinction from other units in the same territory. An example of this would be: Kampor 1; where it signifies a unit within the territory of village Kampor and by bearing a number 1 it differentiates from Kampor 2 or Kampor 3.

Landscape units will be listed starting from the south of the island and following the direction to the north. Each analysis will contain cartographic data relevant to the given unit. When pertinent and present, a visual representation will be given.



### 5.2.1. Landscape unit Barbat 1

The most prominent feature of the landscape in the southeastern part of the island are longitudinal dry-walls traversing the island in southwest – northeast direction.

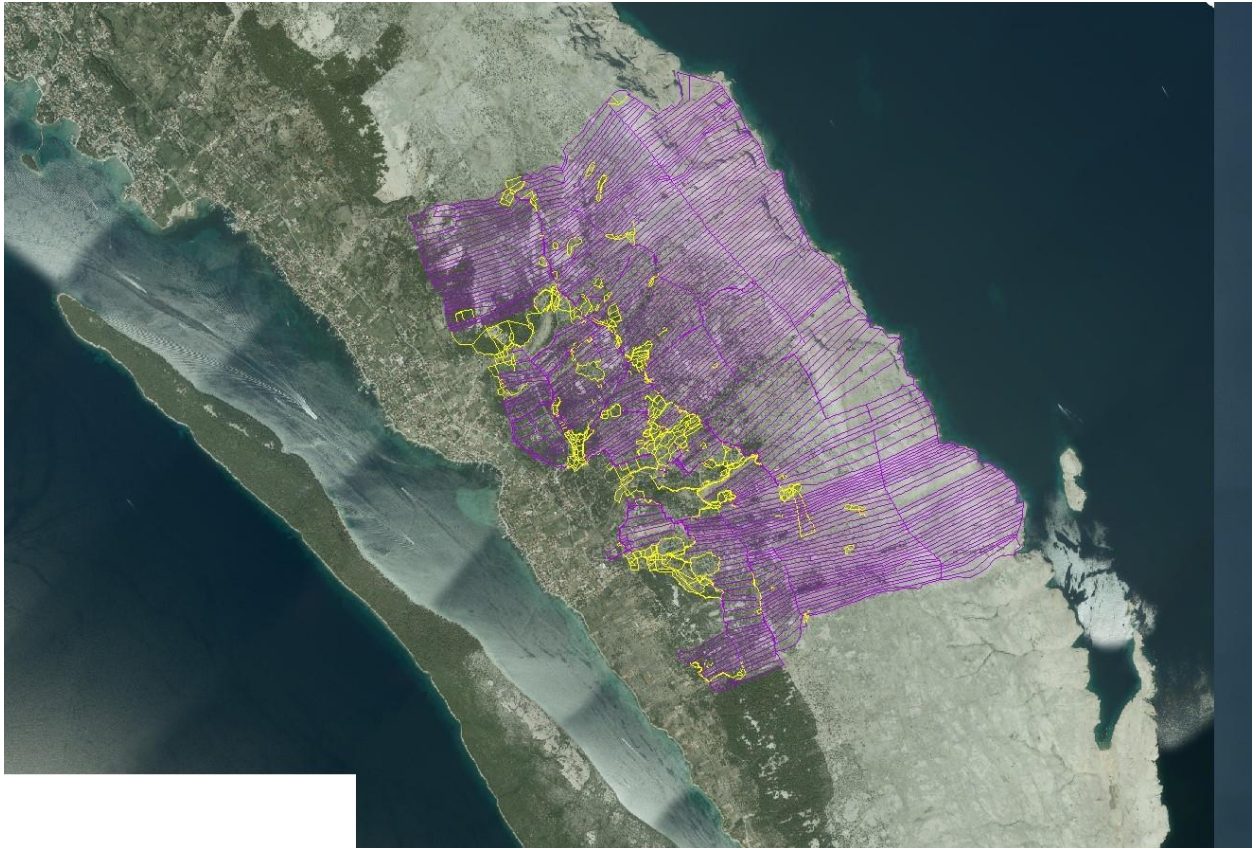


Figure 5.1: LU Barbat 1 drawn in ArcMap 10.6 and layered over DOF 2011.

The area that this landscape unit occupies is a part of the top-of-the-hill area of Kamenjak ridge, from the limit between the sandy – gravel topsoil in the coastal area and the karstic area in the higher ground. In its most prominent part, where the frequency of the parallel dry-walls is most dense, it stretches for almost 3 kilometers (in the southeast – northwest direction). Geologically this part of the island is of Upper Cretaceous origin made of limestone with additions of dolomites. The vegetation is Mediterranean macchia.

These monumental straight lines in the landscape are a feature of the 20th century. After the Agrarian reform (1918) privately-owned estates and commons larger than 100 cadastral yokes (1 acre = 0,7033 yokes) were parcellated into smaller fields to enable each peasant family to have its own land. The Reform brought serfdom and feudal system to an end, strictly forbidding serfdom and colonat relationships, legally entering the Constitution of Kingdom of Serbs, Croats and Slovenes in 1919 (article 21 of the Constitution) (Šimončič-Bobetko 1988, Banić, Peklić 2015). This was one of the major recent events influencing the development of historical landscapes not only on Rab but also in other parts of the Kingdom. It is especially traceable in the coastal regions where fencing was traditionally made by dry-stone walls. Large estates owned by aristocratic families were at this moment given to the peasant families working and living on the particular piece of land. Once large parcels were broken into, by surface significantly, smaller parcels and by shape longitudinal, traversing the open fields of previous landscape. The process took about 15 years. Fertile soil and pastures were divided, and forests were acquired by the state. This monumental action is not preserved in the oral history of the inhabitants of the island. The interesting fact is that, although all of the top-of-hill pastures were divided in the cadaster, only here the division is present in the landscape.

As an argument for the age of the construction of these drywalls is the historic cadaster which bears no traces of division of pastures. Figure 5.2 presents this.



Figure 5.2: Area of LU Barbat 1 on historic cadaster (1828). Pastures are not divided. Would they be divided, parcels would have been drawn.

In this particular region, this meant that the karstic, rocky terrain of the higher ground of villages Banjol and Barbat, and to some extension also Mundanije and Supetarska Draga, were divided into thin strips. The parcels were used as pasture, just as they were used before the division. The smaller lenses of fertile soil within this area in the hilly part of the island (the massive of Kamenjak) were left untouched, respecting their significant fencing (presented in Figure 5.1 in yellow). These are also enclosed lots of land, of relatively small surface, used for different purposes: planting crops and segregation of animal in order to conduct a specific task (sheering, milking, separating). Dating of these enclosures is unclear but it clearly predates the longitudinal parcels for at least 100 years (as seen on third survey chorographic map). Some of the place-names suggests shepherding purposes, like for example Strigarine – derived from the word striga = sheering.

This part of the landscape was used as pasture since the prehistoric times. This kind of activity leaves little trace, but as it was mentioned before, since at least the Bronze age, animal husbandry was the primary economic activity. The island has its specific kind of transhumance sheep herding. Transhumant shepherding traditionally is considered a seasonal movement of livestock from lowland pastures to the mountain pastures and back, usually spending time in the lowland during winter and mountains during summer. Sheep herding on Rab is extensive. The sheep are kept in the lower parts of the hill, relatively close to settlements, during winter. At this time lambs are born sometime during December and January and are suckling for approximately three to four months. Afterwards, lambs are weaned and the sheep are milked until mid-June when they are sheered and released in the hills – Rapost. Here they roam at will until October when they are gathered again and brought back to vicinity of settlements. During their time on Rapost, sheep are being controlled by the shepherd every several days. The main concern is the level of water in water pools during the summer draughts. Sheep graze at their will. Place-names (Rapost) and generic words for pastures (kanat, der) are of pre-Roman and Roman origin.



Figure 5.3: Part of LU Barbat 1, aerial photo, M. Rizner

Historically this was happening in the vast areas of open pastures. The division of these pastures was clearly done following this tradition. Each parcel is covering the land from the foot-of-the-hill area across the ridge and to the slope on the other side of the hill. This means that each herdsman has the ability to follow the traditional way of sheep herding.

### 5.2.2 Landscape unit Barbat 2

Settled on the fringes of landscape unit (LU) Barbat 3, this unit is an example of geometric imposition on the landscape in the form of orthogonal, orderly laid out terraces.



Figure 5.4: position of LU Barbat 2 within the island

The sediment, typical for this part of the island, is gravel – sand. This kind of soil, rigosol on gravel and breccia, is well drained and of lower quality as classified by Miloš and Bensa (2012). It is however, quite good for viticulture purposes (Španjol 1995). The slopes on which these terraces are laid over are indentations of arable lands, formed by gravel-sand sediments over breccia, into in the rocky karstic area of the pastures in the hills. Demarcation between these two geologically and culturally significantly different areas is a drywall following the morphology of the landscape, traversing it in south – north direction.

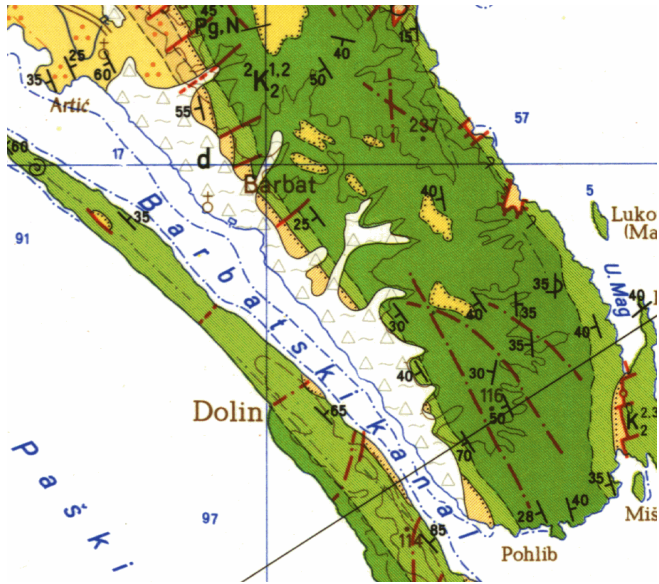


Figure 5.5: Geological map for the area of LU Barbat 2 and 3 (Mamužić 1969)

Terracing in agriculture is a major construction event involving leveling slopes with the purpose of creating accessible, flat or sloped plots for agricultural, silvicultural, or pastoral use. The terraces prevent soil erosion and enable soil distribution, by controlling the quantity of existing soil and soil brought from the surroundings by man (Gothardy Pavlovsky 1972, Countryman 2012). Terracing is beneficial for the soil and agriculture as provides the roots to penetrate the ground and enables the water catchment. Different factors influence the shape of terraces, some of them are morphology of the terrain, soil properties, intended purpose of terraces and local traditional knowledges and practices. These terraces could be classified as step terraces with built risers, following the classification given by Grove and Rackham (2001). Although, useful typology of terraces was also given by international project ALPTER ([www.alpter.net](http://www.alpter.net)). The risers are built in drywall.

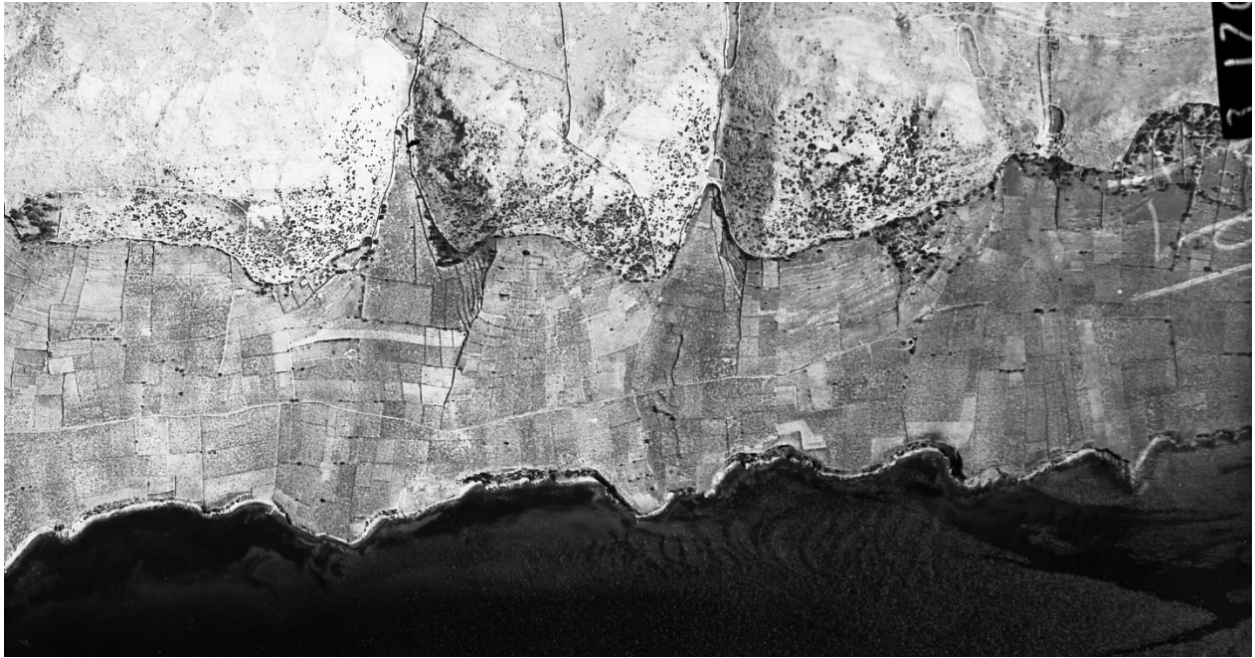


Figure 5.6: LU Barbat 2 on historical aerial photography, RAF 1941

Terraces in question are now abandoned, which unfortunately is often the case with terraced landscapes in Croatian Adriatic (Andlar and Šrajer 2017). The predominant economy of the region, agriculture, is now almost completely abandoned and the focus of the economy is on tourism.

Terracing is landscaping process that is well spread in the Adriatic region of Croatia. It is proposed that the beginning of this process started as early as Neolithic (Price and Nixon 2005; Hughes 2005) or according to others in the Bronze age (Countryman 2012; Grove and Rackham 2001).





Figure 5.7: LU Barbat 2 with terraces drawn in ArcMap 10.6. Zones in purple and yellow are Roman period sites

From an archaeological point of view, this part of island's historic landscapes could be dated in the Roman period. It was suggested that Liburnian economy was relying largely on viticulture and olive growing (Chapman 1996). However, there are no sites or toponyms that could imply that these terraces were built during the Hellenistic period (or before). There are, however, sites dated to Roman / Late Roman period in the immediate vicinity. These are the necropolis above ex-ferry port Pudarica (Konestra 2017), a sunken maritime infrastructure connected to architectural remains on the coast right beneath the landscape unit (Lipovac 2016), the next site is approximately 550 meters in northwest direction, positioned above the coast (Lipovac 2016). Roman agriculture and thus its

landscape is considered to be a generator of surplus (Chapman et al. 1996, Witcher 2006) and as such it is expected to see development in the use of arable land, maybe in extent that have not been used before – such as hill slopes that can not be cultivated without constructing terraces.

As terraces are hard to date, and research into terraced landscapes is only in its beginnings in Croatia (Andlar and Šrajer 2017) the most certain date for construction of any terrace is 19th and 20th century. However, given that the maps and cadaster plans from the 19th century represent not only the situation at the moment of their making but also, they more or less reflect the situation from circa 500 years ago (Rippon 2012), it could be concluded that these terraces are at least of medieval origin. But without further evidence such as archaeological sites or place-names dated to medieval times it can not be concluded that these terraces are of medieval origin. Cadaster maps are made primarily to facilitate taxation therefore parcels represent the ownership not the terrain relief. This is obvious on historic cadaster where these terraces are not presented.

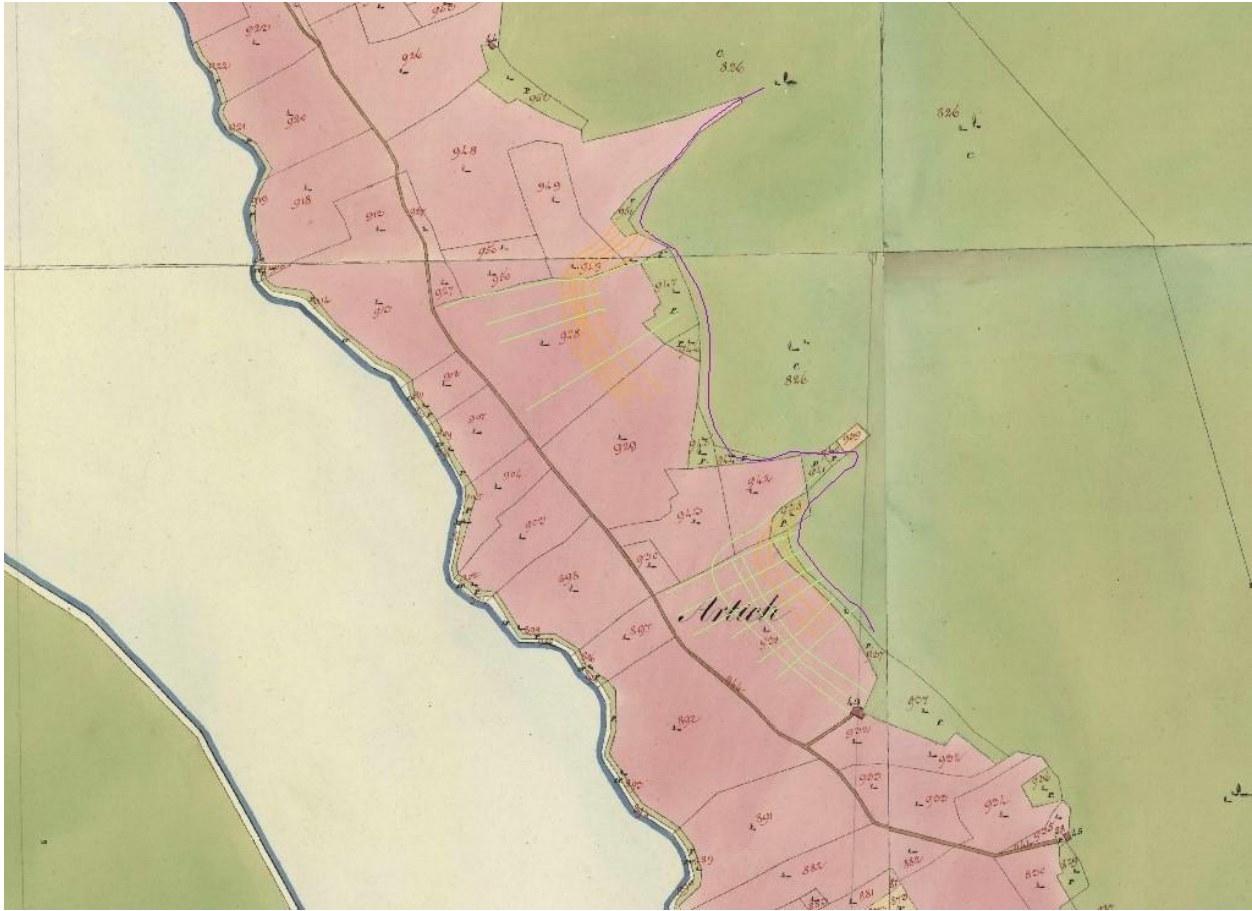


Figure 5.8: LU Barbat drawn in ArcMap 10.6 layered over 19th century cadaster. Terraces occupy one parcel each but are not presented.

### 5.2.3. Landscape unit Barbat 3

This landscape unit occupies the coastal area outside of the village Barbat, towards south. Historically it would stretch through large portion of the village but as the village spread the land was used for construction of houses not for agriculture and this landscape was lost. The historic cadaster of 19<sup>th</sup> century presents this in the most pleasing form.

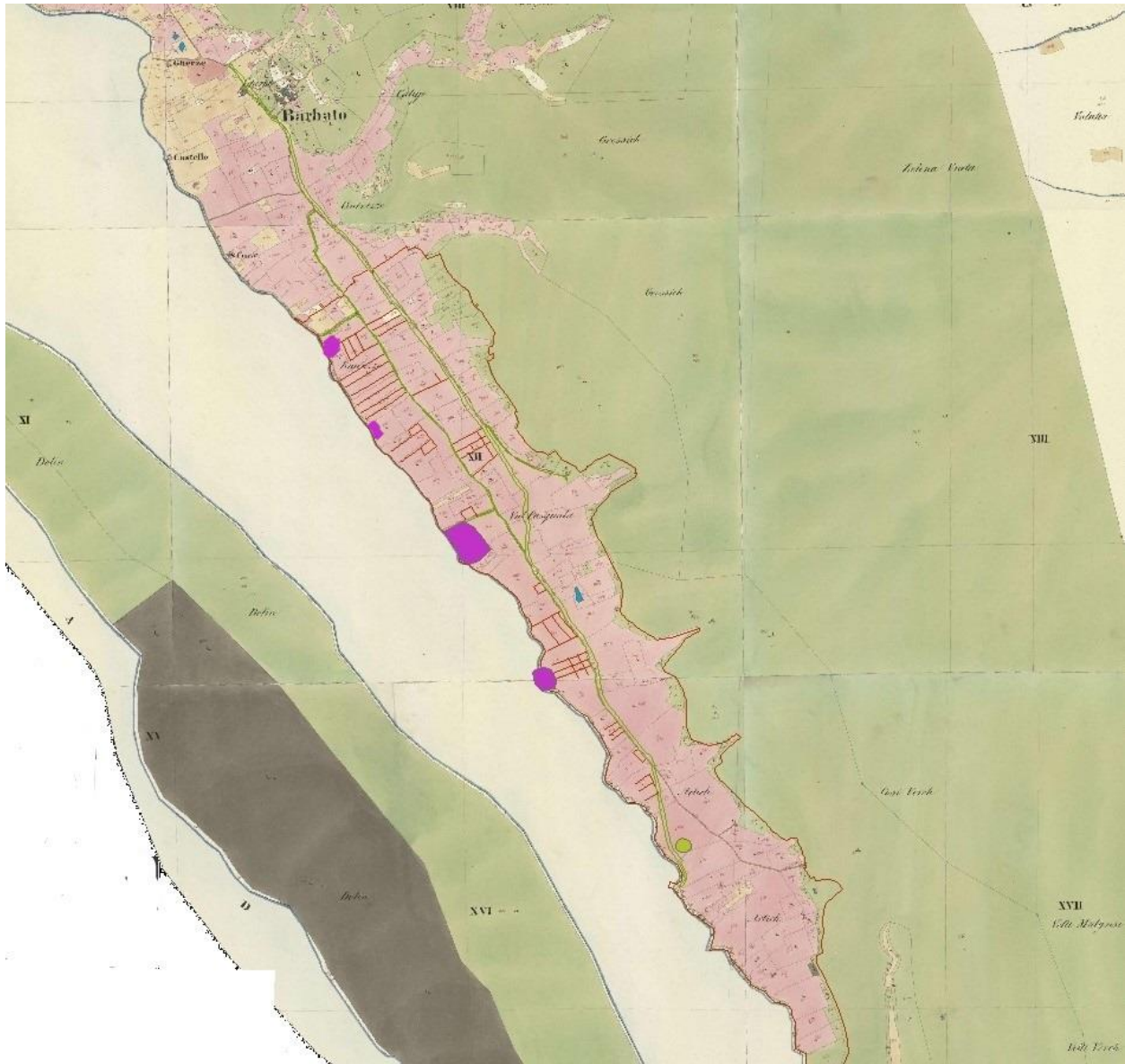


Figure 5.9: LU Barbat 3 layered over historic cadaster. Vineyards of the village are drawn in pinkish red and the extent of LU is drawn in strong red line. This presents how the village spread over previous agriculture land. Purple and yellow are sites. Roads are drawn in green, running through the center of the LU.

Geological sediment is sand – gravel, which, to some extent, limits the agriculture in sense of number of sorts that thrive in such soil.

Archival photography clearly depicts this area as monoculture: it was completely covered in vines for the majority of the 20th century as well as during the 19th century as seen on the third survey map. The 18th century map presents the same monoculture agriculture.



Figure 5.10: Area of LU Barbat 3 on 18<sup>th</sup> century map (source Mapire.eu)

This area is a gentle slope of the coast covered with terraces. The terraces hold parcels of an orthogonal shape. This is not as clearly visible in the cadastral of the 19th century but it is well noticeable in the aerial photography of 1941. This difference can be explained by the planned use of these two sources: cadastral maps are made in order to note and number land ownership regardless the morphology of the terrain; whereas aerial photography is made in order to document the specific situation on the ground. Some of the parcels charted are covering two or three terraces and this is not visible, only the surface of the parcel is visible, and the parcel is a piece of land belonging to a person. Nonetheless, the layout of this portion of island's historic landscapes is terraced and following geometric order.

Today most of this land is abandoned and overgrown with macchia. Historically this was a strong viticulture area until the stronger development of tourism at the end of the 20th

century. One of the oldest historic sources corroborating this is a document dated to 1208 which mentioning vineyard in Pasturana owned by the monastery of St. Stephan in Barbat. Pasturana is a territory in the village Barbat, the place-name is still in use today in slightly different form - Paštiran. The place name is of Roman origin, and an example of Roman district name (Skok 1952, Simunovic 2005). A significant amount of historical data confirms the continuous land use for this area, especially from the 14th century onwards. Notary public books contain numerous contracts between landowners who are buying or selling a vineyard (Mlacović 2008, KK Lib. I, 583, 614, 643, 727, 758).

The imposed geometric order and archaeological topography along with place-names is clearly showing that the land use in this part of the island is in continuity since at least Roman times and possibly since the Late Iron age. In support of this stands a 2nd century Liburnian tombstone, cippus (Fadić 1997, KK, Lib. V, 96) found in 1934.



Figure 5.11: LU Barbat 3 with geometric order of parcels drawn in ArcMap 10.6 in strong red. Historic roads are drawn in green.

The archeological sites are evenly dispersed in the area along the coast and rarely positioned in the central terrace. Starting from the south, the first site is a small necropolis above ex-ferry port Pudarica (Konestra 2017). Following is a sunken maritime infrastructure connected to architectural remains approximately 750 meters towards northwest (Lipovac 2016). The next site is approximately 550 meters in the same direction, positioned on the central terrace (Lipovac 2016). These sites are all dated to Late Roman period, circa 5th century (Konestra 2017), although a recent find of two coins could date the site in the 4th century (personal find). Two other sites featuring architectural remains are, almost evenly, displayed along the coast towards NW. The small finds date them in Late Roman period. It is important to note that these sites are outside of the urbanized area of the village (outside of current urbanization).

Primary connection to these sites was the sea route as evidenced by the remains of the maritime infrastructure found at the coast or in the shallow water just in front of the site (Lipovac Vrkljan et al. 2016).

Aside of these sites, there are numerous other sites (within the urbanized area of the village) mentioned in historic sources or present in the oral history of the inhabitants that corroborate this hypothesis. At the site of the church of St. John (the toponym is Sveti Ivanac), which is a medieval church, Chronicles of Kampo (Lib. 1, 751-752) mention abundance of amphora found during excavations nearby the church. Pater Badurina is retelling the story heard by a person whose father was digging and have found 25 – 30 amphoras (this was in 1909). Besides the amphora, there were numerous walls stretching from the church to the sea (the church is positioned about 25 meters from the sea and 1,5 meter above it). The person claimed that the amphoras contained ashes and were

thus incineration graves. This could be hard to accept given the number of amphoras, the fact that there are no other such grave found in the region (Bekić, Višnjić 2008) and the known use of amphoras in drainage canals which leaves inside sediments that resemble ashes (Rossi 2011, Brecciaroli Taborelli 2011). The same person also claimed that along the coast, in the area from this church to the church of St. Mary (at the southern end of the same area), it is common to find graves. What is common, where exactly are these sites and how many of them are there, is unknown.

Besides this entry from the Chronicles, people from the village reported numerous finds of architecture remains and graves in the coastal strip of the village, during the time of tourism flourishing and great development in house constructions. These reports are also hard to trace and to position in detail. Nonetheless, it should be noted.

At the edge of the area covered by this landscape unit is a very important site of Early Christianity and a Benedictine monastery – St. Stephen. Today a parish church of the village. When the monastery was founded it was given the church with the land (the church was first mentioned in historic documents in 1086 (KK Lib.I, 432) and the monastery in 1252 (idem Lib I, 530). The church was heavily restored in 1850 when it took the morphology it bears today. Before this restoration the architecture was different and clearly of Late Roman / Early Christian origin. There are no preserved graphic documents about the restoration but comparative analyses of historic cadaster (made during the survey in 1827) and recent documentation and photography presents the changes of the architecture of the church.





Figure 5.12: The church of St. Stephen in Barbat on

historic cadaster from 19<sup>th</sup> century.



Figure 5.13: The church of St. Stephen in Barbat, 2016, Archives of the Conservation department in Rijeka, photographed by D. Krizmanic

Toponymy of this area is predominantly Roman. The name of the village is of Roman etymology. Place names like Valsabana, Pasturana and Mentinjuza are of Roman origin (Skok 1952, Simunovic 2005).

Following this line of evidence, it can be concluded that the historic landscape of village Barbat was formed during Roman period with possible older origins.

#### 5.2.4 Landscape unit Barbat 4

This landscape unit presents the medieval development of a settlement a hamlet around the arable land in its vicinity belonging to an aristocratic family. The relationship between the hamlet, the land, pastures and major agricultural land – the vineyards will be presented through comparative analyses of historic cartography, GIS feature classes and historic and recent aerial photography.

The hamlet Grpe is situated on a small hill, some 50 meters above the sea level. Historically it was comprised of two sets of small peasant houses in a row and the gardens surrounding them. The need for soil for gardens is the reason for the abundance of clearance cairns surrounding the hamlet and its gardens. Pastures, mainly commons but also some privately owned are in the back of the hamlet in the top-of-the-hill region of Kamenjak ridge. Arable land is positioned just beneath the hill in the direction of the coast. On the coast there is a mansion belonging to the family owning all the land – family Cernotta. Their mansion was called a castel, though it could hardly be taken for one. This disposition of features presents medieval land ownership and colonat system that was a standard relationship on the island since the Roman times.



Figure 5.14: Hamlet Grpe with its surroundings on historic cadaster from 19<sup>th</sup> century.



Figure 5.15: Castello – mansion of the landowners, the Cernota family, on historic cadaster of the 19<sup>th</sup> century.

the plan of the castle and its land is preserved in the Archives of the parish of Rab. Some calculations are written and the name of the family owning the land neighboring the Cernotta land – the Nimira's. The castle gave the name to this part of the village Barbat – Kaštel.

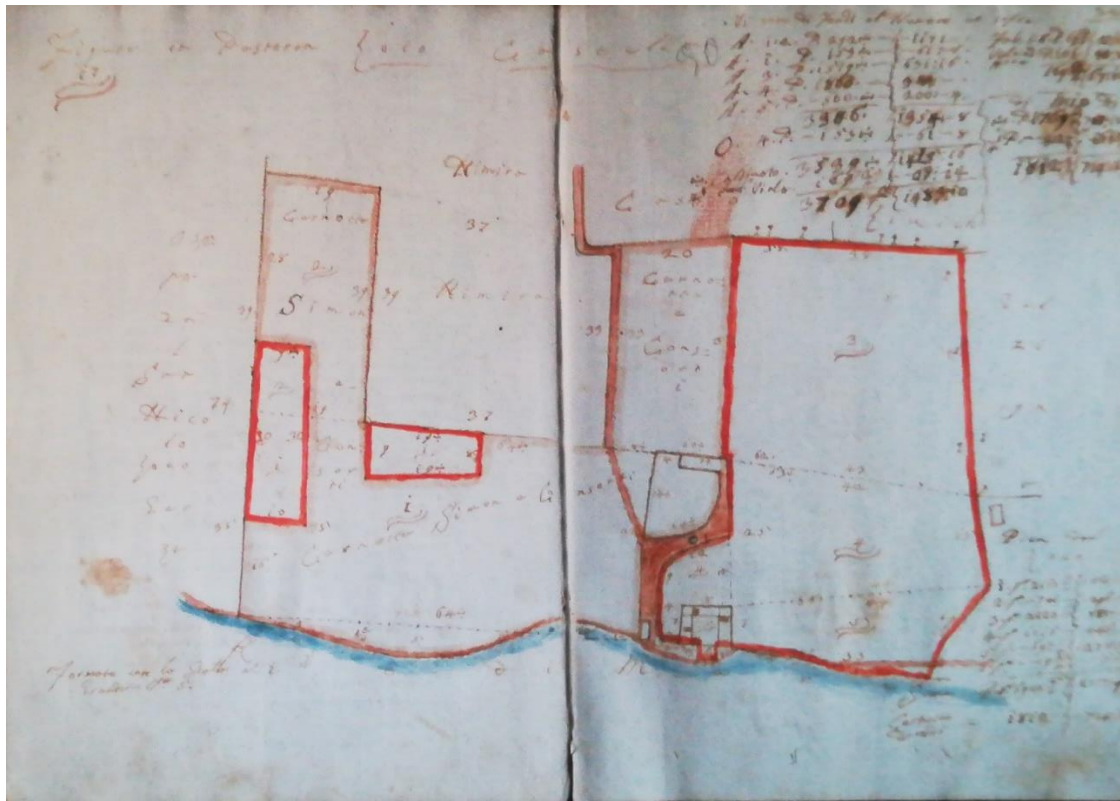


Figure 5.16: plan of family Cernotat's castle (Archives of the parish of Rab)



Figure 5.17: Cernotta castle in 1972 (photo Archives of the Conservation department in Rijeka)



Figure 5.18: LU Barbat 4 layered over historic aerial photography (RAF 1941). Clearance cairns are in red. Green square is the position of the castle and the hamlet that formed around it. Blue lines present orthogonally shaped terraces of vineyards. In the lower left corner is the church of St. Stephen.

The position of the hamlet, on the foot of the Kamenjak ridge, in the high ground but not in the high-altitude position is in accordance with the preliminary hypothesis. The landscape is formed organically following the terrain. In the near-site positions are small gardens. Knowing the landownership relations, these were probably owned by the landowner (aristocratic family) but were not subject to taxation. Colons were allowed to grow gardens for their own purposes. The position of the land for the garden was agreed with the owner. It is highly unlikely that the colons would be allowed to grow their own gardens in the arable land beneath the hill and the hamlet. Therefore, the land for the garden had to first be cleared of the rocks. Hence, clearance cairns were formed. It is

visible on the historic cadaster in the Figure x how the hamlet was a crossing of the paths leading towards the urban center – town of Rab and towards the vineyards in the south. It is also visible how the land suitable for vineyards (Milos and Bensa 2012) was used as much as it was possible – even in the thin strips of the soil that peters out in the rocky karst. The pastures are in the off-site position in the hills with which the hamlet communicated with small paths.

Place-names help determine the time when this hamlet evolved along with the landscape it helped construct. Grpe is a place-name of Roman origin (Simunovic 2008), as well as Kaligo (or Caligo on the historic cadaster) and Kamporara (Camporara). Grpe means higher ground, and Kamporara has the same origin as the name of village Kampor – the word for field (campo). This would give the hamlet or at least its position a older date of origin but there is no other archaeological evidence supporting this. The nearest place-names in the surrounding pastures are of medieval origin – Strigarina, Njivica, Zaragucinja, Fafuska.

The centripetal development of the landscape of the hamlet, the small gardens near-site, the large plots of arable land off-site and the toponymy all suggest that the hamlet and its landscape evolved in the medieval times. The evolution of the landscape in this particular part of the island is strongly related to the colonat system and the power of the aristocratic families from the town of Rab. The immediate vicinity of landscape which evolved earlier, during the Roman times, terraces of the vineyards and the toponymy of the nearby land suggests that the evolution started earlier, but the major development most definitely happened in the medieval times.

### 5.2.5 Landscape unit Barbat 5

This landscape unit presents prehistoric hillfort (Late Bronze Age) Košljen and the landscape that evolved around it. The place-name of the site is of early Slavic origin, inherited from the pre-Slavic inhabitants (Šimunović 2005). It indicates a Slavic version of the word *castello*, *casteliere* – a hillfort, ruins on top of the hill. Behind the name are some facts of life for the site: after it was abandoned in prehistoric time it was never re-established, later population referred to it as to something that is not in use. The landscape around it is also showing the same attitude. Remains of the defense wall is presented in red (Figure 5.19). Later additions – longitudinal drywalls negate the defense wall of the hillfort. The hillfort was constructed in the rocky carst part of the area, above the arable land used for viticulture. Historic sources mention the area beneath (Pasturan) the hillfort but never the hillfort.



Figure 5.19: LU

Barbat 5 presents the evolution of a landscape in relation to the remains of prehistoric hillfort.



#### 5.2.6. Landscape unit Banjol 1

Hillfort of St. Cosma and Damien, one of Justinian's 6<sup>th</sup> century hillforts, situated at the border between villages of Banjol and Barbat is well studied and documented. It features conspicuous landscape patterns. The perimeter of the hillfort takes up a piece of roughly triangularly shaped land, within which is the hillfort. Leaning on the perimetral walls of the hillfort are later dry walls. These walls are the extension of afore mentioned drywalls of LU Barbat 1, modern division of pastures. The drywalls respect the walls of the hillfort. What is interesting is the borderline between the two cadastral communities Banjol and Barbat is just at the NW wall of the hillfort. The modern division of pastures is thus, leaning on the wall of the hillfort at one angle on the side of cadastral municipality of Banjol and at a different angle on the side of the cadastral municipality of Barbat. They meet at the hillfort and at the footpath leading up the hill towards pastures.

Beneath the hillfort a series of terraces were still visible on the aerial imagery of 1941 and 1968. Following the inclination but in an orderly manner. Terraces feature some small finds that could be dated at the same time as the hillfort, but it is inconclusive whether the finds washed down to the secondary position or are they in the original position.



Figure 5.20: LU Banjol 1n aerial orthoimagery from 1968. The path leading to the hillfort is in green, terraces in the slope of the hill in orange and the perimeter of the hillfort is in red. LU Barbat 1 is in pale blue.

#### 5.2.7. Landscape unit Kampor 1

Salterns formed important part of island's cultivated land. Salt was used for revenue and local use. Within the territory of village Kampor there were two salterns. One is at the site Maran at the bottom of the bay of St. Eufemia and the other one is at the site of Frapka, just beside the Monastery of St. Bernardine, to the east. Both salterns feature a stream of fresh water, as well as the saltern in Supetarska Draga. The streams are at the same site as salterns because of the geological sediments that cause the accumulation of water

and the accumulative coasts formed by drowning of valleys formed in soft rocks. Salt was produced by evaporation of the sea water in shallow basins using the energy of the sun. The saltern at the site of Frapka had its own salt magazine but the saltern at the site of Maran did not have one, so the salt was stored at the magazine of Frapka (at least in the high medieval times). Salterns are an example of people's adjustment to the natural environment. The shaping of natural environment, of the land, came only from the people's need to subside their own existence. The water from the stream was channeled through the saltern in such a way that it does not affect the salt basins and the balance was achieved. The environment is shaped according to the necessity, but not completely destroyed.

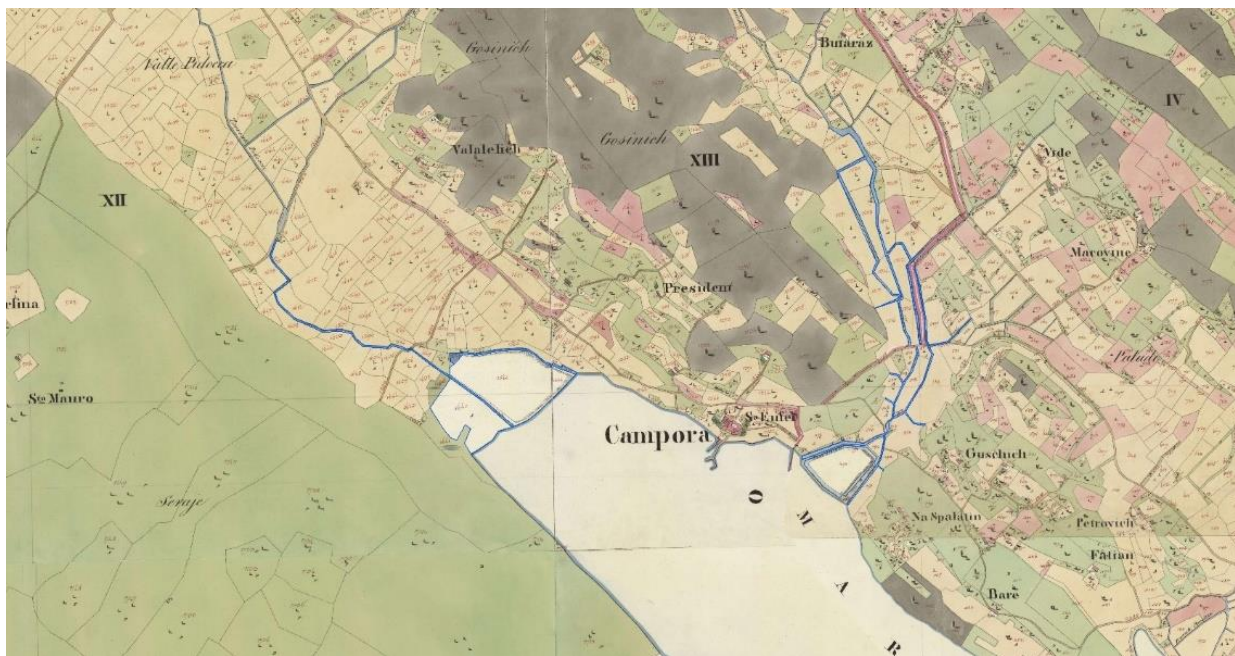


Figure 5.21: LU Kampor 1 on historic cadaster of 19<sup>th</sup> century. Both salterns are presented as well as freshwater systems related to salterns.



Figure 5.22: LU Kampor 1 layered over DOF 1968 in ArcMap 10.6

### 5.2.8. Landscape unit Kampor 3

Landscape unit Kampor 3 represents two settlements situated on top of a hill, conveniently positioned just above the field of Kampor. Settlement by their size can be categorized as a homesteads of probably one family, likely extended. Small house was built on top of the hill, vegetable garden is in the immediate vicinity, mainly having a small yard in between the house and the garden. Mixed crops parcels are further away from the site, but still very close. Pastures follow the mixed crops parcels and are the last part of cultivated land before the forest that surrounds the site. The homestead was built after the forest has been cleared. Place-names suggest medieval origin, as well as their position right above the field of Kampor. The stream that runs between the two homesteads feeds the mill in the field (LU Kampor 4).

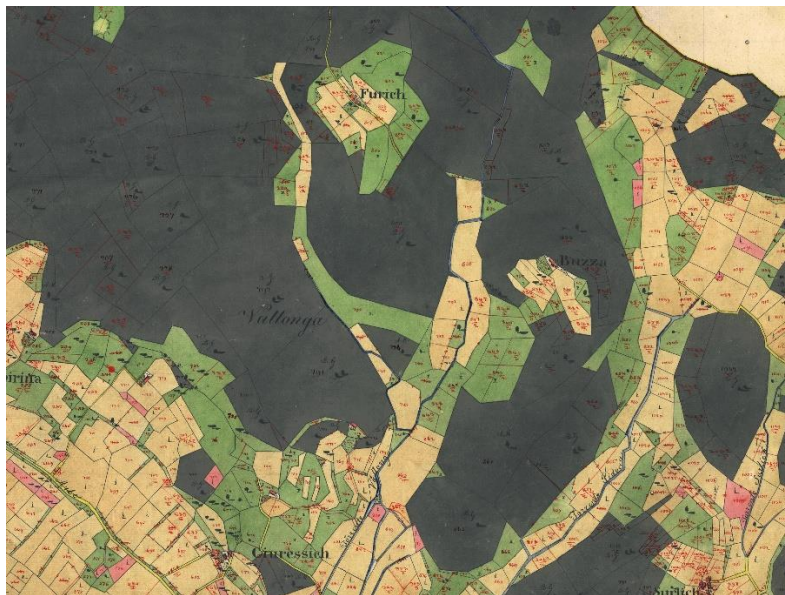


Figure 5.23: LU Kampor 3 on historic cadaster, 19<sup>th</sup> century

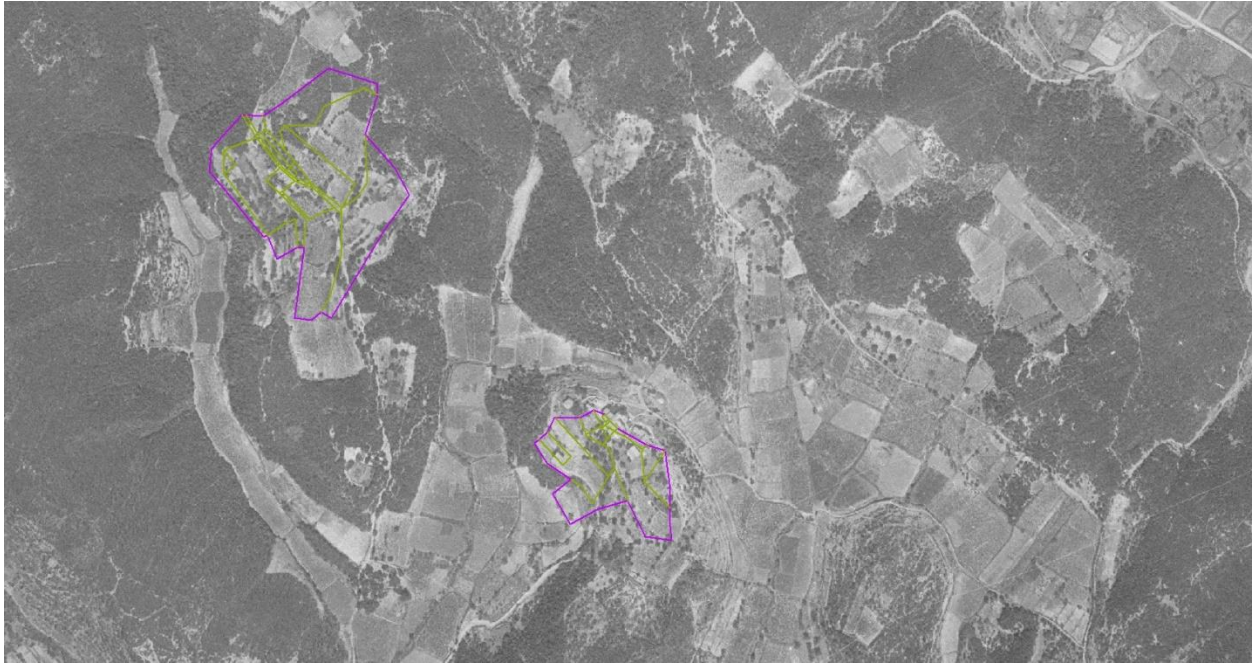


Figure 5.24: LU Kampor 3 layered over DOF 1968 in ArcMap 10.6

#### 5.2.9 Landscape unit Kampor 4

LU Kampor 4 presents the position of one the two mills that are known to have existed on the island. The streams running the mill are the same ones running through the saltern at the site of Maran. are drawn in ArcGis. No traces of this mill exist today except the place-name – Malin. Water impermeable sediments retain water well, unlikely for the Mediterranean environment. The field is cut through with channels for melioration, otherwise the agriculture would be hardly possible. The LU Kampor 4 presents the network of streams and the main channel running through the field. The mill also had an accumulation pool beside it, to enable the control of the operation. Kampor's field is one of the highest quality land on the island and it was used for growing mixed crops.



Figure 5.25: LU Kampor 4 presented on historic cadaster

5.2.10 Landscape unit Supetarska 1

Landscape unit Supetarska 1 presents the pastoral landscapes of the top of the hill area above part of the village Supetarska Draga called Gornja (Upper). The land was divided after the Agrarian reform in 1919 but as opposed to the land in village Barbat (LU Barbat 1), the division never included building demarcations between parcels. Older features (Figure 5.26, in green) in the landscape were preserved and the division took them in regard. The inhabitants of the village Supetarska Draga clearly decided to leave the pastures as they were, in attitude resembling the commons. In comparison to the geomorphology of the territory of village Barbat, those parts of it that were used as pastures, this part of the island is flatter, more even and easier to control. The hilly

pastures of Barbat are rugged, indented and hard to control. In a situation in which an area is divided between a number of persons and the physical demarcation of each parcel would require hours of hard labor by the whole community, but another option is to let the sheep roam freely in the land and use old, existing pens for division of the flock when needed, it is easy to choose the less strenuous option.

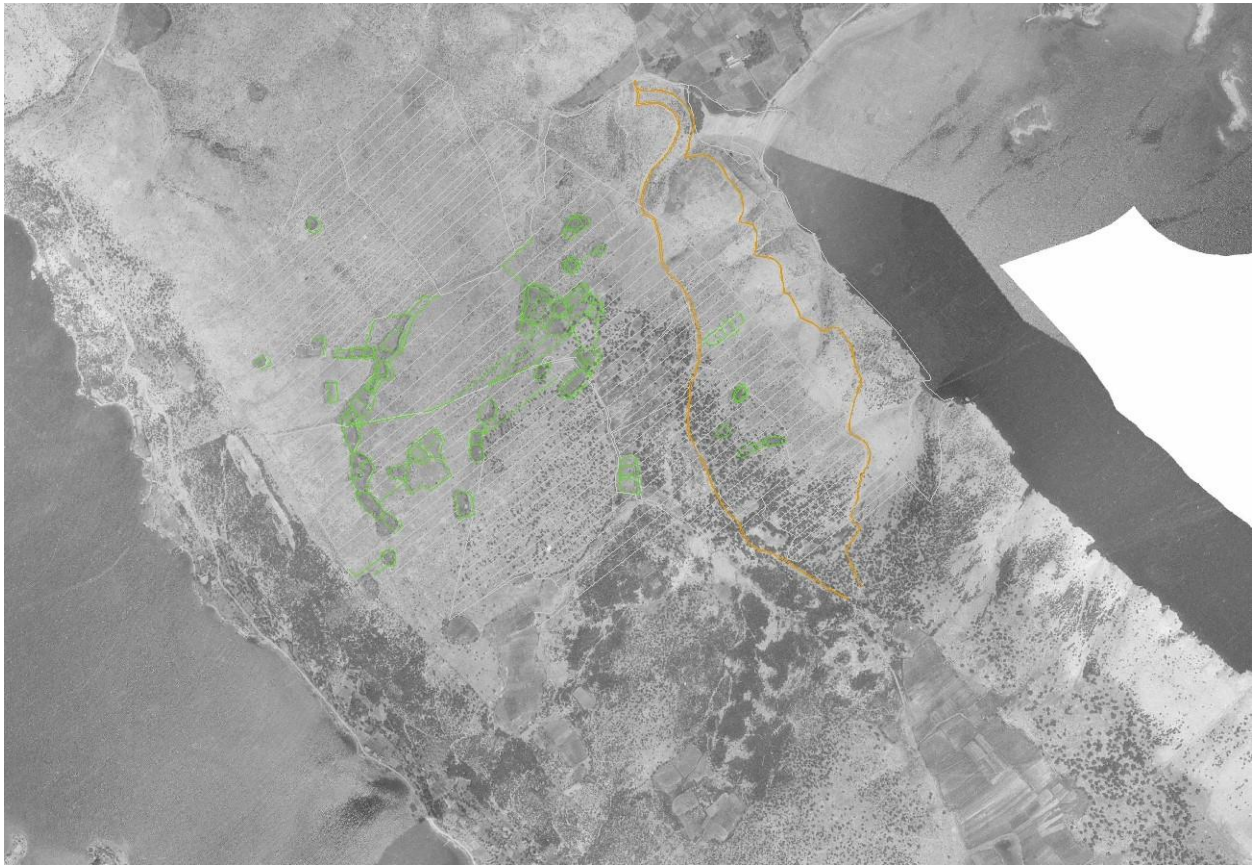


Figure 5.26: LU Supetarska 1, older features in green, the division of the land is marked pale grey



### 5.2.11 Landscape unit Supetarska 3

Landscape unit Supetarska 3 presents the evolution of medieval landscape originating during Roman and Late Roman periods. The Benedictine monastery of St. Peter, founded in 1059 (Racki 1877), greatly influenced the creation of what is today the village Supetarska Draga. The village is formed around the coast of the bay of Supetarska Draga, on the south west coast is part of the village called Donja Supetarska Draga (Lower S. Draga) and on the opposite side of the bay is the part called Gornja Supetarska Draga (Upper S. Draga). The importance of the monastery is most obviously noticed immediately in the name of the village which was derived from the title of the church and the monastery – Saint Peter. In Croatian the name is Sveti Petar, and the sanctorem derived from it is Supetar, meaning territory around / of / near the church or monastery of St. Peter. The bay, being integral part of the territory of the monastery (explained in greater detail further in the text) forms the part of the name of the village. Thus, the result is possessive adjective of the sanctorem Supetar - Supetarska and word for bay – Draga.



Figure 5.27: Church of St. Peter and remains of the monastery in its historical surrounding (Archives of Conservation department in Rijeka, cca. 1946)

The Benedictines arrived to Rab by invitation of the bishop Drago, prior Maius and Rab's dignitaries (Rački 1877, Mlacović 2005). With the invitation they received the right to build a monastery at the church of St. Peter in the field of Supetarska Draga. The foundation charter of the monastery describes the estate that monks received, first part of it was the estate of the church by which the monastery was to be build – St. Peter's church. The second was the estate of a smaller church of St. Cyprian. The limits of the estate of St. Peter's was as follows: From the top of the plane Fruga (just above the field of Supetarska Draga) where the demarcation was some drywall downhill to a stream just behind the church and then following the stream towards the sea coast, following the sea coast to the mill at the edge of the bay and from the mill straight uphill till the ridge and following it

to the point of origin. Diversity and quantity of the land the monks gained allowed the monastery complete autonomy. Generous part of fertile field of Supetarska Draga, amounting for approximately 60 hectares suitable for grain cultivation, the soil is of the highest quality (Miloš and Bensa 2012). Land at the foot of the hill suitable for olive growing and other fruit (vines, olives). Forests at the side of the hill and pastures above the forest at the top of the hill area. All in all the available surface amounted for almost 300 hectares.

The estate of St. Cyprian's was smaller and less diverse. It consisted of a cape and small islands just opposite of it. Mlacović (2005) placed the position of the church and the estate to nowadays Gonar. Knowing the geography of the island, and having in mind toponyms and short description (surrounded by the sea on three sides) mentioned in the charter (Rački 1877) there is little doubt that cape Gonar is the land in question. The charter does not mention the quality of the soil or type of cultivation in this area, but based on historic cadasters and maps (19<sup>th</sup> century and to some extent 18<sup>th</sup> century) and soil typology (Mamužić 1962, [http://tlo-i-biljka.eu/iBaza/Pedo\\_HR/index.html](http://tlo-i-biljka.eu/iBaza/Pedo_HR/index.html)) it can be concluded that the land was used for agriculture in the lower parts and it was forested in the higher parts. Historic sources from the 14<sup>th</sup> century confirm that the land was (at least partially) used for growing grains (Mlacović 2005). Since the morphology of the cape is steep, the agriculture had to include terracing. The remains of these terraces are visible on aerial photography of 1940s and 1960s (Figure xx). The island opposite the cape were cultivated and terraced too. The exact position of the church of St. Cyprian is not clear. It is also a topic of an ongoing debate among the scholars working on the island. The position was sometimes mistakenly given in Kampor, in the forest Dundo, above the small

bay of Gožinka. The mistake arose from a place-name near the above-mentioned remains of a church – Ciprijanovo, meaning: Cyprian's. Who is the Cyprian in question or which one is the church that named this territory, is unknown. Following the information given by the Great Chronicle of Kapor (KK Lib. III, 782-5) it could be concluded that the church in question is St. Damian, one of many churches listed in the Chronicles and archival documents of the island, although Konestra (2016) suggests it is St. Mary's.

Figure 5.28 shows the estates gained by the monks of St. Peter's monastery on cadaster of 19<sup>th</sup> century.

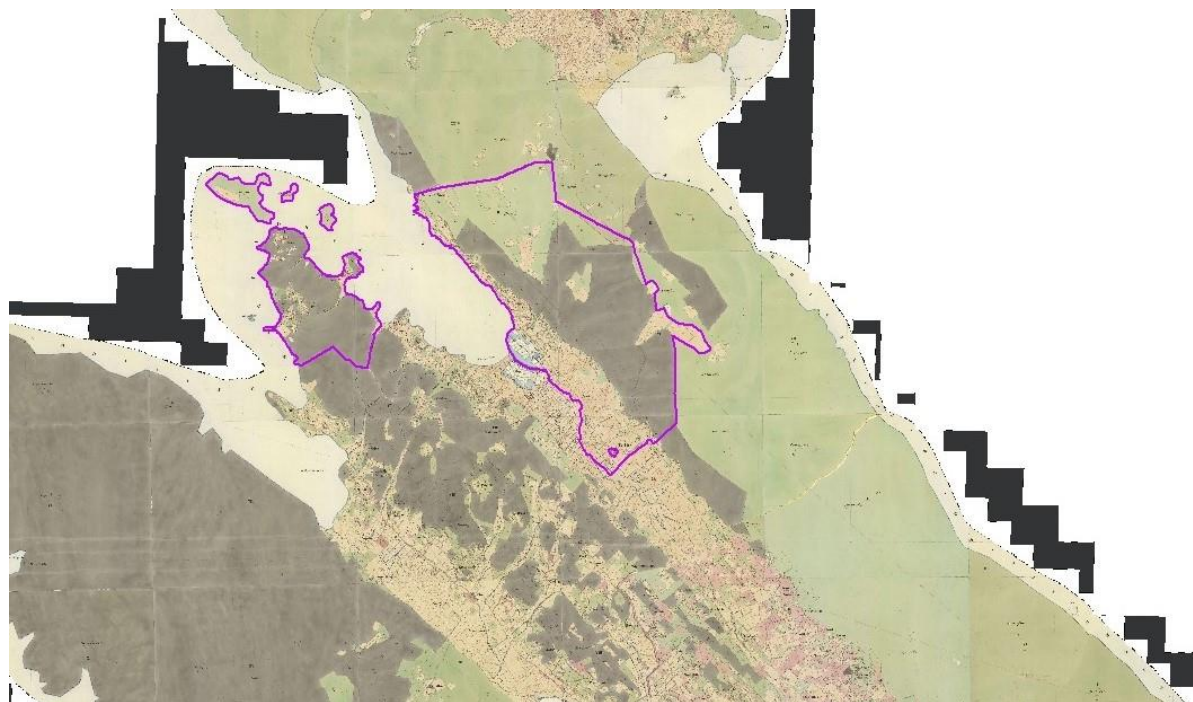


Figure 5.28: Monastery of St. Peter and its estate, as described in the foundation chart. Presented on historic cadaster.

Besides the land the monks also gained the exclusive right to fish in the bay of Supetarska and in the sea in front of church St. Cyprian.

Interestingly, salterns are not mentioned in the foundation charter. However, the papal charter by which the foundation of the monastery was confirmed, dated to 1199 (Smičiklas 1904) clearly mentions salterns. Mlacović (2005) leaves the possibility that the salterns were restored, not built *ab ovum*. Observing the territory in greater time-depth could help with dating the origin of salterns in Supetarska Draga.

It was already mentioned that the church of St. Peter already existed when the monks arrived to build the monastery. Not only it is stated in historic sources (the foundation charter) but it is also obvious in the architecture of the church itself (Jurković 1990). But the church was actually built on an older building. Archaeological finds suggesting the existence of remains of an older building in the layers beneath the church were revealed during the restoration of the church that was conducted in two instances, first in 1964, than again during the 1970s. These are a Roman spolia found beneath one of the columns (Figure 5.30) and remains of walls in one of the side aps (Figure 5.31, 5.32). Besides these two finds, the northern wall of the church lays above an older wall visible from the outside (Figure 5.33).

Surveys in the vicinity of the ex-monastery revealed several clusters of finds, both movable and immovable, of Roman / Late Roman origin (Konestra et al. 2015, Rizner 2012). Figure 5.29 shows the spatial distribution of these clusters in relation to church and the monastery. First cluster is located in the immediate vicinity of ex-monastery's compound. The remains of architecture are covered with vegetation but still visible and easy to follow. One of the walls is traceable for almost 50 meters and is intersected with two other walls on each end.

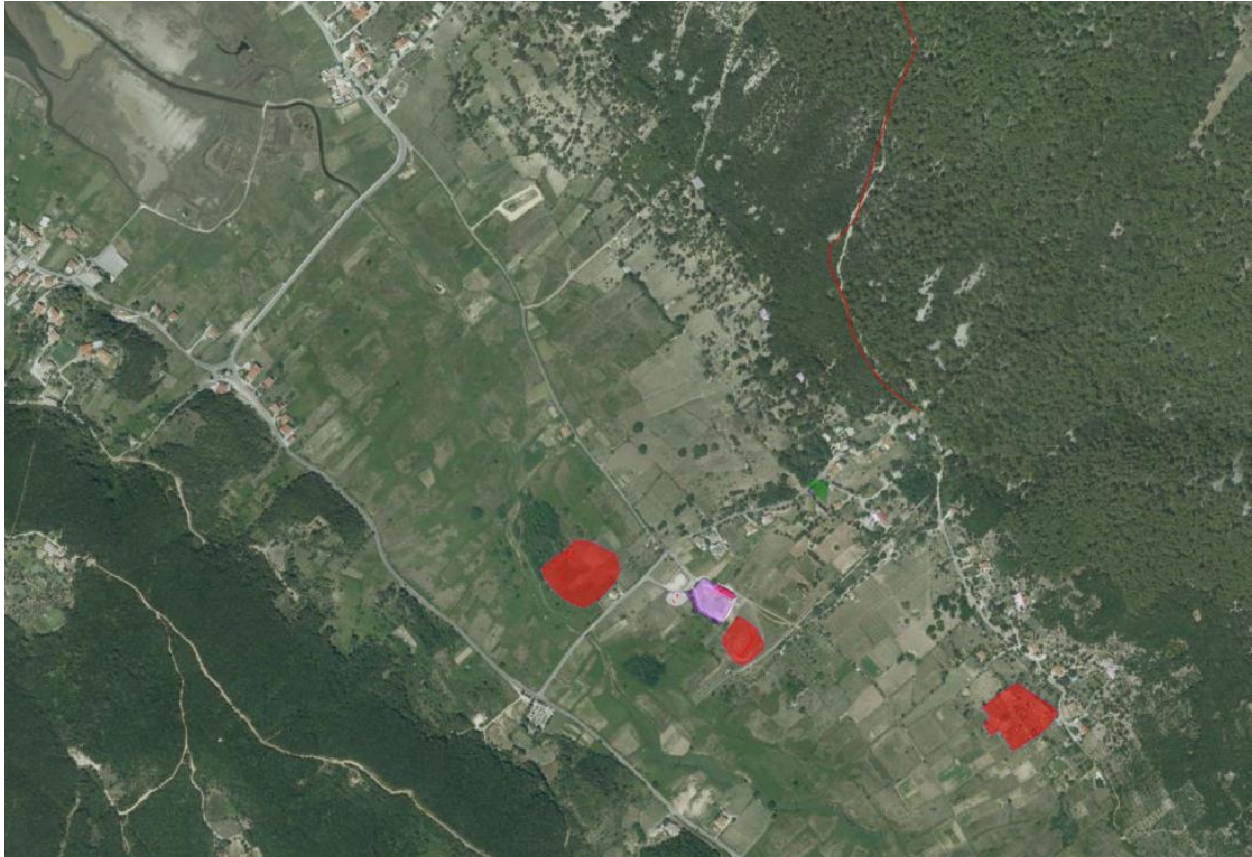


Figure 5.29: Spatial distribution of Roman / Late Roman finds in relation to ex-monastery of St. Peter. The complex of the monastery is in pale violet while the finds are in red. Notice the thin red line in the northern end of the estate.

Given the location of these finds – within a spacious field of most fertile soil on the island, and their characteristics – remains of architecture, construction elements, generous number of finds, and its date to Roman / Late Roman period, it can be concluded that these are the remains of a large Roman rural residential estate. The economy of the villa clearly depended on agriculture, growing grain, fruits (olives and to lesser extent vines) and possibly animal husbandry. The field of Supetarska Draga in its northern (north-west) part ends at the sea coast. The coast is of accumulative type, formed by drowning of valleys formed in soft rock. In layman words this means that the coast and the sea merge in such a gentle manner that the sea is shallow (in terms of couple of centimeters) for

tens of meters off the coast towards the sea. Tidal zone is thus wide and spacious, covering complete end of the bay, approximately a fifth of it. Taking in account the steady rise of the sea level (Fouache et al. 2000, 2005a, 2005b, Benac et al. 2004,) it certainly has been covering even larger area as the line of permanent deeper sea was further away from the coast. The stream (mentioned earlier as a demarcation of monastery's estate) runs towards the sea more or less through the center of the valley and the coast. Both of these characteristics enable the formation or construction of a saltern.



Figure 5.30: Roman period spolia underneath one of the columns of the church of St. Peter (Archives of Conservation department in Rijeka, 1971)



Figure 5.31: Roman period wall

in one of the side aps (Archives of Conservation department in Rijeka, 1978)



Figure 5.32: Roman period wall in one of the side aps (Archives of Conservation department in Rijeka, 1978)





Figure 5.33: Northern wall of the church of St. Peter, older wall is visible protruding in the lower part (Archives of Conservation department in Rijeka, 1974)

The coast naturally provides the basic requirements for a saltern: shallow sea covering great area, gentle, almost flat slope and the vicinity of fresh water. The stream washes generous amounts of sediments at the coast of the bay, the area of the saltern. This could provide the reason why no finds of movable kind were found during any of the surveys. Even the channels between pools of the saltern, that are depicted in the cadaster (both contemporary and historic) are, impossible to find, now after 100 years that the saltern stopped with production. Therefore, there are no finds giving direct evidence of the saltern being in use already during the Roman time. Building the narrative about the territory the saltern is a part of and which it co-created provides enough circumstantial evidence to conclude that it was most likely created at least at the same time as the rural complex.

This line of evidence also provides insight into evolution of the historic landscape of this part of the island. The monks that arrived here in 11<sup>th</sup> century did not just receive the church and its estate, they received also the economy of its estate. This means that the landscape was already prepared for the activities that the monks proceeded to conduct. The large Roman rural estate had influenced the economy of the territory of today's Supetarska Draga. At least this is the case for the fertile field in the valley.

What exactly does this mean in terms of demography, it is not clear. But, as the monks needed their serfs for various agricultural activities, so did the owners of the villa. There could have been a hiatus in settlement of the village but it is a topic to be researched.

#### 5.2.12 Landscape unit Rab 1

Landscape unit Rab 1 presents the landscape that evolved in the immediate vicinity of the only urban settlement on the island. The streams that supplied the town with fresh water are isolated to show the position of the only found piece of Roman period aqueduct enabling the town's fresh water supply (Figure 5.35, in blue). The LU is most conspicuous on the historic aerial imagery. The disposition of the terracing of the hills surrounding shows orderly approach to landscape exploitation. The terraces bear almost orthogonal disposition which suggests possible Roman origin. The two hills in the immediate vicinity to the town, Kokošica Vela i Mala are the location of the spring and the find of the aqueduct. The network of paths leading to the town is presented in yellow.

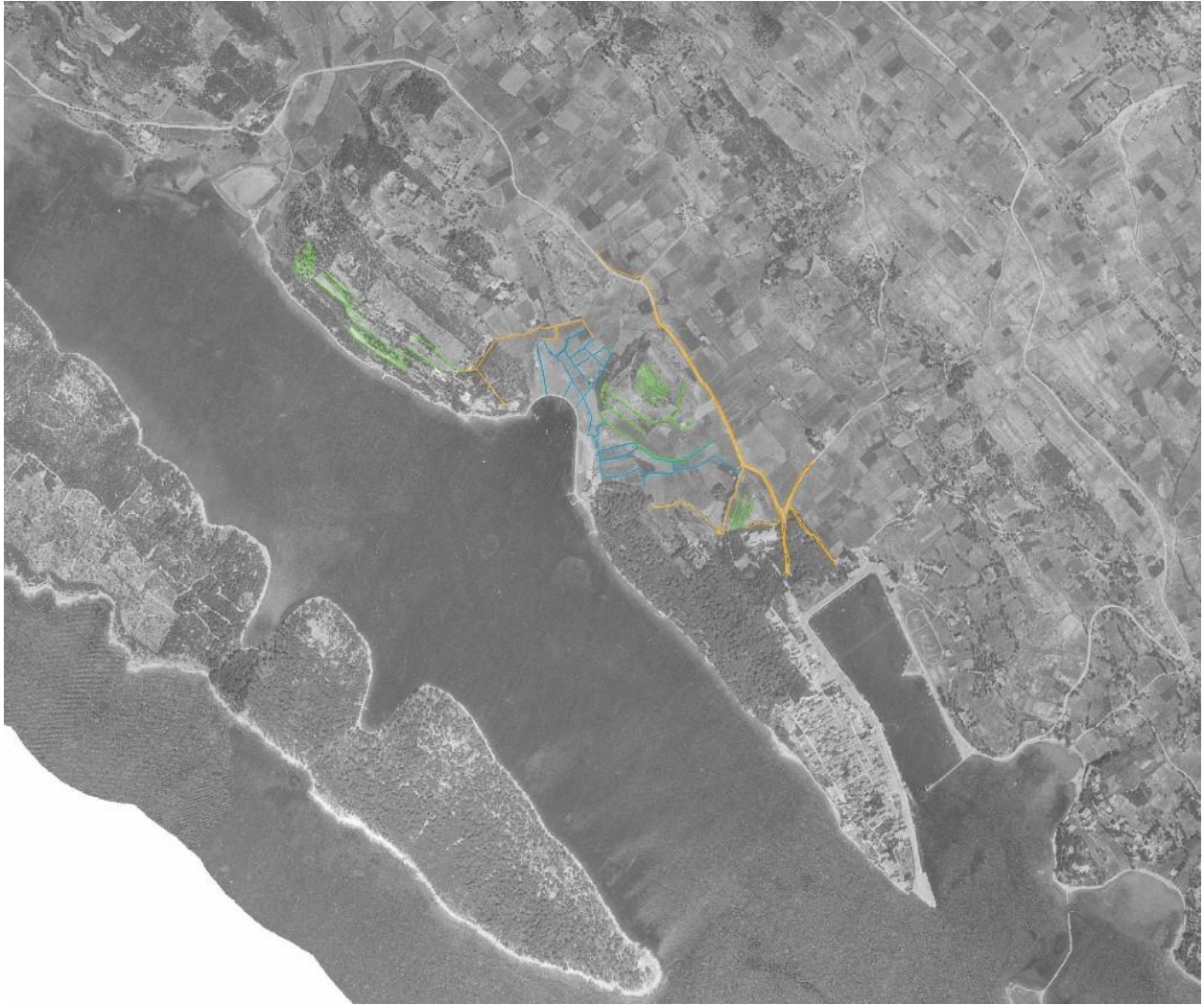


Figure 5.35: LU Rab 1 presented on DOF 1968

### 5.2.13 Landscape unit Frkanj 1

Landscape unit Frkanj 1 presents land use and evolution of landscape from silvi-pasture to degraded forests into macchia and then restoration of forests. The most southern tip of peninsula Kalifront, called Frkanj is a thin ridge, a piece of land protruding in the sea, parallel to the similar ridge on which the town of Rab is situated. It is the ending of one of the ridges of the island. Today this part of Kalifornt is forested. Examining the historical cadasters and comparing it to historic aerial imagery it is clear that this landscape

changed from cultivated land into silvi-pasture and then to the forest. In its western part it borders with the tick forest of Dundo. This border changed from 1820s (Figure 5.36 in Purple) when the survey for the cadaster was made till 1941 and 1968 (Figure 5.36 in turquoise) when the aerial imagery was made. The pastures, or most likely silvi-pastures (the difference between the two is not clear when only looking at the map) protruded deeper into the forest in the 19<sup>th</sup> century. At the beginning of the 20<sup>th</sup> century the state decided to reforest the area. The forest advanced which is the reason the aerial imagery of the 1940s and 1960s show the border between pasture and forest to be deeper into the pasture territory. Historic aerial imagery also reveals features that are likely (only some of them are preserved and could have been controlled in the field) clearances. This suggests that the area has been used as cultivated land.

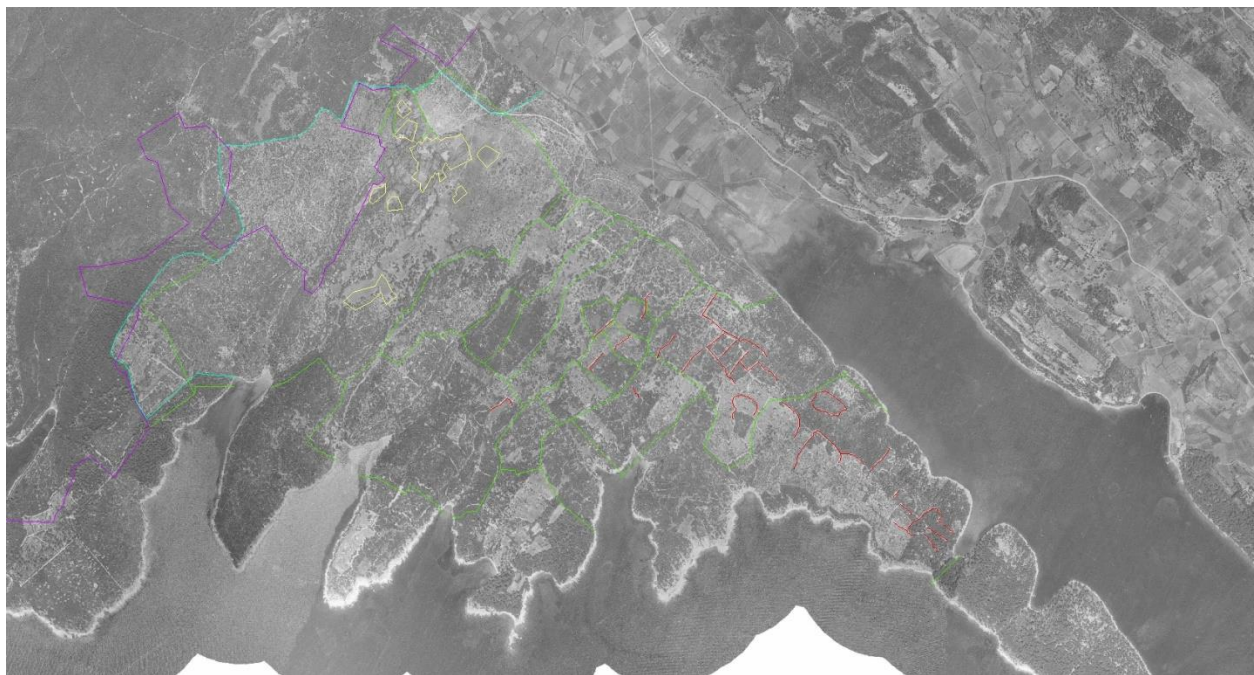


Figure 5.36: LU Frkanj 1 layered over DOF 1968. The border of the ancient forest is in purple, cultivated land in 19<sup>th</sup> century is in yellow, parcels of pastures belonging to different families are in green, clearance cairns are in red.



Figure 5.37: LU Frkanj 1 layered over historic cadaster. The extent of the ancient forest is seen in the upper right.

The features can be grouped into three types: irregularly shaped clearances of smaller size (Figure 5.37 in red), longitudinal features that are not forming a straight line but could have been dry walls and clearances (Figure 5.37 in green) and thin features that present the remains of field boundaries (Figure 5.37 in yellow). The last type also encompasses a hamlet situated within the area. The toponymy of the area suggests clearances: Seraje, Plogar, Ograde (Šimunović 2008). Observing the disposition of the features it can be concluded that the irregularly shaped and of smaller size features predate the longitudinal ones. In the western part of the area, within the pasture the longitudinal features shape a parcel larger the enclosures surrounding it. This micro-position is also a position of the site of church and possible monastery of unknown titular (possibly St. Damian). The clearance enclosed with longitudinal features could present the estate belonging to the church/monastery.

#### 5.2.14 Landscape units Lopar 1, Lopar 2 and Lopar 3

Landscape units Lopar 1, Lopar 2 and Lopar 3 will be analyzed combined because of their shared characteristics, vicinity and probable contemporality.

Landscape unit Lopar 1 represents a settlement situated on top of a hill, conveniently positioned just above the field of Lopar. This settlement by its size can be categorized as a hamlet. Small houses were built on top of the hill, vegetable gardens are in the immediate vicinity, mainly having a small yard in between the house and the garden. Further away, following the slope of the hill is other agriculture land designated for cultivating grains and legumes (in the 19<sup>th</sup> century cadaster considered as 2<sup>nd</sup> class grains: rye, millet, barley, corn and legumes without specifying which) and vineyards. The slopes of the hill are terraced, in the eastern part steeper and denser towards the top of the hill but gentler at the foot of the hill, and steep and dense in the north east. The spatial distribution of buildings, gardens and terraced fields is evolving centripetally from top of the hill towards its foot. Parcels, as drawn in the cadastral maps of the 19<sup>th</sup> century, are of irregular shape, originating in a manner which is respecting the relief that the parcels are dividing. This approach to shaping the natural landscape in order to adjust it to people's needs is in direct opposition to Roman approach, where the natural landscape and its relief is denied and not respected.

Pastures are positioned off-site in the north, bordering with cultivated fields and communicating with the focal point through a network of paths.

Archaeological inventory for this area is sparse. In the immediate vicinity is a site interpreted as possible prehistoric hillfort settlement with a ruined medieval church in its

central part (Batović 1987, Lipovac Vrkljan et al. 2014, Rizner 2012). The site has only been surveyed and without further research more detailed interpretation can not be given.

The position is flat plane with good control of the area.

Toponymy of the micro-area is predominantly Slavic: Rupa, Nevaljica, Stanina, Paparić, Zadruga, Kod Skofa, Scocigora, indicating high medieval origin.

This hamlet is connected by a network of routes with other two hamlets situated on top of other two hills in the immediate vicinity.



Figure 5.38: Centripetal development of the landscape, visible on historic cadaster LU Lopar 1.



Figure 5.39: LU Lopar 1 (in the center) depicted on DOF 1968 in relation to LU Lopar 2 (in the upper right) and Lopar 3 (in the lower left). Together they present the development of medieval Lopar.

Landscape unit Lopar 2 is a hamlet with identical disposition of features as the landscape unit Lopar 1. It is positioned on top of the hill in the east, south east direction. Small houses are scattered over the top plane, with gardens immediately adhering to them. Agriculture land for cultivating grains, legumes and vines is gradually evolving from the top, centripetally developing over the terrain and thus covering the hill in terraced fields. Pastures are positioned in the north but also in the area west and south west which is between Lu 1 and LU 2.

On the historic cadaster the position is labeled Ivanic, confirming the Slavic date of toponyms in the immediate vicinity.

LU Lopar 2 has a much better connection with the sea in Lopar's eastern bay and is well connected to LU Lopar 1 and 3.





Figure 5.40: LU Lopar 2 presented on historic cadaster of the 19<sup>th</sup> century. Notice the place-name Ivanic.

Landscape unit Lopar 3 is positioned in the west from LU Lopar 1, in the same chain of hills as both of previously mentioned LU Lopar 1 and 2. This hamlet, the smallest in its cluster, is positioned on top of the hill and features gardens and houses in the near-site and fields for grains, legumes and vines following the slope of the hill. Parcels are irregular and formed in the manner that respects the relief. In these characteristics, this LU is not different from the other two previously mentioned. It is well connected with other hamlets through a network of paths, and is also the nearest one to the church of St. Mary the Virgin. The earliest mention of this church is in the founding chart of the monastery of St.

Peter in Supetarska Draga in 1059 and later in 1334 (Turk, Turk Šarić 2010). It belonged to the monastery of St. Peter. Village's cemetery is adjacent to the church, in its backyard.

These three hamlets form a dispersed settlement and also share the same characteristic influence on the evolution of historic landscape. By size just larger than a homestead, they were most likely serf settlements. Occupying top of the hill area just above the field of the highest quality soil. It is important to mention, that these hills are, if observed absolutely, quite low, ranging from 80 to 90 meters above the sea level. But in regard to the field above which they are situated, which is just a couple of meters above the sea level, the difference is drastic and significant.



Figure 5.41: LU Lopar 3 presented on historic cadaster of the 19<sup>th</sup> century.



Figure 5.42: LU Lopar 1, 2 and 3 on an areal photography from the 1980s by an unknown author. The picture is taken from the west, presenting the main field, landscape units and its relation to one another and to the field and forested pastures in the north.

The hills gently slope towards the field in the south but are somewhat steeper in the areas between each of them. The slopes are terraced, and were considered and used as second class soil. The first class soil was the field (as noted in the historic cadaster from the 1824). The position has multiple positive qualities: 1) good control of the field and the hinterland of peninsula where the pastures are; 2) the settlement and its on-site elements (gardens, yards, lower quality fields) do not encroach high quality soil; 3) equal altitude enables fluent communication among each other.

Organic formation of parcels that respect the relief of the hill and using each plot of land in the most useful possible manner contributed to the centripetal evolution of the landscape. Terracing the land enabled better use of the soil, not only it flattens the plot in

order to facilitate the cultivation, but it also stops erosion and enables better water catchment and management. In an area such as Lopar, where the sediments are flysch / loess which is extremely prone to erosion terracing of the land that is meant for cultivation is more than useful, it is mandatory. In this case terracing also enabled thorough land use, without white spots.

The disposition of the rural settlement was to some extent preserved until the 20<sup>th</sup> century and is documented in the archival photography of the Conservation department of Rijeka (Figures 5.43 and 5.44).



Figure 5.43 and 5.44: Disposition of the rural settlement – narrow paths connecting various features (Archive of the Conservation department in Rijeka, 1972)



Figure 5.45: Abandoned traditional rural house within the hamlet of LU 1. Ground level is reserved for economic purposes (keeping livestock, tools, supplies), first floor is for living purposes (often including several generations of one family) (Archive of the Conservation department in Rijeka, 1972)



Figure 5.46: Disposition of the rural settlement (LU Lopar 2). Houses with gardens is at the top of the hill, terraced arable land organically evolves respecting the relief, communication is organically woven into the landscape (Archives of the Conservation department in Rijeka, 1972)



Figure 5.47: Relation between the main field of Lopar and the hamlet above it (LU 1). Buildings at the foot of the hill are modern addition, encroaching the terraced land previously cultivated (Archives of the Conservation department in Rijeka)



Figure 5.48: Photography taken from the hill above village Lopar, in the south, presenting in the back terraced slopes adjacent to LU 2 (Photo archive of Matica Hrvatska, branch Rab, author: M. Marojevic, 1930s)

What were the dynamics that have influenced the evolution of the historic landscape in this particular area? Obviously, the terrain itself was the foundation and its specific characteristics were one of the forces involved in the shaping of the landscape. As was stated previously, forming parcels and adding features required for the use of the land (paths, drywalls, demarcations, terraces) was done in respect of the relief which resulted in centripetally evolved landscape. Such an approach is in contrast to Roman approach (which is negating the relief and imposing its own value) but is in comply with prehistoric and medieval approaches to shaping landscape where the gradual encroachment results in organically developed landscape which respects the relief. Recent (19<sup>th</sup> to 20<sup>th</sup> century) or modern approach also tend to negate the relief. Archaeological inventory is sparse and inconclusive speaking in favor of both prehistoric and medieval origin, positions of the LUs are either overbuilt or enclosed with a fence (hence impossible to survey). Toponymy is clearly Slavic indicating high medieval origin. The hamlets are mapped in the historic cadaster of the 19<sup>th</sup> century. These cadastral maps fairly accurately present the situation from 500 years before the mapping occurred, which would be in the first half of the 14<sup>th</sup> century. settlements were homesteads and hamlets of serfs in the colonat system, in which landowner, usually some form of aristocracy, is contracting a colon to cultivate his land. In return the colon must provide portion of the harvest to the landowner. The cost of production was sometimes shared, or the landowner would provide tools, manure, or cover costs. The colon was not allowed to leave the land and lived on the land in a house he built himself on a position that was decided by the landowner. Thus, the ownership of the land and the system of power distribution were other dynamics that influenced the

evolution of the historic landscape. Colons and serfs received the land for cultivation and in return paid the required cost to the landlord but took no part in decision making process. As the colonat system was sort of employment arrangement, settlements (position of which was decided by the landowner) were positioned conveniently to avoid long commute to the work (land cultivation, animal husbandry, work in the saltern) so one of the focal points was most certainly the main field where the majority of work happened. Other focal point for these hamlets was probably of spiritual and social nature so it can be concluded it was the church of St. Mary the Virgin, at least before the parish church of St. John was built and the parish was formed. Historic sources mention the church of St. John for the first time in 1658 (Turk, Turk Šarić 2010).

Therefore, it can be concluded that the forces behind the evolution of the historic landscape for this part of village Lopar were political and economic circumstances of the time in the form of colonat system and its incidences, particularly the owner – holder relations in regard to land.

Generating elements in these LUs are hamlets around which the landscape is radially distributed. Stratigraphic relationships between the generating element (hamlet) and other elements of the landscape (gardens, terraced land for special crops, pastures, roads) are horizontal. But main generating element of the landscape of medieval Lopar is the main field. The hamlets and other elements are here because of the field – inhabitants serve to the field and need to, at the same time, fulfill their own need, therefore settlements are formed and gardens and terraces. Paths and roads are here to connect the micro generating elements (hamlets LU 1, 2, 3) with their own systems to the main system – one generated by the field of Lopar.



This is in direct opposition with the situation in the Roman times when there were most likely two generating elements: one in the north of the peninsula where a small settlement was situated with elaborate manufacturing (pottery production) in area Podšilo. And the other one was most likely again the field. Not many traces of this exists in the landscape, but archaeological evidence speaks of it. The area of Podšilo is well researched, including geophysical non-invasive research and excavations (Lipovac Vrkljan, Šiljeg 2010, Lipovac Vrkljan et al. 2016, Konestra et al. 2017, 2018, 2019). The area around the field is heavily over built but a detailed survey yielded sufficient results such as architectonic remains and other evidence of prolonged use of site. It can be concluded that a villa existed in the southern part of the edge of the field. Furthermore, the villa in bay Punta Zidine is in such position that it is hard to conclude to which system it belonged.

#### 5.2.15 Landscape unit Lopar 4

Landscape unit Lopar 4 is an example of how misleading remote sensing data can be. The LU is situated in the northernmost part of village Lopar. The area is in the vicinity of several Roman / Late Roman sites. The historic aerial imagery clearly shows orthogonally shaped terraces. There are no finds on site but remote data is highly suggestive of a Roman time landscape. Examining the site on the historic cadaster of the 19<sup>th</sup> century reveals no terracing or parceling. The land in the cadaster is pasture, with only a small parcel of arable land. This landscape unit presents historically cultivated land that is suggesting Roman use but when looked deeper in historic cartography, it is clear that Roman land division was not preserved.



Figure 5.49: Cultivated land on DOF 1968. Terraces and parcels are organized in a geometric order.

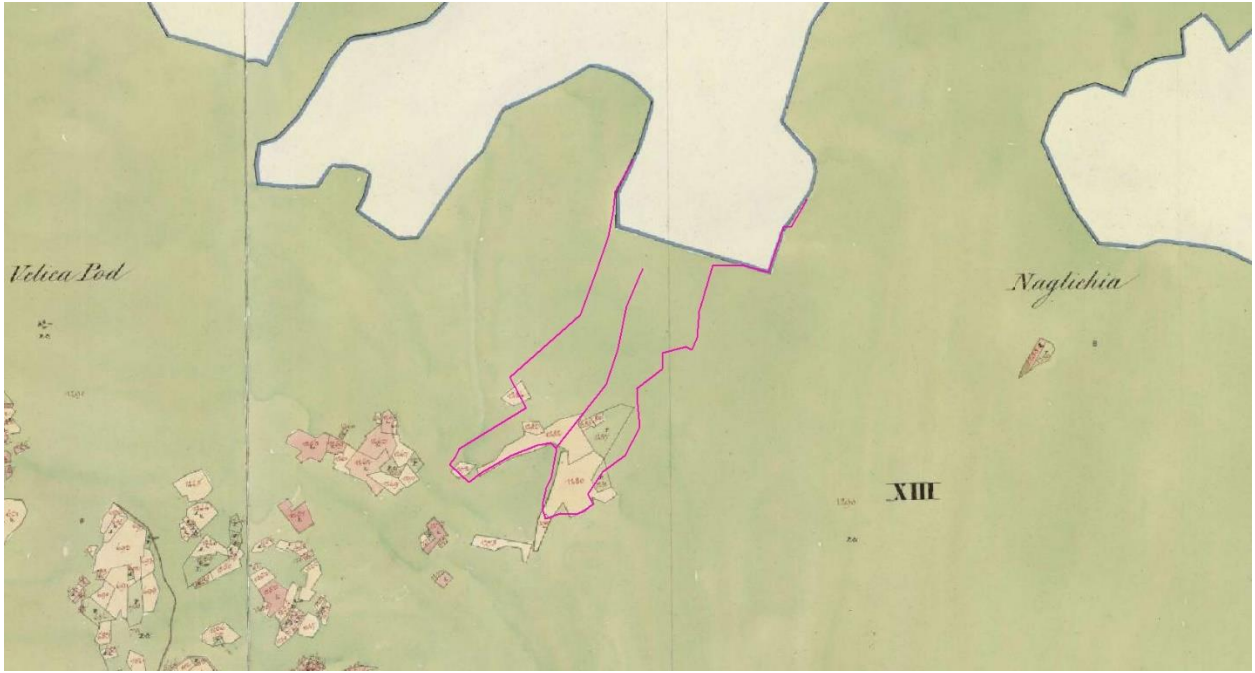


Figure 5.50: LU Lopar 4 drawn in ArcMap 10.6 and overlaid with historic cadaster. Only a small portion on land is cultivated.

### 5.2.16 Landscape unit Lopar 5

Landscape unit Lopar 5 presents a supposed position of a saltern. The suggestion is made based on landscape patterns. Historic aerial imagery revealed a possible site of a saltern in the village of Lopar. The natural conditions are present: shallow water and accumulative coast. The shape of the feature is conspicuous. Comparing it to the known salterns it can be concluded that the lines forming the shape are most likely channels and burrows encircling the basin and protecting it from the sea. When the brine is released in the basin the channel must be closed and the sea prevented from entering the basin otherwise the brine would dilute and salt would not precipitate.

The site is today destroyed, partly because of the forces of nature and the heavy erosion of the surrounding environment and partly because people started filling in the sea and building houses.

It is however interesting to find that salterns were most likely present in Lopar as well.



Figure 5.51: The supposed position of a saltern in green square.

#### 5.2.17 Landscape unit Lopar 6

Landscape unit Lopar 6 is presenting the remains of prehistoric landscape, remains of a hillfort. The landscape surrounding it did not change since the prehistoric times so these remains of the defense wall deteriorated by time, passing sheep, and not by human action. It is the evidence of continuous type of land use in the top of the hill area. It was used as pasture, without further divisions of land plots.



Figure 5.52: Lu Lopar 6, remains of prehistoric hillfort.

### 5.3 Conclusions

The early study of each of the singled-out landscape units corroborated preliminary hypothesis about the land use on the island. Prehistoric sites occupy higher ground – top of the hill area as presented through LU Barbat 5 and LU Lopar 6. Roman period sites mainly occupy coastal areas as it is the case of LU Barbat 2, LU Rab 1, or edges of fertile land like it is the case with LU Supetarska 4. Early medieval sites, such is LU Barbat 4 if it is a peasant settlement occupy higher ground, mid-hill. But monasteries dated to early middle ages do not follow this rule (LU Supetarska 4). Later medieval occupation stayed

mainly on the edges of arable land (LU Kampor 4), although sometimes these sites also occupied higher ground (LU Kampor 3).

The research most certainly confirmed the importance of uncultivated land and especially of animal husbandry.

Historic aerial imagery combined with historic cadaster or maps offer great opportunities for remote research. Modern constructions and changes to the landscape erase some of the conspicuous features but historic imagery holds the information and can be used to further the research.

## Chapter 6: Understanding the evolution of historic landscapes on island Rab

### 6.1 Quantifying the landscape

Quantitative data on size and productivity of agricultural land, uncultivated land and number of individuals needed to exploit them

Assessing the potential of a given area in terms of livelihood and subsistence of people living of it, is important part of analyzing historic landscapes. It gives the estimations of the amount of produce the land in question can give which is directly related to the number of individuals it can sustain, but also the number of individuals needed to maintain or cultivate that same amount of land and the possibility and amount of surplus.

The assessment of soil quality for agricultural land of the island has been made but it is concerned with contemporary situation and can only be taken into account with a generous amount of caution (Miloš and Bensa 2012, Tlo i biljka – digital pedological map

of Croatia). However, some historic data is available and can be used to calculate, with probabilistic value.

The oldest preserved cadastral maps for the island are those from the 19th century, the so-called Franciscan cadaster named after the emperor Franz I. The survey for the island was conducted between 1824 and 1828. The island has been divided into six cadastral municipalities (from south to north: Barbat, Banjol, Rab, Kampor, Supetarska Draga, Lopar). The scale in which the survey was mapped is 1:2880, and the principal units are *juger* and *klafter* for area and Venetian feet and *pollex* for length. Historic cadastral maps made after the surveys taken during the 1820s are using measuring units outside of the metric system. Converting these old measuring units into metric is always somewhat inaccurate as it includes several decimal numbers and multiple conversions. The exact value of both units changed many times in the past were not equal in different geographical areas. The basis is, as it is the case with Roman juger, a day of ploughing. Units that were used for the 19th century cadaster maps are called Lower Austrian and were standardized by emperor Joseph in 1785 (Herkov 1974, Treese 2018). One klafter equals 3,597 square meters, one juger equals 1600 klafters or 5755.2 square meters (about a half of a hectare).

Operative documents that follow the cadaster are unfortunately lost. Economic descriptions for all cadastral municipalities, except Barbat and Supetarska Draga, are preserved and through these some calculations and conclusions can be derived. Data for cadastral municipalities Barbat and Supetarska Draga was extracted from the plans. Cadastral maps and the accompanying documents are kept in the State archives in Split. Comprehensive inventory of cadastral maps and all the accompanying documents

(economic description, ownership disputes etc.) is published by the same institution in a book by Nataša Bajić-Žarko: Arhiv mapa za Istru i Dalmaciju, Katastar Dalmacije 1823. – 1975., inventar (Bajić-Žarko 2006). Economic description gives numbers of inhabitants (classifying them into children, religious people, housewives, elderly and incapable for work and, most important, work capable persons), cultivated and uncultivated land, pastures, forests, houses (with description of construction strategies and roof covering), industry (if present), domestic animals (counting each specie), routes, borders (relating to cadastral municipalities bordering the one in question), modes of land cultivation, description of topography and quality and type of produce. Yield estimations are given in order to calculate the tax and the cost of production. The economic descriptions were not made simultaneously with the survey but were made in 1840 – 41, about 12 to 13 years later. The land is divided in cultivated and uncultivated. Cultivated land was land used for growing mixed crops (barley, corn, rye, millet, wheat, sorghum and legumes), vineyards, mixed vineyards and olive grove parcels or vines with olive trees (vigne olivate)), olive groves and gardens. Uncultivated land was used as pastures, silvi – pastures and forests. Villages of the island have all had similar pattern of land use, with some exceptions (Table 1 for cultivated land and table 2 for uncultivated land).



CADASTRAL MUNICIPALITY	TYPE OF LAND USE quantity in hectares				
	MIXED CROPS	VINEYARDS	VINE/OLIVES	OLIVE GROVES	GARDENS
<b>BANJOL</b>	84.8	113.69	26.57	14.26	0.72
<b>KAMPOR</b>	156.27	173.04	2.14	11.26	0.99
<b>LOPAR</b>	153.95	72.5	0	0	2.16
<b>RAB</b>	138.89	151.71	35.78	32.69	2.52
<b>BARBAT</b>	64.78	234.8	5.2	7.49	0.34
<b>SUPETARSKA DRAGA</b>	256	1.46	0.14	5.02	1.8
<b>TOTAL</b>	842.18	747.2	69.83	70.72	8.53

Table 1: Use of cultivated land for each cadastral municipality, quantity given in hectares

<b>CADASTRAL MUNICIPALITY</b>	<b>PASTURES</b>	<b>SILVI-PASTURES</b>	<b>FORESTS</b>
<b>BANJOL</b>	153.34	0	6.5
<b>KAMPOR</b>	242.5	245.29	1352.7
<b>LOPAR</b>	2123.01	0	171.26
<b>RAB</b>	596.57	38.51	0
<b>BARBAT</b>	1273	0	0.09
<b>SUPETARSKA DRAGA</b>	461	0	386
<b>TOTAL ha</b>	4849.42	283.8	1916.55

Table 2: Use of uncultivated land for each cadastral municipality, quantity given in hectares

Cadastral municipality of Banjol had 240.04 ha of cultivated land, the highest percentage of which is covered in vineyards – 113.69 ha. The rest of it is covered in mixed crops 84.8 ha (barley, corn, sorghum, millet, wheat and legumes), olive groves 14.26 ha, mixed vines/olives parcels 26.57 ha and gardens 0.72 ha. Uncultivated land covered 159.84 ha, and it was mainly pastures – 153.34 ha with negligible amount of forest - 6.5 ha. At the time of listing (1840) there were all-together 468 inhabitants of which 292 work capable persons in 50 families.

Cadastral municipality of Kampur had 343.7 ha of cultivated land, the highest percentage of which was covered in vineyards – 173.04 ha. The rest of it was covered in mixed crops

(barley, corn, sorghum, millet, wheat and legumes) 156.27 ha, olive groves 11.26 ha, mixed vines/olives parcels 2.14 ha and gardens 0.99 ha. Uncultivated land covered 1840.49 ha, most of it forests – 1352.7 ha, and almost equal amount of silvi- pastures – 245.29 ha, and pastures – 242.5 ha. At the time of listing (1840) there were all-together 444 inhabitants of which 291 work capable persons in 53 families.

Cadastral municipality of Lopar had 228.61 ha of cultivated land, the highest percentage of which was covered in mixed crops (barley, corn, rye, millet, wheat and legumes)– 153.95 ha and some vineyards – 72.5 ha (it is stated in the economic description that vineyards were recently introduced and being developed). Uncultivated land covered 2294.27 ha, highest percentage of which were pastures – 2123.01 ha and forests – 171.26 ha. There were no mixed vines/olives parcels, olives or silvi – pastures. At the time of listing (1840) there were all-together 692 inhabitants of which 418 work capable persons in 105 families.

Cadastral municipality of Rab had 361.59 ha of cultivated land, the highest percentage of which was covered in vineyards – 151.71 ha. The rest of it was covered in mixed crops (barley, corn, sorghum, millet, wheat and legumes) 138.89 ha, olive groves 32.69 ha, mixed vines/olives parcels 35.78 ha and gardens 2.52 ha. Uncultivated land covered 625.08 ha, exclusively pastures 596.57 ha and silvi – pastures 38.51ha. Demographics for this cadastral municipality is somewhat different than for other municipalities which is a reflection of it bearing the main settlement on the island, political, economic, social and religious center. At the time of listing (1840) there were all-together 1543 inhabitants of which 286 work capable persons in 43 families that are involved in agriculture. 1125

inhabitants are persons involved in religious matters, civil servants and artisans. All of those integral part of a central settlement and a place of power.

As mentioned previously in the text, economic descriptions for cadastral municipality of Barbat and Supetarska Draga are not preserved. Measuring the surface of the land belonging to each cadastral municipality some conclusions can be made. The data extracted refers to the time of the survey which was in the 1820s. Although the historic cadaster uses different symbols and colors for different type of parcels, some differences are hard to decipher. Such is the difference between pastures and silvi – pastures. Both are depicted in strong green color and bare symbols of shrubs and trees. Exemplary parcels for each type of land use are listed in the preserved economic descriptions. Cross checking the information in the description with cadastral plan reveals that the same symbols and colors were used for both pastures and silvi-pastures.

Another difficulty with reading historic cadastral maps occurred when trying to measure the amount of land used for olive groves. The parcels bear beige color sometimes also a symbol for field – “A” as in Aecker (German for field) and a symbol for trees, olive trees. As the symbols are not uniform there is a possibility that some of the parcels were not recognized as olive groves. The loose relationship to strict and clear depicting of such parcels probably also signifies the secondary status of this kind of agriculture. Olives growing in a general type of field most likely represent olive groves that were also used for other cultures (vegetables or maybe other fruit like almonds).

Unfortunately, number of individuals involved in agriculture is unknown. And impossible to extract.

Cadastral municipality of Barbat had 305.12 ha of cultivated land, of which half was covered in vines – 234.8 ha. The rest of it was covered in mixed crops 64.78 ha, mixed vines-olives parcels 5.2 ha and gardens 0.34 ha. Uncultivated land covered 1273.09 ha, highest percentage of which were pastures 1273 ha, and the rest 0.09 ha was a forest.

Cadastral municipality of Supetarska Draga had 259.4 ha of cultivated land. It was predominantly covered in mixed crops and only a small fraction was covered in vines – 1.46 ha, mixed vines-olives parcels 0.14 ha ha, olives 5.02 ha and gardens 1.8 ha. Uncultivated land covered 847 ha, slightly higher percentage of which were pastures 461 ha, and the forest took 386 ha.

Analyzing this data could provide an insight into the subsistence and possibility of autarchy of the island.

The total amount of cultivate land is 1738.46 hectares and the total amount of uncultivated land is 7049.77 hectares, the numbers refer to all of the cadastral municipalities of the island. Uncultivated land comprises of pastures, silvi – pastures and forests. The amount of it is about four times as much as the amount of cultivated land. The ratio could be significant would it not be related to a marginal landscape, which by definition is needed in greater quantity to be considered economically profitable.

Cultivated land was used for mixed crops, vineyards, olive groves, mixed olive groves and vineyards and gardens. The percentage of each is presented in table 3. Parcels used for mixed crops are obviously the predominant type with 48 %, followed by parcels used for vineyards with 42 %. On the other hand, parcels used for olive groves and mixed olive groves and vineyards are both at 4 % of total amount of cultivated land.

TYPE OF LAND USE	PERCENTAGE OF CULTIVATED LAND
MIXED CROPS	48,44 %
VINE YARDS	42,98 %
VINE/OLIVES	4.017 %
OLIVE GROVES	4,068 %
GARDENS	0,491 %

Table 3: Percentages of various land use types for cultivated land for the whole island

Two values are conspicuous, number of parcels used for mixed crops in Supetarska Draga which is significantly higher than in any other cadastral municipality and number of parcels used for vineyards in Barbat, also significantly higher than in any other cadastral municipality (see Table 1). Total surface of parcels used for mixed crops of 854.69 ha can provide an approximation of agricultural productivity for the island which in favor can help with providing an approximation of *per capita* consumption of cereal. An approximation of number of inhabitants is needed not only to justify the *per capita* consumption but also to calculate the amount of possible surplus.

Number of inhabitants for each cadastral municipality at the time of making the economic descriptions and estimates is given as well as the number of families. Economic descriptions for villages (corresponding to cadastral municipalities) Banjol, Kapor and Lopar were preserved as well as those for the town of Rab which also encompasses its own surrounding land. Numbers of inhabitants for villages of Barbat and Supetarska Draga are not available. Archival data offer the missing numbers but not for the exact same time as it was listed for other villages. Archives of the municipality of Rab for year

1813 offer a total number of inhabitants of 3070. Almost equal number is given in the archives of the diocese of Rab by bishop Petar Galzigna in the year 1801. Comparing these numbers to the numbers available in the economic descriptions following the cadastral survey shows a rise of the number of inhabitants of about 50%, which is hardly possible for the period of 30 years. On the other hand, calculating the mean number of inhabitants of villages (of the available data from the economic descriptions) and not taking into account the number given for the cadastral municipality of Rab (as it is different in structure compared to villages) gives an approximation of 500 inhabitants in a village. Thus, each of villages of Barbat and Supetarska would have 500 inhabitants at the time of the survey which gives the approximation of total number of inhabitants of the island to 4150. According to a census transcribed in the Great chronicle of Kapor from 1638, the number of inhabitants on the island was 2740 (KK Lib III, 96).

As mentioned previously, the cultures grown on parcels for mixed crops were barley, corn, rye, millet, wheat, sorghum and legumes. Crop rotation was used as a mean of improving yield but the use of fallow is not clear. The economic descriptions provide approximations for yield for each type of crop in *Metzen*. This is a historic unit which, for this part of Europe and for the 19<sup>th</sup> century, can be converted as 61.489 liters, as it is a unit for volume (Gyllenbok 2018). 1 liter of wheat grain weighs 0.79 kilograms, of rye 0.71 kilograms, of millet 0.88 kilograms, of barley 0.81 kilograms, for corn 0.72 kilograms, which gives a mean of 0.78 kg. The mean of yield approximation for grains was 8.44 *Metzen* per *Juger*, which equals 518.97 liters of grain per *Juger* or 404.8 kilograms of grains per *Juger* which gives the number of about 704.35 kilograms of grain per hectare.

The approximation of yearly total yield of grains, knowing that the total surface of parcels for mixed crops is 842.18 ha, would be 593189.5 kilograms (593.2 tons).

Daily per capita consumption is estimated to 500 – 700 grams of cereals (Melanima 2009, Brogiolo 2015, 2016) which corresponds to yearly consumption of roughly 180 – 250 kilograms. Taking into account previously mentioned number of inhabitants of 4150, yearly need for cereals for the island would be between 747000 (7.47 tons) and 1037500 (1037.5 tons) kilograms. This clearly shows that the island did not provide enough grains to fulfill the need of its inhabitants. Modern estimates for crop yield for mixed crop are significantly higher, mean number being 2.88 tons per hectare which gives total yearly yield of cereals for the island 2425.5 tons (Kovačević, Rastija 2014). This amount would create not only the needed amount of agricultural product but also surplus.

The other branch of agriculture that dominated the land was viticulture. Vineyards took over 700 hectares of arable soil (Table 1). In the territory of the village Barbat viticulture was by far predominant culture, extending far away towards the south outside of the settlement.

Economic descriptions accompanying cadastral maps and surveys offer some insight into the extent of productivity of the said vineyards. One Juger could take between 4000 and 3200 vines, giving a mean of 3500 vines per Juger or about 6090 vines per hectare which gives an approximation of about 4 550 000 vines in the whole island. The economic descriptions offer the estimated yield per *Juger* from 12 to 20 *Emero* (1 *Emero* equals 56.589 liters) giving a mean of 16.25 *Emero* per Juger or 919.57 l per *Juger* or 1600 liters per hectare. Knowing that the island had 747.2 hectares of vineyards it gives the yield estimation of 1,195 520 liters of wine. This is at odds with modern yield estimations of 3



kilograms of grapes per vine (average) or 1.5 kilograms per vine for high quality wines. Estimations for wine yield out of that amount of grapes is 60 – 70 % (Mirošević, Karoglan Kontić 2008). The yield would be in this case estimated to 13 650 000 or 6 825 000 kilograms of grapes and the wine yield would be estimated to 9 555 000 (for the highest yield estimate) or 4 095 000 liters (for the lowest yield estimate).

Nonetheless, wine obviously provided fertile opportunity for trade and its importance is evidenced in the firm and serious control of it through the medieval statute of Rab (Margetić, Strčić 2004). Village Barbat was obviously the most important wine territory within the island, bearing almost one third of all the vineyards. Trading of vineyards is frequently documented in the medieval documents, of which most mention place-names within the territory of village Barbat.

Another source of highly need product for local use as well as for trade was salt coming from several salterns on the island. Creation of salterns was enabled by island's accumulative coasts formed by drowning of valleys formed in soft rocks (like the valleys of Kampor and Supetarska, bays of Lopar and St. Eufemia). Salt was produced by evaporation of the sea water in shallow basins using the energy of the sun. Largest and longest living saltern was the one in bay of Supetarska Draga, earliest mention of it was in the 1199 document confirming the foundation of St. Peter's monastery (Smičiklas 1904). The whole surface this saltern occupied was 11 hectares but the historic cadaster presents basins on around half of that surface (5,7 hectares). Other two known sites of salterns are both in village Kampor, bay of St. Eufemia, the large one in the bottom of the bay at the location known as Maran (covering area of 3 hectares) and the other one beside the Franciscan monastery of St. Bernardine at the location known as Frapka

(covering area of 0.82 hectare). The existence of both is documented in historical sources since the 13<sup>th</sup> century, without a clear information about when were the salterns created. In 1220 the bishop founded another saltern “in capito Comercarius” (Smičiklas 1904, A. capitula arbi, l. 43, p.7), presumably it is the location today known as Škver. Salterns, although not large in surface, required a significant amount of hard labor. The majority of work was conducted during the summer, in the open air, scraping the precipitated salt crystals. The work was so hard that the villagers who were included in the salt making process were dismissed from galiot duty and other work in the land, this was during the 17<sup>th</sup> century (A. notarili, IX 306, 307, 309).

Aside from the obvious produce gained from the agricultural land, the inhabitants of the island acquired produce from uncultivated land: pastures, forests and silvi-pastures. It is the Most fruitful activity was by far animal husbandry, predominantly sheep which was a primary activity from the prehistory onwards. Almost half of the whole territory of the island was land used as pastures. Rules on marking sheep and lambs were given in a document dated to the 13<sup>th</sup> century. In 1398 a commission have been founded for the purposes of pasture division (Acta communitatis, KK Lib. I, 645). Disputes over pasture division, use and management are common in the medieval documents of the commune. In an appeal of the commoners to the prince about the unfair division of pastures from 1450 (Acta communitatis, XVI, 143). Among other disputes, the commoners demand new division of pastures quoting lower quality and quantity of pastures given to them. Here they count 15 pastures of which three were given to the commoners to use and others were given to the aristocracy. About 30 000 sheep were on the island at the time, of which 4500 belonged to the commoners.

Sheep provided meat, milk, wool and skins. Wool was one of the most important trade produce for the commune during the Middle ages up to the beginning of 19<sup>th</sup> century. Every household was involved in wool production, including female monasteries. Wool spinning was mainly a winter activity. Main trading ground was Venice. Wool was also used as political leverage, as it is evidenced in historic documents. In 1443 the commune of Rab asks the permission of the doge in Venice for free trade of wool and other products (Archivio v. capituli Arbi, L. 44).

Pastures provided other produce besides the obvious sheep products. Such were wild grown plants that were not subject to taxing and that could have been gathered freely – edible plants like asparagus, common smilax or blackberries, or medicinal herbs like sage and winter savory. Other were likely picked in larger quantities and were therefore likely more prone to control but were nonetheless a product of uncultivated landscape. Such is lentiscus (*Pistacia lentiscus*), plant with leaves rich in tannins which were used in tanneries (Šilić 1990). Similar is myrtle (*Myrtus communis*) which also has leaves rich in tannins but also has edible berries and the branches were used for wickerwork. Juniper's berries (*Juniperus europeus*) are used as medicinal matter and the trees were used as poles in agriculture. Rush broom or weaver's broom (*Spartium junceum*) is another plant, a shrub, commonly native to lower parts of island's pastures and forest edges, was widely used for production of textiles. The plant was soaked in water (most often sea water) for some time, beaten and pressed after which the fibers are spinned into a yarn.

Forests, taking almost 2000 hectares of the island's territory, like pastures, come under the category of uncultivated land, *incultum*. Nonetheless, forests provided products and enabled some of the activities of the inhabitants. Obviously, the main product of forests

was wood. Aside from using wood as a primary source of heat needed for cooking and warming living spaces wood was used for making utility objects, building ships, producing lime, producing baked clay objects etc. Historical sources for the territory provide little data for production of small objects but a significant amount of data is available for wood cutting for lime kilns, ceramic objects kilns, and ship building. Good amount of information is provided about managing of forests, too.

In 1409 the commune decided to give its forests and pastures to Venice in exchange for a public servant (A. v. Capituli, L. 44, 4) but in 1441 the state decided to return said pastures and forests back to the commune of Rab (A. v. Capituli L. 18, Processo del capitol contro la communita, 6, 148). In 1487 the doge forbids burning of lime kilns in order to protect island's forests which were heavily cut for fueling lime kilns (A. Capituli, L. 44, A. Communitatis IV, 415, 12). Between 1516 and 1561 the doge repeatedly forbids cutting of forests naming multiple specific place-names of those forests (Processi varii apud comitem Arbensen, II, 348, 349). These are the documents that provide the information on forested parts of the island that are today or in the near past completely void of trees (such were parts of village Barbat in island southernmost tip and parts of Tinjarosa, central hilly part of the island, peninsula Sorinj). These documents also list specific kinds of trees that are forbidden to cut: fruit bearing trees, oaks, holm oaks, wild olive trees and wild pear trees.

Lime kilns were, according to the historic documents, burned in March. Before the burning the kiln had to be prepared: rocks gathered and placed inside the kiln and dried wood neatly placed in a such a manner to secure long, slow and strong burning. The wood used

for burning lime kilns was gathered the year before, as well as wood for other purposes, and was let to dry. Kilns were placed inside forests or on their edges, near to the fuel.

Ceramic kilns were placed following the same logic, near the source of the fuel – the forest. The position was conditioned by the source of the fuel not by the source of the material needed for production (Brogiolo 2015), although water impermeable flysch sediments of the micro location secured clay sources. In 1624 a certain Salustie Memente was granted rental rights by the monastery of St. Peter for the land in Gonar to build a ceramic kiln. The rent was due in roof tiles and bricks. He planned on growing fava beans, green peas, lettuce and kale along with producing bricks and roof tiles. The area of Gonar was forested, and as such is related to in the historic documents from 15<sup>th</sup> century onwards. This characteristic along with the availability of fresh water from the stream in the same location enabled the construction of the kiln and production of ceramic objects. It was this production that influenced the landscape of the micro-area, decreasing the volume of the forest.

The kiln in bay of Mahučina (Lipovac Vrkljan , Konestra 2015, Lipova Vrkljan et al. 2015) in the peninsula of Sorinj (part of village Lopar) had a less visible fuel source. The surrounding landscape today is rocky carst but from the medieval documents it is clear that the peninsula of Sorinj was forested (Processi varii apud comitem Arbensen, II, 348, 349) although it is not clear to what extent. The historic cadasters show only a small parcel of forest on the southern coast of the peninsula and a small patch of forest in the area Fruga but both are not close enough to the bay of Mahučina. Therefore, it can be concluded that during the Roman / Late Roman period as well as throughout medieval times the peninsula of Sorinj was more forested than it was in the 19<sup>th</sup> century.

Deforestation was most likely increased because of ceramic object production. Unfortunately, pollen analyses or any archaeobotanical analyses have not been made, neither for this micro location nor for other parts of the island. Such analyses would most certainly help with the research in past forest of the area.

The site of Podšilo featuring one excavated kiln and possibly more kilns is located in a surrounding of eroded soil and high shrub coverage, only sporadic trees (Lipovac Vrkljan and Šiljeg, 2010). But through the historic documents it can be concluded that the northern part of village Lopar, where the kiln is situated, have been forested. Multiple documents mention forests, illegal cutting of forests or clearing out forest to make space for houses. One document, a contract between Marin de Sebenico and Antonio Cortese from 1546, is about leasing 28 pigs for rearing in pastures in Lopar (A. M. Zizzo, 156, KK Lib II, 154). Pastures for pigs are forests, not rocky carst therefore this document is an evidence of forests within the territory of the village but not in the peninsula of Sorinj, which is at the time clearly identified and diversified from the village. Following this line of evidence, it can be concluded that even in the Late Roman period, when the kiln was constructed and used, the territory was forested to some extent that could have been exploited. Although, the small uninhabited island of St. Grgur, covered in forest in the 19<sup>th</sup> century as evidenced in the historic cadaster, is only one nautical mile across the sea from the site of Podšilo. The fuel for this kiln could have been gathered also on St. Grgur.

Besides the two known kiln sites, both dated to Late Roman period, there are three medieval documents about leasing the land to make a kiln for roof tiles and / or bricks. In 1452 one Cupparichio leases a pasture in Lopar on which he can make a pottery kiln and a lime kiln (A. T de Stantis, 401, KK Lib. I, 793), suggesting that the pasture in question

is likely situated on peninsula Sorinj, the only part of the village providing limestone. In 1551 and 1553 one Antonio Dokula made agreement with two different persons to make a pottery kiln in Lopar (A. F. Fabianich, 342, KK Lib. II, 163 and A. F. Facinia, V, 14, KK Lib. II, 164). The exact location of either is not clear.

As it is the case with the kiln in Gonar, the position of kilns in Lopar was conditioned by the source of the fuel not by the source of the material needed for production (Brogiolo 2015), although water impermeable flysch sediments of the micro location secured clay sources here as well.

There is no record historic, archaeological or ethnographic, of wood charcoal or (wood carbon) being produced on the island.

Forests, like pastures, offered other products, those that are often not as conspicuous and well covered with historic documents, often not the subject of contracts, doge's decrees etc. The forests of Rab, Mediterranean forests, offered oaks and holm oaks, strongly regulated as wood source but not as a source of tannin rich leaves. But the forests also offered fruit bearing strawberry tree (*Arbutus unedo*), wild pear, myrtle, mushroom and lentiscus. The fruit of the strawberry tree ripens when the wood cutting season is in progress, enabling gathering the fruit and the wood at the same time.

Agrosilvopastoral landscape offers the possibility of complementary activities throughout the year. The activities differ seasonally, by quantity and quality. Rural economy can not be observed without acknowledging its key factor seasonality (Rocek and Bar – Yosef 1998). Careful analyses of available historic documents and ethnographic research established a timetable of agro-silvo-pastoral activities. Table 4 lists monthly activities in

both cultivated and uncultivated land, agrarian and marginal landscape. Activities in the agrarian landscape are the most intense from April to December, though May, June, July, August and September are by far months in which activities are more diverse. Grains cultivated on the island are themselves complementary in the sense of rotation of crops. Wheat was a winter crop whereas millet and sorghum are crops preferring high temperatures and drier weather (Kovačević, Rastija 2014). In May the wheat is harvested and the land is prepared for sowing of millet and sorghum, and until September and October there is not much work with the crops. Throughout the spring, summer and most of the fall the vineyards demand a lot of activities. During the summer months, the salterns are in production. Pastoral activities are most intense during winter months, when agrarian activities are dormant. It is the same case with forest activities, wood cutting as well as lime kiln preparations, the most demanding part of the year is winter. Of course, some activities overlap but essentially activities in the agrarian landscape are not at their peak at the same time as it is the peak of the activities in the marginal landscape.

Thus, the integration of agrarian and marginal landscape in one system offers also seasonal and economic integration. And so, the approach to the research of landscape has to be holistic as it is a research of a system.



	<b>Agrarian landscape</b>	<b>Marginal landscape</b>
<b>January</b>		Lamb brought forth - near settlement Wood cut Preparing of lime kilns
<b>February</b>		Sheep/lambs near settlement Wood cut Preparing of lime kilns Start of lamb slaughter
<b>March</b>		Lamb slaughter Wood cut Lime kiln burned Start of sheep milking
<b>April</b>	Vineyard works Sowing of legumes	Sheep milking
<b>May</b>	Wheat harvest Sowing of millet and sorghum Vineyard works Salt production start	Sheep milking Shearing Lime ready to use
<b>June</b>	Vineyard works Salt in brine / start of the harvest	Shearing Sheep released to off settlement pastures
<b>July</b>	Vineyards works Salt harvest	
<b>August</b>	Vineyards works Salt harvest	
<b>September</b>	Grape harvest – wine production Salt ready to trade Millet and sorghum harvest	
<b>October</b>	Olive harvest start Sowing of wheat	Sheep back to near settlement
<b>November</b>	Olive harvest Wine refining	Acorn gathering
<b>December</b>	Olive harvest	Lamb brought forth – near settlement Wood cut

Table 4, Monthly activities in cultivated and uncultivated land

## 6.2 Major ownership changes

Different factors influenced the evolution of historic landscapes on Rab. Primary one is certainly the geographical context of Croatian Adriatic: complex relief forms, thin soil, sparse natural vegetation enhanced with negative human impact, high soil erosivity. Some of these features are shared among other Mediterranean regions but complex topography is specific for the region and is most certainly present on the island and it also most certainly affected human adaptation for the purposes of agricultural production. Secondary factors are without doubt historic circumstances. The position inside the Adriatic region, on its east coast, which is by itself the border area of Mediterranean, Central Europe and the Balkans. This borderline position contributed to the richness of the history; as major states and empires exchanged the rule over the territory. The only urban settlement on the island - the town of Rab, is one of the three similar towns in the Quarner bay region. These are Osor, Krk and Rab. They share the characteristic of being an island town, the origin in the Late Iron age with uninterrupted continuity and being the center of a diocese. This was a place of power, administrative and religious center. No other settlement on the island can be compared to the town. It was a center of a rural territory.

Another factor influencing the evolution of historic landscapes is land ownership and changes to it. As this study is focusing on later periods of prehistory and onward to the present times, the influence of hunter gatherers and early farmers on the landscape will be omitted. Hunter gatherers having a nomadic lifestyle and seasonal subsistence strategies also influenced landscape in a way, as presented in recent studies (Mlekuž

2003, Kaplan et al. 2016). Land ownership was not one of the factors of their influence. The early farmers made significantly larger impact on the landscape, but their presence on island Rab is sparse or deficiently researched. Nonetheless, extensive research in Dalmatian Neolithic and early Bronze age (Chapman et al. 1996) can provide us with data that can, to some extent, be applied to Rab. It was only at the dawn of Bronze age that true changes in the landscape could be observed (Chapman et al. 1996) with the construction of first clearance cairns and field boundaries along with drywall enclosures. It is at this time that the first extensions from domestic space into the landscape occurred. It is important to note that sheepherding was the dominant and the oldest factor influencing the change in the landscape, also resulting in degradation of forests (Glamuzina and Fuerst – Bjeliš 2015). This form of animal husbandry is closely related to enclosing of the land, at least in the small-scale form of sheepfolds (Andlar et al. 2018).

During the Late Iron age Liburnians and Romans were increasingly interacting across the Adriatic. In the late first century BC Liburnian territory was incorporated into the Roman state. The population of the Late Iron age was mainly concentrated in the hill-forts and enclosed settlements (Batović 1977, Batović 1982). It is also the time when the two principles of land ownership can be pinpointed: traditional communal and more recent private (Chapman et al. 1996). Roman domination saw the conversion of major hill-forts into *colonia* or *municipia*, the latter was the case of Liburnian Arba. Thus, the Romanization was a continuation of indigenous settlement pattern. The land use was not completely different, as the Romans used clearance cairns and building of linear drywall delimitations as a form of stating their presence in the territory through managing the landscape in the indigenous way (Chapman et al. 1996, Glamuzina and Fuerst – Bjeliš

2015). Building of these structures helped the Romans manage the relationships between the local tribes, as it can be seen in the example of nearby demarcation drywall above Jablanac bearing the inscription of legatus Dolabella (Rendić – Miočević 1969). Roman rule over the territory is easily visible in the land ownership management. The land ager was divided into three categories: state owned land, private land and pastures (with forests). State owned land was of the finest quality and was given to be managed to the local community (municipium). Private land was of lower quality. Pastures and forests were given to the indigenous community which meant that it was demarcated from the previously communal land (Suić 2003). In the second half of the first century AD new feature in the landscape appeared, a form of rural settlement – *villa rustica*. Villas were built on state owned land by the aristocracy, in the vicinity of towns. These compounds were focused on agriculture in the sense of cultivation, processing and storage of produce. It is commonly accepted that Roman presence in the region left three major features in the landscape roads, aqueducts and centuriated fields (Chapman et al.1996). The imposition of geometric order in the landscape is the common characteristic of the three.

Late Roman period is the period in which the colonat system was introduced (Marušić 1957). It is a system in which landowner, usually some form of aristocracy, is contracting a colon to cultivate his land. In return the colon must provide part of the harvest to the landowner. The cost of production was sometimes shared, other times the landowner would provide tools, manure, or cover costs. The colon was not allowed to leave the land and lived on the land in a house he built himself on a position that was decided by the landowner. The contract was signed for defined period of time, from 1 to 10 years. This

system was preserved on Rab until 1918 when it was abolished by the regent Aleksandar of the Kingdom of Serbs, Croats and Slovenes. The abolishment entered the Constitution in 1919, article 21. and it is known as Agrarian reform. The reform abolished any form of serfdom and feudal relationships, confiscated the land of major landowners and gave it to colons who were cultivating it. Every real-estate larger than 57 hectares was confiscated and divided and this included the commons, and larger forest complexes were given to the state (Šimončič – Bobetko 1989). The whole process took around 30 years.

Three main events mark the land ownership history in the region and in the island. The first is the shift from communal to privately owned sometime after the Late Bronze age, at the beginning of the early Iron Age. The second one is in the Late Iron Age / beginning of Roman domination in the area when the land was divided between state, commune, and private owners (to limited extent). The third is in 1919 – the Agrarian reform that seized private land within properties larger than 50 hectares, communal land and forests divided it between the colons and other families working on it.

### 6.3 Conclusions

The study of the evolution of historic landscape of island Rab is approached through analyses of conspicuous features, appropriately named landscape units. Each of these features represent diagnostic characteristic of the historic landscape and is consisted of a combination of natural and anthropogenic components. Relief, soil quality, availability of various resources and microclimate make natural components, whereas various types of sites, demarcations, land-use patterns and historic data make the anthropological components. Through the study of these units the stratigraphy is formed and observed.

The arable land of southern part of the island, villages of Banjol and Barbat, is in some parts a relict historic landscape formed during the Roman period and used unchanged as it was until 1960s. The specific patterns within this larger area combined with site distribution and place-names confirm this. Similar landscape patterns are found in North West part of the island, village of Kampor, supporting the hypothesis of predominantly coastal use of land during the Roman period.

Several landscape units, in Lopar, Kampor, Gonar, Barbat and Banjol, present top of the hill occupation that is of medieval origin. This is clearly presented with the dynamics of the parcel distribution and supported by archaeological finds and place-names. Most of these landscape units are preserved, although sometimes holding recent additions (new houses).

It was also concluded that the most characteristic feature of landscapes on Adriatic islands in general, not only of Rab, the prominent, long, linear dry walls are very recent (around 100 years old). But aside their age, this specific landscape unit presents one very important historic moment – Agrarian reform of 1919. It was the most important change in the economy of the island after the Roman times and also contributed largely to the evolution of historic landscapes. At this moment, the vast area of what was once common pastures or large privately-owned pastures were simply divided within the families that tended and used this land. Following the logic of islands specific kind of transhumance animal husbandry this division covered thin strips of land stretching over the hills.

Rab's historic landscapes evolved inherently rural. And even though it may seem that the land-use did not change much for centuries or sometimes millennia it is in these patterns that the sequence reveals and gives the needed time-depth. The historic circumstances

commanded the position of settlements and sometimes the connection network. The production sites commanded the land-use patterns: forests surrounded the limekilns and pottery kilns. When the pottery production was abandoned (as is the case in Lopar and Gonar) the forests were not needed as much and land was used for either pastures or agriculture, or sometimes both.

Preliminary study of island's historic landscapes, from point of view of archaeology revealed that sites dated to different periods of history and prehistory occupy different regions of the island according to its geomorphology. Island's specific terrain morphology consisted of two main anticlines, divided with large fields of Quaternary deposits that provide excellent arable land, gentle sloping southern coast in gravel – sand deposits and rocky karst of the top of the hill region provides space for diversity of activities and economic opportunities. Main subsistence strategies from Bronze age onwards were rural: agriculture and animal husbandry. These were also main economic branches, with, to some extent mining in the form of salt harvesting and rock mining.

It was noted that prehistoric sites dated to Late Bronze age and Iron age occupy the top-of-the-hill region of Kamenjak ridge. These are hillforts that include living spaces. Their living space extended to the environment in the immediate vicinity. The main building material was rock, because it is present in abundance. The main subsistence strategies were animal husbandry agriculture in the Bronze age. Unfortunately, no specific paleobotanic, antracologic and zooarchaeological data for local sites exist. Only prehistoric sites that were excavated were either older than this research extends to or were excavated during the time when such sampling has not been done. There is however data from other sites in the region, namely Dalmatia so some conclusions

pertinent to the study of historic landscapes can be drawn. Agriculture was present in some form and it included growing main cereals. It is inconclusive where exactly were cereals grown. Animal husbandry was most likely stronger economic branch. Main species were sheep and goat. The pastures were placed in the vicinity of hillforts, being and extension of living space (Chapman et al. 1996). Land ownership was common – the community owned the land, there was no privately-owned land. As the land was not divided, because there was no need for division, the pastures were in some form of open-fields, although shepherding as primary form of animal husbandry, involved small scale enclosures. Sites dated to this time are hillfort Košljen, burial tumulus and hillfort Gromačica and hillfort Pečina which most of all depicts the extension of the living space into the surrounding landscape. This site is consisted of the main plateau surrounded by drywall defensive wall and wider plateau partially surrounding the main one, slightly lower, on which daily activities took place.

During the Late Iron age some major changes happened. Class stratification of the society started to develop which influenced ownership changes. Privately owned land was introduced. The economy further developed, and paleobotanic and antracologic data shows a steady cultivation of olives and vines (Chapman et al. 1996), along with cereals and animal husbandry. Animal husbandry was still a major economic branch, with pastures positioned in the top-of-the-hill region of Kamenjak ridge, in the communal land. As the land ownership pattern changed it influenced the landscape in form of demarcation. During this time oppidum Arba was formed and became center of power and economy of the island. Its position on the coast, between two well protected bays (its own harbor and Bay of St. Eufemia), on a steep sloped hill with cliffs on the west side,



easy to defend yet accessible. It was also positioned on the major sea routes going from southern Dalmatia to the north of Adriatic.

As the Roman domination in this part of the Mediterranean arrived and strengthened, the settlement pattern changed and the treatment and view of the landscape changed as well. Arba was still a center of power and economy but as a way of generating surplus villas were formed along the coastal areas of the island. In the southern part this meant the emphasize on agriculture, with sites positioned within the agricultural land, but not within pastures. As the high-quality arable land was belonging to the state, the pastures were left to the indigenous community to manage them. The limit between pastures and agriculture was natural: morphology and geological foundation dictated the position of each, pastures covering rocky karstic areas and arable land occupying large fields in flysch or sand – gravel; but it was also manmade in form of drywall, emphasizing the difference in land use. Other than sporadic small, movable finds (pottery sherds, commonly amphora) there are no Roman / Late Roman finds in the up the hill are (where the pastures are).

In the southern part of the island this is notable in geometric layout of the fields and surrounding terraces, orderly placed parcels to provide better organization of land management. The soil of the fields in this part of the island is sand – gravel and the fields face south, south – east in a gentle slope making this part of the island particularly suitable for viticulture. The northern part of the island though, has a somewhat different disposition. This part, today the core of village Lopar, is a sort of peninsula within the island and is thus more sea oriented than some other areas. Sites are mainly positioned along the coast of, what is today, village Lopar going from western side with a villa on

Punta Zidine and circling around the coast in north – east direction. What differs this area from other is its geological foundation which is extremely erosion prone, flysch and loess. This influenced: 1. Economy, 2. Post-use site formation. The influence on economy was twofold: in the field area the particular sediment provided high quality of arable land, along with richness in water; in the more coastal part of the norther bays it provided enough material to form a manufacturing ground for ceramic furnaces. As the excavations and non-invasive research reveal, this is site was most likely a small settlement. The same sediment that influenced the formation of the settlement also influenced the almost complete disappearance of the traces of land use in the landscape. The erosion in this area is so high that changes in the landscape can be observed during year to year survey. Nonetheless, there were some traces left in the place-names of the site – Bili grad (White town). Possibly describing still visible architectural remains, now buried below the sediments. This place-name also indicates a sort of hiatus in the population of this part of the island, it is of clear Slavic origin which for the island is typical only during the high Middle ages. Therefore, it can be concluded that the population that inhabited this part of the island sometimes probably around 13th to 14th century (around the time of the founding of the parish church of St. Mary) found remains of the Late Roman settlement in Bili Grad. Even though Roman influence on the landscape must have been strong, with the orthogonal imposition of land parceling no trace of this is found on historic cartography, historic cadaster or older aerial photography. Maybe, some further site-specific research will change this. This hiatus is visible also in the other part of the peninsula. Roman/Late Roman period sites are scattered along the rim of the field but none of the place-name reveal continuity in population. Place-names are exclusively of

developed medieval origin. This is also visible in the landscape. Sites along the rims of the field which is low in the sense of geomorphology were abandoned. Later more recent sites of medieval times occupied top-of-the-hill areas. This is visible in landscape unit Lopar 1, which was most likely a position of one of the earliest medieval hamlets in what is today Lopar. The organic flow of parcels spreading from the top of the hill in centripetal style towards the foot of the hill suggests this. Organically developed terracing along eastern and western sides of the said hill is another argument for this. Other hamlets of what is today village were also placed on tops of the hills, these hills spreading above the field in the flysch sediments. The mode of settling on the hill is the same as described above. Organically following the morphology of the terrain, forming terraces with risers when needed. These medieval hamlets, settlements, are in direct opposition to prehistoric ones which are positioned on the other side of the field in the karstic part of the island. These too have a good visible control of the field, but much better control of the sea routes coming from the south (Dalmatia, island Pag, Iader) or north and north west (islands Cres and Krk, Tarsatica). Prehistoric sites are clearly positioned so that they communicate with pastures, and large surface of arable land – the field is close but not in the nearest vicinity. It can, thus be concluded that agriculture was displayed mainly through cultivation of enclosed dolinas in the top-of-the-hill area. As opposed to later periods, when the focus dispersed on both husbandry and agriculture in the main large fields of the island.

## Chapter 7: Participative approach to research and protection of historic landscapes

### 7.1 Introduction

This chapter covers the research approach to historic landscape studies through the lens of archaeology and personal experience in conservation of heritage. Historic landscapes are a topic of research for many different fields: archaeologists, historians, geographers, architects and landscape architects, ethnographers, biologist and ecologists as well as agronomists. The focus of each of these fields is usually the same geographical area but semantically it is cultural landscape, historic landscape or significant landscape.

As archaeology is in the past couple of decades more and more so considered a social science, not only humanities science, as it once was, and historic landscapes are a topic often tackled by archaeologists, participative research is observed. Legislative possibilities for participative research in archaeology are presented, as well as participative action for landscape studies.

Following aforementioned a proposition of participative protection is suggested through reinstatement of the commons.

### 7.2 Legislative background for participative research approach in Croatia

When considering archaeological research in Croatia two sets of matters need to be taken in account. The first set relates to the entity planning on conducting research (archaeologists) and the state's body issuing a permit for research (conservation

departments). The second set relates to legislation, national: Law on the protection of cultural heritage and the Rulebook on archaeological research; and international: conventions (Valette and Florence conventions) and frameworks (Faro convention) that are ratified by the Croatian government.

### 7.2.1 National heritage legislation

Matters of heritage protection, safeguarding and preservation in Croatia are governed by the Law on the Protection and Preservation of Cultural Heritage ( Zakon o zaštiti i očuvanju kulturnih dobara NN 69/99, 151/03, 157/03, 100/04, 87/09, 88/10, 61/11, 25/12, 136/12, 157/13, 152/14, 98/15, 4/17, 90/18) . The law was brought into action in 1999, until then in action was a law inherited from the former Yugoslavia dated to 1969. The former state has its own history of heritage laws starting from the first years of its existence. Current Croatian Law on the Protection and Preservation of Cultural Heritage since 1999 has seen 13 changes – mainly minor, pertaining mainly to taxation and harmonization with other laws like EU legislation, civil engineering, construction and similar. This Law defines heritage, as in listing categories of heritage or monuments: movable, immovable, intangible, and in regard of archaeological heritage regulates the legal protection of archaeological sites and zones, as well as the obligation to adopt measures of protection for each building or any other project in the area of the site and/or zone. Furthermore, this law regulates the sale of cultural property (right of first refusal), as well as all other issues concerning actions that may adversely affect archaeological sites and artifact. Archaeological excavations carried out at the construction sites of various facilities are financial obligations of investors. It also defines the objectives of

cultural heritage protection, among others these are: safeguarding the heritage for future generations, taking measures for regular maintenance of heritage, establishing conditions for heritage to serve the need of individual and general interest, and research. The definition of archaeology is not given in the Law as it is given in international declarations that are ratified by Croatia (primarily European Convention on the Protection of the Archaeological Heritage, London 1969 (Council of Europe 1969)). Thus, the Law considers archaeology, or better said archaeological heritage, self-understood.

Landscapes are listed as a type of cultural heritage in the aforementioned Law on the Protection and Preservation of Cultural Heritage, and are furthermore divided into three categories: cultural, historic and other (it is not clear what exactly this category encompasses).

Cultural heritage in Croatia needs to be listed (or scheduled) in order to gain full legal protection. This is the case with all categories of heritage including archaeological heritage, but in compliance with the Valletta convention, archaeological heritage does not need to be listed in order to enjoy full legal protection. This fact, maybe unimportant for the participatory research in archaeology is needed to better understand the presentations of case studies further in the text. At this moment 942 archaeological sites were listed and 12 cultural landscapes (combined cultural and historic) . These numbers present the development phase of the concept of landscapes as cultural heritage among Croatian conservationists. The great discrepancy in listed sites for these two types of heritage is somewhat diminished by the fact that some of the cultural landscapes were listed as ethnographic zones during the 1960s and 1970s. It was a very forward thinking by only a couple of conservationists, among them leading was, most certainly ethnologist

Beata Gothardy Pavlovsky from the former Regional conservation institution (now Conservation department in Rijeka). She proved herself as forward thinker including the cultural landscapes surrounding rural settlements surrounding them into the document of listing it as heritage, as she realized the importance of landscape in the rural life and was aware of settlement and the surroundings being one system. This way she listed around 30 cultural landscapes in the Primorje – Gorski kotar county.

Archaeological research is governed by the Rule-book on archaeological research (Pravilnik o arheološkim istraživanjima NN 102/10) which, first introduced in 2005 and revised in 2010), gives detailed rules on all aspects of archaeological research. Through 13 chapters the Rule-book defines general definitions; the procedure of issuing a permit; permitting of filming and photographing archaeological sites; manager and participants of the excavation; minimum methodological structure required to run an excavation; minimum methodological structure required to run an underwater excavation; post excavation conservation of the site; the obligation of handing in excavation report; minimum required contents of excavation report; minimum required contents of reports concerning survey and other types of (non-invasive) research; export of the field documentation; finds and samples, publishing of the results and requirements to be fulfilled before issuing a new permit.

The Rule-book prescribes in detail the obligations of researchers during and after the investigation, the obligation of the research results, as well as the obligations of conservation of materials and sites. In order to do this, it defines what exactly is under research (archaeological sites and zones – known and potential, land and underwater) and what exactly the research is: excavations (scientific, preventive, revision, test and

supervision), survey, nondestructive methods. Furthermore, it gives strict rules on the process of issuing a permit for archaeological research: who issues it, who can ask for one and be granted one, who can be a manager of a research project, what are this person's responsibilities, what are the technical requirements for conducting research, what are the requirements for documenting the research, publishing of the results etc. Requirements that need to be met in order to be permitted to manage an archaeological research are as follows: Croatian citizenship, university degree in archaeology, at least 2 years of experience in field research and experience in organizing a research.

Both these requirements and the responsibilities of a manager are listed in articles 7 and 8 of the Rule-book. Therefore, once permitted the manager is responsible for the quality of research, standards that are followed during the research, organizing the process of research, following the financial plan confirmed by the permit. The manager is also obliged to provide adequate equipment and instruments for spatial positioning and documenting the site, the excavation and finds. Standards followed during the research are, to be precise: following the stratigraphy, marking the finds, post excavation analyses, preventive conservation of the site. Participants of a research, i.e. who can participate in research is regulated in article 9 of the Rule-book, stating that both domestic and foreign physical and business persons can participate as granted by the permit for the research. Foreign persons need to fulfill other requirements (visas etc.) and the principle of reciprocity (equal number of domestic and foreign participants) needs to be met. The request to the issuing authority for participation of a person or persons is applied for by the manager of research. This is regulated through article 5 of the Rule-book, which specifies the mode of requesting a permit for archaeological research. This request needs



to specify, among other elements, the list of participants in the research. No further specification about participants or the nature of participation is given.

The rule on archaeological research is very detailed when describing a person suitable to be a manager of a research project (article 7 of the Rule-book). The rule also states the importance of their deputy who has to have the same level of expertise, diplomas and experience (article 10 of the Rule-book). But these are the only two persons involved in the research that are specifically named and for whom the exact requirements are given. Anybody else working in any kind of archaeological research is subject to managers' decisions and is her/his responsibility, according to the law these other persons need only to be listed. The list of the participants is required twice: when requesting a permit for the research and afterwards when handing out the report. Thus, Croatian heritage laws do not prohibit participation in archaeological research.

Research of cultural and historic landscapes is, on the other hand, managed solely through the Law on the Protection and Preservation of Cultural Heritage, Section 5, Article 44. A general article encompassing any type of heritage (excluding archaeological heritage). It states that research into heritage can be conducted by physical or legal person complying with special conditions given by the minister of culture and having an approval issued by the governing body (regional conservation department). Special condition given by the minister of culture in this case is a license to research, restore, conserve and maintain cultural heritage, given to persons with adequate education and experience. This license is furthermore governed by a special Rule-book (NN 134/15).

Rural landscapes are furthermore protected through Law on agricultural land (NN 20/18, 115/18). Landscapes of outstanding natural values are protected through Law on nature protection (NN80/13, 15/18, 14/19) as significant landscapes.

### 7.2.2 International legislation pertinent to participative action in heritage and its application in Croatia

Besides its national legislation on heritage Croatia has also ratified international conventions on heritage protection. Among these of interest for the topic of participatory research are:

The European convention on the Protection of the Archaeological Heritage, so called the Valetta convention (Council of Europe 1992) or, in Croatia, more commonly known as the Malta convention, which was brought in 1992, signed by Croatia in 2001 and ratified in 2004 (NN 4/04) (and entered into force in 2005). The European Convention for the Protection of the Archaeological Heritage does not specifically mention participatory research but some of its parts could be interpreted in that sense (for example article 9). Obligations stipulated in the Valetta convention in Croatia have a legal framework through the Rulebook on archaeological research and the Law on the Protection and Preservation of Cultural Heritage.

The Council of Europe Framework Convention on the Value of Cultural Heritage for Society (Council of Europe 2005), so called the Faro Convention was brought in 2005 and ratified by Croatia in 2007 (NN 5/07) (entered into force in 2011). The Faro Convention emphasizes the important aspects of heritage as they relate to human rights

and democracy. It promotes a wider understanding of heritage and its relationship to communities and society. In line with the Faro Convention's principles and criteria, civic initiatives enable institutions and communities to develop decision-making capacities and to manage their development processes, ensuring that heritage contributes to the social, cultural and economic dynamics of the communities. The Faro convention is a “framework convention” and as such does not create obligation for specific actions to the State Parties involved. It defines objectives, identifies areas for action, and the directions for progress. Each State Party can decide on the most convenient means to implement the Convention according to its legal or institutional frameworks, practices and specific experience. In Croatia the Faro convention is implemented through the "Strategy of Protection, Preservation and Sustainable Use of Cultural Heritage of Croatia 2011-2015" . This document, as valuable as it is, does not provide specific explanations of actions required to “democratize” research in cultural heritage. It does however define its goals one of which is strengthening of connections between public and professionals. This, it is advised, should be achieved through provision 3.1.3. which promotes stronger involvement of civil society in informal education on heritage and sustainable use of heritage. Although, participatory research per se is not mentioned, this provision could be understood as such.

European Landscape Convention - the Florence Convention (Council of Europe 2000) is ratified in Croatia in 2002 (NN 12/02), it entered into force in 2004. The Florence Convention is clearly shifting the focus to participation. The convention promotes the concept of landscape as being a phenomenon that affects the whole population and is (among other) a foundation of people’s identity. That its care requires collaboration

between general public and organizations, and that official landscape activities (including various planning policy development and decision-making) should include the participation of the general public (Article 5). The main focus of the convention is to establish procedures for participation by the general public, local, and regional authorities, and other parties, in landscape policy definition and implementation (Article 5, paragraph B). This should be obtained through awareness raising (Article 6, paragraph A) and training and education (Article 6, paragraph B). The Florence convention aspires to explain how heritage can help people to identify with regions, towns, areas where they live and is doing this by promoting active role in decision-making. It considers the changing economies (worldwide) which influences rapid and severe changes in landscape. Building public participation in the way the convention anticipates in Croatia is in its early development stages, as it apparently also is elsewhere in Europe (Goodchild 2007). Some of the actions that were taken are easier categorized as civil disobedience than as public participation with approval of the authorities (for example case-study presented further in the text – Premužićeva trail). Quite often the case is that people have a sense of connection between their identity and the landscape of their locale, but the local authorities are hardly giving up their role in decision-making or are juggling between economic prosper offered by individual investor and public aspiration to protect the landscape. On the other hand, the government is working on implementing the conventions (both Faro and Florence) in a way that contradicts their core, as is the case of a pilot project “Pilot project of local development - Cres”. The area in focus as well as activities were chosen by the Ministry of culture, the main partner in conducting the project was local authority and general public was involved as public in organized round tables

and lectures. It wasn't the people who decided the area, the approach or who participated in research, they were mere onlookers, the approach was top-down. This conclusion comes with the greatest of compliments for the results achieved by the project. (For more info on the project see: <http://www.pplr-otokcres.info/>)

State's bodies issuing permissions any kind of work conducted on heritage are Conservation departments. The Departments are regional, mainly covering a territory of a county or sometimes a part of a county. Conservationists issue permits for excavation and other research to archaeologists or persons holding the license to work on heritage. The permit is issued upon research manager's written request. In the sense of permitting participatory research both national and international legislation are not clear, or not clear enough for an everyday use by conservationist issuing permits. It is therefore the conservationist's job to, on one hand, encourage participatory research and on the other hand to control it in the same way they control any other research in heritage, in order to secure a responsible approach to heritage protection. It is conservationist's responsibility to evaluate the complexity of the site (or a zone) and the level of expertise of persons involved: most importantly related to the manager of the research but also regarding the other competent persons involved. In practice this usually means that participatory research could be permitted on sites of low complexity, with an experienced manager and their vice manager – preferably with more experienced archaeologists involved. In case of landscapes, there are no experiences in researching but there are many experiences in maintaining and restoring the landscape. As well as is the case with archaeology, the regional conservation department issues a permit to a person leading the work. The permit lists the conditions under which the work can be done.

### 7.3 Case studies presenting heritage project involving participatory action

#### 7.3.1 Solin, Kostrena, archaeological excavation

This is a large site with complex stratigraphy mainly horizontal which facilitates excavations. The main regional museum is managing excavations of the site for almost a decade. Since the second year of excavations local schools have participated as a part of the “school in nature” program. For the past two years, the museum has been a partner in a European Union funded Interreg project joining Slovenian and Croatian partners. Their role in the project is conducting participatory activities in archaeological research and conservation actions.



Figure 7.1: Solin, excavations conducted by volunteers, photo: Museum of maritime history of Croatian coast, Rijeka

### 7.3.2 Gorski Kotar, mountainous region of the Primorje – Gorski Kotar county, heritage inventory

This is a project developed by local communities who invited experts to participate and above all facilitate the carrying out of their idea. Local communities included tourist workers, NGOs, foresters, hunters and speleologists. Institutions involved included the Archaeological museum of Zagreb, the Conservation department in Rijeka and the Institute of anthropology. The local communities concluded that cultural heritage is poorly researched, archaeological sites are completely unknown and the region is largely perceived as a mountainous region full of forests and nothing more. They thought it was an inaccurate picture of their home, wanted to rectify it and therefore needed the help of archaeologists. The research was conducted on a volunteer basis and with significant help from local people. After four years of surveys, excavations and other work an archaeological topography map was made. Although the scientific results are vast, more important results include: an NGO strictly concerned with heritage was formed, a research center (with a building that includes dormitories for visiting researchers) is being developed, the NGO grew to be a powerful stakeholder in region creating a true “bottom-up” approach to heritage research, protection and sustainable use.

### 7.3.3 Island Rab, Premužićeva trail restoration

Premužićeva trail is a walking path built in the early 1930s by engineer A. Premužić. The path is built using the dry-stone technique and is, because of the quality of work and the flawless integration with nature, considered a jewel among walking paths. Misuse had

caused deterioration of the path therefore a local mountaineering society started repair works. The local community, using local material and local technique repaired the path through more than one hundred actions, spending all together more than 700 hours of volunteer time. No legal issues were involved as the path is not a scheduled heritage asset (although it deserves to be scheduled). This largely facilitated the process of restoration because for listed heritage the process of issuing required documentation is time and money consuming to such an extent that no local community could afford to do it. The complicated procedure of getting permissions to restore a path like this, the requirements of blueprints and designs for a piece of construction so elegantly incorporated in the landscape, the requirement of a certified construction company to rebuild and restore the path and, lastly, the financial requirement to fulfill it, would have made the work prohibitive. Instead, local knowledge by local people using local materials allowed residents to restore a path that is used by the local community.





Figure 7.2: Participative restoration of Premužičeva trail, photo: M. Rizner

#### 7.3.4 Bakar, Bakarski prezidi – Takala

This cultural landscape or ethnographic zone as it is listed, is located on the steep hill sides above the Bay of Bakar. The main feature are terraces built in drywall technique, used for vine growing. During the years following the WWII the area was abandoned and the landscape was slowly deteriorating. The steepness of the hillside on which it is positioned preserved it from complete destruction of over-building present in the surrounding area. These terraces were built at the turn of the century 19th to 20th by several generations of people from village Praputnjak. The soil was brought on site from the mountains in the back of the area. The grapes were used to produce a local variety of sparkling wine. Local NGO “Praputnjak” organized an action described as revitalization of the vineyard in 2001. The following year an agricultural co-op was founded. Since 2011

a seasonal workshop is organized, involving local stakeholders (NGO, co-op but also local people) and an NGO called Dragodid. This NGO is proficient in matters of drywall heritage: from organizing schools of drywall building, thus promoting the intangible heritage of the art of drywall building to maintain an online platform for mapping drywalls around Croatia. The activities of the workshop mainly include restoring and repairing the drywalls of terraces all done by volunteers, both local and foreign. Conservation department is issuing a permit for these activities and is providing expert advice when needed. This is a clear bottom-up approach where local people were included from the first decision making (to start with the restoring of terraces) to the work itself. The results are multifold: the heritage is preserved and the wine is made. In the last several years the agricultural co-op is measuring steady rise in the harvest.

Figure

#### 7.4 Conclusions on participatory research

Croatian heritage laws do not mention participatory research in archaeology. It is however tackled by international conventions that are ratified in Croatia. It is the responsibility of the archaeologist managing a research project to conduct it in accordance to the state of the art, standards of the discipline and thus in accordance to the Rulebook on archaeological research. It is the responsibility of the Conservation department issuing a permit to ensure that the standards are met and that the rules given by the legislation are followed. It is these clearly defined responsibilities that enable participatory research to be conducted and at the same time to satisfy the legislation. Heritage legislation in

Croatia, when speaking of participatory actions, is far from being rigid. This enables conduction of such projects and sometimes facilitates fund raising as local governments are more likely to fund a project that includes public participation (as seen in case of Solin). It also contributes to the development of the discipline itself as researchers, conservationists and funding bodies likewise see the benefits it brings to heritage protection and presentation, identity building and research projects.

#### 7.5 Reinstatement of the commons as approach to heritage protection

Since the legal status is only the base of any protection, and landscapes being of a particular character when compared to other types of heritage a different approach to protection is suggested. One of democracy and participation, of a grass-root nature has proven to be of great value when it comes to protecting cultural landscapes. Participation in every phase of establishing a protected landscape: in decision making, research, and particularly governing.

Common lands, known as commons, is a property form in which the land belongs to the community and is not divided by individual members of that community.

Common land is a property form in which the land is undivided by individual owners belonging to the same community. It is also known as commons. Forms of commons include fishery rights of local communities, communal irrigation arrangements, pastoral husbandry, communal forests and hunting rights. This chapter is mainly preoccupied with communal forests and pastures, as these are the well-researched forms of land ownership on the island and partially form historic landscapes.

This matter was approached through the observation of historical commons; there is no communal land on the island anymore. Rab have had vast areas of common land through the history. Prehistoric and protohistoric times are considered a period of communal land ownership (Chapman 1996). Given that the economy was predominantly pastoral (at least it is so for the Late Bronze age) and taking in regard the position of prehistoric sites, the commons included the pastures situated in top-of-the-hill region of the Kamenjak ridge. During the Late Iron age with the first-class stratification and especially with the Roman domination in the area the landownership changed and it was divided into traditional communal and recent form of privately owned land. The Roman domination brought the division of land in three folds, as mentioned previously, of which pastures and forests were given to the indigenous community. During the Middle ages the commons were not present per se but pastures were communally used, as the proclamation of 1237 demands all sheep to be branded. Branding is used in order to easily differentiate the sheep of specific owners once they are all together in the pasture. Forests were owned by the state. Second half of the 19th century and early 20th century was the time when common land is legally defined and is referring to pastures. The community (as legal entity) divided pastures among villages.

Legal abolishment of the commons was happened when the Agrarian reform of Kingdom of Serbs, Croats and Slovenians was established in 1919. It not only abolished large estates owned by aristocracy but it also abolished commons, other than forests that were from that time on owned by the state (Šimončič – Bobetko 1989). This meant that what was once large open field pasture or forested pasture became privately owned fenced piece of land. The forests that were state owned were given to inhabitants of the specific

region to maintain and sustainably use. The pastures were governed privately without state being much involved. This was the situation until the end of the 20th century at which point the state completely took over the forests. During the communist era, legally all land was owned by the state, but the rights of particular families owning a relatively small piece of land were not touched.

The archival sources (Great chronicles of Kapor, Lib. V; Arhiv rapske občine) revealed that during the 19th century some forests that were part of the commons were given to private persons for use or were misused by some of the users (it is not clear). The area was considered a forested pasture and because of that no interventions from the forestry officials was involved. This made a major impact on the landscapes by turning a forested area of the island into rocky terrain covered with sparse vegetation of macchia. The particular area, the southern tip of the island – part of village Barbat, was forested at least as early as the Roman period. This area is not only rich in Roman time sites, but also bears the name Valsabana which is concluded as being of Roman origin, meaning the valley of Silvanus (Skok 1950, Šimunović 2005).

The peninsula of Kalifrant, administratively part of village Kapor, is an area of thick Mediterranean forest. Part of it, forest Dundo, is protected as Forest reserve since 1949 (it was the first protection of natural heritage in Primorje – Gorski kotar county). Origin of this forest is described in the legend written by Renaissance writer Juraj Baraković. It is a topic of research for naturalists (of whom important to mention is Španjol 1993). Forests were owned by the state, especially so after the WWII during the communist regime. But some relict form of communal ownership was preserved, not legally but in reality. Land allotments were given to a family to maintain and harvest. It was a form of emfitheusys.

The particular family had rights to cut wood for their needs but supervised by the forestry. All stakeholders benefited from this relationship: the families got the wood they needed, and the forestry got help with maintaining the forest. This form of land use is still performed though only by few families. During the research several families were approached and interviewed about this manner of using the forest. Usually one member of the family provided information. These are the families of Katica Jureša, Nada Jureša and Marin Travaš from village Barbat; family of Boris Sović – Padovan from Palit and family of Nikola Poldan from Kampor. They explained how their families were given rights to use the forest after the Agrarian reform. Their obligations were maintaining, and obeying conditions given by the forestry. This would include surveying the allotment with a forester when specific trees were marked as a sign of their availability for cutting. The particular allotments were not demarcated in any obvious way. The signs of demarcations were subtle signs on natural rocks or centennial trees. The wood was always cut for domestic purposes. Each share touching family stories of days spent in the forest.

The state of this forest being particularly well preserved, maintained and monumental in appearance combined with the particular form of maintenance raised the question of protection of historic landscapes as communal land. There are many well documented examples of communal protection of landscape worldwide. One such communal landscape protection can be found in Italy – Natural park of Ampezzo Dolomites and in Croatia, Slavonia, Gajna both examples of communal pastures. In the very vicinity of Rab and on land that historically was ager of Rab, in Lun on island Pag there is a specific communal approach to governing olive groves. Olive grove, the parcel, is a common land but each tree is owned by another family or sometimes multiple families. In order to

maintain the grove and to secure the harvest the community must work together. The village of Lun went one step further when they atop of agricultural use of the olive grove, valorized it to serve touristic purposes.

Animal grazing in what was traditionally pasture or maintaining forests the way it “always” (as said by the interviewed families) can be labeled as a form of traditional ecological knowledge (Berkes 1993). It is contributing to building resilient communities and contributing to biodiversity of the region (Blondel 2006).

In 2015 Croatia amended the Law on agricultural land in a way that finally recognizes the possibility of joint management on common pastures by accepting cooperatives as tenants of land owned by the Republic of Croatia. This means that even though legally the land is still owned by the state, it is used and maintained by local community.

The economy on Rab changed significantly during the 20th century from being agrarian to being mostly relying on tourism. As such, establishing a common land governance seems like futile work. But if management of landscapes is serving touristic purposes by means of shifting the focus from balneary tourism to cultural or active tourism than the reestablishment of commons is a reasonable step forward. Some traces of such thinking and activities is visible in maintaining drywall demarcations in the top-of-the-hill region of Kamenjak. Local people realized that due to increased abandonment of land (pastures) drywalls are deteriorating. When a drywall falls apart a rubble often closes a path. Therefore, people of villages Mundanije, Banjol and Barbat organized and started repairing these walls, regardless of the ownership. Following that, they organized school students in workshops and taught them how to build drywalls. As a result, the historic landscape of previous commons and then private land is restored, children are learning

about the ways of life of their ancestors, numerous participants are listed as carriers of intangible heritage of the art of building drywalls and subsequently are involved in expert workshops. These actions are strictly grass-root in origin and on the border of being a form of civil disobedience.

Participative approach to governing and researching historic landscapes of the island is a matter which should be initiated by the local communities. Experts should be involved only as advisors and local government should provide legal background.

Some examples of governing the commons prove this way of landscape fostering to be better than others. Harding (1968) describes an area bordering China, Mongolia and former USSR. Naturally this area was the same, grasslands used as pastures but as the countries are different so was the approach to these pastures. Mongolian part was common land, Chinese part was a form of privately tenured land and Russian part was owned and maintained by state owned company. Satellite imagery clearly proved common land in Mongolia to be in better state than the land in other two countries. It is a further evidence which supports the commons as the best form of fostering landscape.

## 7.6 Conclusions on reinstatement of commons

This suggestion is not only in accordance with international conventions (especially the Florence and the Faro conventions), ratified in Croatia, but also following the tendencies of the Western world which promote participative research and protection of heritage. National laws enable both participatory research and governance of landscapes in form of commons. Examples from vicinity and worldwide prove that the concept of commons



is a good way of protecting traditional ecological knowledge, landscapes and both, intangible and tangible heritage.

## Chapter 8: Concluding remarks

### 8.1 Original contribution to the knowledge

The thesis represents a novel approach to territorial studies in Croatian archaeology and is in full concordance with the cutting-edge European tendencies in landscape archaeology. The holistic approach to landscape and observing it as system has never been done. Retrogressive analyses of landscape, with diachronic approach are also not common in the region.

The results revealed settlement patterns through different periods. Land capability is calculated and the approximation of island's autarchy is given. Major economic activities are explained through transdisciplinary research.

The proposal of novel approach to protection of historic landscapes is given.

## 8.2 Future research avenues

Historic landscape studies of the island would further advance with more use of remote sensing technologies, especially LiDAR. Furthermore, pollen analyses have never been done as well as other archaeobotanical studies. Similar research in the neighboring islands would give an opportunity for analogies and possible help with some of less clear finds.

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