

DISCOVERING CULTURAL LANDSCAPE IN CROATIA: HISTORY AND CLASSIFICATION OF CROATIAN ADRIATIC ENCLOSED LANDSCAPE

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ABSTRACT

This paper presents the diversity of Croatian Adriatic enclosed landscapes through their history and classification. The model of 'landscape pattern' is applied - the synthesis of information on land use, land structure, geomorphology, soil, agricultural practices and economic history. The result is derived from long-term research which has involved field work, terrestrial and aerial photo documentation, landscape history research, creation and analysis of various spatial and cartographic GIS data. Six general classes have been recognised (micro-clusters, individual enclosures, managed woodlands, pastures, fields and karst clearings for crops), as well as fourteen sub-classes, described and presented with illustration, photos and GIS data.

Keywords: cultural landscape, enclosed landscape, enclosure, stone wall, Croatian Adriatic, landscape history

ALLA SCOPERTA DEL PAESAGGIO CULTURALE IN CROAZIA – LA STORIA E LA CLASSIFICAZIONE DEI PAESAGGI RECINTATI DELL'ADRIATICO CROATO

SINTESI

Questo articolo presenta la diversità dei paesaggi recintati nell'Adriatico croato attraverso la loro storia e classificazione. Viene applicato il modello del 'modello del paesaggio' - la sintesi di informazioni sull'uso del suolo, la struttura del terreno, la geomorfologia, il suolo, le pratiche agricole e la storia economica. Il risultato deriva dalla ricerca a lungo termine che include la ricerca da campo, la fotodocumentazione terrestre ed aerea, la ricerca della storia del paesaggio, la creazione e l'analisi di vari dati GIS spaziali e cartografici. Sono state riconosciute sei classi (micro-grappoli, recinzioni individuali, boschi pianificati, pascoli, campi e radure), come anche quattordici sottoclassi, descritte e presentate con illustrazioni, fotografie e dati GIS.

Parole chiave: paesaggio culturale, paesaggi recintati, recinzioni, muro di pietra, Adriatico croato, storia del paesaggio

INTRODUCTION

In Croatian standard and vernacular language, the concept of *enclosed landscape* is present in different expressions for enclosed agricultural plots and/or their borders, specifically the dry-stone ones. Some of them denote exclusively the agricultural plot (*drmun, dolčić, dolac, umejak, laz, lazina, lazetina, pasika, pašin, pasičina, krčevina, krčavnica, krivača, tresada, vlaka, vlačica, vlačina, branjevina, liha, vrtlo*, etc.) and some denote the surrounding wall (*mocira, gromača, barbakan, trmezal*, etc.), while some can include both meanings (*ograda, ogradina, međa, meja, graja*), which should be clarified by further onomastic research.

When it comes to Croatian legislation and sectoral policies, the topic of rural/agricultural landscape is inadequately addressed. In terms of protective designations, this category is mostly overlooked, or in rare cases when being the subject of protection, it is caught between 'natural' and 'cultural' approaches (Andlar and Aničić, 2018), with marked absence of tools for interpretation and integral planning and management.

On the other hand, positive outcomes are expected from implementation of the awaited rural development payments for dry-stone and hedges enclosures and related practices (CRDP, 2015). Also, the skill of dry-stone walling is officially recognized as an intangible cultural good (NN, 2017) and Croatia was a member of the multinational nomination after which the "Art of dry stone walling, knowledge and techniques" has recently been enlisted on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity (UNESCO, 2018). Thanks to non-institutional initiatives, the awareness of enclosed landscapes in Croatia has increased particularly along with the appreciation of the dry-stone heritage in general. Since the late 1960s, when the photo of the vineyards near Primošten (Dalmatia) with its distinctive pattern of stone wall enclosed parcels was exhibited in UNESCO headquarters in Geneva under the title 'The work of human hands', the dry-stone walls have a special place in Croatian imagery as an authentic and democratic heritage. However, some twenty years since bringing up the Croatian Adriatic (agri)cultural landscapes topic, the overall contribution by Croatian researchers is still scant, with noticeable absence of comprehensive registers of the condition, diversity and potentials of agricultural landscapes which would undoubtedly lead to an improvement of relevant sectoral policies.

In accordance with the problems outlined, the aim of this paper is to establish basis for interpretation and analysis of Croatian Adriatic enclosed landscapes and to point to their importance and variety, as well as stimulate further research and comparison to international inventories. The main outcomes are a brief historical review and the classification of Croatian Adriatic enclosed landscapes corroborated by illustrations, photos, GIS inventories.

RESEARCH HYPOTHESIS

The main research hypothesis is, that in the absence of unified and widely accepted framework for the classification of the enclosed landscapes, the classification framework presented in Andlar and Aničić (2018) and Andlar et al. (2017) can adequately serve to classify the enclosed landscapes of Croatian Adriatic and represent their functional, structural and morphological features. Furthermore, we assume that, due to the variety of its enclosed landscapes, Croatian Adriatic can be seen as a good case-study area for testing the framework in general.

METHODOLOGY

This paper's topic is a part of comprehensive initiative for registering of Croatian Adriatic silvo-agro-pastoral cultural landscape, which combines the knowledge gained through several research projects, PhD thesis (Andlar, 2012), the work of Dragodid NGO and Suhozid.hr open public dry-stone heritage database (Suhozid, 2018), local landscape character assessments projects, student term papers, bachelor's and master's theses. In methodological means, this paper continues the earlier research: Croatian Adriatic cultural landscape classification (Andlar and Aničić, 2018) and Croatian Adriatic terraced landscapes classification (Andlar et al., 2017). Using the same framework, this classification is based on several hierarchical levels.

The first one is based on general *land use* categories (determined by human striving to cultivate the land, with the activities like ploughing, terracing, pasturing, woodland management etc., rather than using the concept of *land cover* which implies only the type of crop/vegetation). The next level, the subclass, is derived from *land use structure* criteria implying the plot pattern (its shape, size, openness, closeness etc.), while the associated description pertains to the multi-dimensional context (geomorphology, land cover, soil, agricultural practices, function, historical period/s, local land use expressions and place names etc.). Since the subclass is recognized and determined by the repetition of the same spatial pattern, its scale is not fixed: it can cover all, from vast areas to micro locations. Each subclass is exemplified on several geographic locations, substantiated with photos and archetype illustration. Where possible, the variations of subclasses are also indicated. The classification is introduced by a historical review, which outlines the significant periods of enclosed landscape genesis and its natural, socio-economic and cultural context.

Research involved flyovers and fieldwork during the past 10 years, establishment of a geo-tagged photo register, analysis of various spatial and cartographic GIS data (historical and recent digital orthophotos, topographic, soil, land use and historical maps). Particularly for the

historical review, scientific and expert studies from different disciplines were analysed, such as history of economy, eco-history, anthropology, historical toponymy, demography, archaeology, geomorphology, etc.

THE GENESIS OF CROATIAN ADRIATIC ENCLOSED LANDSCAPE

In our previous paper (Andlar *et al.*, 2017), we pointed out the main geographical characteristics of Croatian Adriatic region: complex relief forms, thin soil, sparse natural vegetation, lack of surface water, high and irregular precipitation, high soil erosivity. Most of these characteristics are present across wider Euro-Mediterranean area (presented by Grove and Rackham, 2001; McNeill, 2003), but some, especially the complex topography, are specific for the regional karstic Dinaric-Mediterranean context (presented by Cvijić, 1918; Filipčić, 1998; Bognar, 1999 and others). The diversity of relief forms on karst resulted in the complexity of the other factors important for agriculture (availability of soil, average temperature, precipitation, exposure to wind and solar radiation), which further led to high diversity of human adaptation to agricultural production, in which dry stone wall enclosing has played an important role.

The history of the Croatian Adriatic landscape is characterized by its borderline position between the Mediterranean, Balkans and Central Europe, and consequently, the peripheral status within the great empires or states (Ancient Greece, Roman Empire, Republic of Venice, Ottoman Empire, Napoleon's France, Austrian and Austro-Hungarian Empire, Communist Block, Western World). Unstable political situation along the ever-changing borders, which have been laid mostly through the sparsely populated hinterland areas, favoured ancient forms of non-intensive transhumant sheepherding, while the politically more stable areas, such as islands, have sporadically suffered from high demographic pressure and the 'hunger' for the fertile land (Glamuzina and Fuerst-Bjeliš, 2015).

Sheepherding has been the oldest factor in development of the cultural landscape on a larger scale, resulting in degradation of the indigenous forest vegetation very early in history (Glamuzina and Fuerst-Bjeliš, 2015). Sheepherding is always associated with enclosing, at least with its most elementary form, the sheepfold, which can be built of wood or stone, depending on their availability.

The first land cultivation happened in the Quaternary land deposits (dolines) and was probably followed by dry stone walling, not only for protecting the cultivated land from animals' trespassing, but also for depositing the excess rock. It can be assumed that none of the earliest enclosures survived in their original form, because of the limited durability of the structures - even the stone ones,

as discussed by Kulušić (1999) – or because of the subsequent modifications and re-use of the material. There is some evidence of underpinning masonry and dry stone enclosures in Neolithic settlements (Chapman *et al.* 1996; Moore *et al.*, 2007), as well as some general speculations about the early terracing in the Mediterranean in the Neolithic times (Hughes, 2005), but the abundance of archaeological evidence of using the dry stone technique in the Adriatic Croatia comes from the Bronze and early Iron Age, with the spread of Illyrian hillfort culture (Chapman *et al.*, 1996; Buršić-Matijašić, 2008 *etc.*), including the finding of a bronze age livestock enclosure and dwellings (Chapman *et al.*, 1996; Batović, 2004; Sirovica, 2015). Many of the hill forts still stand on top of hills, and some of them have been used as shepherding enclosures in later times.

Greek and Roman colonization period brought the still visible evidence of rectangular dry-stone demarcations of colonized agricultural lands: a notable example is the Stari Grad Plain, known as Χορα Φαρου (Chora of Pharos), which is known and protected as an UNESCO site (Picture 10e and 12), with the 180x900m orthogonal grid, and several Roman *agri* (Suić, 2003), with the 706x706 m orthogonal grid. Figure 11e shows the remnants of the Ancient Greek orthogonal land division in Stari Grad Plain which has been the basis for all the further layers of agricultural activities. Also worth noting from that period are the stone wall demarcations between the territories of indigenous Illyric communities on the foothills of Velebit mountain (Rendić-Miočević, 1969; Vrkić, 2015 and 2017), which can be seen as early *big-scale pasture enclosures* (presented later in this paper).

In the medieval period, the Euro-Mediterranean had a flourishing agricultural production, stretching from the eleventh to thirteenth century, due to the agrarian revolution and economic development. In the eastern Adriatic, the development of agricultural communities was fostered by the establishment of medieval statutes, which in some cases regulated how agricultural land and dry-stone walls were managed. For example, in the Dubrovnik Statute of 1272 (Šoljić, 2002) the *macera* and *mrgin* are described along with the rules for their maintenance, while in Istrian Demarcation of 1325 (Bratulić, 1992) and Hvar Statute of 1331 (Cvitančić, 1991) *gromače* and *gomile* are mentioned as the territorial demarcation.

From the early fifteenth century onward, the parts of eastern Adriatic under the Venetian rule (especially the islands) have been the targets of regional immigration after the Ottoman annexation of the Adriatic hinterland. The additional need for arable land was partially satisfied by allocations (Latin: *gratia*) of former communal land (mostly pastures) to the new settlers for cultivation (Kasandrić, 1978; Carter, 1992; Kovačić, 1993; Tudor, 2004; Dokoza, 2009).

During the mid-eighteenth century, the Venice-Ottoman war took turn in the favor of Venice. The reclaimed hinterland was assigned by the Venetian state to the new settlers and local warlords, with the first written obligations to enclose the managed woodlands with (dry-stone) walls from the neighbouring pastures (The Grimani's Law/Legge Grimani 1755–1956, in Soldo, 2005).

Concerns about woodland improvement, fueled by the agrarianist theory of physiocracy, continued during the short period of French government (1806–1813) led by the enthusiastic governor Vincenzo Dandolo. In 1808, the newspapers publicly announced that, by that year, about 27.857 *campi* (more than 100 km²) of young woods have been established in 372 villages (Kauders, 1963, 395).

The period of Austrian/Hungarian government (1813–1918), especially the second half of 19th Century, was the period of the greatest changes in the cultural landscape. The last and the biggest large-scale karst reclamation with extensive dry-stone walling took place because of large-scale environmental and socio-political events. Several pandemics of grapevine diseases that had first hit the leading winegrowing regions of France caused the great excess revenues for the winegrowers in the peripheral areas of the global economy (such as Croatian Adriatic), encouraging them to increase the vineyard area several times. The changes in the land taxation led to the changes in the land ownership and rights which resulted in division and enclosing of the pastures and woodlands on several Croatian islands (Trogrlić, 1980; Kale, 2006 and 2010; Kraljević, 1994; Kulušić, 2006; Žuvela-Doda, 2008). The state-led afforestation of the barren karst (the focus was on coastal slope of Velebit mountain) was brought to a new level by the establishment of the office in Senj in 1878, that was responsible for both research, monitoring and activities of building enclosures (by engaging local contractors) and planting the new woods in them (Prpić and Jakovac, 2003).

This period of growth ended in a similar way: suddenly and because of larger-scale events (such as the spread of grapevine diseases to Croatian Adriatic, 1891 Austro-Italian commercial treaty known as 'Vinska klauzula' and World War I) that all led to economic crisis that resulted in land abandonment and exodus (Kraljević, 1994).

Much of the 19th century agriculture land, including enclosures, has never been reclaimed again. The spread of the industrialisation and urbanisation in the 20th century caused much of the arable land being transformed into settlements, while industrial agriculture favoured lowlands areas and wire fencing over enclosures, terraces and other traditional dry-stone landscape structures. Today's big agricultural undertakings mostly consist of the transformation of the former pastures into the fence-enclosed vineyards and

olive orchards by the means of the heavy mechanization. However, the research project on the bearers of the dry stone skill (conducted during 2016 for the inscription of the cultural good in the national register) showed that the upkeep of the traditional dry-stone enclosures is still the vital part of moderately successful sheepherding economies of several bigger Croatian islands, some tradition-oriented winegrowers, and some other active communities where dry stone walls no longer have such a direct significance for their lives but are connected to them in terms of identity.

THE CLASSIFICATION

The unified models for enclosed landscape classification are a rarely targeted topic. One of the few attempts of a more detailed classification of agricultural landscapes at the European level is given within the EUCALAND project (Fairclough, 2010) where main classes are defined by the land use criteria (*open fieldscapes, enclosed fieldscapes, grazing, woodland pastures, terraced landscapes* etc.) while further subclasses are based on the combination of structure and land use (e.g. open fieldscapes divided on open arable field, open mixed field, strip field, forest field or terraced landscapes, which are further divided into terraced fields, enclosed terraces, olive terraces etc.). Also, Historical Landscape Assessment method (Clark *et al.*, 2004) should be considered since it deals with GIS mapping of landscape types and its historical origin on more detailed scale. Although not always, it is mostly applied in the interpretation of current field patterns and its historical period origin. So, the classes like *enclosures, terraces, openfield* are common, and are subdivided according to historical period and structural criteria using nomenclature like; *medieval enclosures, modern enclosures, Pre 18th Century Co-axial/Irregular, Regular Enclosures, medieval strip field enclosures* (Crow *et al.*, 2011; Lambrick *et al.*, 2013). Enclosures are often classified according to margin-type and stone wall-type. Aalen *et al.* (2011) classifies Irish enclosed fields based on the type of field boundary: hedges, dry stone walls and earth dams. Müller (2013) classify European boundaries according to the boundary type (hedged banks, hedgerows, field stone walls etc.), while field stone walls are classified by the type of construction (single, double, multiple etc.).

The first comprehensive proposal of Croatian Adriatic (agri)cultural landscape classification is presented in Andlar and Aničić (2018). It consisted of three levels. The first level is based on general land use categories: *pasture landscapes, managed woods landscapes, terraced landscapes, field landscapes, dry stone wall enclosures for crops and salterns*. The second level revolves around the concept of *land use structure* with the emphasis on open/closed systems (Andlar and Aničić, 2018); along with the main class *dry, stone*

wall enclosures for crops, enclosed landscapes are identified in almost every other main class: *enclosed pastures*, *enclosed woodlands*, *semi enclosed fields* and *enclosed fields*. The third level implies the application of concept of structural, functional and cultural-historical character of landscape with the aim to identify a specific class (Andlar and Aničić, 2018). The classification is presented in the table and by the structural sketch. This classification framework has been further adopted and elaborated for Croatian Adriatic terraced landscapes classification (Andlar et al., 2017). Main classes were further divided in subclasses by the structural criteria. Each subclass is described and corroborated by photos of particular examples, and archetypal axonometric illustrations. It can be observed that terraces subclasses are identified not only in their main category of *terraces* but in other as well, particularly in categories of *fields* and *stone wall enclosures*. This transitory character of many classes is observed in both studies. It means that certain class can contain characteristics from several main classes, and this fact should also be considered in classifying the enclosed landscapes.

Micro-clusters (Figure 1)

Within and around the minor agricultural settlements, we usually find complex patterns of manures, small sheepfolds, gardens, crop fields and threshing floors (Figure 1 and 2), which former function cannot be easily distinguished today when they are out of use and overgrown with wild vegetation. Understandably, the complexity of the pattern would be mostly influenced by the topography, so usually the finest examples are around the small settlements in topographically complex areas. These areas are very sensitive to both urban and vegetation succession: many of them have been built up from mid-20th C. onwards (especially the ones in the coastal strip), or overgrown and not easily recognizable, except on the older aerial imagery.

Individual enclosures – interchangeable use (Figure 3)

Individual enclosures protecting small pockets of productive land, or sometimes even an individual tree, are probably the most distinctive feature of Croatian Adriatic cultural landscape. Scattered over vast areas of barren karst (which has been used as an open pasture by default) they represent adaptation of it to crop growing. These enclosures were built to protect the crops from the grazing herds or from wild animals, but in the times of diminished agricultural activities, some of them were, and still sometimes are, used as a sheepfold, meadow or woodland. Even the remains of the Bronze or Iron age hillforts that are abundant in some parts of Istria and Dalmatia somewhere bear the

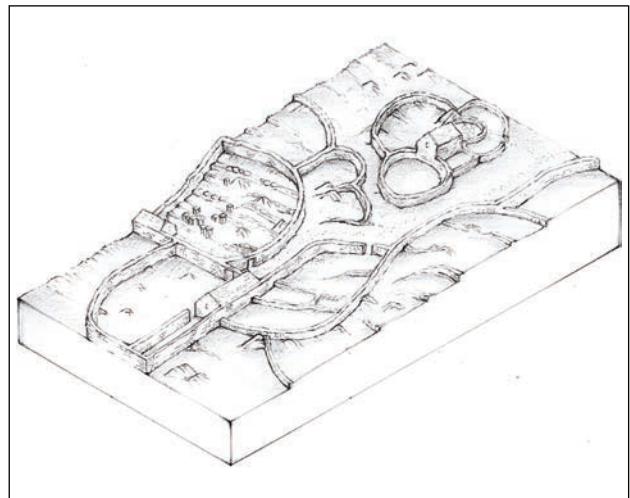


Figure 1: Illustration of micro-clusters (Anita Trojanović).

traces (single walls erected on the top of the ruined ramparts) of latter use by shepherders.

a) Enclosed dolines

The smallest type of enclosed fields are enclosed small dolines. These relief forms are in many ways suitable for agriculture, since they represent natural oasis of soil and microclimatic conditions i.e. moisture and shade. Somewhere they appear as parts of complex agricultural systems (as presented in the 'Enclosed fields' chapter) or are scattered over bare extensive pasture on plateaus or slopes (Figure 4a), even in the woods (Figure 4b). Vast stretches with thousands of scattered enclosed small sinkholes can be found in the mountain foothills, plateaus in some remote areas. One specific subtype are multiple enclosures with multifunctional use (Figures 4c and 4d). The bottom is used for fields, slopes (sometimes terraced) for vine, olive or pasture, a particular enclosure could be used as sheepfold, while on the rim, a simple dwelling or shelter can be found. These complex ensembles are usually set away from the main settlement as a temporary residence.

b) Individual enclosures on rocky terrain

In the times of heightened economic activity and 'hunger for land' (mostly during vine growing boom in the late 19th Century), even the rocky slopes near the settlements or near the previously reclaimed (enclosed) fertile land have also been enclosed and cleared - usually for more valuable crops like grapevine which could justify such an effort. Bigger-scale karst clearings are presented in the chapter 'Enclosed karst clearings for crops', but there are also individual or clustered clearings, from organic (Figures 4e to 4j) to more regular shape (Figure 4k), scattered over the communal pastures from which they have been originally taken over (legally or illegally). Some people from the foothill of Velebit remember that the enclo-

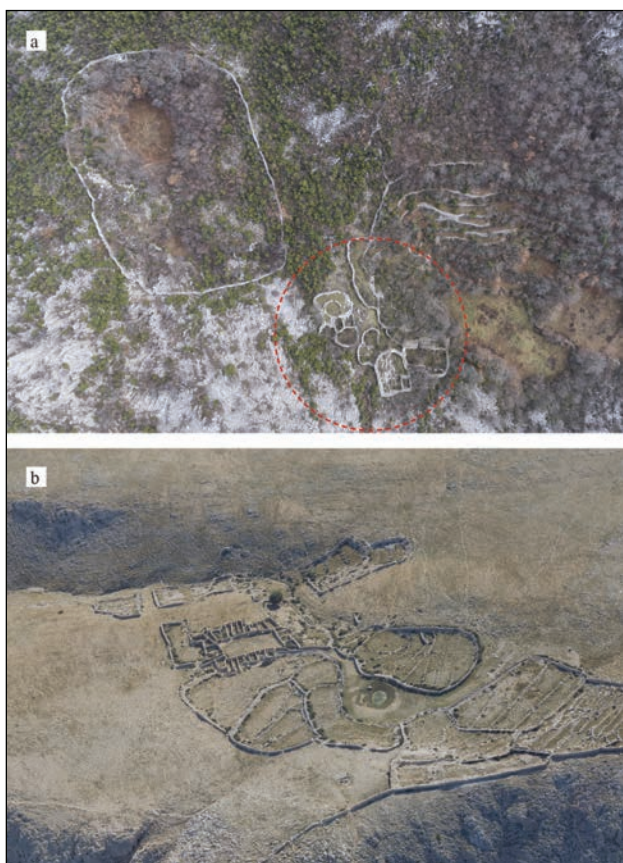


Figure 2: a) Micro-cluster above the enclosed dolina, encircling the livestock stables - abandoned hilly area of Konavle (Photo: Anita Trojanović); a) Micro-cluster in the middle of an open pasture above the southern part of Baška valley (Krk island), embedded in the gully. The cluster is formed around the pond in the centre part of the depression and consists of terraced enclosures (abandoned) on the edge of it and multi-cellular sheepfold (*mrgari*) placed on the outer flattened edge. (Photo: Goran Andlar)

tures at the locality Tršće (literally *The Vines*), initially made for vineyards, were used as a private pasture off the vegetational season, and later, after vineyards ceased to exist.

c) Big sheepfolds

Besides the small sheepfolds that can be found within the micro-clusters, away from permanent settlements, one can recognize the big sheepfolds, visible in the landscape as separate objects. They are not very recognizable among the agricultural enclosures presented above, and not so common either, because big-number shepherding that would require an enclosure for several hundred or more sheep was usually either a part of the late feudal coastal shepherding economy (described by Kulušić, 1999, 67) today mostly neglected, or a part of the now diminished transhu-

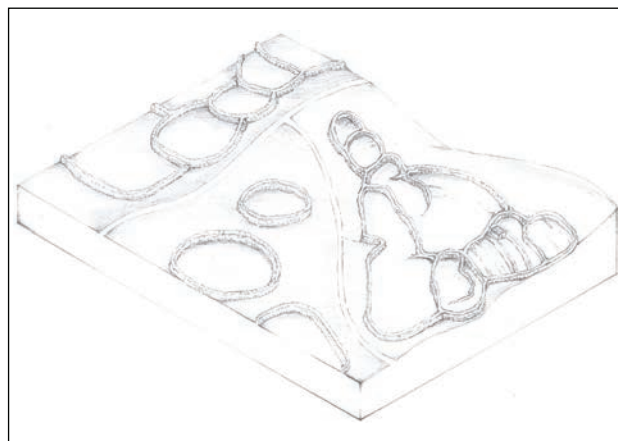


Figure 3: Illustration of variations of individual enclosures (Anita Trojanović).

mant economy of higher parts of coastal mountains (described by Marković, 1980), where the main sheepfolds were mostly made of wood.

By far the most published sheepfolds, and probably among the most published dry-stone structures of Croatia in general are *mrgari*, the flower-shaped multicellular sheepfolds used for sorting out the sheep on the common pastures of Krk and Prvić islands, described by several authors (Fučić, 1998; Vinščak, 2002; Horvatić, 2000 and 2010) (Figure 4). Similar multicellular structures of the same purpose, although not as big and prominent in landscape, can be found on a few other north Adriatic islands: *margari/mergari* of Cres (Jardas, 1964; Jurkota Rebrović, 2009), *zagoni* of Doolin-Rab (Frangješ, 2013), *osici* of Pag island (the most notable is *Dudićev osik*, described by Kale, 2013) etc.

Enclosed pastures

The two main forms of pastures on Croatian Adriatic are common pastures and private ones. Common pastures, or commons (*komunal*, *komunada*, *muša* itd.), are generally on the land of lowest quality, and, except for the stone walls that in some areas separate the commons belonging to different communities, they are not enclosed: other features such as fertile land, woodlands and private pastures are enclosed within them. On the other hand, private pastures are always enclosed, and their grids form the spatial framework for the rotational grazing practices which are especially common in the islands of Kvarner. These practices are based on transfer of herds from one enclosure to another, sometimes combined with collective summer grazing on the commons (for example on southern Krk). Kornati islands, on the other hand, are significant by the total absence of the commons, since all the land was purchased from ex-feudal owners by their former tenants from Murter and Dugi otok communities in the late 19th century. Water ponds

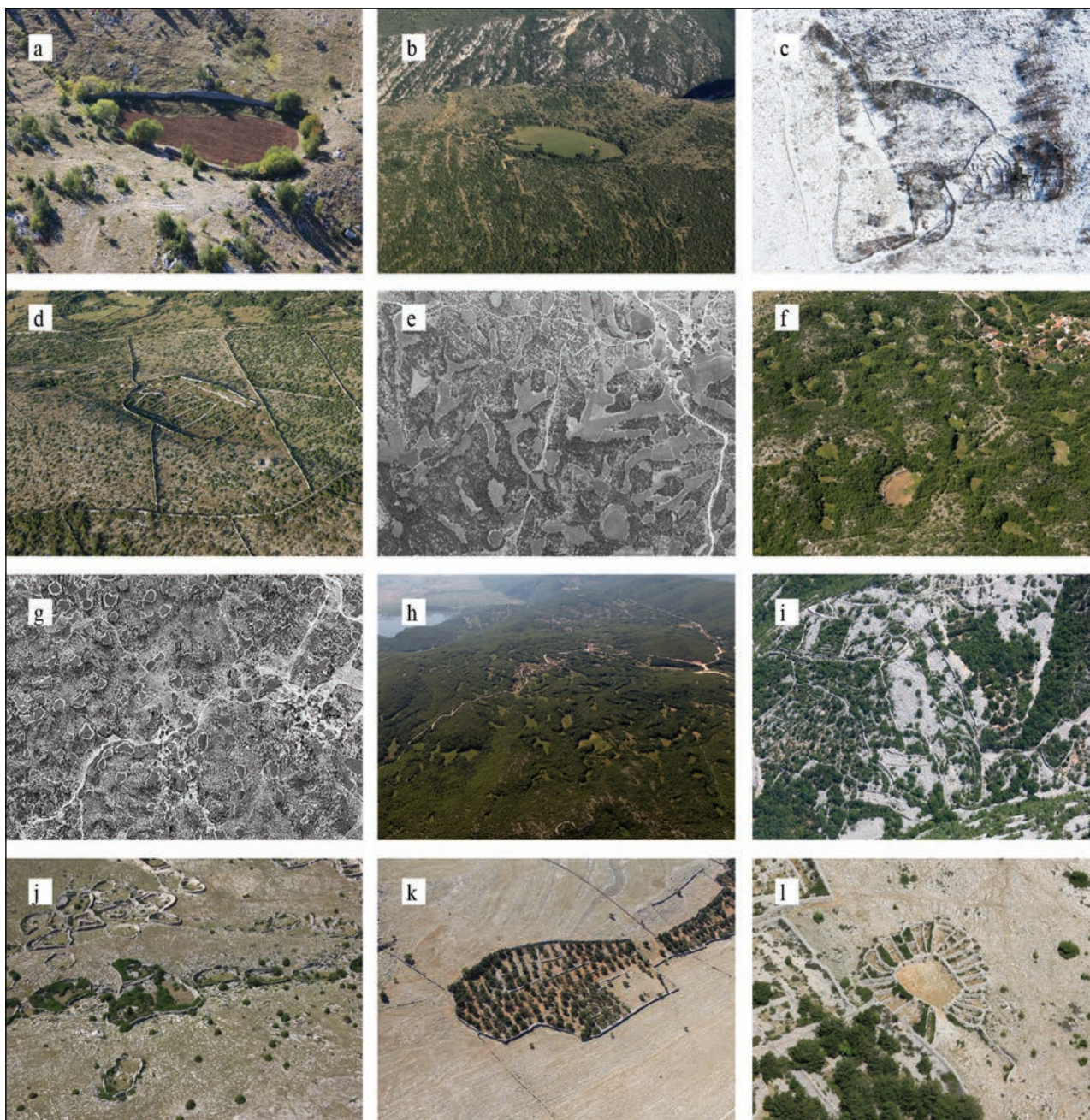


Figure 4: a) Individual enclosed field at the southern foothills slopes of Svilaja – Zelovo (Photo: Goran Andlar); b) Enclosed pasture with big pond and shepherds' shelter (Photo: Goran Andlar); c) Abandoned multi-enclosed karst depression, with multiple agro-silvo-pastoral use in the past - Konavoska brda, Velji do in Konavle (Photo: Anita Trojanović); d) Multiple enclosure for growing crops in the middle of pasture - Cres island (Photo: Goran Andlar); e) Complex system of individual stone wall enclosed-fields scattered between small hamlets on Poljica Kozička plateau near Vrgorac. The massive stone walls are clearly visible in the 1968 orthophoto (ISPU 2018) due to relatively active agriculture; f) The same area as in the previous photo today, partially abandoned and overgrown with woods (Photo: Goran Andlar); g) Complex system of enclosed dolines forming unusual irregular curved plots used for crops, Donji Proložac area, 1968 orthophoto (ISPU 2018); h) The same enclosures today only occasionally used for pasture and surrounded by woods (Photo: Goran Andlar); i) Individual enclosures on the rocky terrain at the foothill of Velebit mountain near Klada (Photo: Goran Andlar); j) Series of individual enclosures enclosing a karst gully and thus keeping the valuable soil from being washed off by sporadic streams - Krk island (Photo: Goran Andlar); k) Stone wall-enclosed karst depression with regular subdivisions, used for olive groves today - Željkovac, Kornat island (Photo: Goran Andlar); l) Mrgar on Krk island (Photo: Branka Aničić).

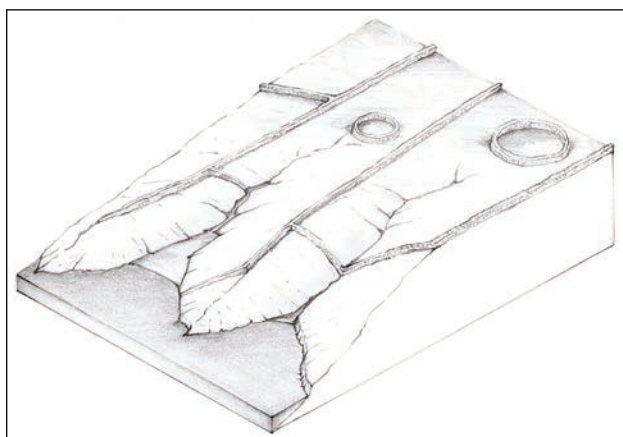


Figure 5: Illustration of large scale pastures (Anita Trojanović).

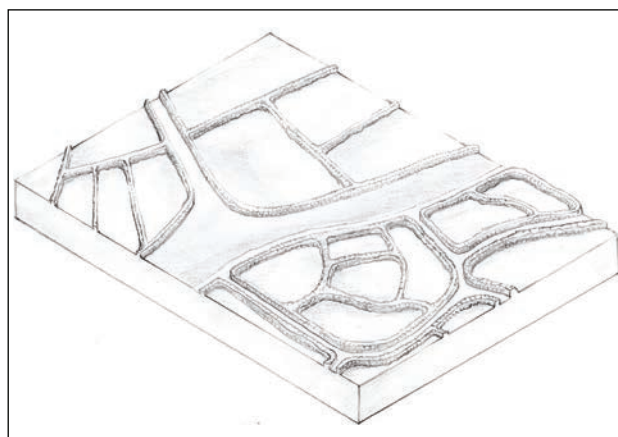


Figure 6: Illustration of the small scale pastures (Anita Trojanović).

scarcely scattered over the karst have immense importance for grazing and their distribution was often crucial for the shape of the enclosure anatomy on larger scale.

a) Large scale patterns (Figure 5)

The largest scale pasture division is, as mentioned previously, the one following the borders of different communes (today recognizable as cadastral communities on the map). In the border walls, one can often see bigger stones that could have been the boundary stones in the times of open pasture before the land divisions in the 18th and 19th Century. The next *level* are the boundaries of big private pastures that were either taken over from the commons (examples of Kvarner islands shown on Figures 7a and 7b) or purchased from the feudal landlord (the example of Kornat shown on Figure 7c) in the first phases of enclosing. In the narrower parts of Cres, Pag, Kornat, and many smaller islands, these long walls are parallel, reaching from one shore to another.

b) Small scale patterns (Figure 6)

Like the islands within the commons, often geometrically subdivided, there are many smaller private pastures. It is very easy to notice the better quality of grass (denoted by darker or more vivid colour on aerial photographs - Figures 7d, 7e and 7f) in the private enclosures compared to the one on the commons. The border is so sharp that the cause of the difference cannot be misinterpreted as a difference in the original soil substrate, but only as a different level of exploitation. On Krk island today, these enclosures are called *drmini* (please compare the chapter on enclosed woodlands).

Enclosed woodlands (Figure 8)

Enclosing of woodland, which was initiated by the state, was a widespread activity during the 19th

century in areas bared by overgrazing and thus threatened by erosion. Stone wall enclosing was necessary to prevent or control livestock movement. Although managed woods were established primarily for forest conservation and coppicing/pollarding, over time they would become used in a multifunctional way (agro-silvo-pastoral). The practice of managing and coppicing/pollarding woods is completely abandoned in Croatian Adriatic today, however, these enclosures are often used as pasture or livestock shelter.

It is important to say that abandoned smaller private pastures and especially the crop field plots (e.g. the ones in dolines) are getting overgrown with vegetation much more quickly than surrounding pasture. That's because of the better microclimate conditions (shelter from wind, moist, soil) and the initial presence of trees that were often planted in the edges of such plots. Therefore, those enclosures can be re-used as (or mistaken for) the enclosed woodlands. Usually the good source for determining the original use during the peak of traditional agricultural activities is the historical aerial photo from the late 1960ies or, even better, 1940ies, or the historical cadastral or topographic map from the second part of 19th century.

a) Organic patterns

The irregular plot shape of an enclosure is the result of adaptation to the configuration of natural karst depressions which were more suitable for woodland enclosing. They are very common, in various patterns, all over the Adriatic hinterland (Dalmatinska zagora) and hilly mainland coast (Senj area), scattered in former open communal pastures in the second transhumance zone, at 500 – 800 m altitudes (*ograde* and *branjevine*). Although mainly fossil kind of landscape, these woodland patches are visible as strong accents in space, particularly in vast flattened areas (Figure 9a and 9b). It is noted that the word *drmun*, now used on Krk island mainly for private pastures, originate from Byzantine word $\delta\rho\upsilon\mu\acute{\omicron}\nu$ (*drymón*),

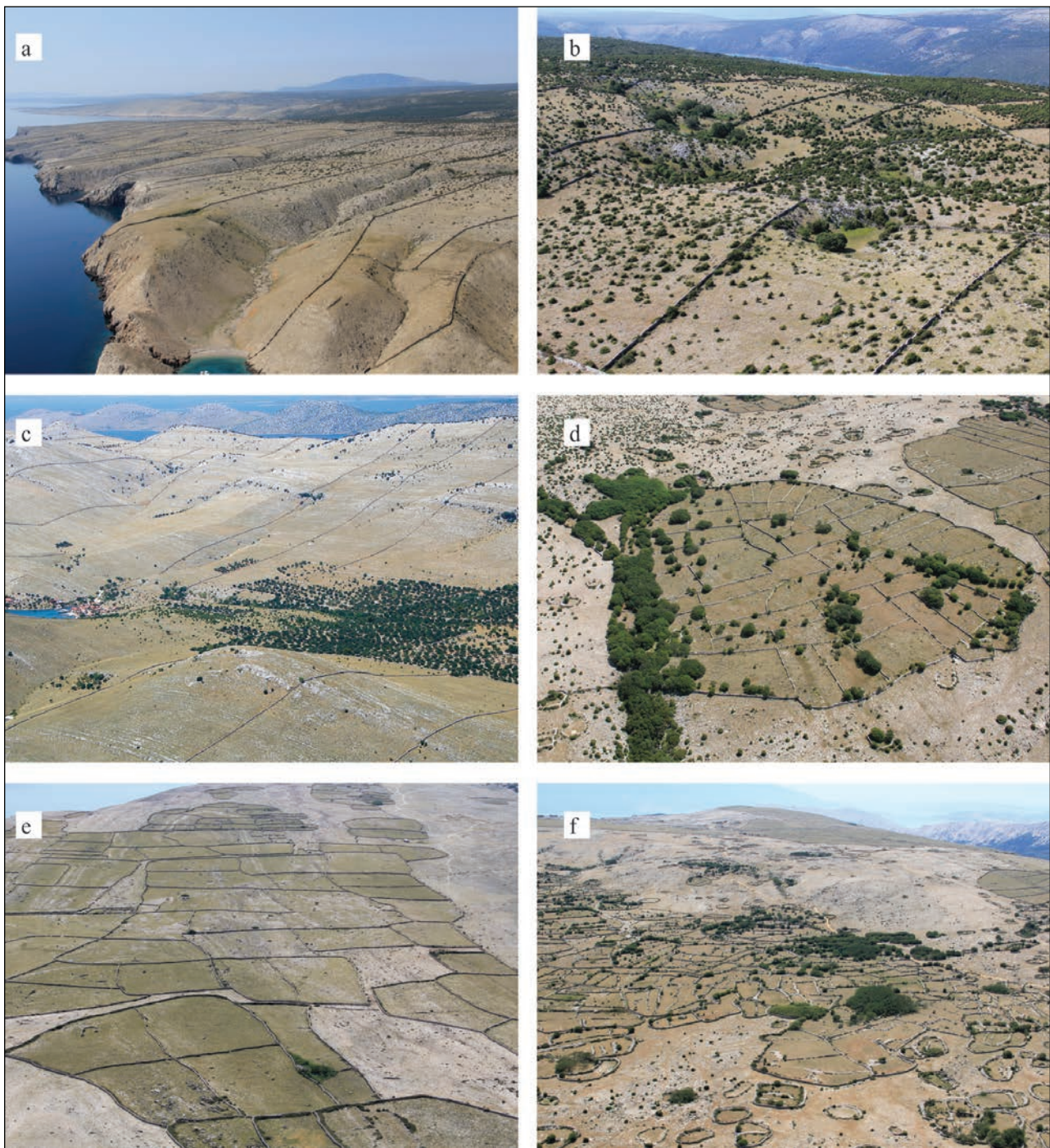


Figure 7: a) Large scale rectangular pastures on Cres island. Usually the pastures oriented towards the north are exposed to bora wind and consequently deprived of higher vegetation (Photo: Branka Aničić); b) Large scale rectangular pastures on Cres island. Southern pastures are usually richer in high vegetation. Small individual enclosed fields can be found scattered within the pastures (Photo: Goran Andlar); c) Large scale rectangular pastures on Kornat island (Photo: Goran Andlar); d) A pattern of small regular enclosures along the upper edge of the northern part of Baška valley (Krk island) located near the village, used as the winter pastures (Photo: Branka Aničić); e) As opposed to large scale patterns which dominate the whole Pag island, the area southern of Pag valley is characteristic for the small scale pastures of irregular to rectangular patterns, some of them locally called *lazi*, *lazine* (Photo: Goran Andlar); f) Characteristic enclosures of irregular oval pattern assembled within a larger karst depression (Krk island). Today these enclosures are mainly used as pastures, but in the past they were used as crop fields (Photo: Branka Aničić).

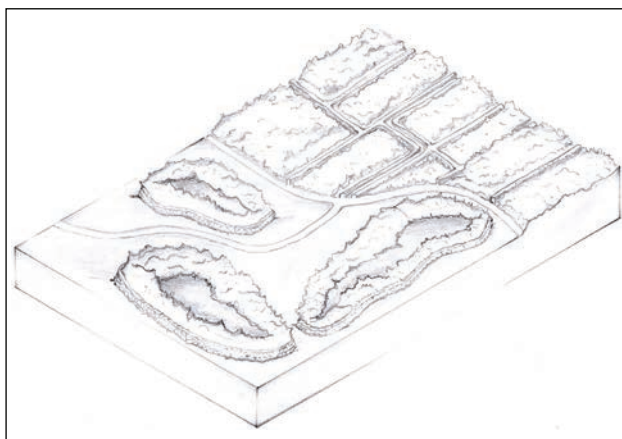


Figure 8: Illustration of the enclosed woodlands (Anita Trojanović).

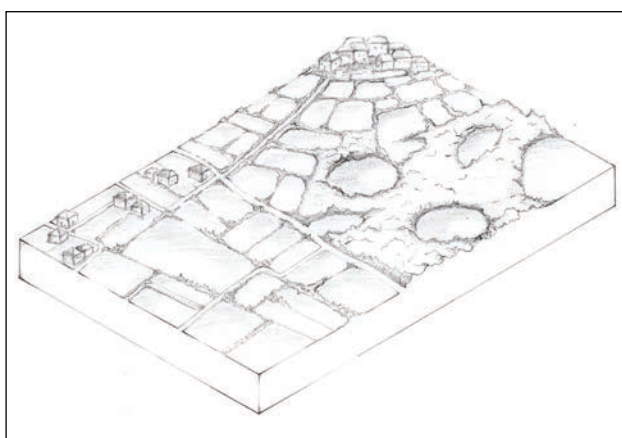


Figure 10: Illustration of enclosed fields on karst plateaus and flysch valleys (Anita Trojanović).

genitive plural form of δρυμός (drymós), meaning forest or park, which confirm interchangeable and complementary silvo-pastoral function of such enclosures.

b) Rectangular patterns

Olib, a small island in northern Dalmatia, is almost entirely characterized by rectangular dry-stone enclosures (Figure 9d) It is cited as a representative area of coppicing/pollarding woodland management (Bura, 1955). However, although Bura seems to identify all the dry-stone enclosures on Olib as the woodland ones, the analysis of historical cadastral map and aerial photo suggests that only several wide strips along the coast were enclosed for that purpose. The character of dry-stone structure confirms that conclusion (Figure 9c).

Enclosed fields

The term 'field' denotes relatively larger areas of naturally accumulated soil used for cultivating crops

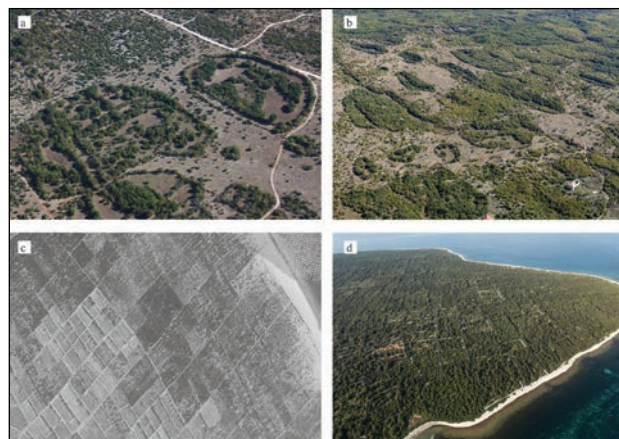


Figure 9: a) Silvo pastoral stone wall enclosures on northern Dalmatian karst plateau (Photo: Goran Andlar); b) A large number of woodland enclosures scattered on the plateau between Svilaja mountain and Peruča lake; c) Enclosed coppiced woodlands (*Quercus Ilex*) on the coastal side of Olib island characteristic for thinner stone walls enclosing larger plots, as opposed to smaller enclosures with massive stone walls being crop clearings (ISPU, 2018); d) Same area today - abandoned fossil cultural landscape (Photo: Goran Andlar).

and where the cultivation is primarily achieved through ploughing. They cover various shapes and sizes of karst depressions (karst valleys, river valleys, karst poljes, uvalas and dolines) and vast flattened areas (karst plateaus) which were in many ways suitable for development of settlements, agriculture and important routes. Due to agricultural suitability land uses are diverse (arable crops, vegetable crops, fruits, meadows, pastures) with long-lasting historical use. Significant number of the fields in the Croatian Adriatic are enclosed, more with stone walls than with hedges.

a) Semi enclosed fields on karst plateaus (top right in Figure 10)

This category is identified with the so-called Red Istria, respectively with the Istrian karst plateau specific for its flatness, numerous small dolines, deeper layer of soil (terra rosa) and dense natural vegetation. Thus, the particular field system has developed here, manifested as a combination of open and enclosed fields (stone walls and hedges) with mixed agro-silvo-pastoral use (Figure 11a, 11b and 11c). The field pattern is seemingly irregular, the combination of oval enclosed dolines and irregular geometric fields. However, on the higher organizational level, the influence of ancient Roman regular raster along with typical radial organisation of central Istria rural landscape is evident. The latter is manifested as central nucleated settlement on a mound, surrounded by a belt of open fields, followed by a larger belt consisting of scattered oval enclosed dolines, irregular flattened field and pastures enclosures and wood patches.

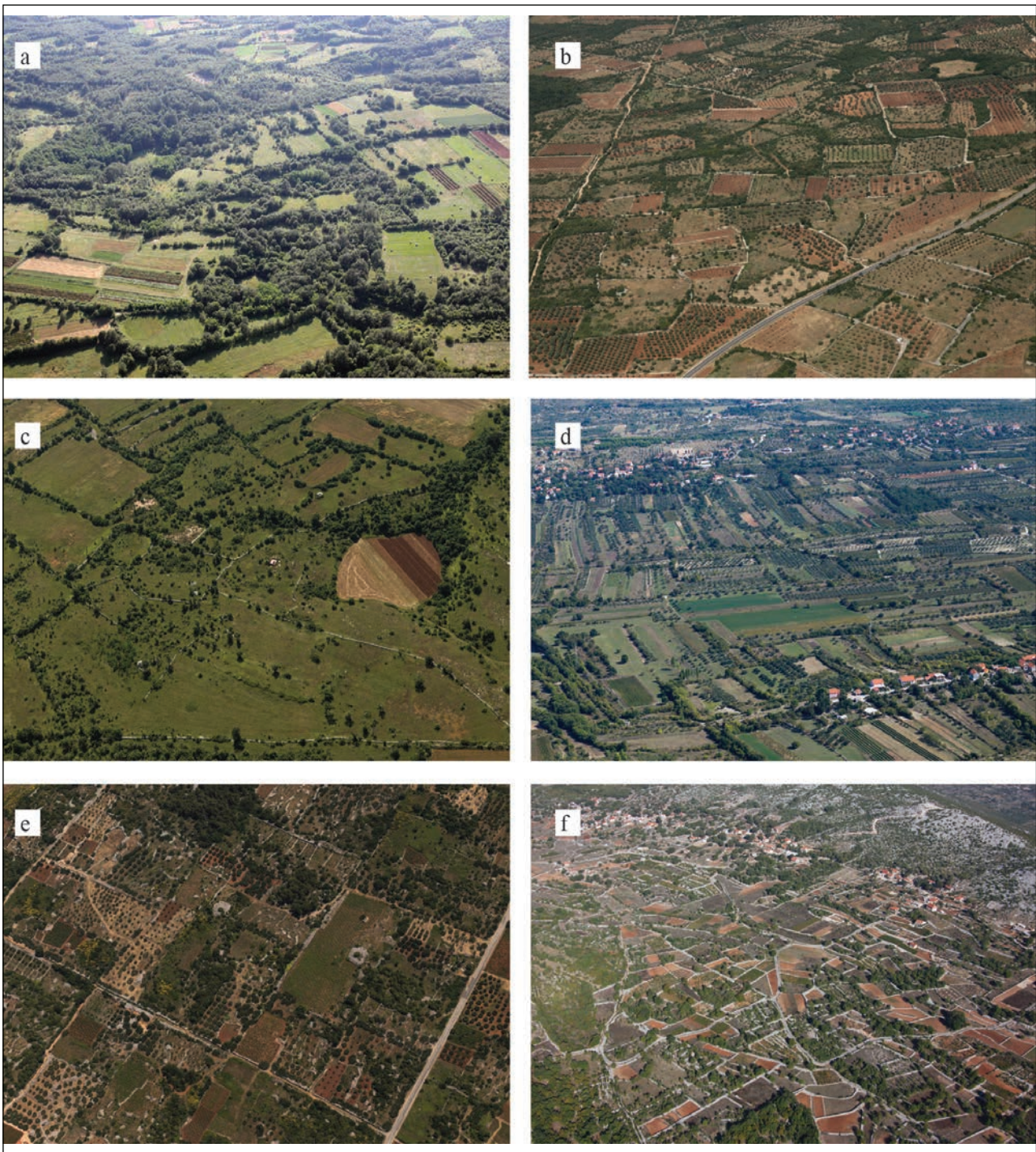


Figure 11: a) Combination of enclosed sinkholes, open fields of geometrical patterns and bosket patches - Red Istria near Žminj (Photo: Goran Andlar); b) Stone wall-enclosed olive groves of irregular geometric pattern but with visible rectilinear axis preserved from ancient Romans times - Red Istria near Vodnjan (Photo: Goran Andlar); c) The detailed image showing the archetype situation of enclosed field in a sinkhole, surrounded by bosket and semi enclosed fields with stone walls and hedges, with two stone wall shelters (kažuni). Red Istria near Vodnjan (Photo: Goran Andlar); d) Combination of open and enclosed strip pattern-fields with mixed use - Dubravice valley near lower river Krka (Photo: Goran Andlar); e) Stone wall-enclosed fields of regular pattern - Stari Grad plain, Hvar island (Photo: Goran Andlar); f) Stone wall-enclosed and terraced fields of irregular pattern at the foot of scattered hamlets - Dalmatinska zagora, Ljubitovica (Photo: Goran Andlar).

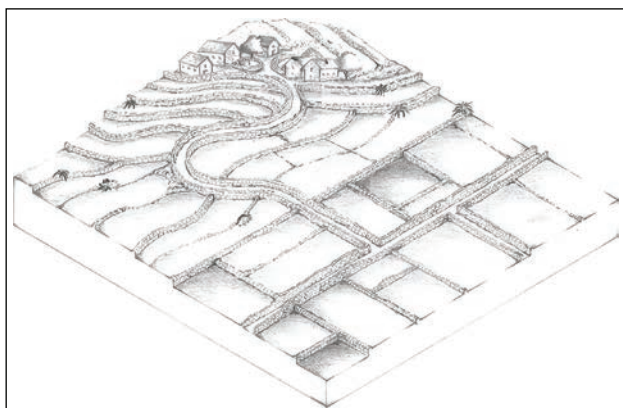


Figure 12: Illustration of enclosed terraced fields (Andlar et al., 2017).

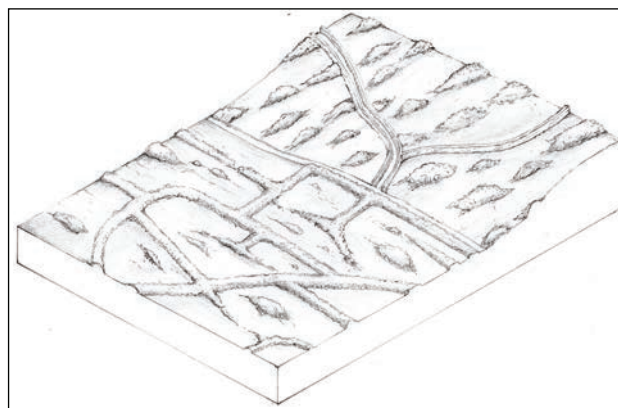


Figure 14: Illustration of enclosed karst clearings for crops of organic pattern (Anita Trojanović).

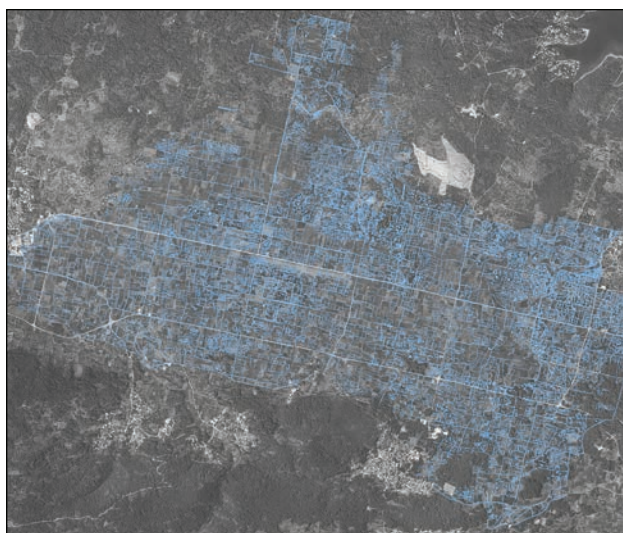


Figure 13: GIS map of stone walls in Stari grad plain (Bedalov et al., 2017).

b) Semi enclosed strip fields in flysch valleys (bottom left in Figure 10)

Typical for Ravni kotari area geomorphologically characteristic for alternation of flysch valleys and limestone uplifts manifested as gently undulating relief with small altitude difference from 100 to 150 m. Limestone areas are typical karst, scarce areas, while flysch valley are fertile being rich with water and soil. Thus, the fields are mostly related to flysch valleys and the linear dispersed settlements developed on southern slopes of the flysch/karst transitions. More hedges, less stone wall enclosed field can be found on the sloping side of valley, while the bottom is more characteristic for open field (Figure 11d). Both are characteristic for strip pattern vertically or parallel laid on the valley direction. Due to settlement proximity, mixed uses are typical.

c) Enclosed terraced fields: wide regular patterns (bottom right in Figure 12)

Wide regular-pattern terraced fields in karst poljes and river valleys as described in Andlar et al. (2017) are associated with large karst depressions with shallow terracing and with mildly undulating bottoms. Due to their spaciousness and gentle slopes, regular (sometimes planned) patterns are common (Andlar et al., 2017). The enclosed fields are common but usually combined with low height terraces, forming a mixed crop system defined by the proximity of settlements and a complex history (Andlar et al., 2017). Such example is Stari Grad Plain on the island of Hvar, where the UNESCO-listed geometrical land division system established by the ancient Greeks is still agriculturally active today (Figure 11e). This geometrical system is today mostly manifested in shallowly terraced and highly fragmented small scale dry stone wall enclosures. The intensity of fragmentation and amount of stone walls can be seen in the GIS map (Figure 13); an area of 1.376 ha counting cca 205 ha of stone piles and massive walls, and cca 420 km of stone walls.

d) Enclosed terraced fields: wide irregular patterns (top left in Figure 12)

Wide irregular-pattern terraced fields in karst uvalas and large dolines, as described in Andlar et al. (2017), are associated with moderate-sized karst depressions with pronounced relief and consequently irregular and organic terrace and enclosures patterns (Figure 11f). This is a typical rural landscape pattern in the Adriatic hinterland; it involves various land uses with mixed crops and is related to small nucleated or scattered settlements and hamlets located above the field (Andlar et al., 2017).

Enclosed karst clearings for crops

Unlike enclosed fields, this type is defined by rocky substrate with scarce or absent soil, and it is found on



Figure 15: a) Irregular stone wall enclosures with inner ellipsoid shaped piles - fire-struck area in the hinterland of Milna on Brač island (Photo: Goran Andlar); b) Irregular stone wall enclosed olive groves with the piles more spontaneously laid out than in the previous example, also on Brač island (Photo: Goran Andlar); c) Irregular stone wall enclosures and stone piles – Modrave (Photo: Goran Andlar).

flattened to mildly sloped areas. In such conditions, the cultivation was dominantly determined by stone removal and stacking in walls and piles, and thus creating small fragmented patches of soil for crop growing. In the absence of soil, it would be brought from the surrounding areas. The karst clearing enclosure type is highly represented in the Croatian Adriatic. Its greater emergence is mostly related to periods of karst bonification and specific economic conditions that pushed the cultivation of such extremely harsh environment: mostly vine or the olive monoculture that could economically justify the effort of clearing the karst.

a) Organic patterns (Figure 14)

A very representative type on the study area, typical for flattened to mildly sloped karst areas whereas the stone was stacked in field boundaries and piles, while the terracing was not so common (Figure 15c). The characteristic organic, spontaneous pattern is probably the result of initial cultivation for old grapevine cultivars and olive, which tolerate irregularly shaped plots and rockiness. Along with stone walls boundaries, the great diversity of piles with various shapes and layout (detached, as boundary, regular and irregular patterns) and functions (including vineyard-keeping posts, catching birds etc.). Representative area of this type are the Brač island olive groves (Figure 15a and 15b).

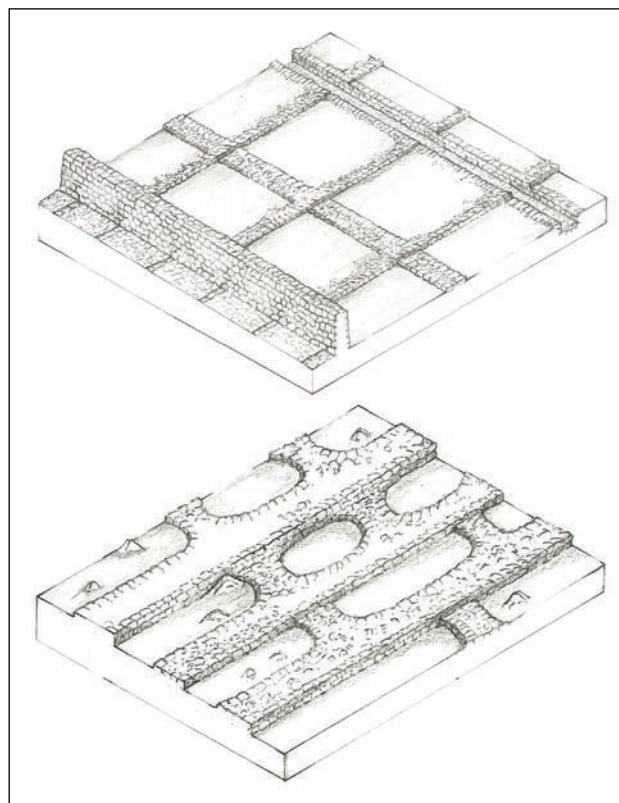


Figure 16: Illustrations of enclosed karst clearings of regular pattern (Anita Trojanović).

b) Rectangular patterns (Figure 16)

The variation of previous type, but specific for the irregular plot pattern (Figures 17a to 17d). The regularity can be related to initial cultivation of vine and to some economic, social or environmental conditions such as organised clearing and enclosing of the land (Figure 17a), but also the configuration of relief etc. For example, the regularity of the pattern increases along with the pitch of the terrain, so this type of enclosures is often a transitional category between enclosure and terrace (Figure 17d)

The particularly interesting is the case of olive groves surrounding the town of Cres and Cres bay on the eponymous island, counting 100.000 olive trees (300.000 in the past) within the area of 2.3 ha. The whole area is intensively divided with stone wall enclosures in various regular and irregular patterns (Figure 18). This large olive grove is in fact a rare agro-pastoral system where sheep graze freely and simultaneously manure the olives.

c) Pockmarked karst enclosures (Figure 19)

Pockmarked karst (*ljut*, *ljutina*, *jut*) is found on flattened to mildly sloped terrain and is characteristic for its rockiness and grit stone substrate deprived of soil. This is an extremely inaccessible and harsh environment which strongly limits the human interventions to

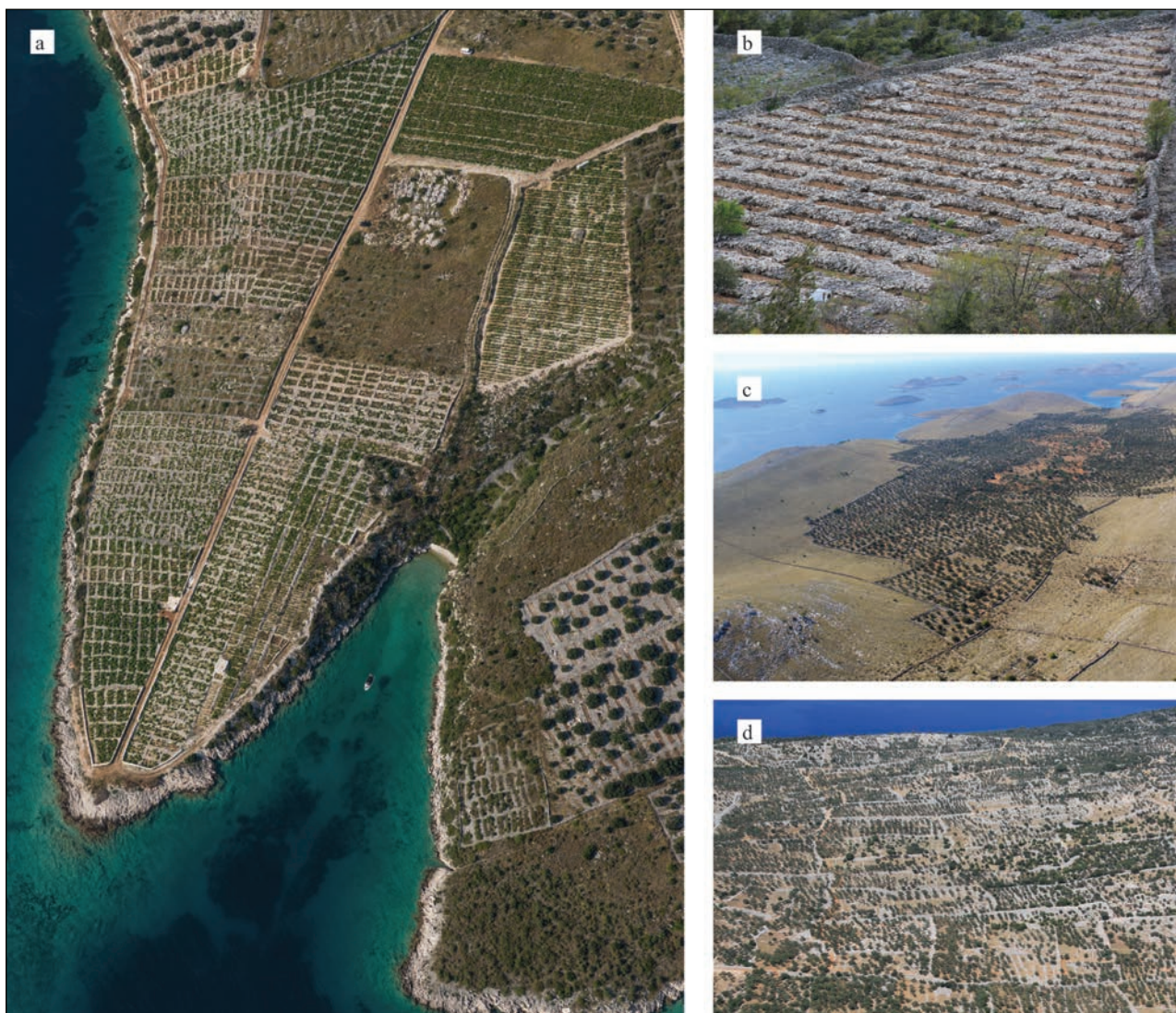


Figure 17: a) Regular plot is subdivided by the rectangular raster of small enclosed and shallowly terraced vineyards (*vlačice*). The most famous such landscape is Bucavac vineyard (Photo: Goran Andlar); b) Similar vineyard patterns can be found in the vast area of Primošten and Trogir hinterland - Blizna (Photo: Goran Andlar); c) Olive grove enclosures of regular pattern surrounded with pastures - Kornat island (Photo: Goran Andlar); d) Olive groves surrounding the town of Cres form one of the biggest olive growing areas in Croatian Adriatic. Various stone wall patterns can be found; in the flattened areas closer to town, rectangular patterns are typical (Photo: Goran Andlar).

mere clearing the natural voids in the rock, slightly reshaping them and filling with soil in order to grow, usually individual, plant (olive, grape, fig, cherry tree). The terrain modelling was almost impossible, stone walls were rare and used only for enclosing the plot. The excess stone was thrown on spontaneous piles. The shape of enclosed plot is adopted to terrain and stone configuration (Figures 20a, 20b and 20c). This kind of land use can be found along the Croatian Adriatic as a microlocation phenomenon (not particularly related only to pockmarked karst), but only on the Konstanjska ljuta area it is present within the area large

enough to form a specific type (class), with the local name *pasike* (Figure 20).

CONCLUSION

This paper is conceptually and methodologically a sequel to the previously published paper on terraced landscapes of the Croatian Adriatic. The main contribution of the paper is to show the diversity of enclosed landscapes of the Croatian Adriatic region and to present an original classification followed by standardized nomenclature that acknowledges their

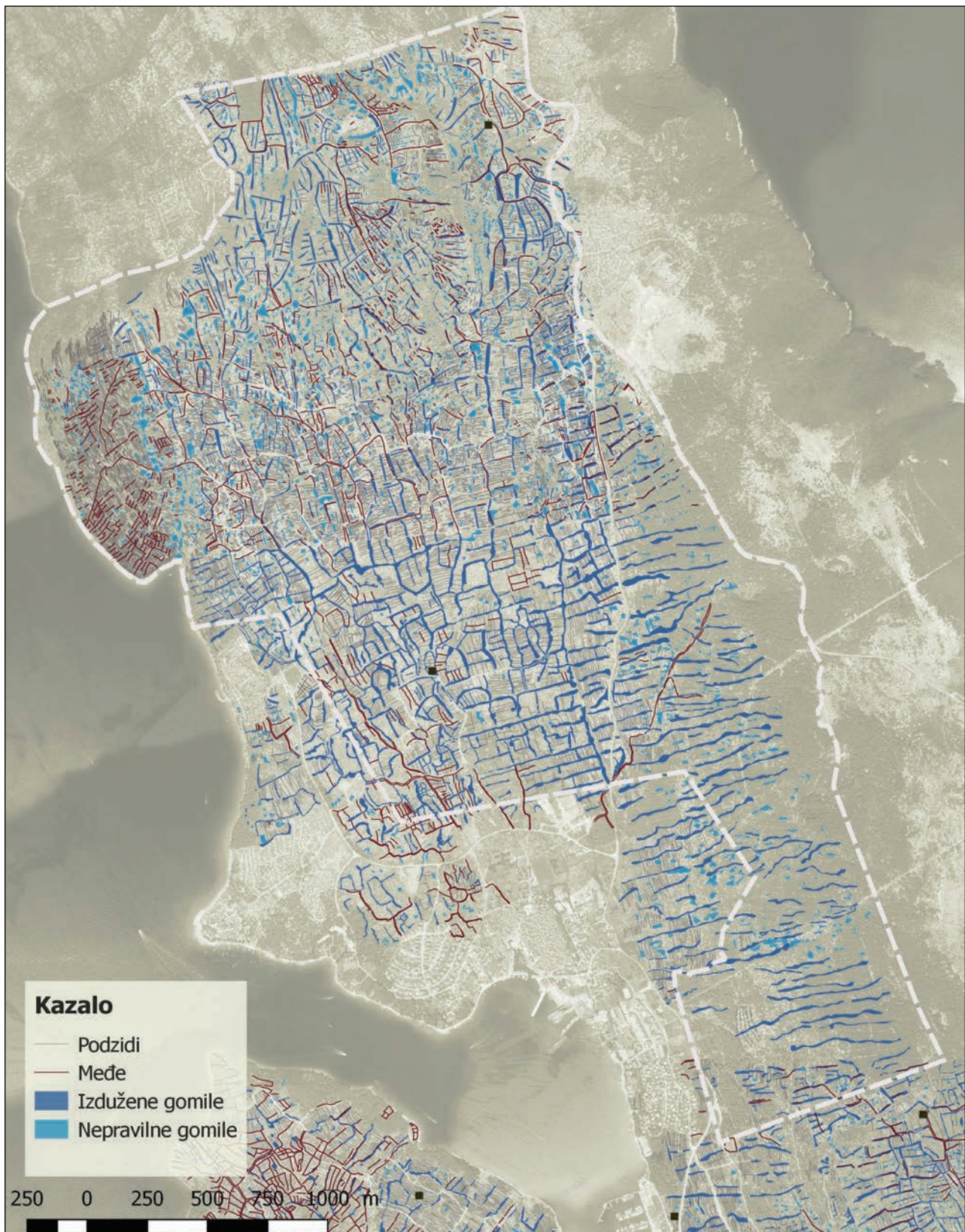


Figure 18: GIS map of stone walls in Cres olive groves showing 304 km of retaining stone walls, 60 km of stone wall field boundaries, 124 ha of elongated regular stone piles and 35 ha of irregular stone piles.

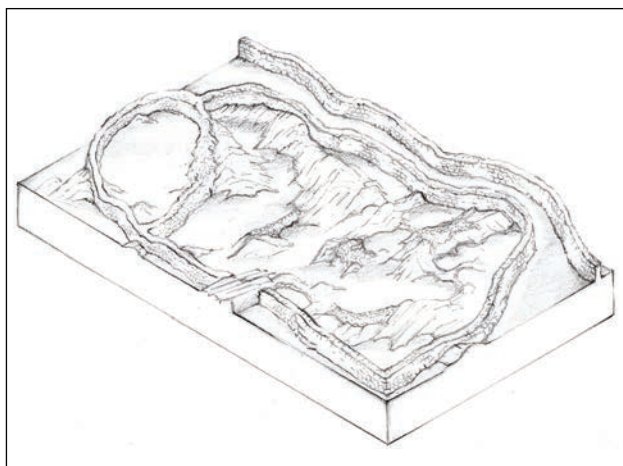


Figure 19: Illustration of pockmarked karst enclosures (Anita Trojanović).

functional and structural features and which should facilitate further interdisciplinary research, comparisons between different case studies and creating databases.

The classification resulted from adoption and elaboration of framework presented in Andlar and Aničić (2018) and using the description and presentation model from Andlar et al. (2017). In comparison to Andlar and Aničić (2018) the subclasses are herein thoroughly described. Same as in Andlar et al. (2017) the description was based on 'landscape pattern' concept - the synthesis of information on land use, land structure, geomorphology, soil, agricultural practices and economic history. The description also pointed out the subclass' spatial distribution, and was followed by particular examples, photos and illustrations. The enclosed landscapes are recognised within five main classes of (agri)cultural landscape (*pastures, managed woodlands, karst clearings for crops, terraces, fields*). In addition, the new main classes are identified here; *micro-clusters* and *individual enclosures*. These are distinctive classes which can be associated with various land uses and as such they could have been extracted as separate subclass within *pastures, managed woodlands, terraces* and *fields*. But due to their strong visual distinctiveness and functional self-sufficiency, they form a unique microsystem phenomenon that should be interpreted separately. Altogether, six general classes have been recognised and fourteen sub-classes (there is an indication of a large number of variables of each class unlocking the great potential for further research and registration/mapping particular examples along researched area).

The facts presented in the previous paragraph indicate great diversity and presence of enclosed landscape, and thus confirm the research hypothesis. The extremely complex topographic situation of the Adri-



Figure 20: a) Olive grove enclosures on the pockmarked karst on a small mound; natural rocks are complimented with piled stones thusly forming small plots for an individual olive (Photo: Goran Andlar); b) Vineyard enclosure on the pockmarked karst in a shallow sinkhole (Photo: Goran Andlar); c) The most active enclosures on the pockmarked karst are those next to the village, in this case village Kostańje (Photo: Goran Andlar).

atic Croatia is probably the basic reason for the complexity of its cultural landscapes, since the general cultivation methods have been pretty much basic and similar throughout the Mediterranean, even through time. Different shapes and different dispositions of the cropland and livestock enclosures are the consequence of the different local topographic conditions; to maximise the effect of the hard work of building dry-stone walls, man had to engage as much of the natural configuration as possible into the landscape layout. The best example are the enclosed dolines or sinkholes, sometimes ridiculously small, scattered in different formations over the rocky hills or grouped in the mountain valleys. Additionally, local agricultural practices and the distinct topography created a wide range of different micro-structural types and forms while the numerous and diverse names for the same or similar forms and the same names for various forms can be interpreted as a result of a multivariate and dynamic cultural and historical context.

After the research done on both terraced and enclosed landscapes of Croatian Adriatic, we would like to emphasize that the dichotomy, which has become common in the study of dry-stone landscapes, doesn't really fit the immense complexity of cultural landscapes of this area, where 'enclosed' and 'terraced' generally come together, interwoven and complemented by diverse forms and patterns of stone deposit heaps within the parcels - in the way that one can hardly compare to any other region in the world.

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ODKRIVANJE KULTURNE KRAJINE NA HRVAŠKEM: ZGODOVINA IN KLASIFIKACIJA HRVAŠKE JADRANSKE OGRAJENE KRAJINE

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POVZETEK

Hrvaški Jadran je tipična regija s suhimi zidovi. Ključna značilnost njenih podeželskih območij je nizka intenziteta kraškega poljedelstva za katero je značilno razdrobljeno zemljišče ograjeno s suhimi zidovi. Prisotnost, gostota in raznovrstnost krajin ograjenih s zidovi predstavljajo veliko dediščino, gospodarski, turistični in ekološki potencial, vendar niso dovolj prisotni v ustreznih sektorskih politikah in so do zdaj splošno neznani širši in strokovni javnosti. Zato je v tem strokovnem spisu predstavljena različnost hrvaških primorskih ograjenih krajin skozi njihovo klasifikacijo in zgodovino. Uporabljen je model »krajinskega vzorca« - sinteza informacij o rabi zemljišča, strukturi zemljišča, geomorfologiji, tleh, kmetijskih praksah in gospodarski zgodovini. Rezultat je izveden na osnovi dolgotrajnih raziskav, ki so vključevale terensko delo, dokumentacijo posnetkov na zemlji in letalskih posnetkov, raziskovanje krajinske zgodovine, izdelavo in analizo različnih prostorskih in kartografskih GIS podatkov. Spoznanih je šest splošnih razredov (mikro-klasteri, posamezne ograde, upravljani gozdovi, pašniki, polja in kraške krčevine za pridelke), ter štirinajst podrazredov, opisanih in predstavljenih z ilustracijami, fotografijami in GIS podatki.

Ključne besede: kulturna krajina, ograjena krajina, ograda, suhi zid, hrvaški Jadran, zgodovina krajine

SOURCES AND BIBLIOGRAPHY

- Aalen, F. H. A., Whelan, K. & M. Stout (2011):** Atlas of the Irish Rural Landscape. Toronto, University of Toronto Press.
- Andlar, G. (2012):** Outstanding Cultural Landscapes of the Croatian Adriatic. Doctoral Thesis. Zagreb, Faculty of Agriculture, University of Zagreb.
- Andlar, G. & B. Aničić (2018):** Multi-method Approaches to Cultural Landscape Assessment in Croatia. In: Fairclough, G., Sarlöv Herlin, I., Swanwick, C. (eds.): Routledge Handbook of Landscape Character Assessment. London, Routledge.
- Andlar, G., Šrajter, F. & A. Trojanović (2017):** Classifying the Mediterranean Terraced Landscape: The Case of Adriatic Croatia. *Acta Geographica Slovenica*, 57, 2, 111–129.
- Bedalov, J., Bogovac, L., Bolčević, M., Cerovečki, B., Celić, I. & M. Slijepčević (2017):** Student Work: A Guide for the Revitalisation of Stari Grad Plain. Zagreb, Faculty of Agriculture, School of Landscape Architecture, University of Zagreb.
- Batović, Š. (2004):** Benkovački kraj u prapovijesti. Zadar, Matica hrvatska.
- Bognar, A. (1999):** Geomorfološka regionalizacija Hrvatske. *Acta geographica Croatica*, 34, 7–26.
- Bratulić, J. (ed.) (1992):** Istarski razvod (3. izd). Pula, Libar od grozda.
- Bura, D. (1955):** Prebirni način gospodarenja u niskim privatnim šumama crnike (*Quercus ilex*) na otoku Olibu. *Šumarski list*, 7-8, 156–176.
- Buršić-Matijašić, K. (2008):** Gradinska naselja: Gradine Istre u vremenu i prostoru, Zagreb, Leykam international.
- Carter, F. W. (1992):** Agriculture on Hvar During the Venetian Occupation: a Study in Historical Geography. *Hrvatski geografski glasnik*, 54, 1, 45–61.
- Chapman, J., Shiel, R. & Š. Batović (1996):** The Changing Face of Dalmatia. London, New York, Leicester University Press in association with the Society of Antiquaries of London.
- Clark, J., Darlington, J. & G. J. Fairclough (2004):** Using Historic Landscape Characterisation, English Heritage Review of HLC Applications. London, English Heritage.
- CRDP (2015):** Rural Development Programme of the Republic of Croatia for the Period 2014–2020. Zagreb, Ministry of Agriculture.
- Crow, J., Turner, S. & A. Vionis (2011):** Characterizing the Historical Landscapes of Naxos. *Journal of Mediterranean Archaeology*, 24, 111–137.
- Cvijić, J. (1918):** Hydrographie souterraine et évolution morphologique du karst. *Recueil des travaux de l'institut de géographie alpine*, 375–426.
- Cvitanić, A. (ed.), (1991):** Hvarski statut. Split, Književni krug.
- Dokoza, S. (2009):** Dinamika otočnog prostora – društvena i gospodarska povijest Korčule u razvijenom srednjem vijeku. Split, Književni krug Split.
- Fairclough, G. & Eucaland Project contributors (2010):** Complexity and Contingency: Classifying the Influence of Agriculture on European Landscapes. In: Pungetti, G. Kruse, A. (eds.): *European Culture Expressed in Agricultural Landscapes: perspectives from the Eucaland Project*. Roma, A. Palombi Editori, 115–148.
- Filipčić, A. (1998):** Climatic Regionalization of Croatia according to W. Köppen for the Standard Period 1961–1990 in relation to the Period 1931–1960. *Acta Geographica Croatica*, 33, 1–15.
- Frangješ, G. (2013):** Rapski zagoni - višeprostrorni suhozidni objekti za razvrstavanje ovaca. Rapski zbornik.
- Fučić, B. (1998):** Veli mrgar, in: *Terra incognita*. Zagreb, Kršćanska sadašnjost, 179–182.
- Glamuzina, N. & B. Fuerst-Bjeliš (2015):** Historijska geografija Hrvatske. Split, Sveučilište u Splitu, Filozofski fakultet.
- Grove, A. T. & O. Rackham (2001):** The Nature of Mediterranean Europe: An Ecological History. New Haven, CT and London, Yale University Press.
- Horvatić, B. (2000):** Mrgari, rožice od gromače. *Krčki kalendar* 7, 93–102.
- Horvatić, B. (2010):** Jadranski suhozidi: Baška-mrgari. <http://www.dragodid.org/jadranski-suhozidi-baska/> (last access: 6. 8. 2018).
- Hughes, D. J. (2005):** The Mediterranean: An Environmental History. Santa Barbara, California, ABC-CLIO.
- Jardas, F. (1964):** Prilog poznavanju ovčarstva i pramenke na otoku Cresu. Digitalna zbirka Hrvatske akademije znanosti i umjetnosti, *Rad JAZU*, 11, 101–143.
- Jurkota Rebrović, M. (2009):** Tradicijsko ovčarstvo otoka Cresa: prilog istraživanju. Lubenice, Centar za održivi razvoj - Eko park Pernat.
- Kale, J. (2006):** Kamen po kamen – krajolik. *Hrvatska revija: dvomjesečnik Matice hrvatske, Obnovljeni tečaj*, 6, 2, 83–91.
- Kale, J. (2010):** Prijedlog modela inventarizacije suhozida. *Zagreb, Prostor*, 18, 2, 452–467.
- Kale, J. (2013):** Dudićev osik kao krajobrazni ključ. In: Skračić, V. (ed.): *Toponimija Otoka Paga*. Zadar, Centar za jadranska onomastička istraživanja Sveučilišta u Zadru, 251–261.
- Kasandrić, I. (1978):** Gratia - agrarni odnos na općinskoj zemlji. Prilozi povijesti otoka Hvara, 5, 1, 53–73.
- Kauders, A. (1963):** Pošumljavanje krša u SR Hrvatskoj. *Šumarski list*, 11-12, 393–398.
- Klisura, M., Kuničić, M., Rimac, M., Trojanović, A. & J. Vrabec (2017):** Student Work: Agricultural Landscape Revitalisation Plan of the Town of Cres. Zagreb, Faculty of Agriculture, School of Landscape Architecture, University of Zagreb.
- Kovačić, J. (1993):** Hvarski ager u srednjem i novom vijeku. *Mogućnosti*, 40, 1/2, 208–214.

- Kraljević, R. (1994):** Vinogradarski slom i demografski rasap Južne Hrvatske u osvit 20. stoljeća: Vinogradarstvo Dalmacije 1850–1904: uspon, procvat, klonuće. Split, Književni krug.
- Kulušić, S. (1999):** Tipska obilježja gradnje “u suho” na kršu Hrvatskog primorja (na primjeru kornatskih otoka). Hrvatski geografski glasnik, 61, 1, 53–83.
- Kulušić, S. (2006):** Knjiga o Kornatima. Murter, Murterski zbor.
- Lambrick, G., Hind J. & I. Wain (2013):** Historic Landscape Characterisation in Ireland – Best Practice Guidance. The Heritage Council, The Heritage Council of Ireland Series.
- Marković, M. (1980):** Narodni život i običaji sezonskih stočara na Velebitu. Zbornik za narodni život i običaje, 48, 5–139.
- McNeill, J. R. (2003):** The Mountains of Mediterranean World: An Environmental History. Cambridge, Cambridge University Press.
- Moore, A., Mengušić, M., Smith, J. & E. Podrug (2007):** Project “Early Farming in Dalmatia”: Danilo Bitinj 2004–2005 (Preliminary results). Journal of the Archaeological Museum in Zagreb, 40, 15–24.
- Müller, G. (2013):** Europe’s Field Boundaries. Stuttgart, Neuer Kunstverlag/Neuer Sportverlag.
- NN (2017):** Excerpt from The Register of Cultural Goods of the Republic of Croatia. Official Gazette, 03/2016, 44/17.
- Prpić, B. & H. Jakovac (2003):** Nadzorništvo - inspektorat u Senju na stranicama “Šumarskoga lista”. Šumarski list, 126, 107–110.
- Rendić-Miočević, D. (1969):** Novi Dolabelin „terminacijski“ natpis iz okolice Jablanca. Journal of the Archaeological Museum in Zagreb, 3, 1, 63–74.
- Širovica, F. (2015):** Pod kod Bruške - analiza nalazišta s osvrtom na problematiku pretpovijesne suhozidne arhitekture. Opvscvla archaeologica, 37/38, 50–93.
- Soldo, J. A. (2005):** Grimanijev zakon: zakon za dalmatinske krajine iz 1755./56. godine. Zagreb, Kartografija i geoinformacije, 6, 8, 89–91.
- Suhozid (2018).** <http://suhozid.geof.unizg.hr>. (last access: 8. 6. 2018).
- Suić, M. (2003):** Antički grad na istočnom Jadranu. Zagreb, Institut za arheologiju.
- Šoljić, A., Šundrica, Z. & I. Veselić (eds.) (2002):** Statut grada Dubrovnika - sastavljeno godine 1272. Dubrovnik, Državni arhiv.
- Troglić, S. (1980):** Novija literatura o agrarnim odnosima u Dalmaciji u vrijeme druge austrijske uprave. Radovi: Radovi Zavoda za hrvatsku povijest Filozofskoga fakulteta Sveučilišta u Zagrebu, 13, 1, 207–220.
- Tudor, A. (2004):** Ladanjska izgradnja i formiranje agrarnog krajolika – primjeri zapadnog dijela otoka Hvara. Zbornik I. kongresa hrvatskih povjesničara umjetnosti, Zagreb.
- UNESCO (2018):** Representative List of the Intangible Cultural Heritage of Humanity, Files Under Process, No. 1393. <https://ich.unesco.org/en/files-2018-under-process-00913>. (last access: 22. 8. 2018).
- Vinšćak, T. (2002):** Veli mrgar ili cvijet u kamenu. Studia ethnologica Croatica, 10/11, 1, 89–93.
- Vrkić, Š. (2015):** Novi nalaz rimskog međašnog zida u Golubiću kod Obrovca. Archaeologia Adriatica, 8, 1, 101–122.
- Vrkić, Š. (2017):** Tko je izgradio veliki suhozid na istoku Bukovice? Miscellanea Hadriatica et Mediterranea, 3, 1, 25–62.
- Žuvela-Doda, B. (2008):** Priko luških mejah. Zagreb, Društvo VELA LUKA, Luško libro, 16.