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THE TERRACED LANDSCAPE AS A PART OF THE DUBROVNIK REGIONAL IDENTITY: CROSS TIME STUDY OF THE REGION DUBROVAČKO PRIMORJE (REPUBLIC OF CROATIA)

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ABSTRACT

Terraced landscapes are a part of the identity of the Mediterranean region of Dubrovačko Primorje in Croatia and are recognised as part of its cultural heritage. Increasing tourism development is causing various problems that are reflected in the landscape, specifically in the disappearance of the features of these outstanding spaces. In Croatia, this is especially evident due to a lack of protection of these landscape elements in Croatian law as well as a lack of awareness of their value within the local community. The main focus of this study is on changes in terraced landscapes over the passing of time. Research was first conducted in 2001 and 2002. The comparative analysis carried out in this study shows that despite evident revitalisation of areas closer to the sea, other spaces with terraces have a higher level of abandonment and devastation. These processes have brought about a number of different consequences, mostly connected to social factors, as awareness of the value of these outstanding spaces within the local community is crucial for its subsistence.

Keywords: agricultural terraces, terraced landscape, Mediterranean area, Dubrovačko Primorje, Croatian dry stonewalls structures

IL PAESAGGIO TERRAZZATO COME PARTE DELL'IDENTITÀ REGIONALE DI DUBROVNIK: RICERCA NEL TEMPO DELLA REGIONE DUBROVAČKO PRIMORJE (REPUBBLICA DI CROAZIA)

SINTESI

Il paesaggi terrazzati sono una caratteristica della regione mediterranea in Croazia e sono riconosciuti come patrimonio culturale. Il veloce sviluppo turistico sta causando molti problemi che si riflettono nel paesaggio facendo scomparire questi fenomeni ambientali. In Croazia ciò succede a causa della mancanza degli strumenti di protezione per questi paesaggi e della non consapevolezza dei valori all'interno della comunità locale. Pertanto, l'obiettivo principale di questa ricerca è focalizzato sui cambiamenti dei paesaggi terrazzati nel tempo. La prima esplorazione è stata condotta durante gli anni 2001 e 2002. Le analisi comparative di questo studio con la situazione attuale hanno mostrato che nonostante l'evidente rinascita delle aree più vicino al mare, sono sempre di più i paesaggi a terrazze con un elevato grado di abbandono e devastazione. Questo processo ha portato a una serie di conclusioni diverse, per lo più legate agli aspetti sociali, poiché la consapevolezza per i valori ambientali all'interno della comunità locale è importante per la sua sopravvivenza.

Parole chiave: terrazze agricole, paesaggi terrazzati, area mediterranea, Dubrovačko Primorje, strutture croate di muretti a secco

INTRODUCTION

Terraced landscapes are a typical element of Dubrovačko Primorje, a region situated north of Dubrovnik. They represent an inherent element of the landscape, mostly connected to the coastal zone and areas around villages in the hinterland. As they are a defining visual characteristic of the extensive area, they can also be considered an element that gives *genius loci* to the space. This research is focused on the spatial distribution, classification and aspects of terraced landscapes that must be considered in their future evaluation (which is not a part of this study). As this region has evidence of human activity from ancient times, they also need to be looked at as an historical element of the space. Their significance therefore has a very complex background that needs to be examined from different perspectives. Because terraced landscapes define the visual character of the space, their structural character must be defined by a classification of forms. Their structural forms are closely connected to the natural background.

Therefore, they cannot only be explored by their structural forms and vitality, but also as an element that is closely connected to the area's natural (geology, geomorphology, and pedology, in which particularly important information is relief and soil character), as well as its socio-cultural background (historical development, social significance and as an element of cultural heritage). Moreover, they are a part of an area that is developing as a rural touristic destination and therefore must be recognised as a resource for this activity. Besides agricultural productivity of food, they contribute to the visual complexity of the site and should be considered part of a cultural heritage that has a strong associative character due to its historical significance connected to the human communities and their connection to the landscape. Exploration of their agricultural vitality conducted in 2002 and in 2012 shows us the direction of the positive trends in development. Implementation for the protection of these elements in Croatia is unsatisfactory and does not recognise them as an important element of the landscape. In these kinds of circumstances, they are considered quite vulnerable and so can be easily erased by the development of housing and other infrastructure in the area.

Based on analysis of the relevant materials, this research sets out to propose the working hypotheses:

- Terraced landscapes are a recognisable landscape feature of the area of Dubrovačko Primorje. They show diverse elements in their structural character, which are mainly influenced by relief and pedology (the natural aspect). Although formed in a natural setting, they have since given ecological value to the site (the ecological aspect).
- Their origins can be traced to various historical periods connected to human agricultural activity within the area (which can be explored through the historical, cultural and social aspects).
- The last decade has shown substantial changes in their usage in which a trend in their recultivation is visible in the approachable areas.
- Terraced landscapes are a form of Croatian cultural heritage, but a lack of implemented protection in Croatian law leaves them vulnerable to change.

WORKING METHODS

This study was based on various aspects of research of terraced landscapes. In the exploration of spatial elements within the landscape, structural analyses usually stand as a very important factor. This is evident from the research carried out by Grove and Rackham (2003), Andlar and Aničić (2017). They explored the structural character in order to make a spatial classification of the terraced landscapes. Their method was used in this research but further developed into micro-scale by a subdivision of classes.

Extensive literature and cartographical analysis (historical, thematic) were the basis for interpretation of the results and finding the causality of development of the terraced landscapes. This was made in order to gain knowledge about the discovery of their historical usage and the period of their construction, as well as for the understanding of their connection to the natural elements that have influenced the development of their structural character. As this study is based on landscape changes that occurred during a time with a purpose of research of spatial changes within certain time periods, comparative analysis was used for two periods: 2002–2012 and 2002–2018. For each period, various analytical tools were used, as elaborated below. This was done in order to determine spatial changes within a time period in order to conduct knowledge about their transformations. The results gave us information that was usable for predictions of scenarios of further processes. Since the preparation of spatial data and further spatial analysis used Corine Land Cover (Coordination of Information on the Environment Land Cover, CLC, 2000/2012) and land use maps as a base, it was inevitable that the year 2012 was chosen instead of 2018, as CORINE 2018 had not been released yet. Still, the orthophotos used were from a recent date (2018), as well as the conducted field research.

Therefore, research done for these hypotheses was based on analysis of data from various fields, directly or indirectly connected to the landscape processes (pedology, geology, geomorphology, vegetation, water features and cultural landscape structures derived from the orthophotos in 2002 and 2018 using GIS tools). The next step was to analyse the data on the terrestrial habitats, Corine Land Cover and land use map. Results were checked through the overview of DOP, taken from WMS services of the National Geodetic Administration (http://www.geoportal.hr/). Maps were processed in GIS applications where they were also graphically repre-

sented and described. Extensive field research was also conducted during two time periods (2002 and 2018). The former included aerial photography with drones, in order to gain more accurate data for analysis. Comparisons of the information from this database were used for detailed analysis.

A limitation to this research was that there were large surfaces beneath the woodland coverage, which investigations in 2002 did not recognise as terraced landscapes, due to the fact that they were not visible. Usage of newer technology such as aerial photographs made by drones in 2018 and recent orthophotos have enabled insight into the latent and overgrown terraced landscapes. Results, therefore, cannot be precise and statistically compared due to development of analytical technologies and consequently different surfaces that went under process of analysis. However, both types of spatial analysis resulted in maps of spatial distribution of the terraces that showed us the general direction of the changes, which should be further researched.

Exploration of present Croatian legislation on the issue of cultural landscape and European Union (EU) policies and practices that deal with this matter, pointed out the gaps between the regulations for the treatment of the terraced landscapes and the actual situation. It also indicated usable information for their possible development under EU funding.

LOCATION

The area of exploration, Dubrovačko Primorje, is situated within the southern part of the Croatian coast. The space is defined by a northern border with Bosnia and Herzegovina, the coast to the south west and the south eastern part bordering the town of Dubrovnik. The location is defined primarily by rural landscapes that have begun their transformation into semi-urban areas along the coastline. The area is therefore defined by the coastal zone, oriented towards the sea, and by the hillside background, defined by the typical Mediterranean karst region. Ten settlements are the defining habitation areas with less than 1,000 people living in it. Historically, these settlements utilised the surrounding landscape as a production area with many different types of agricultural landscapes. These terraces are among the most represented landscape features, significantly defining the *genius loci*.

TYPES OF TERRACED LANDSCAPES AND THEIR DIVISION WITHIN THE EXPLORED AREA

Research of studies concerning terraced landscape classification has shown a certain lack of methodological uniformity and standardised classification (Andlar, 2012). Perhaps the most extended exploration was made within the Interreg project ALPTER, which dealt with the problems of abandoned terraced agricultural areas of the alpine region (2005-2008). There were also other projects dealing with terraced landscapes such as PATTER, PROTERRA, TERRISC as noted in Ažman Momirski and Kladnik (2015). Moreover, cultivated terraced landscapes are included in the EU rural development plan (2007-2013), as well also in the Biodiversity Action Plan for Agriculture and Soil Thematic Strategy.

The neighbouring Slovenia has done a notable amount of research throughout the last few decades on the topic of terraced landscapes and various aspects that concern it (Titl, 1965; Bračić, 1967; Belec, 1968; Plut, 1977; Kladnik, 1990; Drobnjak, 1990; Ažman, Momirski, Berčič, 2007; Kladnik et al., 2016; Likar, 2017; Šmid Hribar et al., 2017). The first attempt to review all terraced landscapes in Slovenia, including their typologies, was introduced by Ažman Momirski and Kladnik (2008, 2009, 2012).

Perhaps the most distinctive and usable classification of terraced landscapes for this research is the one done by Grove and Rackham (2003) with the example of Crete, which can be adapted and used for the whole of the Mediterranean area. It is categorised into steep terraces, pocket terraces, braided terraces, check-dam terraces and terraced fields.

Within the Croatian territory there were several studies done that investigated terraced landscapes from different aspects (Freudenreich, 1962; Gams, 1991; Slapšak et al., 1998; Kulušić, 1999, 2006; Zaninović, 2002; Aničić and Perica, 2003; Tudor, 2004; Kale, 2006, 2008, 2010; Borovičkić, 2008; Petrić, 2008; Buble, 2009; Zupančič, 2010 and Lozić et al., 2013).

Aničič and Perica (2003) classify drywall terraces based on the slope of the terrain on which they are raised: (a) terraces built on karst slopes with an incline of 13–44%, (b) terraces for the cultivation of vineyards, and (c) terraces built on slopes with an incline of 44% or more. Andlar (2012) distinguishes several landscaping terraces: (a) regular longitudinal terraces, (b) regular rectangular terraces, (c) irregular geometric terraces, (d) terraced fields and (e) terraced colluvial curtains. This categorisation was developed in later research (Andlar and Aničić, 2017; Andlar et al., 2017) and was proposed (Andlar and Aničić, 2017) for the classification of Croatian terraces on a national level.

Terraces have been classified by certain criteria of land formation (structure) as follows: (1) Terraced field landscapes (a) Wide regular-pattern terraced fields in landscapes with the karst field and river valleys, (b) Wide irregular-pattern terraced fields in landscapes with the karst basin and large valleys, (c) Terraced fields in landscapes with shallow ravines and dry valleys, (d) Terraces and terraced field landscapes on colluvium, (e) Unwalled terraced field landscapes); (2) Hillside terraced landscapes (f) Regular-pattern step-terraced landscapes, (g) Irregular-pattern terraced landscapes, (h) Pocket-pattern terraced landscapes, (i) Off-contour terraced landscapes.

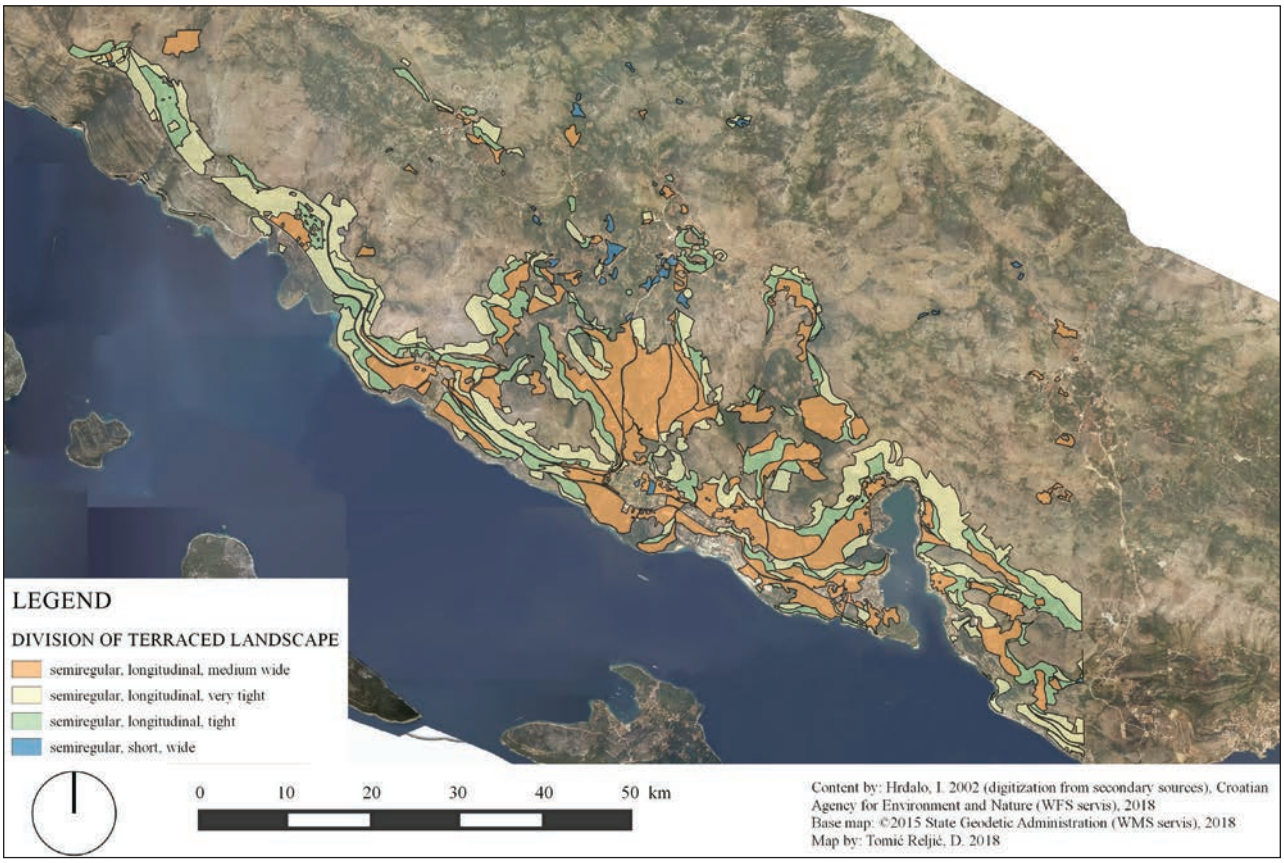


Figure 1: Spatial distribution of subdivision of terraced landscapes (Hrdalo, 2002; Tomić Reljić, 2018).

This research demonstrated just two different types of terraces within the investigated area, according to Andlar and Aničić (2017): types of terraces (g) Irregular-pattern terraced landscapes (most represented), (h) Pocket-pattern terraced landscapes (but in a small percentage). At the same time, similar results were shown in comparison to the Grove and Rackham classification where only steep terraces and terraced fields were also found (2003). Therefore, the division of terraced landscapes in the investigation of 2002 by Hrdalo et al. (2008) was the most suitable for an explored site, as that research was based on smaller units which can be considered micro-locations, thus our approach was based on a micro-scale.

Therefore, in this research subdivisions of terraced landscape were: A – semi-regular, longitudinal, very tight; B – semi-regular, longitudinal, tight; C – semi-regular, longitudinal, medium wide; D – semi-regular, short, wide (Figure 1). Those that are longitudinal are connected to the curvilinear shape of the slopes, while its tightness is connected to the steepness. Thus tighter ones are also the steepest (A 32–55°, B 12–32°, C up to 12°, D up to 12°). Collected information showed that relief caused development of different structural types (Figures 2 and 3). At the same time development of its forms were influenced by depth of soil – in flatter areas, where soil was deep, terraces were wider. In situations where steep terrain caused lack of soil, terrace structure was more longitudinal, and terraces were tighter.

The study did not differentiate between those once connected to the field or only to the hillside because there were spaces that could fit into both categories. Our method therefore was based on their shape, which was overlaid with different thematic maps in order to understand their development, and hypothesising their tendencies and trends in the future.

ECOLOGICAL VALUES OF TERRACED LANDSCAPE

Many authors have reported on the ecological significances of terraced landscapes (Tarolli et al., 2014; Petit et al., 2012; Lavorel et al., 2010). Likar (2017) has reported a very interesting piece of research. He wrote that stone terraces accumulate heath during winter days, returning it over the course of the day, which helps plants stay alive during cold periods. Chemin and Varotto (2008) emphasised that terraces are not "fields at altitude", but a practical system important for the stability of the threshold slopes and for the hydraulic balance of the slopes. The authors researched the *masiere* in

Figure 2: Different types of terraces, village Kliševo (Photo: A. Trojanović, 2018).

Figure 3: Different types of terraces, village Ljubač (Photo: A. Trojanović, 2018).

Brenta canal, which contain drainage for embankments, an accumulation structure for solar energy and have a function of containment for the land.

Besides the anti-erosional function of the terraces and their prevention of landslides, other studies were based on the very important significance of terraced landscapes for habitats (Tarolli et al., 2014; Petit et al., 2012; Lavorel et al., 2010). They not only support the growth of crops, but are also a specific habitat for many fauna species such as small mammals, reptiles, amphibians, birds and insects which nest in the cracks of walls. Therefore, they represent a dynamic system within the green infrastructure, as they are the location of unique ecological networks. Dry stone walls often have corridor functions and are important for connectivity. Their significance in the increase of their ecological value, when linked to other nearby natural land, lies in the fact that they enhance rich forests and macchia edges.

As a significant per cent of the explored area is located under woodland and macchia, dry stone walls have an impact on their ecological vitality. In an ecological network they can have a role as part of the stepping stone principle within the valuable ecological areas, that is, in their connectivity (Dramstad et al., 1996). Their historical usage was ecologically important due to food production in the past, while the use of chemical plant protection can lower its ecological value in the present scenario.

Therefore, in an integral approach towards the research of terraced landscapes, that represent a past way of life, ecological value is connected as well (historical agricultural production was based on eco-production). At the same time, the southern part of the coastal zone within the explored area is part of Natura 2000 and therefore this aspect of terraced landscapes must be considered and incorporated in future agricultural usage. As already mentioned, necessity for connectivity in valuable ecological areas (especially Natura 2000), by usage of dry stone walls as a connection element, can enhance their values. Moreover, as Natura 2000 is basically a base for the development of green infrastructure, which is a strategy for further development of biodiversity (see The EU Strategy on Green Infrastructure; European commission, 2018), future implementation should consider and interconnect with all the values of the terraced landscape within its area and its sustainable management protection, in securing and enhancing its ecological qualities.

HISTORICAL AND CULTURAL SIGNIFICANCE

Terraces, as spatial elements, are typical Mediterranean elements that define landscape cultural identity. Many researchers have studied their historical background. They have been an element of production landscape developed in close connection to the relief and geomorphological background. Therefore, Filipčić (1998), Bognar (1999) and Andlar (2012) argue that their close connection to the relief complexity, lack of thick soil and lack of surface water are, besides agricultural production, a very important factor in stabilisation of steep slopes.

Their presence in the Mediterranean areas has been marked from the earliest centuries of inhabitation. Many researchers write about their possible presence from the Neolithic period (Price & Nixon, 2005; Hughes, 2005), while some researchers connect them to the Bronze Age (Grove and Rackman, 2003). The Greek and Roman periods are clearly connected to the development of terraces as a division of landscape agricultural areas. Zaninović (1997) elaborated Greek agricultural divisions of the field in the island of Vis (Greek Issa) as well as the Stari Grad plan on the island Hvar (Zaninović, 2002). As these fields are spread along the surrounding landscape slopes, they are developed in the form of terraces and therefore connected to the explored topic. It was during the Middle Ages that medieval communal statutes began to regulate the development of the space within their jurisdiction. One of the more integral sets of laws concerning management and development of the space (urban and agricultural conditions) was the Dubrovnik statute from the year of 1272. In Chapter Five, subchapters XXIV and XXV, it describes a set of building regulations for the dry stone walls of the terraces (Trojanović, 2015; Dubrovački statut, 1990). Andlar et al. (2017) mentions that according to Delort and Walter (2002) the flourishing of agrarian production from the eleventh to thirteenth century, due to the agrarian revolution and economic development, can be connected to the spread of terraced areas. The same authors emphasise the fact that a bird's eye view of the island of Korčula, made by Simon Pinargenti from 1573 shows terraced landscapes (Andlar et al. 2017). Glavina (2008) discuss the cleaning of sites of Dingač on Pelješac for terracing the wine region Dingač in the sixteenth century, which was under the jurisdiction of the same republic as the investigated site (and therefore was regulated by the same Dubrovnik statute as the researched area). The Eastern Mediterranean coast, according to Andlar et al. (2017) had been extensively terraced during the late nineteenth century and at the beginning of the twentieth century under the Austro-Hungarian Empire. Crisis after the First World War and the outbreak of Peronospora (at the end of nineteenth century from America) caused the abandonment of terraced regions that were on the steepest and most remote areas (from settlements) due to the depopulation of the rural hinterland. The second half of the twentieth century was characterised by policies that did not support agricultural activity in the coastal zone but gave support towards primary touristic development (and partially industry). Dubić (1978) reports that post-war wine production in Yugoslavia was not encouraged because priority was given to crop

production (Dubić, 1978). At the same time agrarian reforms in that period were not stimulating agriculture due to the introduction of limits on agricultural surfaces in private ownership (maximum of 10 ha). According to Malić (1988), this was under the living minimum of four family members, which consequently lead to the deagrianization of Croatia.

The explored region took part in previously mentioned facts of this chapter, but during some historical periods had some local specific condition. Roller (1949) writes that this area became part of the Dubrovnik Republic in 1399 and was for the better part of the century more or less an unstable area. Gruić (1994) said that previous inhabitants (Vlasi) within the area were pushed out of the site, that the area is rarely populated and was extensively cultivated at the end of fifteenth century due to the regulations of the Dubrovnik Republic which was seeing the developing of viticulture in the Pelješac peninsula and was not supporting it in Dubrovačko Primorje (Terra nova). In that time, this area was more oriented towards pastures, which were developed in different landscape forms, defining the entire hinterland of the Dubrovačko Primorje region (even today). But as Roller (1949) mentions, by the end of fifteenth century there are 460 terraces around the summerhouses in Trsteno with olive trees and fruit; it is apparent that terraced landscapes were a part of the coastal area within the explored region. The explored area belongs to the governance of the landlord (Knez) of Dubrovačko Primorje who is managing the area spatially, economically and judicially. This period is when the Dubrovnik Republic became the second wealthiest republic in Europe in 1500 at 900 USD BDP (gross domestic product per capita), when only the Venetians had more at 1100 USD BDP (Switzerland had 742 USD BDP, France 727 USD BDP) (Nodari, 2017). Therefore the economic situation is closely connected to spatial development under the Dubrovnik Republic regime (road infrastructure, water supply, etc.). That is why this period was an era when the terraced landscape played a very important role in agricultural production and therefore probably the largest percentage of the area was developed during this period of prosperity. This fact is very important because it implies the resilience of the terraced landscape for more than 500 years in the explored region. Nineteenth century intensification of agricultural production lead to the maximum usage of the terraces within the researched area, when it was a vivid part of the region. The twentieth century brought the same problems as in other parts of the Croatian coast (Peronospora, war) when large migrations to the American and Australian continent occurred. The second half of the twentieth century was characterised by further depopulation of an already abandoned area in Dubrovačko Primorje. Along with the aforementioned agrarian reforms, this area became less attractive for living and was characterised by the migration of inhabitants into the town of Dubrovnik where the need for labour in the touristic and industrial sector attracted them.

SOCIAL ASPECT OF USAGE OF TERRACES

The previous chapter explained, chronologically, the emergence throughout various historical periods of terraces in the researched space. But their presence was made for many different reasons. The main reason for their construction was to utilise the landscape surface for agricultural activity where lack of areas with flat fertile ground was a problem. The steep relief fertile ground is washed by the rainy periods and its construction was a way of collecting this soil, built by hand, with dry stone walls. Therefore, they appeared as proof of human survival in harsh conditions.

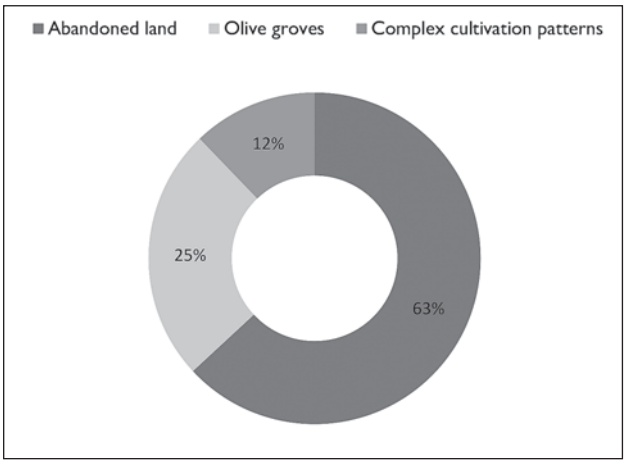
According to Likar (2017), they represent manifests of the time when they were made, because they are proof of traditional values. The author also emphasises their importance for the transfer of knowledge (important information and skills), community cooperation, care for members of the community, as well as respect for the worth and achievement of one's predecessors. Their value, therefore, goes beyond their visual presence in the landscape, because they contain important aspects of society and knowledge from the past.

According to Tillmann and Salas (2016) each terrace is unique and illustrates multiple uses, in which people through "the wisdom of their cultural heritage" manage the water, the soils and the climate. Authors also emphasise that local people understood these changes because their lives depended on their knowledge of nature.

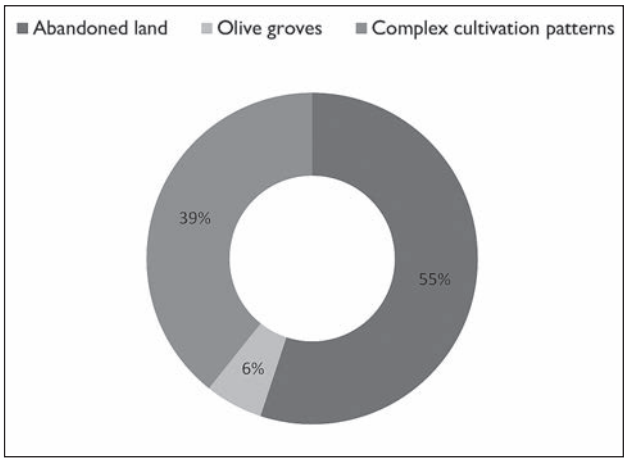
Therefore their significance is important as a cultural heritage and they can be investigated as associative landscapes connected to the notion of human life in history. Today they do not have this significance in the human community and awareness of their value is low as their potential is unrecognised. For their protection, awareness of their value is crucial (especially because they can be easily demolished due to new development). As their legal protection, as well as financial incentives for renewal is limited in Croatian practice, there is urging for their inventory, characterisation and possible revitalisation in the process of protection.

ANALYSES OF SITE – CROSS TIME

Maps of terraces from the investigation conducted in 2002 showed that terraced landscapes were basically spread along the coastline, within the coastal zone, and around villages in the hinterland (Figure 4). Their shape is closely connected to the relief and pedological background (Hrdalo et al., 2008). Therefore those that are steeper were tighter and are mostly connected to the lack of soil, while broader ones are connected to the less steep relief and more fertile soil (mould soil,



Graph 1: Land use distribution in 2002.



Graph 2: Land use distribution in 2012.

colluvium, rendzina soil). Exploration also showed that around 70% of terraced landscapes were in a phase of succession (Graph 1). This was equally distributed along the coastal zone, while distribution of abandoned terraces was more present in the hinterland.

This information reflects the socio-demographic situation of the area in the 2002 investigation. Whereas areas closer to the sea were more populated than those within the hinterland, abandonment is notably present in the area further from the coastline. The hinterland was mainly populated with an ageing population (the ageing process of the agricultural workforce), which makes up the largest per cent of the working force in the agricultural sector. The coastal zone is connected with the touristic sector so the process of depopulation was only mildly expressed. Therefore, its inhabitants are not depending only on the agricultural sector but are combining touristic and agricultural activities as an economic resource. Cultivars, which are planted in terraced landscapes, are closely connected to this situation because olive trees, as the highest per cent of plants used in agriculture, need less maintenance than vineyards. Close to the most inhabited villages there are also various cultures of vegetables and crops.

Research of the situation in 2012 showed a different result (Figure 5). There are more areas that have been cultivated and less than 55% have undergone a process of succession (Graph 2). This is a very positive trend and therefore can be considered a factor for the prediction of future development but within a controlled situation.

Further on, terraced landscape comparisons showed that A – semi-regular, longitudinal, very tight, connected to the steep slopes at 32–55°, had minimal progressive and positive trends in the revitalisation when comparing these two investigations. Other groups of terraces classified as B – semi-regular, longitudinal, tight on 12–32° steep slopes; C – semi-regular, longitudinal, medium wide; D – semi-regular, short, wide, both up to 12° in steepness have equally shown a trend in the increase in agricultural production within them.

Usage increase of the terraced landscapes is connected to the overall increasing number of the population within the explored area due to many factors (in 1991 the number of inhabitants was 1,820[1] with two-thirds of the population located within the coastal zone, while in 2012, there were 2,649[2] inhabitants with four-fifths of them located within the coastal zone). Revitalisation of the most touristic accommodations in the town of Dubrovnik (after their damage in the war of 1991) and evident spread of touristic activity within the explored area (even in the hinterland in a form of rural tourism) caused a return of inhabitants. The high economic value of the living spaces per square meter in the town of Dubrovnik, caused the area to be inhabited by younger families. This stimulated the processes of revitalisation of the agricultural land (as well as the terraces) mainly between the coastal zone and inland villages (Figure 6). This process is evident but still very slow due to the fact that its main economic field is not connected to agriculture, as young people work on agricultural land only in their free time (so they can only be considered a new, part-time agricultural force). The process of development of the area can be seen in the renewal of old paths and road infrastructure in last decade. It has obviously caused a renewal of the region between the villages of Orašac, Gromača, Kliševo and Ljubač (Figure 7) due to the revitalisation of old olive trees and vineyard areas. This demonstrates how investments into

1 Inland villages – Osojnik 190, Ljubač 57, Gromača 115, Kliševo 70, Mrčevo 93; coastal villages – Zaton 400, Orašac 520, Trsteno 220, Brsečine 120, Dubravica 35 (numbers were calculated during field exploration by native inhabitants in 1991).

2 Inland villages – Osojnik 301, Ljubač 69, Gromača 146, Kliševo 54, Mrčevo 90; coastal villages – Zaton 985, Orašac 631, Trsteno 240, Brsečine 96, Dubravica 37 (numbers were excluded from national population census).

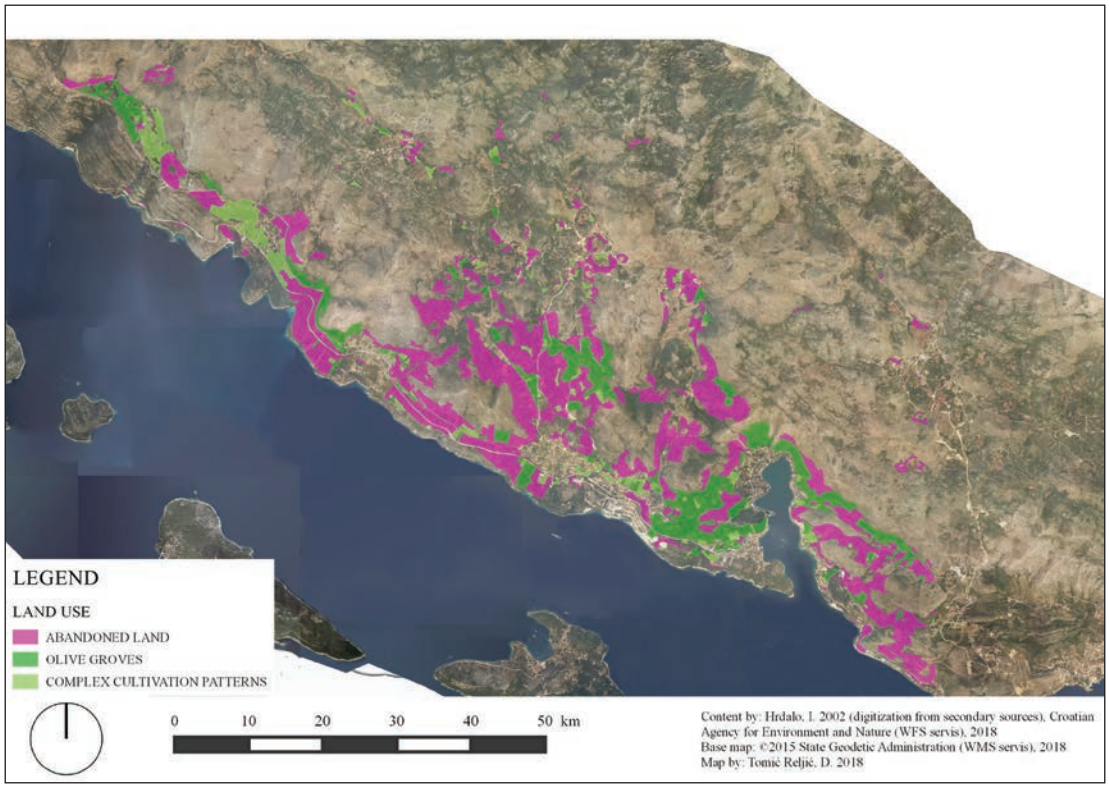


Figure 4: Usage of terraces in 2002 year (Hrdalo, 2002; Tomić Reljić, 2018).

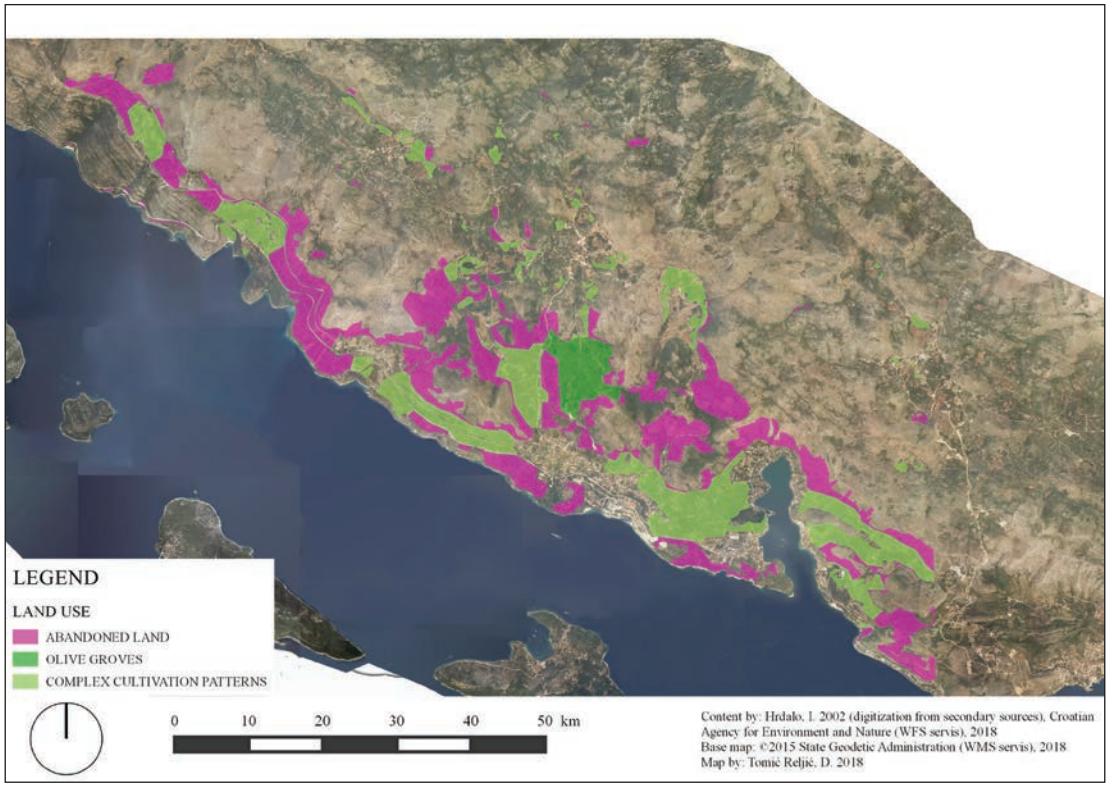


Figure 5: Usage of terraces in 2012 year (Hrdalo, 2002; Tomić Reljić, 2018).

Figure 6: Revitalisation of terraces (Photo: A. Trojanović, 2018).

communication routes can give positive benefits to the revitalisation of even more remote zones in the region.

Comparisons of the situation in 2002 and 2012 have shown positive changes in the usage of agricultural areas in the form of terraces. But these processes are not completely governed from State level (through the legislative and spatial policies) and are not sustainably planned. Today, the process of development of built areas is still in a balance with agricultural terraced areas. A lack of careful planning and a carefully managed approach to the revitalisation of the agricultural terraced areas can cause their disappearance in certain zones. Tourism and agricultural activity can coexist in sustainable development but with a careful directing in their development.

TERRACED LANDSCAPES IN CROATIAN LEGISLATIVE

Cultural and rural landscape in Croatia is (or should be) protected by two laws; Law on the Protection and Conservation of Cultural Property (OG 69/99, 151/03, 157/03, 100/04, 87/09, 88/10, 61/11, 25/12, 136/12, 157/13, 152/14, 98/15, 44/17) and Law on Nature Protection (OG 80/13, 15/18). According to *Ordinance on the form, content and manner of keeping the Register of Cultural Property of the Republic of Croatia*, the category of cultural landscape, separated in a special cluster, is divided into two groups, cultural landscape and historical landscape, including memorial areas. The legal obligation to protect the aforementioned groups is to make a conservation analysis base. It is not, however, a tool to manage the protected area. Besides the formal obligation to create a management plan for UNESCO protected sites, there is no obligation to create a management plan for other forms of cultural landscape where the guidelines for preservation and development of drywall structures are to be defined. It follows that the mentioned protection models do not offer an adequate framework for the conservation and development of the ordinary or everyday landscape and its structures.

In Nature Protection, rural and cultural landscape is protected through the category of *Significant Landscape*. It is defined as a natural or cultivated area of great importance, value and biodiversity and/or geo-diversity or landscape of preservation and containing unique attributes characteristic to a particular area. It should be similar to the IUCN category of *Protected Landscape*, which implies an area of distinct character with significant ecological, biological, cultural and

Figure 7: Abandonment of steep terraces, Krčevine area (Photo: A. Trojanović, 2018).

scenic value, and where safeguarding the integrity of this interaction is vital to the protecting and the sustaining of the area and its associated nature conservation and other values. Although at the theoretical level this form of protection provides an adequate framework for the protection of exceptional rural sites, the realisation is mainly directed at landscapes of exceptional natural beauty. Still, when the subject of protection is an anthropogenic or semi-natural space, human activity is largely overlooked. On the other hand, the obligation to draft management plans for significant landscapes has not yet been realised.

The analysis of the sectoral legislation and spatial development documents in Slovenia on the occurrence of terraced landscapes within those documents (Ažman Momirski and Berčić, 2016) indicates that terraced landscapes are not recognised as a landscape system *sui generis* within Slovenian spatial planning but rather hidden within the term cultural landscape.

Management of the rural landscape is considered through the measures for implementation of the specific goals. It sets targets, conditions and defines methods for its realisation based on financial and human resources, legal and institutional frames. In the research on the conceptual and operational approach to challenges derived from the two main goals of the EU, sustainable development and rural development, Spaziante et al. (2013) stress the importance of their deeper integration with an aim of mutual benefits in achieving their goals. The starting point for such an assumption, in the context of the EU, lies in the basis of the European Landscape Convention (ELC) and the Rural Development Policy, the second pillar of the CAP (Common Agricultural Policy; Regulation (EU) No 1306/2013), where Good Agricultural and Environmental Conditions, abbreviated as GAEC, refers to a set of European Union standards (described in Annex III of Council Regulation 73/2009) defined at national or regional level, aiming at a sustainable agriculture.

ELC explicitly refers to the integration of landscape policies with other sectoral policies at different levels of government, and emphasises the role of agricultural activity in landscape development. Preservation and improvement of landscapes is mentioned as a key priority for the development of rural communities as well, Regulation (EU) No 1305/2013 of the European Parliament and the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005 (eur-lex.europa.eu) emphasises the importance of the landscape (Paragraphs 19, 22). The support is planned for "studies and investments associated with the maintenance, restoration and upgrading of the cultural and

natural heritage of villages, rural landscapes and high nature value sites, including related socio-economic aspects, as well as environmental awareness actions" (Article 20, Paragraph 1f).

In the case of Croatia, rural development policy is a mechanism for the Management of the rural landscape, with a legal basis in the Rulebook. Paying Agency for Agriculture, Fisheries and Rural Development (PAAFRD) implements and controls certain objectives, using the prescribed measures as a management tool. Within Rural, the development policy from 2014-2020 (Hadelan et al., 2016), the building of terraces is considered a non-productive investment related to environmental conservation. Investment implies (1) raising a terrace on an earlier terraced plot, which requires reconstruction of supporting walls and (2) raising a terrace on a new land plot, which requires the mechanical puncture of former forest and pasture lands on slopes, with the performance of drywall pods and the formation of wide sloping terraces similar to traditional terraces on colonial surfaces.

DISCUSSION

Research done within the area of Dubrovačko Primorje showed that terraced landscapes are a feature of the landscape that clearly developed alongside and closely connected to the natural character of the area. Relief and pedology were very important factors for their development deriving different forms of terraces. This investigation showed that division of semi-regular terraces, which can be longitudinal – tight, medium and wide, as well as short and wide. This division cannot be connected to other types of explored classifications suggested by other authors because the size of the explored area is smaller. Therefore, classification of Andlar and Aničić (2017) in this research area showed only two types of terraces: irregular-pattern terraced landscapes (most represented) and pocket-pattern terraced landscapes (a very small percentage) discovered within the site. Similar results were found in the Grove and Rackham (2003) classification that gave us only two types of structures (steep terraces and terraced field). That is why they were not usable for micro-scale. Therefore, this study has further developed a division of terraced landscapes, using micro-units. Relief character defined the structure of the terraces. They are mostly curvilinear, following the form of the slope and its tightness is dependent upon it. Tighter terraces are the steepest with the greatest lack of soil. Flat surfaces are the widest terraces with a thicker layer of soil.

Natural research aspects of terraces have brought knowledge of other values besides their significant causal connection to the natural conditions with their development; they have ecological significance within the area. They have an anti-erosion function and prevent landslides, which is a very important aspect of understanding their values in the mitigating climate change issues recently emphasised. Besides this, the coastal southern part of the explored area is covered with terraces that are a part of Natura 2000 and therefore have an even greater ecological impact. As a Green infrastructure plan is in development by the government of the town of Dubrovnik, their inclusion in it is very important, so that they capture the important ecological roles in the space (they are a habitat for many species and act as a connectivity element).

Exploration of historical development showed that the research area was a place where human settlements existed since ancient times. The exact point of development historically of specific dry stone wall terraces cannot be estimated without further multi-disciplinary investigation but probably the majority of the structures were developed during the Dubrovnik Republic, at the end of fifteenth century and in the nineteenth century period when this area was a lively space in the background of the town of Dubrovnik (in the Austro-Hungarian period). Their value should then not only be considered for their visual appearance, which clearly marks explored landscape, but also embraced as a part of the cultural and historical heritage, containing knowledge about the human communities that built them.

Exploration of their changes within cross time research showed positive trends in the revitalisation of terraced landscapes. Research done from twenty different examples showed that around 70% of terraced surfaces were abandoned, while 10 years later in 2012, their revitalisation was much more visible, due to the fact that there were more, around 45% of which are agriculturally productive. Research indicated that the most endangered are the very thin terraces located on the higher altitudes and on the steepest slopes of the hills. This condition is connected to their lack of accessibility and shallower soil. Other classified terraced landscapes have shown a positive revitalisation trend. This is a very positive process that is connected to the revitalisation of olive trees rather than to viticulture. This can be linked to the economic profit from the increase in price of olive oil, and a less complicated process of production, but also given the fact that this area is under the administration of the town of Dubrovnik, which has invested into road infrastructure in the more remote areas, as well as demographic structure (in 2002 there were more older inhabitants than in 2012 due to the spread of young families to cheaper living areas). This caused very visible changes in the landscape. But these structures are still not very well comprehended in all aspects. Croatian legislation offers some sort of possibility of protection, but this is mainly oriented towards the very specific areas that might be found within the explored area (for example the exceptional rural area of the village of Ljubač) but does not offer an overall approach which is necessary in order to achieve the holistic development of the entire

area. As there are many aspects to their value, terraced landscapes must be catalogued, characterised and evaluated. This will then form a base for their revitalisation and future development. Their potential is huge and without an understanding of their importance they can easily be erased due to the trend in development of new areas for tourism and housing. The global economic crisis slowed an intensive development of settlements within the coastal zone, but this pressure was lower on terraced landscapes, and this trend can easily be changed. Therefore, they must be recognised as a valuable spatial element. This is problematic in the Croatian situation where lack of legislative protection was discovered.

CONCLUSIONS

Terraced landscapes are a feature of the Mediterranean basin; whose recognisable structure characterises the Mediterranean region. Croatia has not yet made a national landscape character assessment and therefore these structures are under threat of new construction development. As these spaces are usually distributed along the coastline, which is under developmental pressure, they have become endangered. Terraced landscapes are the most represented dry stone wall structures in the area of Dubrovačko Primorje. Therefore, they are a part of the local identity and can be considered as spatial *genius loci*. Besides their visual and agricultural value, they have huge social, historical, cultural and ecological value and therefore can be an example of rural development as its resource. They must be considered an element of sustainable development and something that can be passed on to future generations. Existing Croatian legal protection is not very forward orientated in the recognition of these landscape features; therefore they are under threat in certain regions that are under the pressure of construction development. The Dubrovačko Primorje region has seen positive trends in the recultivation of terraced spaces as investigation has shown positive revitalisation processes of the terraces. This is due to the fact that road infrastructure has been developed and there is still not a large amount of pressure of development caused by the spreading of villages. This is connected to the global economic crisis that emerged in last ten years and consequently slowed development of housing areas. As terraced landscapes are placed mostly within the coastal zone, they can become endangered elements of the landscape in the future. Therefore, their recognition is crucial for protection with regards to these various aspects of their value.

TERASIRANA KRAJINA KOT DEL DUBROVNIŠKE REGIONALNE IDENTITETE: RAZISKAVA REGIJE DUBROVNIŠKEGA PRIMORJA TEKOM ČASA (REPUBLIKA HRVAŠKA)

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POVZETEK

Terasirane krajine so del identitete mediteranske regije na Hrvaškem in so prepoznane kot kulturna dediščina. Zelo hiter turistični razvoj povzroča veliko težav, ki se v krajini odražajo v izginevanju prostorskih značilnosti terasirane krajine. Do tega pojava na Hrvaškem prihaja zaradi pomanjkanja orodij za zaščito prostorskih elementov terasirane krajine in ozaveščenosti o vrednotah terasirane krajine v lokalnih skupnostih. Zato je glavni cilj pričujoče raziskave osredotočen na spremembe terasiranih krajin skozi čas. Prvo raziskovanje terasirane krajine na območju dubrovniškega primorja je potekalo v letih 2001 in 2002. Primerjalne analize te študije s sedanjim stanjem so pokazale, da imajo, kljub revitalizaciji območij, ki so bližje obalnemu prostoru, prostori s terasami višjo raven zapuščenosti in uničenja. Raziskavo smo sklenili z nizom različnih zaključkov večinoma povezanih s socialnimi vidiki, saj je zavest o prostorskih vrednotah v lokalnih skupnostih ključnega pomena za njegovo preživetje.

Ključne besede: kmetijske terase, terasirana krajina, sredozemsko območje, Dubrovniško Primorje, hrvaške suhozidne strukture

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