

THE TERRACED LANDSCAPE IN THE BRKINI HILLS

TERASIRANA POKRAJINA V BRKINIH

Lučka Ažman Momirski, Drago Kladnik



MATEVŽ LEINARČIČ

Cultivated terraces are one of the most typical cultural landscape elements in the Brkini Hills.

Kmetijske terase so ena najbolj značilnih prvin brkinske kulturne pokrajine.

The terraced landscape in the Brkini Hills

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ABSTRACT: The study of terraced landscapes is becoming an increasingly important area of international research. This paper starts by presenting the most important research and professional activities related to terraced landscapes and examples of studying them around the globe. This is followed by a detailed presentation of the features of the unique terraced landscape in the Brkini Hills, Slovenia. For a more detailed analysis, five villages were selected in the central and western part of the region. Interdisciplinary research includes studying extremely unfavorable demographic processes, natural factors at work in the modern terraced landscape, historical changes in landscape phenomena, and a detailed observation of the terrace forms that comprise the terraced landscape. Despite modern mechanized farming, the remaining farmers are finding it increasingly difficult to maintain the terraced landscape, which is also threatened by afforestation. The mixture of very long terrace platforms and the distinct intermediate slopes presents a unique experiential value that is increasingly being lost.

KEY WORDS: rural geography, cultural landscape, land use, terraced landscape, cultivated terraces, Brkini Hills, Slovenia

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ADDRESSES:

Lučka Ažman Momirski, Ph.D.

Faculty of Architecture

University of Ljubljana

Zoisova cesta 12, SI – 1000 Ljubljana, Slovenia

E-mail: lucija.azman@fa.uni-lj.si

Drago Kladnik, Ph.D.

Anton Melik Geographical Institute

Research Center of the Slovenian Academy of Sciences and Arts

Gospodarska ulica 13, SI – Ljubljana, Slovenia

E-mail: drago.kladnik@zrc-sazu.si

1 Introduction

The study of terraced landscapes intensified at the close of the twentieth century. In 1997, Cinque Terre, a belt on the northeastern coast of the Ligurian Sea in Italy, was added to the UNESCO World Heritage List (under the new »cultural landscape« category; Alberti and Lodatti 2012). This steep cliff coast is also an exceptionally picturesque terraced area. The significance of areas »whose character is the result of the action and interaction of natural and/or human factors« (Internet 1, Article 1 of the General Provisions) was also highlighted by the adoption of the European Landscape Convention.

Between 2001 and 2010, several international projects on safeguarding, restoring, and planning terraced landscapes were carried out, including the following:

- PATTER: the purpose of this project was to identify and describe the types and condition of cultivated terraces on the Spanish island of Majorca, and in the areas surrounding Nice and Genoa (Lasanta et al. 2013);
- PROTERRA: this project supported twelve pilot actions aimed at restoring cultivated terraces in six Mediterranean countries (Internet 2);
- ALPTER: the main goal of this project was to improve awareness of the spatial features of terraced landscapes in the Alpine region (Internet 3); and
- TERRISC: this project explores the preservation of terraced landscapes as a strategy for preventing natural disasters, especially floods and erosion, in the Balearic and Canary Islands, Portugal, and southwest France (Internet 4).

The EU included cultivated terraced landscapes in its 2007–2013 rural development plan, its Biodiversity Action Plan for Agriculture (to improve or maintain biodiversity and prevent its decrease due to agricultural activities), and its Soil Thematic Strategy. The EU also supports areas with limited development opportunities and agricultural areas with highly ranked natural values, which in many cases include terraced land. The preservation and maintenance of terraced landscapes are also among the priorities of the Soil Thematic Strategy (Lasanta et al. 2013).

The international study of terraced landscapes reached its peak with the first two international conferences on terraced landscapes. At the first one, which took place in China in the fall of 2010, the International Terraced Landscapes Alliance (ITLA) was established and the Honghe Declaration on the protection and development of terraces (Internet 5) was adopted. Together with over a hundred conference papers on various aspects of terraced landscapes from around the globe, this declaration is also published in extensive volumes in Chinese and English (Peters and Junchao 2012). Not many regional studies of terraced landscapes were presented at the conference. In addition to a fairly insufficient presentation of the global distribution of terraced landscapes (Rivera 2012) and the ALPTER project results in the Veneto region (Alberti and Lodatti 2012), the noteworthy contributions are on efforts to protecting the traditional terraced landscape in the southern Chinese province of Yunnan (Wenxing, Kun and Lingchong 2012) and efforts to protect and develop terraced areas in the Philippine Cordilleras (Baguilat 2012). Ann Kendall's article (2012) presents in detail the study of extensification of cultivated terraces in the Alpujarra Valley on the southern rims of the Sierra Nevadas (Douglas, Critchley and Park 1996) and compares them to the Inca terraces in Peru.

The second ITLA conference was held in Peru in the spring of 2014. It began with the presentation of an important Chinese achievement: in 2013, the cultural landscape of the Hani rice terraces in Honghe Prefecture in the province of Yunnan was listed as a World Heritage Site (Junchao 2014). The extensive study of eleven terraced landscapes in Peru took into account both active and abandoned terraces (Lambruschini 2014), and especially interesting was the comparison of the features and issues of terraced landscapes in Peru and Japan (Baba 2014). The restoration of Bolivian terraces was presented in detail using the case of the settlements in Tapacarí Province in the Cochabamba Department (Crespo 2014). There were a few presentations of European terraced landscapes; noteworthy among them were the efforts to preserve the terraced landscape in the Cembra Valley north of Trento in the Trentino–Alto Adige region in Italy (Zanotelli 2014).

With the expansion of the research area, the publication of research findings also intensified. The results of the ALPTER project had already been presented in two publications: *Terraced Landscapes of the Alps: Atlas* (Scaramellini and Varotto 2008) and *Terraced Landscapes of the Alps: Projects in Progress* (Fontanari and Patassini 2008). The first publication also includes several syntheses of results of regional studies conducted as part of this project (Castex et al. 2008; Brancucci and Comenale Pinto 2008; Freppaz et al. 2008; Mazzoleni et al. 2008; Werder et al. 2008; Chemin and Varotto 2008; Azman Momirski 2008; Arnberger, Eder and Brandenburg 2008). With regard to the ALPTER project, one also needs to mention the interdisciplinary

volume on the terraced landscape of the Gorizia Hills (Ažman Momirski et al. 2008), which also includes studies on land use changes and landslide hazard. This publication is definitely the most comprehensive Slovenian presentation of this topic to date.

An exhaustive chronological overview of research on cultivated terraces and terraced landscapes in Slovenia, and an outline of Slovenian terraced landscapes were only published a few years ago (Ažman Momirski and Kladnik 2009). Considering that in many parts of Slovenia cultivated terraces have fairly strongly (and in some places even predominantly) characterized the landscape, one would rightfully expect that much more research has been done in this area. The currency of this research topic was definitely the impetus for two graduate-level studies by Helena Križaj Smrdel (2010a; 2010b). Continued national research on Slovenian terraced landscapes provided the motivation for a volume on terraced landscapes in sub-Mediterranean Slovenia (Ažman Momirski 2014).

The traditional terraced landscape of the Brkini Hills is unique in both Slovenia and beyond, and it therefore deserves more detailed treatment. It has been studied relatively poorly to date. Perhaps the most direct treatment so far has been provided by a comparative study of the land use changes in the Mediterranean terraced settlements of Krkavče in the Koper Hills and Ostrožno Brdo in the Brkini Hills (Ažman Momirski and Gabrovec 2014); Ostrožno Brdo is also one of the five sample settlements in this study. It was also studied as a pilot area by Križaj Smrdel (2010a; 2010b). It is interesting that in his detailed demographic and economic study of the region between Mount Snežnik and Mount Slavnik, in which he also describes in detail the conditions in the Brkini Hills, the recognized Slovenian social geographer Vladimir Klemenčič was barely aware of cultivated terraces and terraces as important landscape elements because he mentions them only fleetingly in two places (Klemenčič 1959).

1.1 Outline of the study area

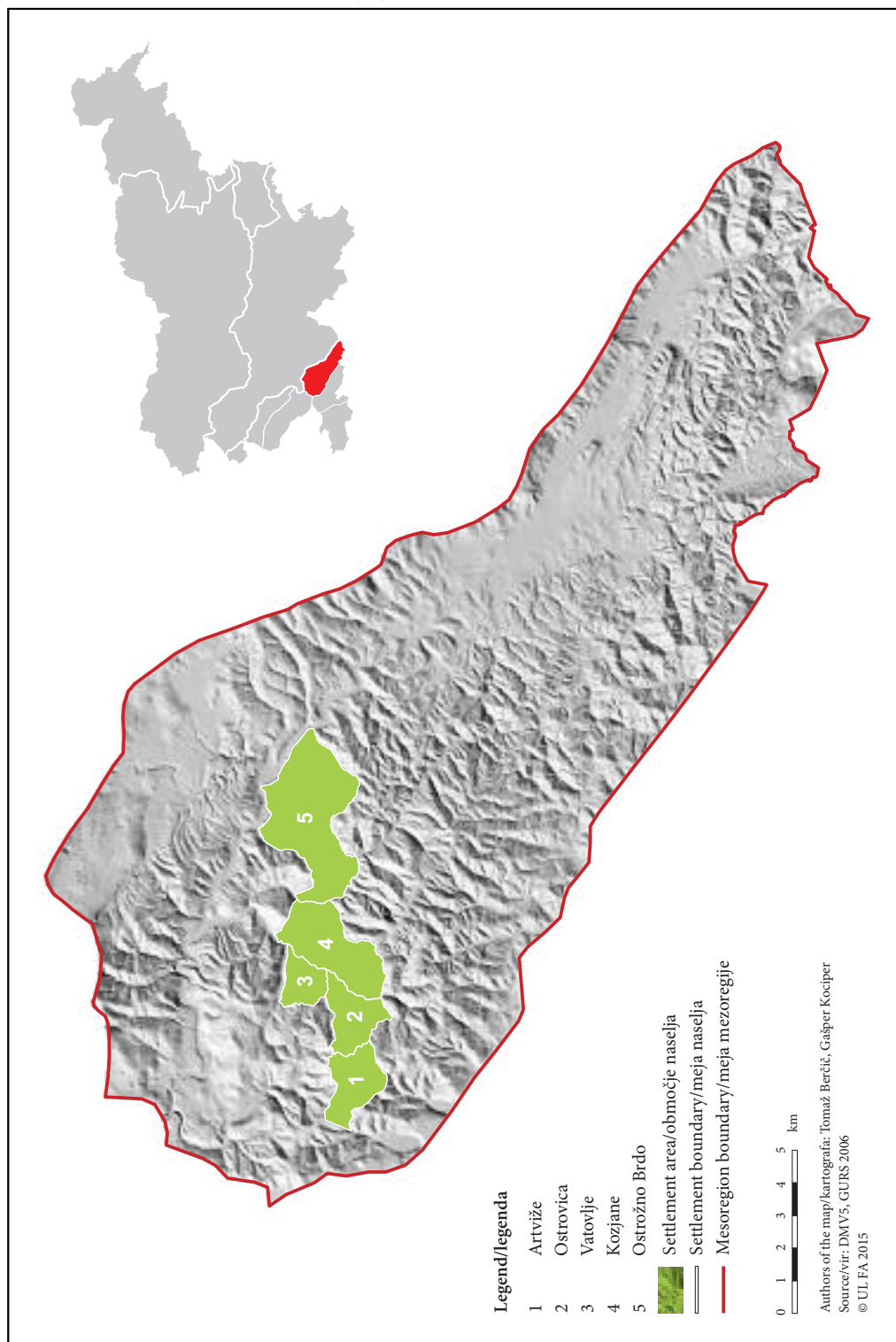
Slovenia is among the few places in Europe with cultivated terraces throughout the entire country. They appear in all types of Slovenian landscapes, but differ by frequency, purpose, and contemporary function (Ažman Momirski and Kladnik 2009).

Not many countries can compare to Slovenia in terms of landscape diversity; it is located at the intersection of the Alps, the Pannonian Plain, the Dinaric Alps, and the Mediterranean, and is influenced by the Germanic, Hungarian, Slavic, and Romance cultures. It is known for both its natural and cultural diversity, as well as its variability and transitional character. One can distinguish between four basic landscape types and nine subtypes (Kladnik, Perko and Urbanc 2009). One of the basic Slovenian landscape types is the Mediterranean landscape, which is divided into two subtypes: Mediterranean low hills and Mediterranean plateaus (Perko 1998). Mediterranean hills are characterized by a poorly permeable flysch substratum, and Mediterranean plateaus are characterized by a permeable limestone substratum, of which diverse karst features are typical. The majority of terraces that define the most typical terraced landscapes can be found in the Mediterranean region, but many can also be found in karst Dinaric landscapes and the winegrowing Pannonian low hills (Ažman Momirski and Kladnik 2009). They are rarer elsewhere, but only a few Slovenian landscapes lack them completely. Among the nine natural subtypes, only the Pannonian plains are completely without any terraces.

The Brkini Hills are classified under Mediterranean low hills, but their characteristics make them significantly different from typical Mediterranean low hills (e.g., the Gorica, Koper, and Vipava Hills, and even the flysch Vipava Valley); because of their higher elevation (their highest point, 817 m above sea level, is at Saint Servulus' Church above Artviže), they are more like hills, and because of their location towards the interior of Slovenia they combine the features of the Mediterranean and continental climates (Ogrin 1996).

The mesoregion of the Brkini Hills and Reka Valley has a diverse landscape composition and runs in a northwest-southeast Dinaric direction in southwest Slovenia (Figure 1). It has an area of 341.5 km², which accounts for 1.68% of Slovenia's total area. The region is divided between the municipalities of Divača, Hrpelje - Kozina, Ilirska Bistrica, and Pivka, and also includes the Reka Valley in addition to the Brkini Hills. The Reka Valley is divided into the Podgora area, the Ilirska Bistrica Basin, the gorge section of the valley, and the Vreme Valley; in addition, the Košana Valley north of the Reka Valley is also part of the mesoregion.

Figure 1: Location of the five settlements studied in the Brkini Hills mesoregion and the location of the mesoregion in Slovenia. ►



The Brkini Hills are predominantly composed of impermeable Eocene flysch and can be divided into the western, central, and eastern parts. There is another area of less pronounced flysch hills beyond the Jelšane lowland to the southeast, which can be referred to as the Jelšane Hills (Šebenik and Kladnik 1998). The majority of terraces – which can be classified as agricultural under the basic typology (Ažman Momirski and Kladnik 2009) – can be found in the central and western parts of the Brkini Hills. Therefore, five settlements were selected in this area for more detailed study: Artviže in the Municipality of Hrpelje - Kozina, Ostrovica, Vatovlje, and Kozjane in the Municipality of Divača, and Ostrožno Brdo in the Municipality of Ilirska Bistrica.

The selected settlements in the northwestern part of the mesoregion border on one another, and the total area they cover runs in an east-west direction and measures 2,201.9 ha or 6.4% of the entire mesoregion. The average elevation of the mesoregion is 562 m, but the average elevation of the area studied is nearly 635 m. Compared to the rest of the mesoregion, it includes more land with a northern and eastern aspect, but even more obvious is its greater inclination: its predominant slope gradient ranges from 30.1% to 50% (16.8° to 26.6°; 44.5% of the area), whereas the inclination in the rest of the region predominantly ranges from 15.1% to 30% (8.6° to 16.7°; 32.4% of the region). In the entire mesoregion, 30.9% of land has a slope gradient below 15% (below 8.5°), whereas in the pilot area this percentage is only 10.6%. The Brkini Hills and the Reka Valley have a 71.4 percent share of forest, which ranks them among extremely wooded Slovenian mesoregions. The study area is even more wooded than that (81.4%); meadows and pastures predominate among agricultural areas and tilled land accounts for less than one percent (0.83%).

The study area of the five settlements lies in Škocjan Caves Regional Park, which covers 450 km² and includes the entire Reka watershed (Internet 6). The five settlements studied also partly extend into water protection zones. The southern part of Ostrožno Brdo extends into a natural asset area (the Šmagurka Creek Valley), and its northern part along the Reka River belongs to important ecological areas or special conservation areas.

The sample settlements selected vary by location. Ostrožno Brdo and Kozjane are located at the top of the ridge, Artviže lies slightly below the top, and Ostrovica and Vatovlje lie on the slopes. Ostrožno Brdo and Kozjane are ribbon villages and the other three are clustered villages.

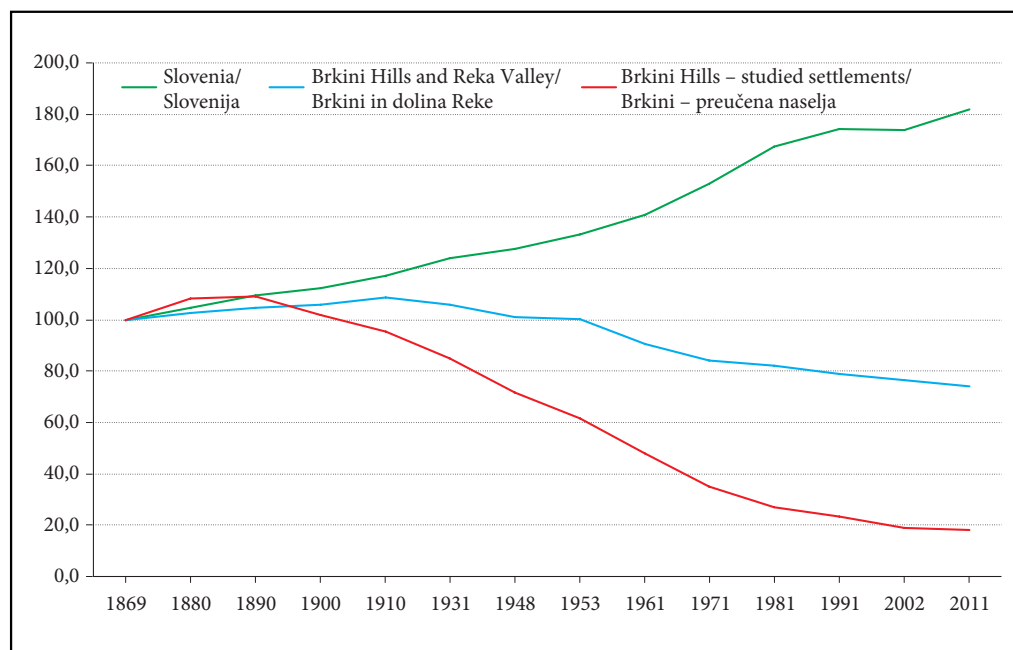


Figure 2: Comparison of changes in the population (index) of Slovenia, the Brkini Hills mesoregion, and the five settlements studied in the census years between 1869 and 2011.

All of the settlements are away from main traffic routes and major employment centers. In addition, their dramatic demographic development has been influenced by their location at the edges of their respective municipalities. In 2011, all five settlements had a total population of 191, which is only 16.8% of the population they had during the peak year of 1890, when 1,140 people lived in the area. The population began to rapidly and inexorably decrease after the Second World War, even though it had already been decreasing persistently during the first half of the twentieth century. Ostrožno Brdo is the largest among the five; in 2011, it had a population of 94, and a full 433 in 1890. Kozjane is now the smallest settlement in terms of population (13 people lived there in 2011), even though its population in 1880 was 283; this was twice as much as in Ostrovica and Vatovlje, which are now ahead of Kozjane by a few inhabitants (Ostrovica has a population of 17 and Vatovlje a population of 20). Compared to its maximum population in 1880, the population in Kozjane decreased to 4.6%; Artviže seems to have fared best, with a population of 28.0% compared to the peak year of 1880.

The population of the entire mesoregion of the Brkini Hills and Reka Valley is 15,086. The share of population of the five sample settlements in the entire mesoregion is 1.3%, and the share of population of the mesoregion in Slovenia is 0.7%. In the mesoregion as a whole, the population has also been gradually decreasing ever since the peak year of 1910, whereas the population in the rest of Slovenia is characterized by gradual growth across all time periods (Figure 2).

The demographic profile of the Brkini Hills and especially the sample settlements is affected not only by the extensive decrease in the population, but also the closely related unfavorable age structure, characterized by a predominance of the elderly and only a small number of young people. The share of farming population has also decreased because people found jobs in the valley. Despite the widespread use of agricultural machinery, the remaining farmers find it difficult to manage and maintain the available farmland and subsequently also the cultivated terraces; accordingly, an increasing number of these terraces are abandoned and gradually becoming overgrown with bushes and trees.

1.2 Theoretical premises

With the new cultural geography, the study of landscapes should extend beyond mere morphological analysis and become interpretative in nature. Attention is directed towards metaphorical, ideological, value-related, and other intangible qualities of landscapes. According to this perspective, the world cannot be comprehended merely through objective approaches, but can be experienced and understood even more deeply by using a subjective approach. The »landscape« refers not only to physical reality and hence, primarily to space, but also to the organization and perception of the social, cultural, cognitive, political, and economic elements of human existence. Thus a landscape is also a mental map and image, in which one can identify diverse stories connected with people's past and their everyday lives (Urbanc 2008).

In Slovenian geography, the evaluation of landscapes has been tackled most seriously by Bojan Erhartič. In addition to the intrinsic or existential, cultural, socioeconomic, functional, geosystemic, and research and educational types of landscape values, he also identified aesthetic values, which provide unique experiences. Human perception appreciates diversity, complexity, typical patterns, and a local character. He also mentions attraction value, in which the presence of a specific phenomenon improves the quality of life in a non-material sense and provides an important ace in the hole for tourism (Erhartič 2012).

The aesthetic value of terraced landscapes, including the one in the Brkini Hills, is defined by a repeating pattern of terrace platforms and slopes, or slope geometrization. Terraced landscapes are spatial features with exceptional physiognomy, in which terraces are the most important element of the cultural landscape. These types of landscapes are attractive not only during the time of year when the lush and colorful vegetation seduce the locals and passersby, but also in the winter, when the geometry of the terraces becomes even more pronounced in the landscape (Ažman Momirski and Radikon 2008). Due to their typical landform, there are frequent attempts to typify terraces that influence the landscape aesthetics. The land use typology of terraces (Ažman Momirski and Kladnik 2009) is widely accepted and used, but some authors also typify terraces by geographical area. Such typological approaches may be inappropriate because terrace types can also occur outside a defined geographical area. Due to their uniqueness, Križaj Smrdel (2010b) defined the terraces in the Brkini Hills as a Brkini type of cultivated terraces or as one of the three types of traditional terraces in Slovenia. The exceptionality of the Brkini Hills terraced landscape lies in the clearly identifiable cultivated terraces across an extensive area that account for the majority of farmland around

the largely elongated settlements along the ridges. Even though the land use on them has extensified and parts of them are already becoming overgrown with bushes and trees, the majority are still used and properly maintained.

A combination of usually very long, mostly grass-covered terrace platforms adapted to the terrain, and pronounced intermediate slopes, which are reinforced with fruit trees in places, offers a unique experiential value, which is becoming increasingly evident when comparing this landscape to other attractive landscapes in Slovenia and abroad. It is probably no coincidence that terraced landscapes are often included in the various slideshows of exceptionally beautiful and picturesque landscapes available on the Internet (e.g., Internet 7). In fact, one of the most frequently used photo from Slovenia is the aerial photo of the Brkini Hills slope with Ostrožno Brdo taken by Marjan Garbajs. Thanks to its aesthetic value, it has been published in several volumes (e.g., Perko and Orožen Adamič 1998; Luthar et al. 2008; Križaj Smrdel 2010a) and scholarly papers with illustrations (e.g., Kladnik, Perko and Urbanc 2009).

1.3 Methodology

The ALPTER project team, founded in 2003 and 2004 based on university initiatives, developed the methodological bases for evaluating terraced landscapes. The bases envisage a description of the selected study area and a presentation of its geological conditions, climate, historical development, land use, terrace characteristics, drainage, accessibility, ownership, land protection, terrace conservation status, and developmental factors. *Terraced landscapes of the Alps: Atlas* (Scaramellini and Varotto 2008) contains several articles on the theoretical and methodological bases and the methodology of measuring and evaluating terraced landscapes (e.g., Scaramellini 2008; Acovitsióti-Hameau 2008; Bonardi 2008; Brancucci and Masetti 2008); the article »Mapping and Geographical Classification of Terraced Landscapes: problems and proposals« (Varotto and Ferrarese 2008) is especially valuable from the methodological point of view.

Digital orthophoto maps (a color orthophoto with a pixel resolution of 0.50 m), a digital elevation model (DEM), and the register of the current use of agricultural and forest land (Internet 8) were used to produce maps. Data obtained through deskwork were supplemented through field research and mapping. The 5 × 5 m digital elevation model used (DMV 5) was created in 2011 in parallel with the cyclical recording and design of the orthophoto. The register of the current use of agricultural and forest land is kept by the Ministry of Agriculture and Environment for all of Slovenia. An interpretational key is used for determining the current use, which includes various definitions of the available data.

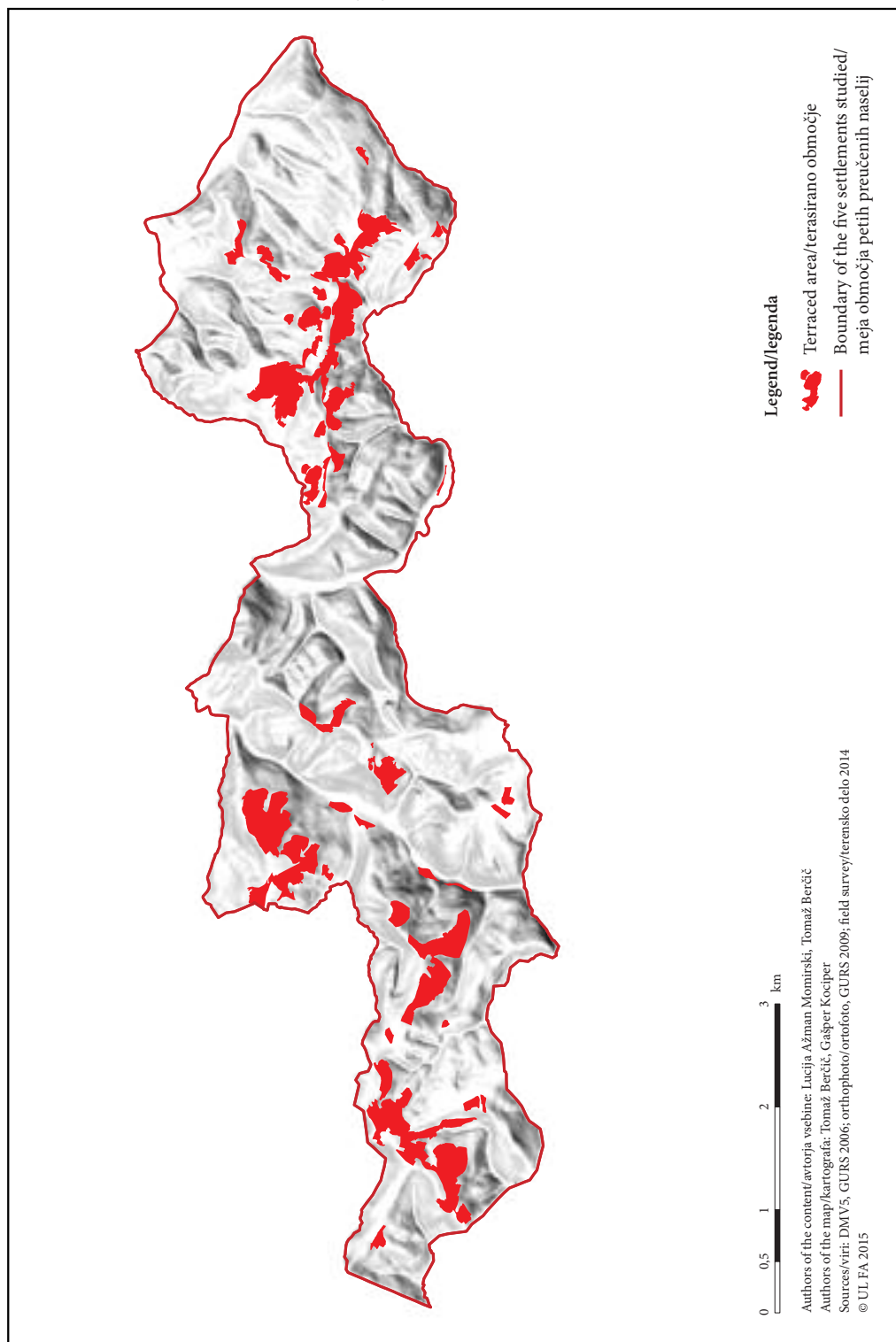
The data on the current use are captured using a computer-supported interpretation of orthophotos and supplemented with data from other registers, field research, and measurements. The register of current land use defines agricultural land as any land with cultivation potential that is not defined as forest. Minimum areas of data capture are specified for the individual types of land use (Internet 8). The following five basic land categories can be found on the terraces in the Brkini Hills: tilled land and gardens, orchards, grassland, forest, and built-up areas.

Even though the local names of terraces and their components are an interesting research topic, this study uses the generally known technical terms. A terrace is composed of two basic elements: the terrace platform and the terrace slope (Ažman Momirski et al. 2008). The terrace platform is the flat part of the terrace, where crops are usually grown, and the terrace slope is the steeper part connecting two platforms. Terrace slopes may be covered with soil and grassed over, and in the Mediterranean region they are often made from stacked rocks that were cleared from the fields.

2 Results

The claims that all the ridges in the Brkini Hills have been converted into cultivated terraces (Križaj Smrdel 2010a, 25) are not true. The ridges have been converted into terraces only in part; a far more typical spatial feature in the Brkini Hills is the terraced upper parts of the slopes below the ridges (Figure 3). The study area includes 228 ha or 10% of terraced land.

Figure 3: Terraced areas in the five settlements studied in the Brkini Hills. ►





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Figure 4: Aerial photo of Ostrožno Brdo with the two most pronounced terraced areas and village of Prelože in the background.



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Figure 5: Aerial photo of Ostrovica with its main terraced area and village of Misliče in the background.



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Figure 6: Many cultivated terraces away from the settlements and terraces with unclear ownership status are already being overgrown with forest.

Terraced landscapes can be easily identified in three settlements in particular. Two terraced areas stand out in Ostrožno Brdo. The first, which is among the most extensive contiguous terraced areas, lies in the northwestern part of the village, and the second, which is significantly smaller, lies in its northwestern corner (Figure 4). The terraced area in the Ostrožno Brdo cadastral district measures 93.6 ha and accounts for 10% of the area of the entire village.

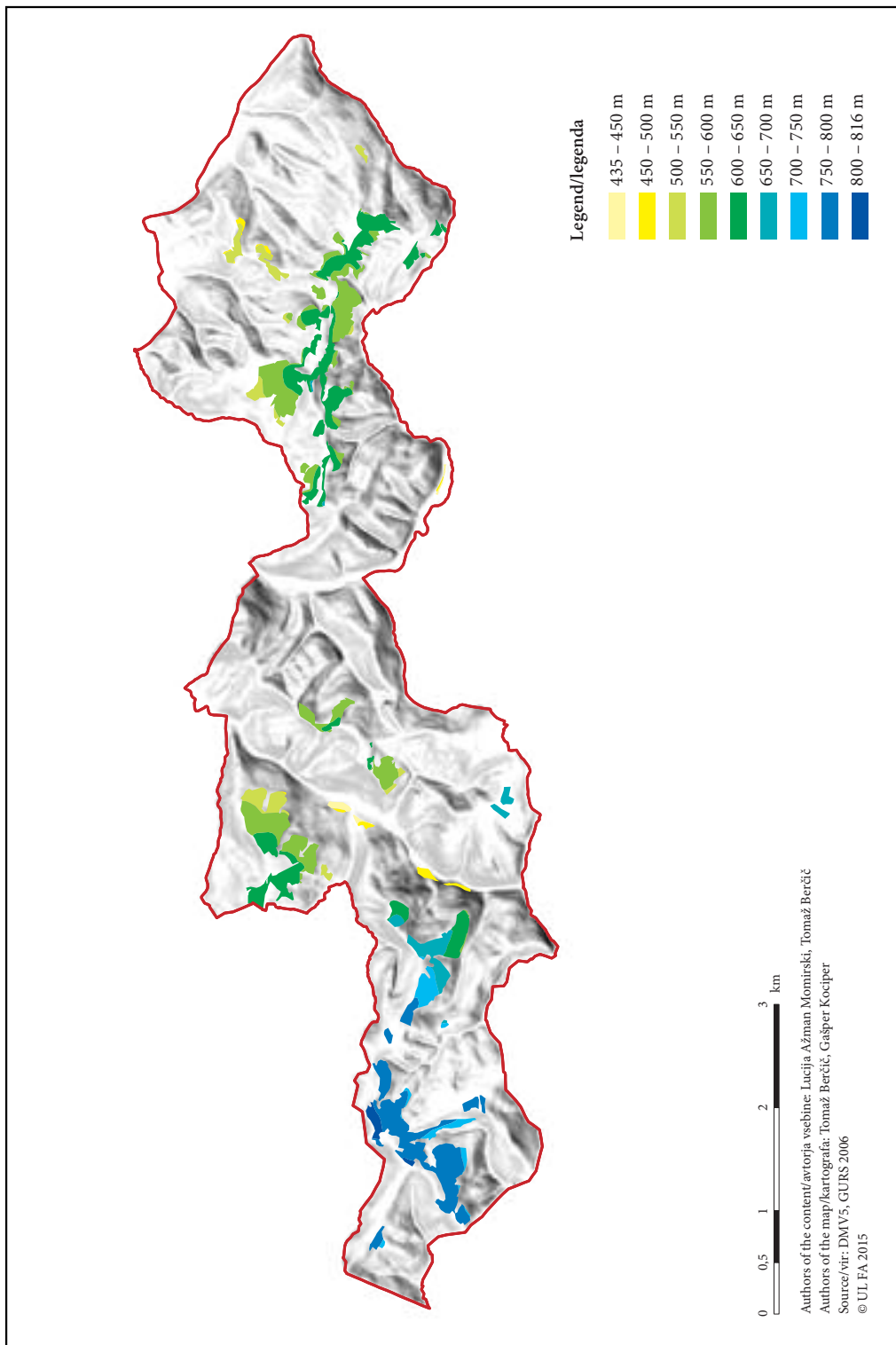
There is a conical belt of easily identifiable and extremely picturesque terraces on the slope west of Ostrovica (Figure 5), and in Vatovlje the entire eastern and southern slopes are terraced.

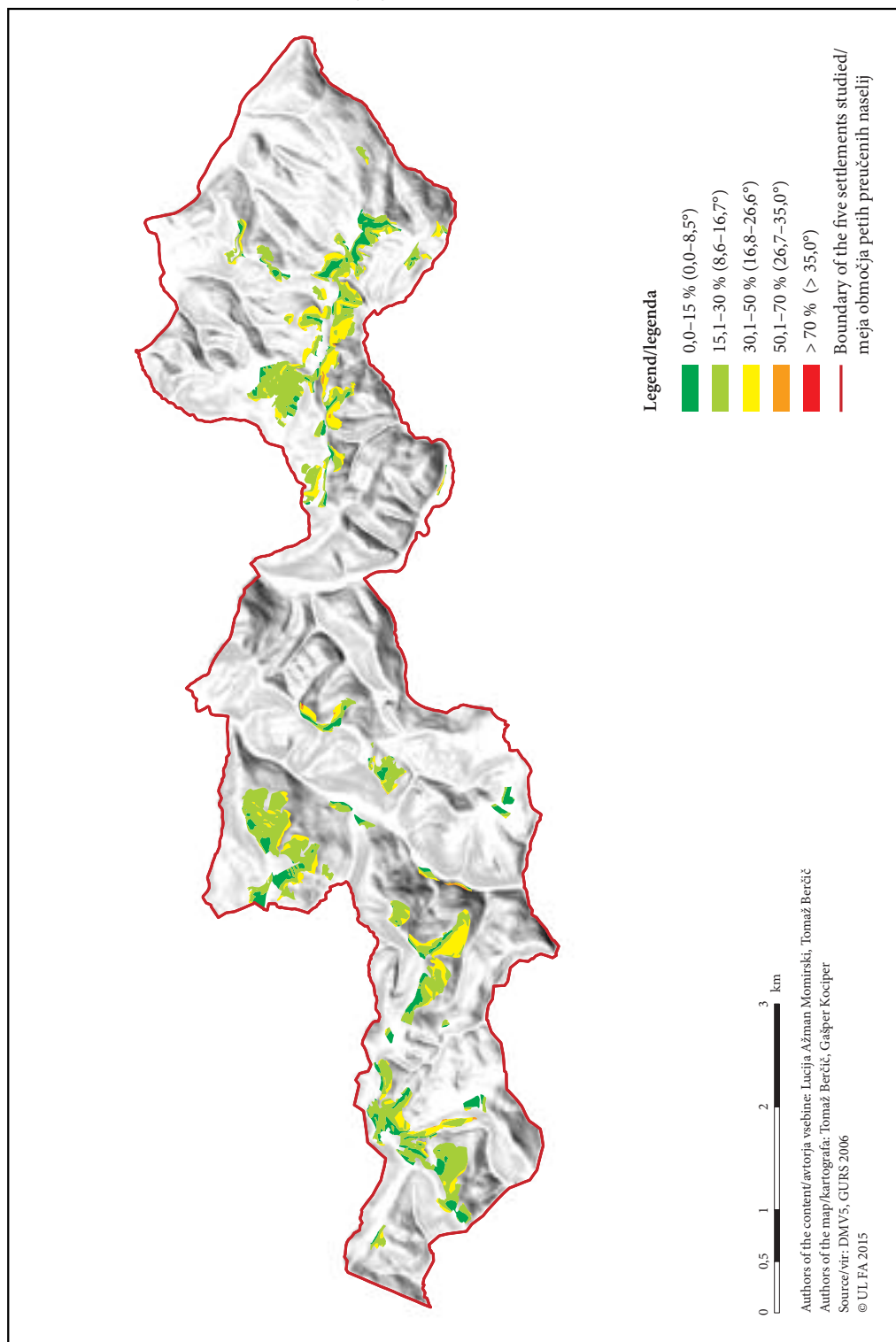
A significant number of deteriorated terraces can be identified on the sunny slope south of Ostrožno Brdo, where the edges between the terrace platforms and terrace slopes can no longer be clearly traced. The slope has been converted into a dynamic, rolling terrain, where traces of the former terraces can still be found. The terraces on the lower part of the slope in Ostrovica and in particular in Vatovlje have already largely been overgrown with forest (Figure 6). The terraces in Artviže are also no longer completely intact, even though the terraced landscape there has started being overgrown only recently. In line with the extremely unfavorable demographic development, extensive terraced areas have been overgrown in Kozjane; the satellite images (GURS 2011) also show that all of the farmland in the northeastern part of the village has already been overgrown with forest.

Over 70% of terraces in the study area lie on eastern or southern slopes. Surprisingly few have a western aspect (i.e., only 11%). The terraced slope in Ostrožno Brdo is interesting in this regard because the majority of the terraces there have a northern aspect. Similarly surprising findings were revealed by a study of the cadastral district and settlement of Medana in the Gorizia Hills, where, however, aspect does not have any significant effect on the distribution of vineyards and winegrowing terraces because of the low elevations and favorable microclimatic conditions (Ažman Momirski, Škvarč and Kodrič 2008). Despite their considerable elevation (between 443 and 655 m above sea level; and between 437 in 816 m in the area

Figure 7: Elevation of terraced areas in the five settlements studied in the Brkini Hills. ► p. 40

Figure 8: Slope gradient of terraced areas in the five settlements studied in the Brkini Hills. ► p. 41







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Figure 9: Long terraces with tall slopes in Ostrožno Brdo.



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Figure 10: Terrace slopes in the form of dry stone walls are extremely rare.

of all five settlements; Figure 7), the cultivated terraces on the northern slopes in Ostrožno Brdo lie immediately below the ridge and are thus sufficiently well insulated to enable intensive arable farming on the terrace platforms and the growth of fruit trees on the slopes between them. The conditions for this were even more favorable in the recent past. Elevation had a strong impact on the selection of crops; for example, grapevines do not grow at higher elevations (except on trellises). After the massive conversion of tilled fields into meadows, which are also used for grazing cattle, only a few individual fields are still tilled in the terraced areas, where people mostly grow wheat for flour of their own.

Three-quarters of terraces lie on moderate slopes with a slope gradient ranging from 15.1% to 30% (8.6° to 16.7°), and there are no terraces on extremely steep slopes (Figure 8). This explains the relatively wide terrace platforms, although their width varies considerably, with some being even up to three times wider than the narrowest ones. Just under one-fifth of terraces lie on slopes with a gradient between 0 and 15% (0.0° and 8.5°), and just over one-fifth of them lie on relatively steep slopes with a gradient between 30.1% and 50% (16.8° and 26.6°).

The terraces in the Brkini Hills are typically quite long. They are usually approximately 150 m long, but in some places (the most terraced areas of Ostrožno Brdo and Vatovlje) they are over 300 m long. According to the locals, they were created by hand, in which the terrace slopes were reinforced with the rocks they had removed from the fields, which they then covered with soil and planted with grass. The terraced soil slopes are grassed over, and often planted with fruit trees; the traditional trees used are cherry and plum trees, the roots of which reinforce the slopes well. Colnarič et al. (1985) recommend that a terrace slope should have a 1 : 1 ratio between the height and width; however, steeper terrace slopes with a ratio of 1 : 0.7 are permissible on loamy-sand, sandy-loam, firm marl, and rock substrata. The majority of the terrace slopes in Ostrožno Brdo are steeper than the 1 : 1 ratio; they are mostly approximately 1.5 m tall, and exceptionally also up to 3 m (Figure 9).

The center of Kozjane also features typical Mediterranean terraces with reinforced slopes in the form of dry stone walls (Figure 10).

A comparison of the parcellation in the cadastral survey created under Emperor Francis I and the orthophoto of the terraced land in the northwestern part of Ostrožno Brdo revealed that the survey map and the orthophoto overlap completely. Hence, it can be concluded that individual terraces, and especially their slopes, have remained completely the same over nearly two hundred years; that is, their platforms have the same length and width, and their slopes have the same height and width. Geomechanically, the terraces in the Brkini Hills are thus very stable, in which an important role is played by plants and their roots, which make the ground more stable by creating suction, while also functioning as reinforcement. Geomechanical instability is often connected with rapid social development and the subsequent growth in property value and increased surface vulnerability (Zorn and Komac 2011); it can also be a short-term consequence of the long-term effects of climate changes (Zorn and Komac 2013). For the time being, the Brkini Hills are not yet affected by these problems.

Irrigation and drainage are not used on the terraces in the area studied, even though a small irrigation system has been set up along the border between the Janežovo Brdo, Prelože, and Čelje cadastral districts not far from there. Because more precipitation is retained on the platforms than on slopes without terraces, the terraces accumulate more water. They can also be conceived of as a reservoir that retains the water from the frequent heavy rain (Ažman Momirski 2007). In the extreme north of Ostrožno Brdo, right next to the Reka River, irrigation and drainage have been carried out, which, however, has nothing to do with the cultivated terraces.

Now there are only a few tilled fields and gardens left and, even so, their number is significantly smaller than that of orchards (Križaj Smrdel 2010a). In addition to orchards and, naturally, forest, the other most frequent types of land use include grassland (i.e., meadows and pastures; Figure 11). Cattle are being grazed in many abandoned tilled fields (Figure 12) because livestock farming has become more important than the previously predominant subsistence arable farming.

In the past decades, spontaneous afforestation has been the predominant process of land use changes across the entire study area. The share of forest is also relatively high (16%) in terraced areas, which indicates that cultivated terraces are being overgrown. Nonetheless, the study also revealed individual cases of deforestation. The locals in the Brkini Hills are reviving traditional orchard cultivation (apples, pears,

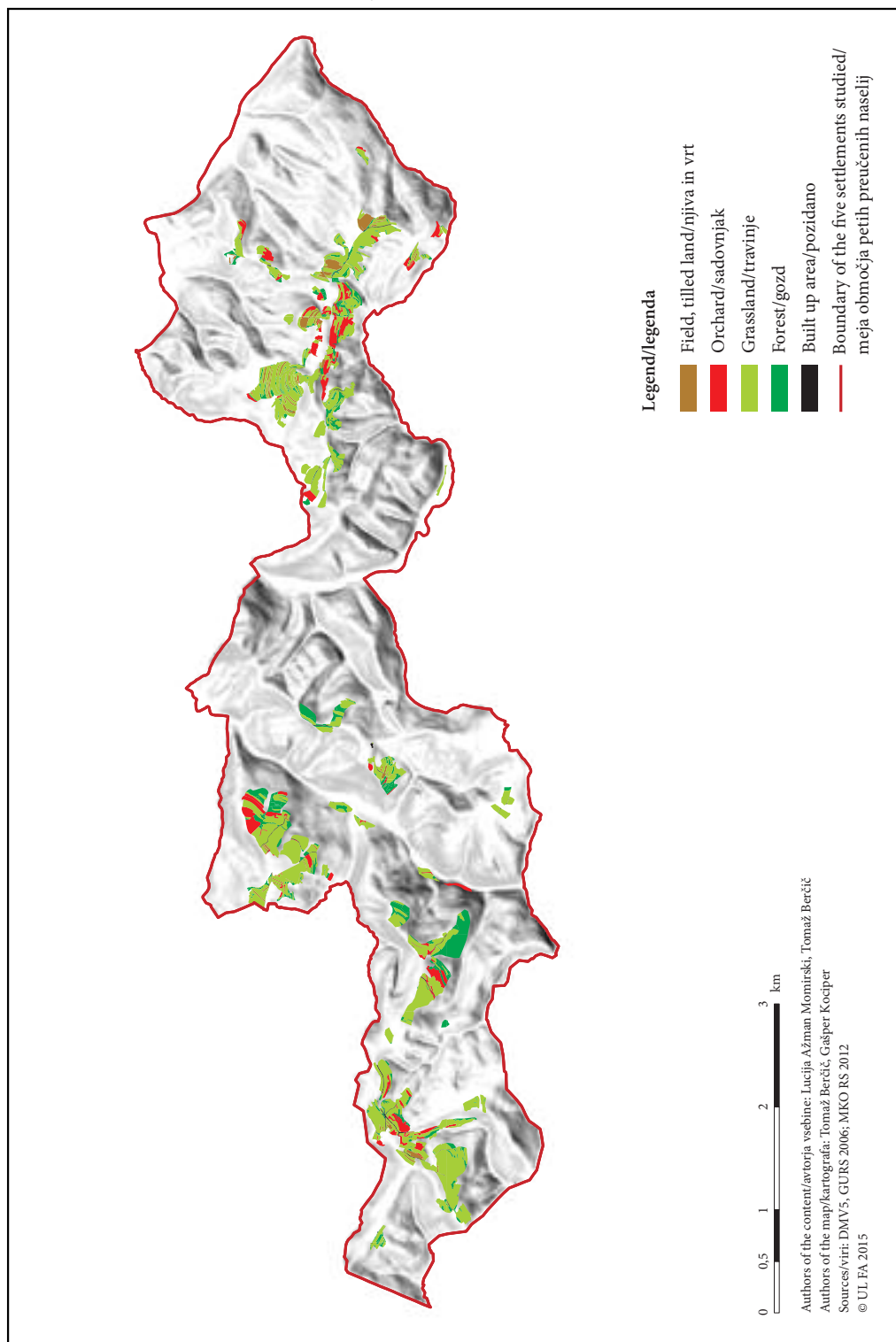




Figure 12: Cattle are being grazed on many abandoned terraces.

plums, hazelnuts, cherries, sour cherries, and peaches) because the area offers excellent conditions for both integrated and organic production. Orchard cultivation goes back to the late eighteenth century, when it was primarily promoted by teachers and priests (Volk et al. 2011). The temperatures, precipitation regime, and typical windy conditions have a beneficial effect on fruit quality. The majority of orchards were already set up on the terraces (specifically, the terrace slopes) by the beginning of the nineteenth century. Today the orchards on the terraces are an important land use category because they cover a full 12% of the terraced areas. Fruit trees have traditionally been planted on terrace slopes to prevent erosion, in which the terrace platform can be used for other cultivation. Despite the efforts, in many places the fruit trees are no longer being properly maintained and are beginning to disappear, which also threatens the existence of terraces.

3 Discussion

Terraces are important for agricultural production because the soil on them has unique chemical and physical properties that allow the production of high-quality crops. Due to increased general awareness of the quality of the food produced, the Brkini Hills have invaluable agricultural potential.

The relation between the landscape shaped by agriculture and the effects of its character is also important. Terraced landscapes are not only an important agricultural resource, but also a great tourism opportunity. This type of landscape is attractive in every season: in the spring, when nature is waking up and clads itself in fresh green colors, in the summer, when the lush and colorful vegetation seduces the locals and passers-by, in the fall, when it dons an incredibly picturesque garment of yellow and brown shades, and in the winter, when the geometry of the terraces comes most to the fore. The advantage of the Brkini Hills is that, because of higher elevations, the climate there is very pleasant during the summer hot spells. The appeal and dramatic effect of the landscape there is sufficient to make the study area an important tourism destination. However, one needs to bear in mind the lesson learned from other terraced landscapes across Europe (e.g., Cinque Terre): that tourism itself does not impact the maintenance and restoration of terraces, and



DRAGO KLADNIK

Figure 13: A modified and newly terraced slope between villages Ostrožno Brdo and Prelože.

the planting of permanent crops, but that this primarily involves the challenges connected with land management and balanced regional development.

No large-scale systematic restoration of terraces was established in the settlements studied in the upper parts of the Brkini Hills. However, on the borders of Ostrožno Brdo towards Prelože, a slope with a northern aspect was identified that has been modified in its upper part and mechanically converted into terraces in its central and lower parts. This might have been surprising considering the general and omnipresent overgrowth and decay of cultivated terraces if one had not been familiar with the complex land-ownership conditions that accelerate land fragmentation. The traditional attachment of Slovenian farmers to their land also contributes its share; the farmers in the Brkini Hills are no exception in this case, which hinders the sale of farmland or even makes it impossible. In the upper part of the terraced area, winter wheat had already been planted on the wide terrace platforms adapted to mechanized farming (Figure 13), whereas the lower terraces were still being »worked on.« Similarly, only a few examples of new terrace construction can be found elsewhere in Europe because as a rule, farmers can barely maintain the cultivated terraces.

An important advantage of the step-like transformation of the slopes in the Brkini Hills is that there are no landslides in the terraced areas. Improved demographic and economic conditions could prevent the land from being overgrown with low-quality forest stands. Considering the exceptionally unfavorable demographic profile, planned measures for preserving the population and maintaining the cultural landscape are vital because only in this way can the development vitality of the area be restored and further attraction of the countryside be ensured.

4 Conclusion

The terraced landscape of the Brkini Hills is such an important value that it deserves to be preserved for future generations. To this end, mechanized farming should be made possible on the terraces and access roads should be built for this purpose.

The development vision for agriculture in the Brkini Hills and the local economy in general should definitely be based on environmentally friendly organic farming because there is an increasing demand for organically produced food. In addition, secondary activities on farms should be promoted, and crafts based on local tradition and low-impact forms of tourism should be developed. This would most likely help preserve the severely endangered cultural landscape, on which terraces in particular have left a unique and clearly identifiable mark.

However, all of this can only be carried out if there is a sufficient vital population that can maintain the cultural landscape. The infrastructure has already been improved and now appropriate conditions must also be provided for the remaining population to make a living in this area, bearing in mind that the population's age structure must be rejuvenated. Without this, nothing bodes well for even the most attractive and unique landscape. The development trends in the past and current century indicate that, without additional efforts, this area will experience a demographic collapse and be transformed back into the original forest landscape.

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Terasirana pokrajina v Brkinih

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IZVLEČEK: Mednarodno preučevanje terasiranih pokrajin postaja čedalje bolj pomembno raziskovalno področje. Uvodnemu delu članka, kjer predstavljamo najpomembnejše raziskovalne in strokovne aktivnosti, povezane s terasiranimi pokrajinami, in primere njihovega preučevanje po svetu, sledi podroben prikaz značilnosti samosvoje terasirane pokrajine Brkinov. Za podrobnejšo obravnavo smo izbrali pet naselij v osrednjem in zahodnem delu pokrajine. Interdisciplinarna raziskava je obsegala proučevanje izrazito neugodnih demografskih procesov, naravnih dejavnikov sodobne terasirane pokrajine, zgodovinskih sprememb pokrajinskih pojavov pa tudi podrobno opazovanje oblik teras, ki terasirano pokrajino sestavljajo. Kmetovalci jo kljub novodobni strojni obdelavi vse težje ohranjajo; njen obstoj ogroža tudi ogozdovanje. V Brkinih se čedalje bolj izgublja preplet marsikod zelo dolgih terasnih ploskev in izrazitih vmesnih brežin, ki predstavlja edinstveno doživljajsko vrednoto.

KLJUČNE BESEDE: geografija podeželja, kulturna pokrajina, raba tal, terasirana pokrajina, kmetijske terase, Brkini, Slovenija

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NASLOVA:

dr. Lučka Ažman Momirski

Fakulteta za arhitekturo

Univerza v Ljubljani

Zoisova cesta 12, SI – 1000 Ljubljana, Slovenija

E-pošta: lucija.azman@fa.uni-lj.si

dr. Drago Kladnik

Geografski inštitut Antona Melika

Znanstvenoraziskovalni center Slovenske akademije znanosti in umetnosti

Gosposka ulica 13, SI – 1000 Ljubljana, Slovenija

E-pošta: drago.kladnik@zrc-sazu.si

1 Uvod

Raziskovanje terasiranih pokrajin se je intenziviralo na prelomu iz drugega v tretje tisočletje. Leta 1997 je bil na UNESCO-v seznam svetovne dediščine (v na novo uvedeno kategorijo 'kulturna pokrajina') uvrščen pas severovzhodne obale Ligurskega morja v Italiji, imenovan Cinque Terre (Alberti in Lodatti 2012). Strma klifna obala je obenem izjemno slikovito terasirano pobočje. Pomembnost območij, katerih »... *značilnosti so plod delovanja in medsebojnega vplivanja naravnih in/ali človeških dejavnikov* ...« (internet 1, Splošne določbe, 1. člen), poudarja tudi sprejetje Evropske konvencije o krajini (*European Landscape Convention*).

V prvem desetletju novega tisočletja je bilo izvedenih več mednarodnih projektov o varovanju, obnovi in načrtovanju terasiranih pokrajin, med njimi:

- PATTERN, katerega namen je bil poiskati in opisati vrste kmetijskih teras ter stanje njihove ohranjenosti na španskem otoku Majorki ter na območjih francoske Nice in italijanske Genove (Lasanta s sod. 2013),
- PROTERRA, ki je podprl 12 pilotnih ukrepov, katerih cilj je obnavljanje kmetijskih teras v šestih sredozemskih državah (internet 2),
- ALPTEP, katerega glavni cilj je bil izboljšati poznavanje prostorskih prvin terasiranih pokrajin na območju Alp (internet 3) in
- TERRISC, ki preučuje ohranjanje terasirane pokrajine kot strategijo za preprečevanje naravnih nesreč, zlasti poplav in erozije, na Balearskih in Kanarskih otokih ter na Portugalskem in v jugozahodni Franciji (internet 4).

Evropska unija je kmetijske terasirane pokrajine vključila v načrt razvoja podeželja v obdobju 2007–2013, akcijski načrt biodiverzitete v kmetijstvu (zaradi izboljšanja ali vzdrževanja biodiverzitete in preprečevanja zmanjšanja biodiverzitete zaradi kmetijskih aktivnosti) ter tematsko strategijo varovanja prsti. Evropska unija izraža podporo tudi območjem z omejenimi možnostmi razvoja in kmetijskim območjem z visoko opredeljenimi naravnimi vrednotami, ki jih v številnih primerih predstavljajo prav terasirana zemljišča. Prednostna naloga tematske strategije za varovanje prsti je med drugim ohranjanje in vzdrževanje terasirane pokrajine (Lasanta s sod. 2013).

Mednarodno preučevanje terasiranih pokrajin je doseglo vrhunca s prvima dvema svetovnima konferencama o terasiranih pokrajinah. Na prvi, ki je bila na Kitajskem jeseni 2010, je bilo ustanovljeno Mednarodno združenje terasiranih pokrajin (*International Terraced Landscapes Alliance* – ITLA). Sprejeta je bila tudi Honghejska deklaracija (*Honghe Declaration*) o varovanju in razvoju terasiranih pokrajin (internet 5), ki je skupaj z več kot stotimi konferenčnimi znanstvenimi in strokovnimi prispevki o raznovrstnih vidikih terasiranih pokrajin z vseh koncev sveta objavljena tudi v zajetnih monografijah v kitajskem in angleškem jeziku (Peters in Junchao 2012). Regionalnih orisov terasiranih pokrajin ni veliko. Poleg dokaj pomanjkljivega prikaza svetovne razprostranjenosti terasiranih pokrajin (Rivera 2012) in predstavitve rezultatov projekta ALPTEP na območju Benečije (Alberti in Lodatti 2012) lahko izpostavimo le še prizadevanja za varovanje tradicionalne terasirane pokrajine v južnokitajski pokrajini Junan (Yúnnán) (Wenxing, Kun in Lingchong 2012) ter za zaščito in razvoj terasiranih območij v filipinski Kordiljeri (Baguilat 2012). V prispevku Kendalllove (2012) je zaradi primerjave z inkovskimi terasami v Peruju podrobno predstavljena tudi študija ekstenzifikacije terasiranih kmetijskih zemljišč v dolini Alpujarra na južnih obronkih španskega pogorja Sierra Nevada (Douglas, Critchley in Park 1996).

Druga svetovna konferenca pod okriljem združenja ITLA je bila spomladi 2014 v Peruju. Začela se je s predstavitvijo pomembnega dosežka Kitajske, saj je leta 2013 kulturna pokrajina terasiranih rižišč ljudstva Hani v prefekturi Honghe pokrajine Junan postala del svetovne kulturne dediščine (Junchao 2014). V pregledni raziskavi enajstih terasiranih pokrajin v Peruju so upoštevana tako aktivna kot opuščena območja teras (Lambruschini 2014), posebej zanimiva pa je bila primerjava značilnosti in problematike terasiranih pokrajin v Peruju in na Japonskem (Baba 2014). Obnova bolivijskih območij teras je bila zelo podrobno predstavljena za naselja province Tapacarí v okrožju Cochabamba (Crespo 2014). Prikazov evropskih terasiranih pokrajin je bilo malo. Med njimi velja omeniti napore za ohranitev terasirane pokrajine v dolini Cembra severno od mesta Trento v deželi Trentinsko – Zgornje Poadižje (Zanotelli 2014).

S širitvijo raziskovalnega področja se je okreplilo tudi publiciranje njegovih izsledkov. Rezultati dela v okviru projekta ALPTEP so bili že prej objavljeni v publikacijah *Terraced landscapes of the Alps: Atlas* (Scaramellini in Varotto 2008) in *Terraced landscapes of the Alps: Projects in progress* (Fontanari in Patassini 2008). V prvi je tudi več sinteznih prikazov rezultatov regionalnih študij, izvedenih v okviru projekta (Castex s sod. 2008; Brancucci in Comenale Pinto 2008; Freppaz s sod. 2008; Mazzoleni s sod. 2008; Werder s sod. 2008;

Chemin in Varotto 2008; Ažman Momirski 2008; Arnberger, Eder in Brandenburg 2008). V sklopu projekta ALPTER je treba izpostaviti še interdisciplinarno monografijo o terasirani pokrajini Goriških brd (Ažman Momirski s sod. 2008), ki vključuje tudi raziskave o spreminjanju rabe tal in plazovitosti. Publikacija je zagotovo najbolj celovit slovenski prikaz obravnavane tematike doslej.

Izčrpen kronološki pregled preučevanja kmetijskih teras in terasirane pokrajine v Sloveniji je bil skupaj z orisom slovenskih terasiranih pokrajin objavljen šele pred nekaj leti (Ažman Momirski in Kladnik 2009). Glede na dejstvo, da so kulturne terase v mnogih predelih Slovenije dokaj izrazite, v nekaterih pa celo prevladujoče zaznamovale pokrajinsko podobo, bi lahko na tem področju upravičeno pričakovali več opravljenega raziskovalnega dela. Aktualnost raziskovalne teme je zagotovo vplivala tudi na v okviru podiplomskega študija pripravljena prispevka Helene Križaj Smrdel (2010a; 2010b). Nadaljevanje nacionalnih raziskav slovenskih terasiranih pokrajin je povod za pripravo monografije o terasiranih pokrajinah v submediteranski Sloveniji (Ažman Momirski 2014).

Tradicionalna terasirana pokrajina Brkinov je povsem samosvoja tako v okviru Slovenije kot tudi širše, zato si zasluži podrobnejšo obravnavo. Doslej je bila razmeroma slabo preučena. Še najbolj neposredno se je dotika primerjalna študija sprememb rabe tal na območjih sredozemskih terasiranih naselij Krkavce v Koprskih brdih in Ostrožno Brdo v Brkinih (Ažman Momirski in Gabrovec 2014), ki je tudi eno od petih vzorčnih naselij v pričujoči študiji. Kot eno od sondnih območij jo je raziskovala tudi Križaj Smrdelova (2010a; 2010b). Zanimivo je, da se priznani slovenski socialni geograf Vladimir Klemenčič v svoji zelo podrobni demografski in gospodarski študiji pokrajine med Snežnikom in Slavnikom, v kateri natančno oriše tudi razmere v Brkinih, kmetijskih teras in terasiranosti kot pomembne pokrajinske prvine skorajda ni zavedal, saj terase bežno omenja le na dveh mestih (Klemenčič 1959).

1.1 Oris preučevanega območja

Slovenija je kot le redkokatera evropska država preprejena s kulturnimi terasami. Te se pojavljajo v vseh tipih slovenskih pokrajin, vendar se razlikujejo po pogostnosti, namenu in sodobni funkciji (Ažman Momirski in Kladnik 2009).

Le malokatera država se po pokrajinski pestrosti lahko primerja s Slovenijo, saj se na njenem ozemlju stikajo in prepletajo Alpe, Panonska nižina, Dinarsko gorovje in Sredozemlje ter germanski, madžarski, slovanski in romanski kulturni vplivi. Zato Slovenija slovi tako po naravni kot kulturni raznolikosti, pa tudi spremenljivosti in prehodnosti. Razlikujemo štiri temeljne pokrajinske tipe in devet podtipov (Kladnik, Perko in Urbanc 2009). Eden od temeljnih pokrajinskih tipov v Sloveniji so sredozemske pokrajine, ki se delijo na podtipa sredozemska gričevja in sredozemske planote (Perko 1998). Za prva je značilna slabo prepustna flišna podlaga, za druge pa prepustna apnenčasta, ki jo zaznamujejo raznovrstni kraški pojavi. Največ teras, ki opredeljujejo najbolj značilne terasirane pokrajine, je prav v sredozemskem prostoru, precej jih je tudi v kraških dinarskih pokrajinah in vinorodnih panonskih gričevjih (Ažman Momirski in Kladnik 2009, 31), medtem ko se drugje redkeje pojavljajo, vendar je brez njih le redkokatera slovenska pokrajina. Med devetimi naravnimi podtipi so povsem brez njih le panonske ravnine.

Brkini so sicer uvrščeni med sredozemska gričevja, vendar se po svojih značilnostih bistveno razlikujejo od tipičnih sredozemskih gričevij (Goriška, Koprška in Vipavska brda, tudi flišna Vipavska dolina), saj imajo zaradi večje nadmorske višine (najvišje, 817 m, se vzpnejo pri cerkvi sv. Socerba nad Artvižami) poteze hribovja, glede na lego proti notranjosti Slovenije pa se v njihovem podnebnju prepletajo lastnosti sredozemskega in celinskega podnebnja (Ogrin 1996).

Pokrajinsko neenotna mezoregija Brkini in dolina Reke se v dinarski smeri severozahod–jugovzhod razteza v jugozahodnem delu države (slika 1). Meri 341,5 km², kar je 1,68 % površine Slovenije. Med občine Divača, Hrpelje-Kozina, Ilirska Bistrica in Pivka razdeljeno območje mezoregije poleg Brkinov sestavljajo še dolina Reke, ki se deli na Podgoro, Ilirskobistriško kotlino, debrski del doline in Vremsko dolino, severno nad dolino Reke pa je k mezoregiji pripojena še Košana dolina. Brkine, ki jih prevladujoče sestavlja vododržni fliš eocenske starosti, lahko razdelimo na zahodni, osrednji in vzhodni del. Onstran Jelšanskega podolja na jugovzhodu je še manj izrazit predel prav tako flišnih brd, ki bi ga lahko poimenovali Jelšanska brda (Šebenik in Kladnik 1998). Največ teras, po temeljni tipologiji (Ažman Momirski in Kladnik 2009) jih lahko opredelimo za poljedelske, je v osrednjem in zahodnem delu Brkinov, zato smo tam izbrali območja petih naselij za podrobnejšo obravnavo. Artviže spadajo v občino Hrpelje - Kozina, Ostrovica, Vatovlje, Kozjane v občino Divača in Ostrožno Brdo v občino Ilirska Bistrica.

Slika 1: Lega območij petih preučениh naselij znotraj mezoregije Brkini in dolina Reke ter lega mezoregije v Republiki Sloveniji. Glej angleški del prispevka.

Izbrana naselja v severozahodnem delu mezoregije mejijo druga na drugo, njihovo skupno območje je razpotegnjeno v smeri od zahoda proti vzhodu in meri 2201,9 ha ali 6,4 % mezoregije. Medtem ko je povprečna nadmorska višina mezoregije 562 m, je povprečna nadmorska višina preučevanega območja skoraj 635 m. Opazno je, da je na njem v primerjavi s celotno mezoregijo nekoliko več zemljišč s severno in vzhodno ekspozicijo, še precej bolj očitna pa je njegova večja nagnjenost, saj je prevladujoč naklonski razred od 30,1 do 50 % (od 16,8 do 26,6°) (44,5 %), v celotni regiji pa od 15,1 do 30 % (od 8,6 do 16,7°) (32,4 %). V celotni mezoregiji je do 15 % (do 8,5°) nagnjenih zemljišč 30,9 %, na pilotnem območju vsega 10,6 %. Z 71,4 % deležem gozda Brkini z dolino Reke spadajo med zelo gozdnate slovenske mezoregije. Podrobno preučeno območje petih naselij je še bistveno bolj gozdnato (81,4 %), med kmetijskimi zemljišči prevladujejo travniki in pašniki, njiv je manj kot odstotek (0,83 %).

Podrobno preučeno ozemlje petih naselij je na območju okrog 450 km² prostranega Regijskega parka Škocjanske jame, ki zajema celotno porečje Reke (internet 6). Na ozemlja petih izbranih naselij deloma segajo tudi vodovarstvena območja. Ostrožno Brdo v svojem južnem delu sega na območje naravnih vrednot (dolina potoka Šmagurke), v severnem delu, ob reki Reki pa spada med ekološko pomembna območja oziroma med posebna ohranitvena območja.

Izbrana vzorčna naselja se medsebojno razlikujejo glede na lego. Ostrožno Brdo in Kozjane sta postavljeni na temenu slemena, Artviže nekoliko pod temenom, medtem ko je za Ostrovico in Vatovlje značilna pobočna lega. Ostrožno Brdo in Kozjane sta obcestni naselji, preostala tri pa so gručasta.

Vsa naselja so prometno odmaknjena in oddaljena od večjih zaposlitvenih središč. Ob tem je njihov dramatičen demografski razvoj zaznamovala tudi lega na obrobju matičnih občin. V vseh petih izbranih naseljih je leta 2011 živelo 191 ljudi, kar je glede na demografski višek v letu 1890 (1140 ljudi) le še 16,8 %. Število prebivalcev se je začelo naglo in nezadržno zmanjševati po drugi svetovni vojni, čeprav je že v prvi polovici 20. stoletja vseskozi vztrajno nazadovalo. Največje med petimi naselji je Ostrožno Brdo, kjer je leta 2011 živelo 94 ljudi, leta 1890 pa kar 433. Zdaj so glede na število prebivalcev najmanjše naselje Kozjane (leta 2011 je tam živelo 13 ljudi), ki so leta 1880 imele 283 prebivalcev, kar je bilo več kot dvakrat toliko kot na Ostrovici in Vatovljah, ki dandanes Kozjane prekašata za nekaj prebivalcev (Ostrovica 17 in Vatovlje 20). Na Kozjanah je torej število prebivalcev glede na maksimum nazadovalo na 4,6 %, še najbolj pa so jo odnesle Artviže, kjer živi še 28,0 % ljudi glede na maksimalno število leta 1880.

Slika 2: Primerjava spreminjanja prebivalstva (indeks) na območjih Slovenije, mezoregije Brkini in petih preučениh naselij v popisnih letih 1869–2011. Glej angleški del prispevka.

Sicer pa v celotni mezoregiji Brkini in dolina Reke živi 15.086 ljudi. Delež petih vzorčnih naselij v prebivalstvu mezoregije je 1,3 %, delež prebivalstva mezoregije znotraj Slovenije pa 0,7 %. Tudi v mezoregiji kot celoti se število prebivalcev od demografskega viška v letu 1910 vseskozi postopoma zmanjšuje, medtem ko je za Slovenijo za vse časovne preseke značilna postopna rast (slika 2).

Demografsko podobo Brkinov in še bolj vzorčnih naselij pa ne kazi le močno zmanjševanje števila prebivalcev, pač pa tudi z njim tesno povezana neugodna starostna sestava s prevlado ostarelih in z le majhnim številom mladih ljudi. Zaradi zaposlovanja v dolini se je zmanjšal tudi delež kmečkega prebivalstva. Preostali kmetovalci kljub novodobnemu razmahu rabe kmetijskih strojev le stežka obvladujejo in vzdržujejo razpoložljiva kmetijska zemljišča in s tem seveda tudi kmetijske terase, zato jih je čedalje več opuščениh; postopoma jih preraščata grmovje in drevje.

1.2 Teoretska izhodišča

Z novo kulturno geografijo naj bi preučevanje pokrajine preseglo zgolj morfološko analizo in postalo interpretativno. Pozornost se usmerja na metaforične, ideološke, vrednostne in druge neoprijemljive kakovosti pokrajine. Skladno s tovrstnim pogledom sveta ne moremo dojeti zgolj z objektivnim pristopom, ampak ga lahko izkusimo in še globlje razumemo s subjektivnim. Pokrajina se ne nanaša zgolj na fizično realnost, predvsem na prostor torej, ampak tudi na organizacijo in dojemanje družbenih, kulturnih, mišljenjskih, političnih ter gospodarskih prvin človekovega obstoja. Tako je pokrajina tudi miselni zemljevid in podoba,

v kateri je mogoče prepoznati številne zgodbe, prepletene s preteklostjo in vsakdanjim življenjem ljudi (Urbanc 2008).

V slovenski geografiji se je z vrednotenjem pokrajine še najresneje spoprijel Erhartič, ki je izpostavil vrednotenje narave. Med zvrstmi vrednot je ob intrizičnih ali eksistenčnih, kulturnih, socialno-ekonomskih, funkcijskih, geosistemskih ter znanstvenoraziskovalnih in izobraževalnih izdvojil tudi estetske vrednote, ki zagotavljajo svojevrstna doživetja. Človekovo zaznavanje ceni raznolikost, kompleksnost, značilne vzorce in lokalni značaj. Govora je tudi o privlačnostni vrednoti, kjer navzočnost določenega pojava izboljša kakovost življenja v nematerialnem smislu in je marsikod pomemben turistični adut (Erhartič 2012, 34–38).

Estetsko vrednost terasiranih pokrajin, brkinska ni izjema, določa ponavljajoči se vzorec terasnih ploskev in brežin oziroma geometrizacija pobočja. Terasirane pokrajine so prostorski pojav z izjemno fiziognomijo, v kateri so najpomembnejša prvina kulturne pokrajine terase. Takšna pokrajina je privlačna in urejena ne samo v tistih letnih časih, ko bujnost in barvitost vegetacije zapeljujeta pogled tu živečih ali mimoidočih, temveč tudi pozimi, ko postane geometrija teras v pokrajini še bolj prepoznavna (Ažman Momirski in Radikon 2008). Zaradi značilno oblikovanega površja so pogosti poskusi tipizacije teras, ki vplivajo na estetski videz pokrajine. Nesporna in splošno uporabna je tipizacija teras glede na rabo tal (Ažman Momirski in Kladnik 2009), medtem ko nekateri avtorji opredeljujejo terasne tipe glede na geografsko območje. Takšni tipološki pristopi so lahko pomanjkljivi, saj se tipi teras pojavljajo tudi izven opredeljenega geografskega območja. Tako je Križaj Smrdelova terase v Brkinih zaradi njihove izjemnosti opredelila kot brkinski tip kulturnih teras, enega od treh tipov tradicionalnih teras v Sloveniji (Križaj Smrdel 2010b). Izjemnost brkinske terasirane pokrajine lahko utemeljimo z veliko razsežnostjo izrazito oblikovanih kmetijskih teras, ki v bližini povečini slemenskih naselij sestavljajo glavnino vaških kmetijskih zemljišč. Čeprav se je zemljiška raba na njih ekstenzivirala in se del že zarašča z grmičevjem in drevjem, je glavnina še vedno v rabi in je primerno vzdrževana.

Preplet reliefni izoblikovanosti prilagojenih, marsikod zelo dolgih, večinoma s travo poraslih terasnih ploskev in izrazitih vmesnih brežin, mestoma utrjenih s sadnim drevjem, predstavlja edinstveno doživljajsko vrednoto, ki se je ob možnostih vizualne primerjave privlačnih pokrajin ne le v domačem, ampak tudi v svetovnem merilu čedalje bolj zavedamo. Ni najbrž naključje, da se med raznimi na spletu dostopnimi kolaži estetsko izjemnih, slikovitih pokrajinskih podob kot po pravilu pojavljajo prav terasirane pokrajine (na primer internet 7). Pri nas je bila zelo pogosto uporabljena prav zračna fotografija terasiranega brkinskega slemena z Ostrožnim Brdom, ki jo je posnel Marjan Garbajs. Tudi zaradi svoje estetske sporočilnosti je objavljena v več monografijah (na primer Perko in Orožen Adamič 1998; Luthar s sod. 2008; Križaj Smrdel 2010a) in s fotografijami opremljenih znanstvenih prispevkih (na primer Kladnik, Perko in Urbanc 2009).

1.3 Metodologija

V letih 2003 in 2004 na podlagi univerzitetnih pobud ustanovljena skupina projekta ALPTER je izoblikovala metodološka izhodišča za vrednotenje terasiranih pokrajin. Opredeljena izhodišča so predvidela opis lokacije izbranega preučevanega območja ter predstavitev njegovih geoloških razmer, podnebja, zgodovinskega razvoja, rabe tal, značilnosti teras, odvodnjavanja, dostopnosti, lastništva, varovanja zemljišč, stanja ohranjenosti teras in razvojnih dejavnikov. O teoretsko-metodoloških izhodiščih ter metodologiji zajemanja in vrednotenja terasiranih pokrajin je v publikaciji *Terraced landscapes of the Alps: Atlas* (Scaramellini in Varotto 2008) objavljenih več prispevkov (na primer Scaramellini 2008; Acovisióti-Hameau 2008; Bonardi 2008; Brancucci in Masetti 2008), med katerimi je z metodološkega zornega kota še posebej dragocen članek *Kartiranje in geografska klasifikacija terasiranih pokrajin: problematika in predlogi* (Varotto in Ferrarese 2008).

Za izdelavo kartografskega gradiva smo uporabili digitalne ortofoto načrte (DOF – barvni ortofoto z velikostjo slikovnega elementa 0,50 m), digitalni model višin (DMV) ter evidenco dejanske rabe kmetijskih in gozdnih zemljišč (internet 8). Kabinetno pridobljene podatke smo dopolnili s terenskimi ogledi in kartiranjem. Uporabljeni digitalni model višin 5 × 5 m (DMV 5) je bil izdelan leta 2011 vzporedno s cikličnim snemanjem in izdelavo ortofota. Evidenco dejanske rabe kmetijskih in gozdnih zemljišč za območje celotne Slovenije vodi Ministrstvo za kmetijstvo in okolje. Za določanje dejanske rabe se uporablja interpretacijski ključ, ki vsebuje različne opredelitve razpoložljivih podatkov.

Podatki o dejanski rabi so zajeti z metodo računalniško podprte interpretacije ortofoto posnetkov in dopolnjeni z uporabo drugih evidenc, terenskimi ogledi in meritvami. V evidenci dejanske rabe so kot

kmetijska zemljišča določena vsa zemljišča, ki imajo pridelovalni potencial in niso opredeljena kot gozd. Za posamezne vrste rabe so določene tudi najmanjše površine zajema (internet 8). Na terasah v Brkinih se pojavlja naslednjih pet temeljnih zemljiških kategorij: njiva in vrt, sadovnjak, travinje, gozd in pozidano.

Čeprav so lokalna poimenovanja teras in njihovih delov zanimiva raziskovalna tema, v raziskavi uporabljamo splošno znane strokovne izraze. Posamezno teraso sestavljata temeljni oblikovni prvini terasna ploskev in terasna brežina (Ažman Momirski s sod. 2008). Terasna ploskev je uravnani del terase, kamor se praviloma sadi kmetijske kulture, terasna brežina pa je nagnjeni del terase, ki premošča višinske razlike med terasnimi ploskvami. Terasne brežine so lahko nasute z zemljino in zatravljene, v sredozemski pokrajini so pogosto oblikovane iz zloženega otrebljenega kamenja.

2 Rezultati

Nekatere trditve (Križaj Smrdel 2010a), da so vsa brkinska slemena spremenjena v kmetijske terase, niso točne. Slemena so le deloma terasirana, bistveno bolj značilna prostorska prvina Brkinov je, da so terasirani zgornji deli pobočij pod njimi (slika 3). Na podrobno preučnem območju je terasiranih 228 ha ali 10 % zemljišč.

Slika 3: Terasirana območja v petih podrobno preučeni brkinskih naseljih.
Glej angleški del prispevka.

Dobro prepoznavna terasirana pokrajina je predvsem v treh naseljih. V Ostrožnem Brdu izstopata dve terasirani območji. Prvo, ki je med najbolj prostranimi sklenjenimi terasiranimi zemljišči, je na severozahodu vasi, drugo, precej manjše, pa na njenem severovzhodu (slika 4). Območje teras v katastrski občini Ostrožno Brdo meri 93,6 ha oziroma 10 % vaškega ozemlja.

Slika 4: Zračni posnetek Ostrožnega Brda z obema najbolj izrazitima terasiranimi območjema; v ozadju je naselje Prelože.
Glej angleški del prispevka.

Slika 5: Zračni posnetek Ostrovice z glavnim terasiranim območjem; v ozadju je naselje Misliče.
Glej angleški del prispevka.

Na Ostrovici je na pobočju zahodno od vasi lijakast pas dobro prepoznavnih in izjemno slikovitih teras (slika 5), na Vatovljah pa je v celoti terasirano vzhodno in južno pobočje.

Na prisojnem pobočju južno od Ostrožnega Brda je mogoče opaziti precej propadlih teras, pri katerih pregibi med terasnimi ploskvami in terasnimi brežinami niso več jasno prepoznavni. Pobočje je preobraženo v razgiban, valovit teren, na katerem je še vedno mogoče prepoznati, da so bile tamkaj nekoč urejene terase. Teraso v spodnjem delu pobočja na Ostrovici in še posebno na Vatovljah so že v znatni meri zaraščene z gozdom (slika 6). Tudi terase na Artvižah niso več povsem nedotaknjene, čeprav se je tamkaj zaraščanje terasirane pokrajine začelo šele pred kratkim. Skladno z izrazito neugodnim demografskim razvojem so obsežna zaraščena terasirana območja v naselju Kozjane, kjer je mogoče tudi iz vzorcev na satelitskih posnetkih (GURS 2011) razbrati, da je vsa kmetijska zemljišča na severovzhodu vasi že prerasel gozd.

Slika 6: Mnoge od naselij oddaljene kmetijske terase in terase z neurejenim lastništvom že prerašča gozdno drevje.
Glej angleški del prispevka.

Več kot 70 % teras na obravnavanem območju ima vzhodno in južno lego. Zahodnih ekspozicij je presenetljivo malo, le 11 %. Zanimiva pa je izpostavljenost terasiranega pobočja na Ostrožnem Brdu, kjer ima največ teras severno lego. Podobno presenetljivo ugotovitev smo razkrili tudi v raziskavi za katastrsko občino in naselje Medana v Goriških brdih, kjer pa zaradi nizke nadmorske višine in ugodnih mikroklimatskih razmer ekspozicija na razporeditev vinogradov in vinogradniških teras nima odločilnega pomena (Ažman Momirski, Škvarč in Kodrič 2008). Vsekakor so na Ostrožnem Brdu kljub precejšnji nadmorski višini (med 443 in 655 m; na območju vseh petih naselij pa med 437 in 816 m) (slika 7) tudi v severni legi zaradi lege tik pod ovršjem slemena kmetijske terase dovolj dobro osončene, da omogočajo, še bolj pa so to v polpreteklji dobi, intenzivno njivsko rabo na terasnih ploskvah in rast sadnega drevja na brežinah med njimi. Na

izbor kmetijskih kultur je pomembno vplivala nadmorska višina, ki v višjih legah ne omogoča rasti vinske trte (razen v brajдах). Po množični spremembi njiv v travnike, na katerih pasejo tudi živino, so na terasiranih območjih obdelane le še posamezne njive, na katerih pridelujejo predvsem ozimno pšenico, namenjeno domači oskrbi s krušno moko.

Slika 7: Nadmorska višina terasiranih območij v petih podrobno preučenih brkinskih naseljih.
Glej angleški del prispevka.

Slika 8: Nakloni terasiranih območij v petih podrobno preučenih brkinskih naseljih.
Glej angleški del prispevka.

Tri petine teras je na zmerno nagnjenih pobočjih z naklonom od 15,1 % do 30,0 % (od 8,6 do 16,7°), teras na izrazito strmih pobočjih ni (slika 8). To pojasnjuje razmeroma široke terasne ploskve, vendar se širine terasnih ploskev precej razlikujejo, saj so najširše tudi do trikrat širše od najožjih. Slaba petina teras je na pobočjih z naklonom od 0 do 15,0 % (od 0,0 do 8,5°), dobra petina pa na bolj strmih pobočjih z naklonom od 30,1 do 50,0 % (od 16,8 do 26,6°).

Značilna prvina brkinskih teras je njihova precejšnja dolžina. Običajno so terase dolge približno 150 m, vendar ponekod na najbolj izrazito terasiranih območjih Ostrožnega Brda in Vatovelj presegajo dolžino 300 metrov. Po pripovedovanju domačinov so bile ročno izdelane tako, da je bila brežina sicer utrjena s kamnjem, ki so ga izkopali med obdelovanjem kmetijskega zemljišča, a so ga pozneje zasuli z zemljinjo in zatravili. Terasne brežine so zemljate in zatravljene, marsikod zasajene s sadnim drevjem, tradicionalno predvsem s češnjami in slivami, katerih korenine jih dodobra utrdijo. Colnarič in sodelavci (1985) priporočajo razmerje med višino in širino terasne brežine 1 : 1, na ilovnato-peščeni, peščeno-ilovnati, trdni lapornati in skalnati podlagi pa naj bi bile dopustne tudi bolj strme brežine z razmerjem 1 : 0,7. Terasne brežine v Ostrožnem Brdu so večinoma bolj strme od razmerja 1 : 1, visoke v glavnem okrog metra in pol, izjemoma celo do treh metrov (slika 9).

Slika 9: Dolge terase z visokimi brežinami na Ostrožnem Brdu.
Glej angleški del prispevka.

Na Kozjanah so v središču vasi urejene tudi značilne mediteranske terase z utrjeno brežino v obliki suhega zidu (slika 10).

Slika 10: Terasne z brežinami v obliki suhega zidu so zelo redke.
Glej angleški del prispevka.

Primerjava parcelacije franciscejskega katastra in ortofoto posnetka terasiranih zemljišč na severozahodu Ostrožnega Brda je razkrila, da se izris in ortofoto posnetek povsem prekrivata. Iz tega lahko sklepamo, da so posamezne terase, predvsem pa njihove brežine, v slabih 200 letih ostale povsem enake, torej enako dolge in z enako širokimi terasnimi ploskvami ter z enako visokimi in širokimi terasnimi brežinami. Geomehansko so torej brkinske terase zelo stabilne, pri čemer imajo pomembno vlogo rastline in njihov koreninski sistem, ki na stabilnost tal vplivajo tako, da ustvarjajo sukciijo, obenem pa delujejo kot armatura. Geomehanske nestabilnosti so pogosto povezane s hitrim družbenim razvojem, posledično rastle vrednosti premoženja in zato večjo ranljivostjo površja (Zorn in Komac 2011), lahko pa so tudi kratkoročna posledica dolgoročnih učinkov podnebnih sprememb (Zorn in Komac 2013). Vendar zaenkrat v Brkinih teh problemov ni.

Namakanja ali osuševanja teras na obravnavanem območju ni, čeprav je nedaleč stran, na meji med katastrskimi občinami Janežovo Brdo, Prelože in Čelje, postavljen majhen namakalni sistem. Ker se na terasnih ploskvah zadrži več padavin kot na neterasiranih pobočjih, terase akumulirajo večjo količino vode. Razumemo jih lahko tudi kot rezervoar, kjer se zadržuje voda, ki pogosto pade v obliki močnejših nali-vov (Ažman Momirski 2007). Na skrajnem severu območja naselja Ostrožno Brdo, neposredno ob reki Reki, so bile sicer izvedene hidromelioracije, ki pa s kmetijskimi terasami nimajo nobene zveze.

Slika 11: Sodobna raba tal na terasiranih območjih petih podrobno preučenih brkinskih naselij.
Glej angleški del prispevka.

Njive in vrtovi so v sodobnosti le še skromno zastopani in jih je bistveno manj od sadovnjakov (Križaj Smrdel 2010a). Poleg sadovnjakov in seveda gozda je najbolj zastopano travinje, torej travniki in pašniki (slika 11). Na mnogih opuščeni njivah pasejo živino (slika 12), saj je živinoreja postala pomembnejša od nekoč prevladujoče samooskrbnega poljedelstva.

Slika 12: Na mnogih opuščeni terasah pasejo govejo živino.

Glej angleški del prispevka.

V zadnjih desetletjih je izrazilo prevladujoč proces spreminjanja rabe tal na celotnem preučeni območju ogozdovanje. Delež gozda je razmeroma velik (16 %) tudi na terasiranih območjih, kar kaže na zaraščanje kmetijskih teras. Kljub temu smo v posameznih primerih ugotovili tudi krčenje gozda. V Brkinih načrtno oživljajo tradicionalno sadjarstvo (jabolka, hruške, slive, leske, višnje, breskve, češnje), ki ima na tem območju odlične razmere tako za integrirano kot ekološko pridelavo. Zametki sadjarstva, ki so ga spodbujali predvsem učitelji in župniki, so s konca 18. stoletja (Volk s sod. 2011). Temperaturne razmere, padavinski režim in značilna vetrovnost ugodno vplivajo na kakovost sadja. Večji del sadovnjakov je bil že na začetku 19. stoletja urejen na terasah oziroma terasnih brežinah. Dandanes so sadovnjaki na terasah pomembna zemljiška kategorija, saj so zasajeni na kar 12 % terasiranih območjih. Sadno drevje tradicionalno sadijo na terasnih brežinah, s čimer preprečujejo erozijo, pri čemer je uravnana terasna ploskev na razpolago za drugačno kmetijsko rabo. Kljub naporom sadno drevje marsikod ni več vzdrževano in propada, s tem pa je ogrožen tudi obstoj teras.

3 Razprava

Terase so za kmetijsko pridelavo pomembne, saj ima prst na njih svojske kemijske in fizikalne lastnosti, zato je mogoče na njih gojiti visoko kakovostne kmetijske kulture. V obdobju povečane ozaveščenosti o kakovosti pridelane hrane je kmetijski potencial, ki ga premorejo Brkini, neprecenljiv.

Pomemben je tudi odnos med pokrajino, ki jo je oblikovalo kmetijstvo, in učinki njene podobe. Terasirane pokrajine niso samo pomemben kmetijski vir, ampak so hkrati lahko precejšnja turistična priložnost. Takšna pokrajina je privlačna in urejena v vseh letnih časih: spomladi, ko se prebujata narava in se obarva s svežimi zelenimi odtenki, poleti, ko bujnost in barvitost pestrega rastlinja zapeljuje pogled tam živečih in mimooidočih, jeseni, ko se odene v neverjetno slikovito paletno rumenkasto-rjavkastih barvnih odtenkov, in pozimi, ko geometrija teras v ogoleli pokrajini postane še najbolj prepoznavna. Prednost Brkinov je, da je tamkajšnje podnebje v času poletnih temperaturnih viškov zaradi večje nadmorske višine zelo prijetno. Privlačnost in dramatičnost brkinske pokrajine je tolikšna, da bi preučeno območje lahko postalo pomembna turistična destinacija. Ob tem se je seveda treba zavedati, kar je nauk tudi iz drugih terasiranih pokrajin v Evropi, kakršna je na primer Cinque Terre, da turizem sam po sebi ne vpliva na vzdrževanje in obnavljanje teras ter saditev trajnih nasadov, ampak gre predvsem za izziva upravljanja z zemljišči in uravnoveženega regionalnega razvoja.

V preučeni naseljih vršnega dela Brkinov nismo zaznali nobenega sistematičnega obnavljanja teras v večjem obsegu. Zato pa smo na meji naselja Ostrožno Brdo, v smeri proti Preložam, naleteli na v zgornjem delu preurejeno, v srednjem in spodnjem delu pa povsem na novo strojno terasirano pobočje z vzhodno ekspozicijo. To bi bilo ob množičnem, vsepovsod prisotnem zaraščanju in propadanju kmetijskih teras presenetljivo, če ne bi poznali zapletenih zemljiškoposestnih razmer, ki pospešujejo zemljiško razdrobljenost. Svoje prispeva tudi tradicionalna navezanost slovenskega kmeta, brkinski ni nikakršna izjema, na zemljo, kar zavira ali celo onemogoča promet s kmetijskimi zemljišči. V zgornjem delu terasiranega območja je bila na širokih, strojni obdelavi prilagojenih terasnih ploskvah že zasajena ozimna pšenica (slika 13), spodaj ležeče terase pa so bile še »v delu«. Primerov novega terasiranja je malo tudi drugod po Evropi, saj kmetovalci kulturne terase praviloma komajda vzdržujejo.

Slika 13: Preurejeno in na novo terasirano pobočje med Ostrožnim Brdom in Preložami.

Glej angleški del prispevka.

Pomembna prednost stopničastega preoblikovanja pobočij v Brkinih je, da na terasiranih območjih ne prihaja do plazenja pobočij. Izboljšanje demografskih in gospodarskih razmer bi lahko preprečilo nadaljnje zaraščanje zemljišč z neakovostnimi gozdnimi sestoji. Načrtni ukrepi za ohranjanje poseljenosti in vzdrževanje kulturne pokrajine so glede na izjemno slabo demografsko podobo nujni, ker se le na ta način lahko povrne razvojna vitalnost in zagotovi nadaljnja privlačnost podeželja.

4 Sklep

Terasirana pokrajina v Brkinih je tako pomembna vrednota, da bi jo veljalo ohranjati zanamcem. Zato je treba na terasah omogočiti strojno obdelavo in za ta namen nanje urediti dovozne poti.

Razvojna vizija brkinskega kmetijstva in lokalnega gospodarstva nasploh zagotovo temelji na okolju prijaznem ekološkem kmetovanju, saj je po na ta način pridelani hrani vse večje povpraševanje. Ob tem velja spodbujati dopolnilne dejavnosti na kmetijah, razvijati na krajevnih značilnostih temelječo obrt in mehke oblike turizma. Verjetno bi to lahko pripomoglo k ohranjanju močno ogrožene kulturne pokrajine, ki ji je prav terasiranost vtisnila edinstven, nikjer drugje tako izrazito prepoznaven pečat.

Vse to pa bo izvedljivo le ob zadostnem številu vitalnih prebivalcev, ki bodo lahko skrbeli za vzdrževanje kulturne pokrajine. Infrastruktura se je že izboljšala, treba bo poskrbeti še za primerne možnosti preživetja preostalega prebivalstva, ki se bo seveda moralo pomladiti. Brez tega se še tako privlačni in enkratni pokrajini ne obeta nič dobrega. Razvojne težnje prejšnjega in začetka novega stoletja obetajo, da bo brez dodatnih prizadevanj prišlo tako do demografskega zloma kot do nezadržne popolne preobrazbe v prvobitno gozdno pokrajino.

5 Literatura

Glej angleški del prispevka.