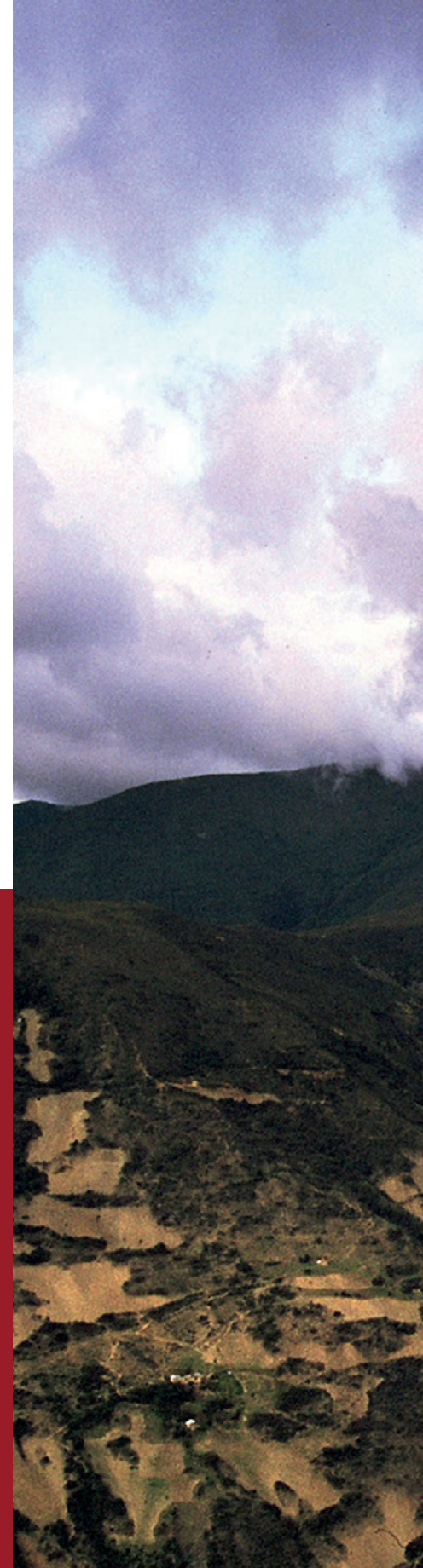


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REVISTA PROYECTO PROGRESO ARQUITECTURA

N21

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Nuestra revista, fundada en el año 2010, es una iniciativa del Grupo de Investigación de la Universidad de Sevilla HUM–632 *“proyecto, progreso, arquitectura”* y tiene por objetivo compartir y debatir sobre investigación en arquitectura. Es una publicación científica con periodicidad semestral, en formato papel y digital, que publica trabajos originales que no hayan sido publicados anteriormente en otras revistas. Queda establecido el sistema de arbitraje para la selección de artículos a publicar mediante dos revisores externos –sistema doble ciego– siguiendo los protocolos habituales para publicaciones científicas seriadas. Los títulos, resúmenes ,palabras clave y texto completo de los artículos se publican también en lengua inglesa.

*“proyecto, progreso, arquitectura”* presenta una estructura clara, sencilla y flexible. Trata todos los temas relacionados con la teoría y la práctica del proyecto arquitectónico. Las distintas “temáticas abiertas” que componen nuestra línea editorial, son las fuentes para la conjunción de investigaciones diversas.

La revista va dirigida a arquitectos, estudiantes, investigadores y profesionales relacionados con el proyecto y la realización de la obra de arquitectura.

*Our journal, “proyecto, progreso, arquitectura”, founded in 2010, is an initiative of the Research Group HUM–632 of the University of Seville and its objective is the sharing and debating of research within architecture. This six–monthly scientific publication, in paper and digital format, publishes original works that have not been previously published in other journals. The article selection process consists of a double blind system involving two external reviewers, following the usual protocols for serial scientific publications. The titles, summaries, key words and full text of articles are also published in English.*

*“proyecto, progreso, arquitectura” presents a clear, easy and flexible structure. It deals with all the subjects relating to the theory and the practise of the architectural project. The different “open themes” that compose our editorial line are sources for the conjunction of diverse investigations.*

*The journal is directed toward architects, students, researchers and professionals related to the planning and the accomplishment of the architectural work.*

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## ADAPTED SLOPES

Lucija Ažman Momirski (<https://orcid.org/0000-0002-9244-3348>)

**SUMMARY** This article focuses on three research questions: 1) Were terraced landscapes built in the analytical or creative phase of the first human intervention in a place? 2) Does the geometry of the slopes adapted as a terraced landscape apply in a conscious planning process? 3) What are the patterns and relationships between buildings, settlements, and terraced landscapes? The first issue was examined at the archaeological site Lepenski Vir, where a settlement and trapezoidal huts were built on terraces. The terraces were designed more in the creative phase than in the analytical phase because some of the terraces already had a shape that corresponded to and followed the shape of the huts. The answer to the second question is based on an understanding of the importance of horizontal and vertical measurements, their symbolism, and the origins of agriculture. The applied geometry of the slope is one of the indicators that the terraces were built on the basis of conscious planning and rational order, which is an instrument of basic economics and land delimitation issues. The types of relationships between buildings, settlements, and terraces are numerous, and sometimes they can represent a pattern that occurs in a particular region. Because the aim of civil and other initiatives is to protect terraced landscapes from the prejudice of marginality and ignorance, extended studies may be expected in this vast field of case studies.

**KEYWORDS** terraced landscapes; adapted slopes; architecture; urbanism

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## INTRODUCTION

The first simple human intervention into a space has four stages. The first two are analytical, and the last two are creative.<sup>1</sup> The analytical phases are 1) identification of key locations in an unknown spatial area (defining drinking water wells, protected locations, passages through difficult transition areas, and the like), and 2) linking key locations into a meaningful whole that can be mastered from the territorial focus. The creative phases are 3) marking passages between key locations that are oriented towards natural space, or earthly phenomena, or have guides such as mountain peaks or constellations, or, on a smaller scale, markings carved in a trunk along the way; such markings are of vital significance: the path must remain known if people want to exploit the area safely, and 4) the creation of the first spatial agglomeration. Among the first human constructions created, we can consider a site where tools were made, a storage place, a fireplace, and an artificial shelter added to the fireplace.

If the emergence of the terraced landscape is hypothetically interpreted within these phases, when the

slopes for the construction of houses and settlements were adapted to them, then the emergence looks like the following. In the analytical phases, there is the choice of a location on a steep bank, protected by a geographically impassable area on the one hand and a good view on the other. The analytical phase could lead to the construction of adapted slopes and their leveled platforms, which function as an infrastructure or the basic physical (and organizational) structures necessary for the operation of a society and facilities (e.g. buildings, paths, etc.). In the creative phase, the first houses and settlements are built on flat platforms; sometimes they sit on the hills, sometimes between the slopes, and so on. The question is what kind of relationship exists between the analytical and creative phases when leveled platforms are built: are they part of the analytical phase or the creative phase?

## THE FIRST SETTLEMENT AND THE TERRACED LANDSCAPE

The descriptions in the introductory part can be presented using the example of Lepenski Vir, which is one of the

1. KOŠIR, Fedja. Ob začetku oblik o naselbinskem sestavu Lepenskega vira. In: Fedja KOŠIR. *Izbrani članki*. Ljubljana: Fakulteta za arhitekturo Univerze v Ljubljani, 2000, pp. 33-44.



1. Archaeological plan of the prehistoric settlement of Lepenski Vir.

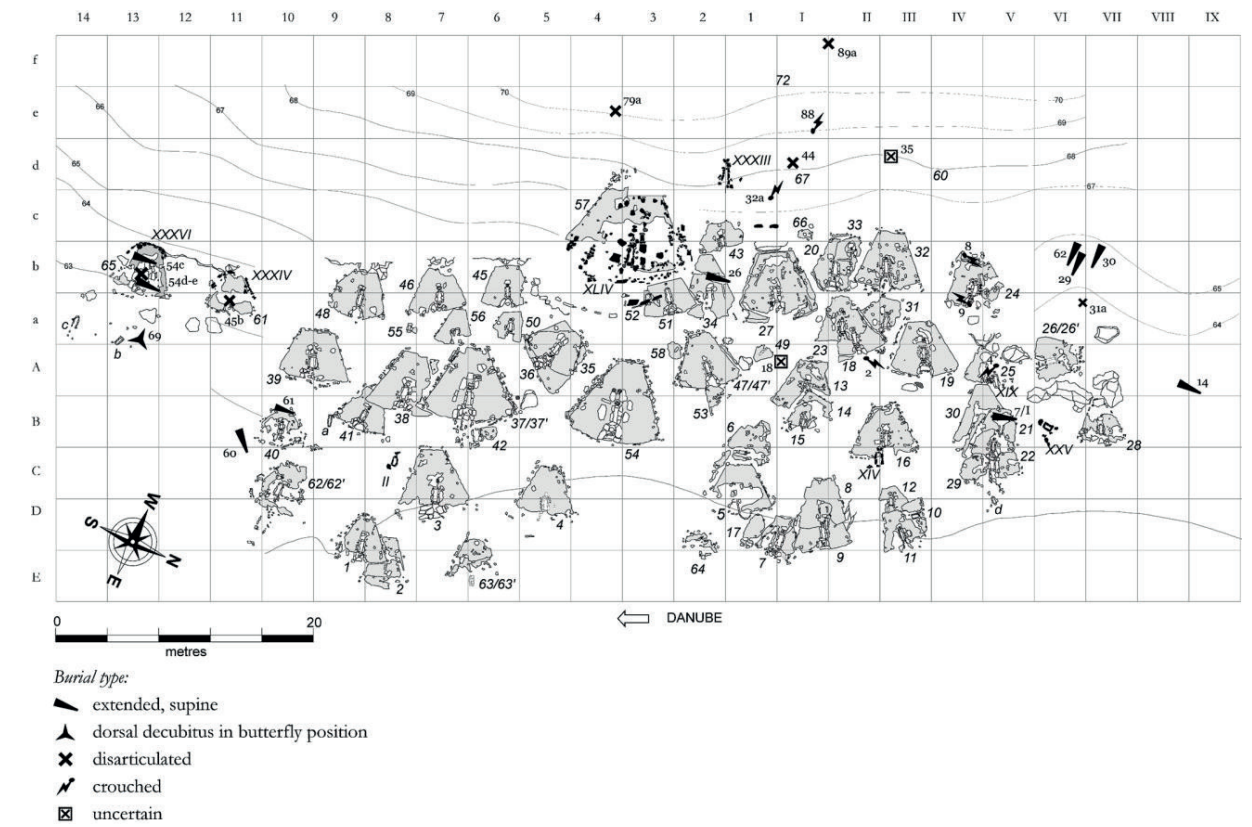
best-known Mesolithic and Early Neolithic sites not only in Europe but in the world<sup>2</sup> and one of the best examples of the so-called Mesolithic-Neolithic transition in Europe.<sup>3</sup> The Danube Gorges, an area embracing a 130 km section of the Danube Valley along the Serbian–Romanian border, were probably continuously populated at least between 10,000 and 5500 cal BC.<sup>4</sup> There is an assumption that intensified fishing led to the prolonged stay of human groups in the area and consequently to the formation of the first (semi)sedentary settlements.<sup>5</sup> The riverside terraces were certainly favorable for fishing and hunting wildfowl because they were close to large whirlpools and small river tributaries.<sup>6</sup> The settlement sits in a narrow terraced belt between the river and the forest. The selected site had all the important features that make up the first analytical part of the first human spatial intervention.

Archaeological discoveries of a series of settlements<sup>7</sup> located on sandy river terrace slopes correspond to the second analytical phase of linking key locations into a meaningful whole that can be mastered from the territorial focus (Figure 1).

Treskavac Hill, which is 679 m high and located in front of the Lepenski Vir site, and is visible from afar,

was vitally important because it served as a landmark for fisherman from Lepenski Vir when traveling up and down the Danube River. The relation of Treskavac Hill and the Lepenski Vir settlement site was also loaded with other meanings:<sup>8</sup> researchers have determined that the sun rises above the hill exactly between April 20th and May 1st. This period of the year corresponds to the time when the heliacal rising of the open star cluster the Pleiades occurs, which for many ancient cultures denotes the beginning of the year. Panković et al.<sup>9</sup> demonstrated that for an observer at Lepenski Vir the heliacal rising of the Pleiades ends exactly at April 20th, and so the hill could have been used to set a basic calendar. The findings of the research raise the very likely possibility of Lepenski Vir as one of the oldest ancient Sun and Pleiades constellation (proto)observatories, with Treskavac as a natural marker.<sup>10</sup> The use of Treskavac Hill—which marked passages between key locations, served as a guide, and promised security through orientation—was of utmost importance to people and was a result of their creative behavior.

Archaeologists have also discovered that there is a direct mimetic link between the form of trapezoidal building



shapes found in the Upper Gorge sites of Vlasac, Lepenski Vir, and Padina and the central landmark in this landscape setting.<sup>11</sup> The proportions of the houses are linked to earlier human habitats in caves because light only penetrated through the doors into the buildings.

The houses at Lepenski Vir replaced the natural shelters that people used to live in throughout history with artificial shelters or huts, which represents the first human architectural artefact.<sup>12</sup> The structure of chaotically scattered and dispersed artificial shelters or huts is the first human settlement. The oldest settlement patterns are clearly unplanned agglomerations, and Lepenski Vir has elements of both unplanned and planned

agglomeration.<sup>13</sup> In the dispersed agglomeration one can only find very simple coning, which cannot conceal its archaic and anarchic growth. The archaeological site of Lepenski Vir also brought to the light “the most fascinating examples of the specificity of this regional sequence”: “buildings with a trapezoidal layout and concrete-like floors plastered with reddish limestone.”<sup>14</sup> Moreover, Lepenski Vir has an exceptional character because it is the “only site to have trapezoidal floors plastered with hard-rock limestone conglomerate during the Neolithic phase”<sup>15</sup> (Figure 2).

The requirements that define the structure of the agglomeration are barely understandable to modern

2. BORIĆ, Dušan. *Deathways at Lepenski Vir: Patterns in Mortuary Practice*. Belgrade: Serbian Archaeological Society, 2016.

3. RUSU, Aurelian. Lepenski Vir—Schela Cladovei Culture’s Chronology and its Interpretation. In: *Brukenthal. Acta Musei*. 2011, 6.1, pp. 7–23.

4. BORIĆ, Dušan; MIRACLE, Preston. Mesolithic and Neolithic (Dis)continuities in the Danube Gorges: New AMS Dates from Padina and Hajdučka Vodenica (Serbia). In: *Oxford Journal of Archaeology*. 2004, vol. 23, n° 4, pp. 341–371.; RADOVANOVIĆ, Ivana. *The Iron Gates Mesolithic*. Ann Arbor, MI: Archaeological Series 11. International Monographs in Prehistory, 1996. In 2011, Rusu concluded that the chronological time limits of the Lepenski Vir culture were between 9500 and 6000 cal BC.

5. RADOVANOVIĆ, Ivana. The Culture of Lepenski Vir: A Contribution to the Interpretation of Its Ideological Aspects. In: *Antidoron Dragoslavo Srejavici completis LXV annis ad amicus, collegis, discipulis oblatum*. Belgrade: Center for Archaeological Research, University of Belgrade, 1997, pp. 87–93; DINU, Alexandru. Mesolithic Fish and Fishermen of the Lower Danube (Iron Gates). In: *Documenta Praehistorica*. 2010, n° 37, pp. 299–310.

6. Lepenski Vir (literally, the ‘Lepena whirlpool’) is named after the large whirlpool it faces (SUMMERS, David. *Real Spaces. World Art History and the Rise of Western Modernism*. London: Phaidon Press, 2003, p. 263).

7. The sites are (RUSU, Aurelian, op. cit. supra, nota 3): Alibeg–Pescari; Padina; Lepenski Vir; Vlasac; Cuina Turculi–Dubova; Veterani–“terasa”–Dubova; Ogradena–Icoana; Ogradena–Răzvrata; Hajdučka vodenica; Ostrovul Banului–Gura Văii; Schela Cladovei–Drobeta-Turnu Severin; Ostrovul Corbului–“Botul Cliucului”; Velesnica; Ostrovul Mare–Gogoșu, river km 875; Ostrovul Mare–Gogoșu, river km 873; Kula.

8. FOWLER, Chris. Landscape and Personhood. In: Bruno DAVID; Julian THOMAS, eds. *Handbook of Landscape Archaeology*. Walnut Creek, CA: Left Coast Press, 2008, pp. 291–299; cf. RADOVANOVIĆ, Ivana, op. cit. supra, nota 5; BORIĆ, Dušan. Places That Created Time in the Danube Gorges and Beyond, c. 9000–5500 BC. In: *Documenta Praehistorica*. 1999, n° 26, pp. 41–70; BORIĆ, Dušan. Body Metamorphosis and Animality: Volatile Bodies and Boulder Artworks from Lepenski Vir. In: *Cambridge Archaeological Journal*. 2005, vol. 15, n° 1, pp. 35–69. DOI: 10.1017/S095977430500003X

9. PANKOVIĆ, Vladan; MRDJEN, Milan; KRMAR, Miodrag. Was Lepenski Vir an Ancient Sun or Pleiades Observatory? In: *arXiv*. Cornell University, 6 Jan 2015 [accessed July 27th, 2018]. Available at: <https://arxiv.org/abs/1501.01108>

10. Ídem.

11. BORIĆ, Dušan. The House between Grand Narratives and Microhistories: A House Society in the Balkans. In: R. A. BECK, Jr., ed. *The Durable House: House Society Models in Archaeology*. Carbondale, IL: Center for Archaeological Investigations, Occasional Paper n° 35, 2007, pp. 97–129.

12. KOŠIR, Fedja. *Zamiseli mesta*. Ljubljana: Slovenska matica, 1993.

13. Here non-differentiated forms are predominantly defined by the “functionalism of immediate use” and the ideas of the world and society, which are clearly embedded in the sculptures of Lepenski Vir.

14. BORIĆ, Dušan, op.cit. supra, nota 11, pp. 97–129. Among other finds are numerous large stone sculptures and other symbolic artefacts. Sculptures were carved in river sandstone boulders. The figures represented an assemblage of powers in a way that could not occur naturally (e.g., combining the mouth of a fish and bird-claw hands; SUMMERS, David, op. cit. supra, nota 6, p. 263)

15. BORIĆ, Dušan, op. cit. supra, nota 11, pp. 97–129.



2. Trapezoidal floors plastered with hard-rock limestone conglomerate.
3. Floors of trapezoidal houses on terraced platforms at Lepenski Vir.



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man,<sup>16</sup> due to both detachment from nature in modern society and the elementary relations in the ancestral community. The analogous differentiation of Lepenski Vir from other prehistoric agglomerations is in the subtleness of the huts' design.<sup>17</sup> Therefore the intriguing question about this site can be expanded to how the trapezoidal form of the house came into being.

The plan of the individual buildings at Lepenski Vir proves that its inhabitants already possessed mathematical knowledge. The layout of the house is an equilateral triangle, in which the upper triangle is cut off and the lower side of the triangle is defined by a circular

section. In the interior, the altar is mounted exactly at the place where the three perpendicular bisectors of the sides of the triangle meet at the triangle's circumcenter, around which stone sculptures of different sizes were positioned. The huts are similar or similarly aligned and single-celled. They could be defined almost as standardized. Such a phenomenon can occur only in a society that lives practically permanently in one location.<sup>18</sup> The excavators and researchers of Lepenski Vir<sup>19</sup> speculated that the form of the house was related to the body position (sitting with crossed legs) of Burial 69 at Lepenski Vir.<sup>20</sup>

16. The non-differentiation of forms also mirrors the undetermined separation of the rational and irrational.

17. KOŠIR, Fedja, op. cit. supra, nota 1.

18. Ídem. However, it is difficult to define buildings on the base of the plan as real sanctuaries and to confirm the thesis that the agglomeration at Lepenski Vir is a cultic place with a wider meaning.

19. SREJOVIĆ, Dragoslav. *Lepenski Vir: Nova praistorijska kultura u Podunavlju*. Belgrade: Srpska književna zadruga, 1969; SREJOVIĆ, Dragoslav. *Europe's First Monumental Sculpture: New Discoveries at Lepenski Vir*. London: Thames and Hudson, 1972.

20. The grave is interpreted as a shaman's burial. The dating of similar body burial positions suggests a period of approximately 8440 to 7700 cal BC (BORIĆ, Dušan; MIRACLE, Preston, op. cit. supra, nota 4; PRICE, T. Douglas; BORIĆ, Dušan. Farmers and Foragers in the Danube Gorges: Mobility, Contact and Exchange. Paper presented at the *Annual Meeting of the Society for American Archaeology*, Montreal, 2004), whereas the trapezoidal buildings appeared almost a



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Authors such as Radovanović<sup>21</sup> and Borić<sup>22</sup> have published interpretations that emphasize the significance of body position and orientation in relation to the landscape. Živaljević<sup>23</sup> suggests a consideration that "the position and orientation of the body reflects the belief on how one moves through the landscape during life, and/or how its 'soul' continues this journey after death."

The terraces that these houses stood on were therefore to some extent geometrically adapted to the size and shape of the houses (Figure 3). Interestingly, archaeological plans do not show the terraced platforms that form the basis for the construction of houses and the settlement, only topographic slope lines with elevations; however, even those are marked only in the surrounding of the archaeological site and not for the site itself. In any case, the terraces were designed more in the creative phase than in the analytical phase because the terraces partly already had a shape that corresponded to and followed the shape of the houses themselves. The constructions of the terraces had to be geometrically determined or measured, at least in part.

These assumptions raise questions of how the landscape and, above all, the slope that people transformed into terraced terrain, was geometrized, and what the relationship is between buildings, settlements, and the terraced landscape.

#### GEOMETRY OF SLOPES

The slopes were always geometrized according to at least two principles: horizontal (planar; Figure 4) and vertical. Surveying of the land—the imposition of lines of sight—must have involved the imposition of planar order, but the imposition of lines of sight on the Earth's surface is always incompatible with both topographical details (e.g., hills, valleys, and vegetation) and the curvature of the Earth. Each two-dimensional grid to some extent contradicts the topography. A grid can also be three dimensional so that measurement is used in the third direction of the coordinate system, perpendicular to the points defined by the intersections of lines in a horizontal grid.

In the most basic definition, a grid is a system of perpendicular lines (forming squares or cubes) divided by the same measure. Geometrization rationalizes slopes.

full millennium later. Although some assumptions have been made that "[i]t has been tempting to see this instance as a perfect example for the claim that the body and the house were often homologically related by mapping the body onto architecture" (CARSTEN, Janet; HUGH-JONES, Stephen. *About the House: Lévi-Strauss and Beyond*. Cambridge: Cambridge University Press, 1995, p. 42), it is unclear to what extent this burial position should be connected with the form of the plan of the shelter and to the form of the shelter in general.

21. RADOVANOVIĆ, Ivana, op. cit. supra, nota 5.

22. BORIĆ, Dušan, op. cit. supra, nota 8; BORIĆ, Dušan, op. cit. supra, nota 8.

23. ŽIVALJEVIĆ, Ivana. Concepts of the body and personhood in the Mesolithic-Neolithic Danube Gorges: interpreting animal remains from human burials. In: *Етноантрополошки проблеми*, 2015, y. 10 (3), pp. 675–699.





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The measurement of a slope, whatever it was, always requires the use of a measure: a criterion or a unit of measure. The immediacy of measurement against what is measured tends to transform any place into land and at the same time negate the actual topographical incident. (Agricultural) land became what one could measure. Even if pre-agricultural people identified themselves with territories and resources, it was the rise of agriculture that led to the division of the land. In Mesopotamia, for example, the fields were not only divided but also irrigated, and both processes were a difficult task due to regular flooding. The unit of measurement was linked not only to the division of the fields, but also to the harvest and its even distribution.

It could be argued that in some places the geometry of the slope, if the slope has been used to locate a settlement, is influenced by the shape or at least the size of the architecture (huts, shelters, etc.) built on the terrace

platforms. In contrast, one could ask whether landscapes terraced for agricultural reasons could be designed based on knowledge gained for agriculture in flat areas. To define this as a general rule for adapted slopes and terraced landscapes is too speculative because the conditions for the development of terraced landscapes differ based on many local standing points, such as microclimate, soil structure, social organization, and other factors. Both surveying (of agricultural fields) and construction (of houses) are associated with the requirement to use a measure. In Latin, a measurer is called *ensor* 'land-surveyor; surveyor of building-works'. In Latin sources, this word can also mean 'architect' or 'engineer'. Both surveying and construction are associated with the requirement to use a measure.

Measure in the ancient world was closely connected with fertile land: in Greek, *meter* is 'mother'<sup>24</sup> and the Earth is personified as Mother Earth<sup>25</sup>. In Peru, the relationship with *Pachamama* (Mother Earth) is very present: it "is a living person: We owe her a lot for all that we receive. For every farm activity, we should get her permission and keep her content, so that we can work with no accidents. You may spread a lot of fertilizer in the plot, but if you offer *Pachamama* nothing, there is no guarantee that you will have a good harvest."<sup>26</sup>

Stepped platforms also introduce elevation, which in architecture is the basic method for qualifying and defining places. Distinctions in height are almost always hierarchical. In general, height marks difference by a simple spatial relationship. Differences in level could articulate ritual movements along the path within a place, and the differentiation of a level or the transition from one level to another is one of the main ways to articulate access to the most important places or sites. In a construction, beyond a certain point, height is difficult to attain, and in architecture the demand for height can also generate a demand

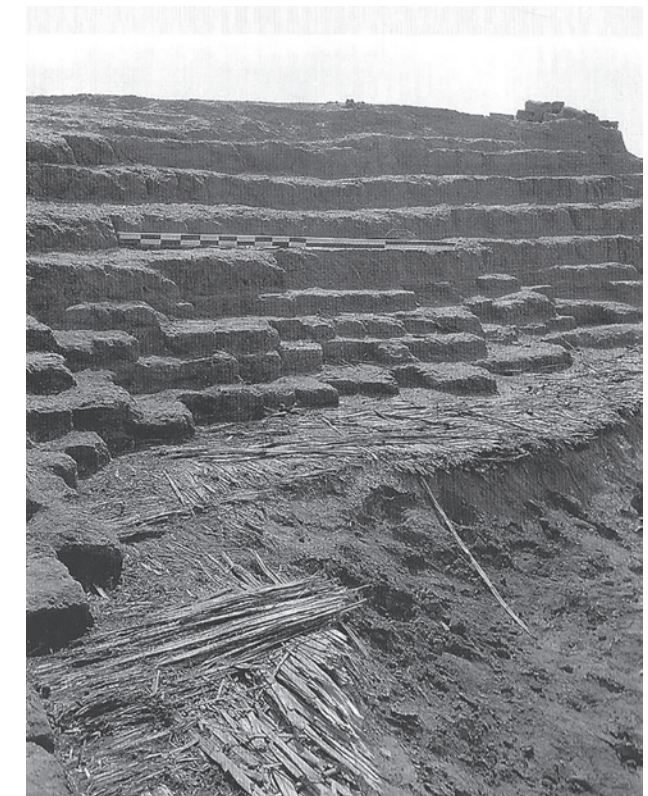
4. A geometrized landscape in Slovenia.

5. Reed layers served as stabilizers between the massive clay brick layers of large Mesopotamian buildings. In Uruk, the reed layers in the core masonry of the Eanna Ziggurat from the twenty-first century BC are well preserved.

24. *Mati* (Slovenian), *mother* (English), from Greek *mētēr*; *mēter* (Slovenian), from Greek *metron*, related to the ancient Indian *mātra* 'measure' and *māti* 'he measures' (Snoj, Marko. Slovenski etimološki slovar. Ljubljana: Mladinska knjiga, 1997.).

25. Although "Mother Earth as an expression of the earth as the giver of life is from 1580s" (*Online Etymology Dictionary* [accessed August 29th, 2019]. Available at: <https://www.etymonline.com/>).

26. YAPA, Kashyapa A. Reducing Climate and Other Risks through Nature-Aided and Faith-Based Experiences by Peruvian Terrace Farmers. In: *Annales, Series Historia et Sociologia*. 2016, vol. 26, n° 3, pp. 389–398. DOI: 10.19233/ASHS.2016.30. (AAC, 2015, 28). Mrs. Martina Mamani A., Raqchi, San Pedro Dist., Canchis, Cusco.



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for creating new construction skills. Reaching height and multiplying levels can have a simple cosmographic meaning.

The temple platforms of the Mesopotamian ziggurats<sup>27</sup> had dramatic height differences. No ziggurat has survived intact to today,<sup>28</sup> but it is clear that they varied in their dimensions (from 30 to 60 m on each side and from 40 to 100 m high) and their number of terraces (from three to seven).<sup>29</sup> Their structure and the materials used are identical: ziggurats were made up of a superposition of terraces of decreasing size, built of clay bricks among which were interspersed reed mats (Figure 5). They could be decorated with decorative baked bricks. Their plan was square or rectangular.

In Eridu, the first city in Sumerian civilization, a series of superimposed temples began with a small shrine about four meters high, erected in the fifth millennium BC. The temple, which was a commercial and ritual center of the city, stood higher than other buildings after successive reconstructions of the temple (the house of the god). The higher the elevation, more complicated was the ritual approach.<sup>30</sup> As temples became temple platforms, or ziggurats, they assumed the symbolic value of mountains.<sup>31</sup> The ziggurat of Enlil was called the "House of the Mountain, Mountain of the Storm, Bond between Heaven and Earth." The Great Mother, Ninhursag, was the Lady of the Mountains.<sup>32</sup> The terrace tower is a symbol of the junction between Heaven and Earth, described by Sumerian literature as a

"mountain," symbolizing the pillar that has separated Heaven and Earth since time immemorial from creation, but also uniting them. These terrace temples are also known in Syria. Recently, a new hypothesis of their proto-Elamite origin has been proposed in view of the discoveries of the Jiroft civilization in southern Iran. This proposal is accompanied by a new Elamite etymology that would mean 'elevation of (human) creation'.<sup>33</sup> The ziggurat may have balanced the cosmos and the real, reflecting the awareness

27. Also *zikkurat*; from Assyrian *ziqquratu* 'height, pinnacle' from (Akkadian) *zaqāru* 'to be high' (*Online Etymology Dictionary*, op. cit. supra, nota 25), 'to rise high'; which can be translated as 'rising building' (LENDERING, Jona. Etemenanki (the "Tower of Babel"). In: *Articles on ancient history*. Livius.org [accessed September 8th, 2019]. Available at: <https://web.archive.org/web/20170523034458/https://www.livius.org/articles/place/etemenanki>). A ziggurat is a pyramid-shaped stepped temple tower, which is an architectural and religious structure characteristic of the large cities of Mesopotamia. The ziggurat was always built with a clay brick core and a baked brick exterior. The sloping sides and terraces were often decorated with trees and shrubs (hence the Hanging Gardens of Babylon; *Encyclopaedia Britannica*, 2019 [accessed September 8th, 2019]. Available at: <https://www.britannica.com/technology/ziggurat>). In comparison to the Egyptian pyramid, a ziggurat was not a tomb.

28. The enormous ziggurat in Tchogha Zanbil, the ruins of the holy city of the Kingdom of Elam, and dedicated to the Elamite divinities Inshushinak and Napirisha, is the largest ziggurat outside of Mesopotamia and the best preserved of this type of stepped pyramidal monument (UNESCO, 2019 [accessed August 29th, 2019]. Available at: <http://whc.unesco.org/en/list/113>).

29. ANTHONIOZ, Stéphanie. Ziggurat, origine et symbole. In: *Lumière et vie*. 2009, n° 281, pp. 73–77.

30. The ascent was made via an outer triple staircase or a spiral ramp (either perpendicular to the facade or along the monument), but no ascent has been discovered for almost half of the known ziggurats (*Encyclopaedia Britannica*, 2019, op. cit. supra, nota 27).

31. SUMMERS, David, op. cit. supra, nota 6, p. 204.

32. Ídem.

33. ANTHONIOZ, Stéphanie, op. cit. supra, nota 29.



- 6. Terraces in Písaq, Peru.
- 7. Renovated and re-cultivated terraced landscapes in Peru.
- 8. Terraced landscapes in the Colca Valley, Peru.



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exceptional human creations have supported civilizations to endure globally (Figure 8).

Because of this importance, civilizations devoted much of their energy to the construction (for which we do not have written evidence) and maintenance of terraced landscapes (which we can still observe as a living terraced landscape in many world regions): historically, terraces were not as vernacular, unplanned, or out of the interest of central power and rule as can be found in many interpretations. Their great dimensions and worldwide locations indicate this. Moreover, terraced landscapes symbolize both ritual and real actions in life.

The practices of agriculture were interlaced with ritual meaning, which can be confirmed by etymological analysis. The word *agriculture* is derived from Latin *ager* 'field' and *cultura* 'cultivation' from *colo* 'I till, cultivate', but more immediately from the participle, *cultus*, whence *cult*, the observance of the gods.<sup>34</sup> In Peru, as Yapa<sup>35</sup> describes, "rituals and feasts are not limited to special circumstances. From the time the Andean farmer prepares the plot until the harvest is stored, he converses continuously with his deities and tries to placate them through celebrations. These are ceremonies to ensure a successful agricultural campaign."

The applied geometry of the slope is one of the indicators that terraces were constructed on the basis of conscious planning and that a rational order—which is an instrument of a relatively developed level of a basic (irrigation) economy and the most closely intertwined land demarcation issues—was being implemented.<sup>36</sup>

#### THE RELATIONSHIP BETWEEN BUILDINGS, SETTLEMENTS, AND TERRACED LANDSCAPES

In the same way as one is inclined to think that terraced landscapes are not important for sustaining societies, one is inclined to think of city plans separate from the surrounding agricultural lands that sustain them, when these lands are actually of crucial economic and political importance. Towns and cities depend on arable lands to

that their balance and functionality ensure the permanence of civilization.

In many geographical regions, the slopes of the mountains are terraced from the bottom to the top of the hill. In the Peruvian Andes they represent an exceptional landscape (Figure 6) and evidence of people's incredible effort to transform and reconstruct the entire slope of the mountains. The Peruvian terraced landscapes offer evidence about the area's former population size and are an image of the infrastructure of survival (Figure 7). These

34. SUMMERS, David, op. cit. supra, nota 6, p. 416.  
35. YAPA, Kashyapa A., op. cit. supra, nota 26.  
36. KOŠIR, Fedja, op. cit. supra, nota 12.



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sustain their population. The technology for creating terraces inside settlements and in the landscape are the same; the difference is in their purpose.<sup>37</sup> This has been also demonstrated by three selected examples of settlements in central Europe; many more exist.

Exceptional archaeological findings on Mount Donatus (*Donačka gora*) in Slovenia confirm that people also transformed slopes and settled on terraced platforms during the transition between the Bronze and Iron Ages. Hillside terraces carved into rock are an exceptional archaeological discovery on the steep slope of Mount Donatus at an elevation of 750 meters in the Municipality of Rogatec. A study published in the early 1990s states that the archaeological site consists of terraces that were formed when collecting stone for querns.<sup>38</sup> After computer conversion of Lidar data for the terrain in 2015, archaeologists confirmed the existence of terraces that were clearly manmade. An archaeological field survey was conducted at the site in the fall of 2016. Remains of settlements from the transition of the Copper Age into the Iron Age (approximately when civilization was flourishing in the New Kingdom of Egypt, about 2,800 years ago) were found on terraces south of the steep slope; these terraces enjoy excellent natural protection by cliffs on all sides. Houses and

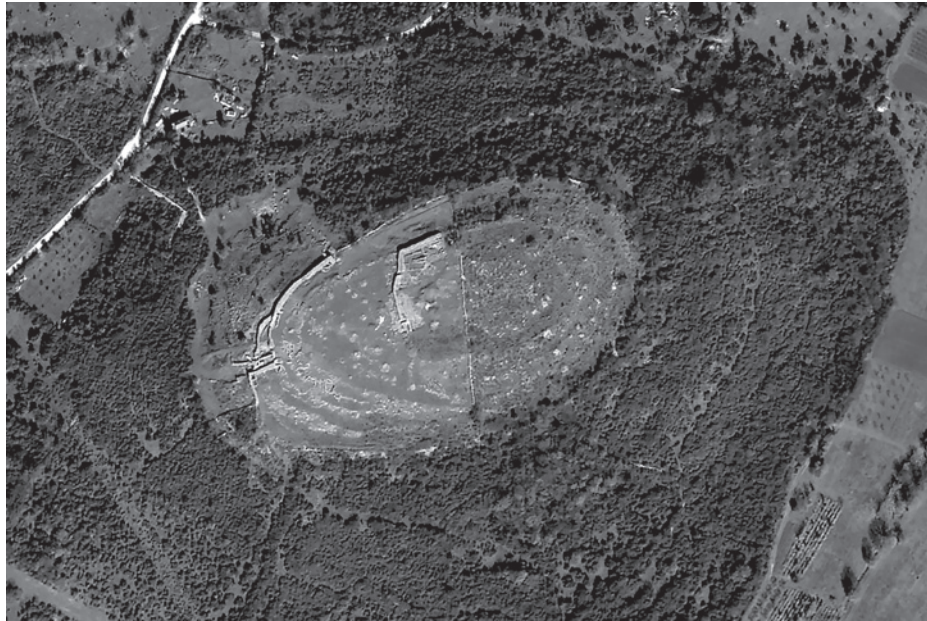
shacks stood on some terraces, and there were probably gardens and barns on other terraces. The terraces were about five meters wide and twenty or more meters long. Even after the Bronze Age, the terraces were occasionally in use (as is evident from pottery found at the site) in late Antiquity and possibly in the early Middle Ages.<sup>39</sup>

At the beginning of the second millennium BC, around 1800 BC, a newly settled community began extensive work to reshape the peak of the hill at the Monkodonja hillfort near Rovinj in Croatian Istria<sup>40</sup> (Figure 9). The site is laid out in oval concentric plateaus, the smallest one being the highest. The wider and more extended the platform, the lower it is. The material remains found in situ are evidence that the inhabitants were already able to build dry stone walls and earthen terraces for the village foundations (houses, platforms, and communication routes) and enclosure walls.<sup>41</sup> Research also indicates that people were compelled to build terraces for agricultural production in order to produce a sufficient quantity of food for a relatively large population living in the hilly Istrian environment. Studies of the finds at hillforts in Istria have shifted the boundary of features that until recently were ascribed to the Romans: grape seeds, which were found during the last excavations at the Monkodonja hillfort in

37. LIKAR, Darko. An Architectural and Urban-Planning Perspective on Cultivated Terraces in Northern Istria. In: *Annales, Series Historia et Sociologia*. 2017, vol. 27, n° 1, pp. 131-146. DOI: 10.19233/ASHS.2017.11  
38. CIGLENEČKI, Slavko. *Polis Noricum*. Podstreda, Slovenia: Zavod Spominski park Trebče, 1992.  
39. ODAR, Boštjan. Naselbina na Donački gori obljudena v času največjega razcveta Novega kraljestva v Egiptu. In: *Kozjansko.info*. 27 October 2016, 23:31 [accessed September 2nd, 2019]. Available at: <http://kozjansko.info/2016/10/naselbina-na-donacki-gori-obljudena-v-casu-najvecjega-razcveta-novega-kraljestva-v-egiptu/>  
40. IVETIĆ, Egidio. *Istra kroz vrijeme: pregled povijesti Istre sa osvrtom na grad Rijeku*. Rovinj, Croatia: Centar za povijesna istraživanja, 2009.  
41. LIKAR, Darko, op. cit. supra, nota 37.



9. Monkodonja hillfort near Rovinj in Croatian Istria.  
10. A terraced landscape in the functional area of the new part of the settlement of Krkavče in the Koper Hills, Slovenia.  
11. A dry stone wall at the end of the terrace in the Krkavče area in the Koper Hills, Slovenia.



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1997, indicate that grapevines were already present before the arrival of the Romans.<sup>42</sup>

In Slovenian Istria, terraces in settlements were excavated down to the subsoil for the foundations of houses. Because there were few flat areas and the terrain was dynamic and hilly, the land had to be transformed into a terraced landscape suitable for cultivation in the functional area of settlements (Figure 10) and also beyond, and into a terraced land of clustered settlements with platforms and connecting ramps, where houses, gardens, streets, and squares are located today. The excavated and broken-up stone was used to build stone houses, and the excavated soil was removed from the construction site and used for a garden around the house. The procedure was similar for cultivated terraces, except that the stone was used to construct dry stone walls (Figure 11) or sometimes to demarcate the cultivated area. In response to the unique climate, terrain, soil, and agricultural practices of the

past—especially until the end of the nineteenth century—the terraces in northern Istria were the most important feature of the landscape overall, both in the countryside and in the settlement areas<sup>43</sup> (Figure 12). After construction, the terraces were subject to the constant influence of natural forces and the effects of human activities, and so they were changed by constant maintenance for various reasons: new land use, improvement of their construction and repair of terrace slopes, abandonment of agriculture, and even their deliberate destruction by new spatial development. The terrace platforms, which contain a layer of fertile soil and cultivated plants, are even more exposed to dynamic processes. Destructive droughts and intense rapid flooding or flood damage were the reasons for seeking a solution to maintain the balance between exceptionally favorable and exceptionally poor natural conditions. Terraces are the main spatial tool for solving these problems in Mediterranean areas that are favorable for settlement but

42. IVETIĆ, Egidio, op. cit. supra, nota 40.

43. LIKAR, Darko, op. cit. supra, nota 37.



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demanding for agriculture due to the hilly terrain. Many generations have made great efforts to constantly build and maintain terraces and crops, and they have gradually gained knowledge of how to use terraces to control the microclimate to create a surplus of food and, in the case of Slovenian Istria, an exceptionally well-organized distribution network for the sale of their products at home and abroad.<sup>44</sup>

The typology presented in the three cases is three-fold: 1) at Mount Donatus, at a relatively high elevation and on a very steep slope, the functional use of the terraces was divided into residential and agricultural terraces; 2) in Mokondija, terraces were built concentrically around the center of the settlement in order to maintain sufficient leveled areas for agricultural production, and 3) the settlements in Slovenian Istria are located in exposed places, on peaks, and all favorably inclined slopes are terraced. The second and third examples could represent a pattern (a model for imitation in other places): in Istria there are many prehistoric fortified settlements from the Bronze Age and Iron Age on strategic hilltops. Older researchers (e.g., Carlo Marchesetti) listed about 445 hillforts in Istria and the Soča Valley in 1903.<sup>45</sup> Moreover, the relationship between settlements and terraced landscapes in northern Istria—the example represented by Krkavče—could be defined as a pattern characteristic for the entire region of the Koper Hills. In this case, however, the extent of the terraced landscapes is much greater than the extent of the area of the settlement.

As awareness of terraced landscapes grows on a global, European, and national level, we expect the scope of studies on the relationship between buildings, settlements, and terraced landscape to expand in the future as well.

#### CONCLUSIONS

The conclusions we can draw are that terraces were already built in the time of the hunter-gatherers, in this case to build their huts on them, but settled communities adapted and leveled slopes for the cultivation of crops.



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44. Ídem.

45. MIHOVIČIĆ, Kristina. *Istra kroz vrijeme*. Rovinj: Centar za povijesna istraživanja. Collana degli Atti - n° 30, 2009.



12. A terraced landscape and settlements in the vicinity in the Krkavče area in the Koper Hills, Slovenia.

The relationships between the buildings on the terraces and the terraced landscapes are not clear, nor it is clear which of the phenomena occurred earlier. These relationships are not yet methodologically and systematically defined today. It can only be stated that the construction of terraces is to be understood as part of a creative, conscious, and planned intervention in space, regardless of the period in which this intervention took place or when it takes place. Because the aim of civil and other initiatives is to protect terraced landscapes from the prejudice

of marginality and ignorance<sup>46</sup>, extended studies can be expected in the broad field of case studies on the relationships between architecture, settlements, and terraced landscapes in the future. The most important civil initiative on the protection, preservation, study, and promotion of terraced landscapes and related cultures worldwide is the International Terraced Landscapes Alliance (ITLA), through which farmers, researchers, activists, and others involved in the ITLA are dedicated to promoting the significance of terraced landscapes.■

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