Research Article

Kristina Horvat*

Early Neolithic Settlement Patterns in Northern Dalmatia

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Abstract: This article focuses on the early Neolithic settlement patterns in northern Dalmatia, located in the middle of the eastern Adriatic. At the present state of research, a total of 35 Neolithic sites have been known in this region, 26 of which belong to the Early Neolithic. Observing the type and character of the early Neolithic sites, their micro-topographic features, proximity and availability of resources, organization of life in relation to environment requirements, continuity of life at a particular location, and economic strategies, we come to the conclusion that the early Neolithic settlement patterns in northern Dalmatia were determined by natural landscape and its resources. They are the postulate and basis for the development of different aspects of social life and economy, as well as the starting point for the interpretation of the character and dynamics of the development of the early Neolithic communities in this area. The site locations, stratigraphic relations, and radiocarbon dating also suggest movements of the early Neolithic communities. The movements seem to have taken place exclusively within the fields. Discussion whether it was one or several simultaneous communities/settlements remains limited, since the state of research does not allow precise attribution of the site to certain chronological segments of the Early Neolithic.

Keywords: Early Neolithic, northern Dalmatia, settlement, settlement patterns, movements

1 Introduction

In the central part of the eastern Adriatic, northern Dalmatia is one of the most distinct agrarian regions of coastal Croatia. It is an area covering about 1,700 km² of coastal zones and hinterland between the cities of Zadar and Šibenik (Figure 1). Due to its favourable geostrategic location and quality of natural base conditions, from the early prehistory this area has been an intersection of various forms of cultural development, a space for the transfer of ideas, knowledge, and material goods, and for the formation of various economic and social contents.

Among the rich archaeological material that testifies to long cultural and historical development, the Neolithic finds stand out especially in terms of the satisfying state of research in northern Dalmatia. Decades of archaeological research have contributed to this, initially focused on stylistic-typological and chronological framework, followed by settlement and economic aspects of the Neolithic communities, their material and spiritual culture, and processes of Neolithization. In addition to shedding light on some long unanswered questions, mentioned explorations suggested necessary changes of predominant research

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* **Corresponding author: Kristina Horvat**, Department of Archaeology, University of Zadar, Petra Krešimira IV/2, 23 000 Zadar, Croatia, e-mail: khorvat@unizd.hr

Figure 1: Research area.

approaches and concepts in interpretations of character and dynamics of the development of the eastern Adriatic Neolithic. Changes are necessary primarily because of the contrasting regional and environmental conditions in the eastern Adriatic region that demand regional approach. Shifting away from traditional research strategies and introducing regional approach and interdisciplinarity, a broad perspective has been opened to address issues that hitherto have not received enough attention. One of them relates to the settlement patterns of the early Neolithic communities.

2 Current Knowledge About the Settlement Patterns of the Early Neolithic Communities in the Eastern Adriatic Region

It is well known that early sedentary communities wisely chose spatial and community zones suitable for their needs and lifestyle. The fertile alluvial fields prone to seasonal flooding, open landscapes with reduced forest cover, and gentle slopes near water courses and clay resources represented ideal habitats (Bailey, Andreescu, Howard, Macklin, & Mill, 2002; Biagi, Cremaschi, & Nisbet, 1993; Commenge, 2009; Davison, Dolukhanov, Sarson, & Shukurov, 2006). Several natural zones in the eastern Adriatic region were ideally suited to the needs of the early sedentary communities. In the mid-twentieth century, this fact motivated Šime Batović, one of the most important researchers of the eastern Adriatic Neolithic, to launch the first project focused on consideration of social change and land use in prehistoric Dalmatia. *The Neothermal Dalmatia Project* encompassed northern Dalmatia region, where new and previously known sites had been systematically recorded (Batović, 1989; Chapman, Shiel, & Batović, 1996). Furthermore, systematic field survey was conducted as well as various analyses with an aim of creating a more complete image of the type and position of sites, population density, relation between natural potentials and

prehistoric settlements, relation between the cultures represented, spatial organization of human activities, changes in spatial patterns, and social structure (Chapman, Shiel, & Batović, 1987). Some new Neolithic sites were discovered in the survey, and a small-scale excavation was carried out at an early Neolithic site (Batović, 1984; Chapman et al., 1996, pp. 176–186).

Systematic collection of exact data on palaeoenvironment, settlement systems, and survival strategies of the Neolithic communities of the eastern Adriatic started only by the end of the 20th century, but on a small scale (Combourieu-Nebout et al., 2013; Ilijanić, 2014; Miracle, 1995; Surić, 2006; Surić & Juračić, 2010; Wunsam, Schmidt, & Müller, 1999). This was followed by few individual regional projects such as *The Pupičina Peć Project* in Istria (Miracle, 2006) and *Neolithic Landscape of Central Dalmatia: Archaeological Survey, Excavation and Spatial Analysis* in central Dalmatia (McClure & Podrug, 2016), as well as systematic research of certain Neolithic sites. Mostly they offered data about economic and settlement aspects and showed that current state of research is hardly proportionate to the number and importance of the known Neolithic sites, or to the number of open questions related to the eastern Adriatic Neolithic. Issues related to the settlement patterns of the early Neolithic communities definitely belong to unresolved and insufficiently studied questions.

These questions came to focus of a number of projects and research in the second half of the twentieth century in Europe and beyond. This marks the beginning of the development of dynamic scientific-research work dealing with dialectic relation between the natural surrounding and prehistoric communities (Binford, 1972; Higgs, 1975; Higgs & Vita-Finzi, 1972; Hodder & Oron, 1976). That was the time of creation of archaeological approaches with various theoretical and methodological starting points, and then also variable interpretations of correlations of natural and cultural contents (*spatial archaeology, settlement archaeology, New archaeology, environmental archaeology, landscape archaeology, etc.*). They illustrated a wide range of possibilities and challenges that researchers of these questions encountered. At the same time, they led to the formation of a new research perspective in which crucial questions, such as Neolithization process, spreading of the novelties of the “Neolithic package,” position and organization of Neolithic settlements, formation of new Neolithic economic contents, and so on, are considered almost only in relation to natural geographical characteristics and natural potentials.

Despite great popularity of these research approaches and wide possibilities of their use, unfortunately they have not been tested in the eastern Adriatic region. It is a great pity, especially if we consider the fact that regional and environmental approach represents the principal framework for understanding and valid interpretation of narrow spatial and environmental Neolithic wholes of the eastern Adriatic. This has been evident from the recent considerations of the Neolithization process of the eastern Adriatic (Forenbaher & Miracle, 2005; Legge & Moore, 2011; Marijanović, 2007).

3 Northern Dalmatia – Settlement Patterns in the Early Neolithic

A majority of the currently known Neolithic sites in the eastern Adriatic are situated in northern Dalmatia. Some of them are the earliest Neolithic sites in the eastern Adriatic (McClure, Podrug, Moore, Culleton, & Kennett, 2014; Moore et al., 2019, pp. 27–29; Podrug et al., 2018). Those data are not surprising given the fact that it is an area of uniform relief, in which low karst folds alternate with fertile valleys with limitless possibilities for accepting and affirming all aspects of the Neolithic lifestyle. Fertile soils, highly valuable in agrarian terms, abundant water resources, and pastures have still remained a basis of the economic development of this area, very important in the wider region regarding demographics and economics.

At present, 26 out of 35 known Neolithic sites (Figure 2) in the area of northern Dalmatia are attributed to the early Neolithic, that is Impressed Ware culture. Mostly, these sites were discovered in the mid-twentieth century, owing to agricultural activities of the local population. There is just one pile-dwelling site, three cave sites and the rest are open-air sites (Figure 2), which are almost identical regarding microlocation. They are located in the field or along the edge of the field (Figure 3), right next to the water source after which the entire site is usually named. Geological map (Ivanović et al., 1973; Majcen, Korolija, Sokač, & Nikler, 1970) indicates that their positions are associated with Quaternary deposits which are subject to

Figure 2: All currently known neolithic sites in Northern Dalmatia: (1) Privlaka, (2) Vrsi, (3) Nin, (4) Crno vrilo, (5) Islam Grčki, (6) Smilčić, (7) Biljane Donje, (8) Zemunik Donji, (9) Kula Atlagić, (10) Kula Atlagić, (11) Benkovac (Brdine), (12) Benkovac (Barice), (13) Buković (Vrcelji), (14) Lisičić, (15) Brgud, (16) Lišane Tinjske, (17) Raštevčić, (18) Sikovo, (19) Tinj, (20) Polača, (21) Gornja Jagodnja, (22) Lepuri, (23) Stankovci – Širitovac, (24) Velim – Velištak, (25) Krivače, (26) Vrbica, (27) Rašinovac, (28) Tradanj, (29) Mratovo, (30) Oziđana pećina, (31) Škarin samograd, (32) Pokrovnik, (33) Konjevrate, (34) Danilo, and (35) Pakoštane.

Figure 3: One part of the typical valley in the area of the Northern Dalmatia (photo: M. Grgurić).

seasonal flooding (Ivanović, Sakač, Sokač, Vrsalović-Carveić, & Zupanić, 1976; Majcen, Korolija, Sokač, & Nikler, 1973). Fertile soils suitable for various agricultural activities developed on the Quaternary deposits, as well as open landscapes with reduced forest cover that does not require a more significant deforestation. Due to high share of clay, they are a good source of raw material and a waterproof hydrological insulator that regulates the direction of surface drainage. It is reasonable to expect discoveries of new Neolithic sites dating to the Early, Middle, and Late Neolithic at identical positions in northern Dalmatia. This is suggested not only by a number of Neolithic sites located next to Quaternary deposits and water sources but also by the data collected thus far in the regions of northern and central Dalmatia. These data are primarily related to diverse archaeological finds attributed to the Neolithic, presently kept in the museum collections. Some of them were found in the areas that are presently mine suspected, so they have been inaccessible after the Croatian War of Independence. The exact findspot for some of these finds is not stated. We should also keep in mind some old finds that suggest possibility of new discoveries. For instance, at Danilo, as the eponymous site of the Middle Neolithic Danilo culture, pottery sherds of the Impressed Ware culture were collected back in the mid-twentieth century (Batović, 1966, pp. 91–92; Korošec, 1962, p. 14). Therefore, this site was added to the list of the earliest recognized sites of the Early Neolithic in the eastern Adriatic, though cultural layers from this phase had not been determined. On the other hand, at the Epigravettian and Early Neolithic site in Konjevrate, a small number of pottery finds and radiocarbon analysis results suggest the Middle Neolithic, whose cultural deposit has not been determined in the excavated area during the research (Korić & Horvat, 2018; McClure et al., 2014). Mentioned finds suggest that certain yet undiscovered sites are hidden in the vicinity of some known Neolithic sites, i.e. that only segments of larger site complexes with several settlement wholes have been discovered at certain locations, belonging to different chronological segments of the Neolithic. A model has been made proposing some 40 new Neolithic sites in northern Dalmatia (Horvat & Blaće, 2017), based on the idea about the presence of a bigger number of Neolithic sites. Their location was predicted on the basis of spatial distribution of currently known sites, type of geological sediments, basic geomorphological features of the region, and availability of water. Field surveys with the aim of verifying the model are ongoing.

On the basis of radiocarbon analyses and collected archaeological material, it has been determined that the sites of the Impressed Ware culture in the region of northern Dalmatia cover the entire chronological and development range of the Early Neolithic, i.e. the period from c. 6100 BC to c. 5300 BC (Forenbaher & Miracle, 2012, 2013; McClure et al., 2014; Moore et al., 2019, pp. 27–29). It is interesting, however, that so far only one of them (Pokrovnik) has a stratigraphy that covers almost the entire chronological and developmental range indicated. All other early Neolithic sites, researched in different extents, are attributed to shorter relative chronological sections of the Early Neolithic, generally not more than about 200 years (Forenbaher et al., 2012). The situation is identical at other excavated Neolithic sites along the eastern Adriatic. An interesting question which remains open is if any of them were simultaneous, which would imply the simultaneous existence of a certain number of separate early Neolithic communities. A bigger number of excavated early Neolithic sites with determined radiocarbon dates are necessary to provide an answer to that question. What is quite certain at present is that in most of these positions life continued after the Early Neolithic phase through the Middle and/or Late Neolithic (Figure 4). Duration of these phases, at most known sites, does not exceed c. 200 years (Forenbaher et al., 2013; McClure et al., 2014; Moore et al., 2019, pp. 27–29).

Judging from the stratigraphic data and collected archaeological material, it seems that life stopped between the occupations dating to different chronological segments of the Neolithic, i.e. different Neolithic cultures. After this settlement and cultural discontinuity (Horvat, 2017, pp. 153–155; McClure & Podrug, 2016, p. 125), life sometimes continued in the identical microposition, and sometimes the settlement zone was moved. At the present state of research, three sites seem to be most interesting, considering the examples of displacement of settlement zones: Barice in Benkovac (Marijanović, 2012), Bribir – Krivače (McClure & Podrug, 2016, p. 125), and Građuše – Lokve in Islam Grčki (Batović, 1987). It seems that settlement zones from different periods did not overlap, but they were adjacent. Since their horizontal dimension is not fully explored, interpretation of spatial relations of the settlements from different Neolithic phases and consequently of the dynamics of development of the Neolithic communities remains unresolved until bigger, compact research units are opened. The same research strategy is crucial for the sites where cultural layers of the Middle Neolithic partially and/or fully

Figure 4: List of sites and phases (drawing: K. Horvat).

superpose the Early Neolithic ones, such as the sites in Sikovo (Čondić, 2012/2013), Smilčić (Batović, 1966), or Pokrovnik (Brusić, 2008; Marijanović, 2017; Moore et al., 2019).

There is no doubt that the basic reasons for selection of a particular microposition and its usage during the multiple developmental stages of the Neolithic had to be favourable microenvironmental conditions and high-quality economic potentials, which enabled the acceptance and affirmation of the basic aspects of the Neolithic lifestyle, especially the new economic postulates. This statement is uncontested regardless of whether we refer to continuous use of same microregions or their use with interruptions. It is worth mentioning that moat ditches/trenches, drainage canals, and/or heaps of amorphous stones were found at all Neolithic sites. These artificial constructions have attested that selected positions were affected by various natural processes to which these early sedentary communities adapted very skilfully. Drainage canals and heaps of amorphous stones (Figure 6) were probably used for drainage, that is reduction of adverse effects of precipitation. Were the ditches/trenches dug for the same reason? The answer to that question is still missing, despite numerous and diverse interpretations of similar phenomena in other spatial and cultural environments (Marijanović, 2017, pp. 34–42; Pasztor, Barna, & Zotti, 2015; Robb, 2007, p. 93; Tripković, 2013). Regardless of their primary function, it seems beyond doubt that precipitation was contained in them in humid periods. On the other hand, in dry months, precipitation was retained in dug-in reservoirs, crucial for maintaining agricultural crops. This is best illustrated by the modern landowners in northern Dalmatia who still dig and use similar water reservoirs whose bottom reaches waterproof clay deposits.

Location of most Neolithic settlements on mild natural slopes belongs to clever adaptable strategies in line with microenvironmental characteristics and natural potentials of selected living space, its advantages and limitations, but also actual needs of each early Neolithic community. In addition to avoiding parts of the terrain prone to flooding, selecting sunlit slopes sheltered from wind implies more efficient usage of agricultural land. Modern olive groves, vineyards, and other agricultural zones in northern and central

Dalmatia follow the identical spatial pattern. They are located at the transition from the field to the zone of natural lower plants used for cattle pasture. Some of these lands were obtained through deforestation as evidenced by reforestation zones and local (micro)toponyms (Magaš, 2009; Šimunović, 1986, pp. 18–19). Since palynological and sediment analyses are exceptionally rare in the region of northern Dalmatia (Grüger, 1996; Ilijanić, 2014), we do not know if and to what extent early Neolithic communities cleared natural vegetation. There were also no analyses that might suggest anthropogenic influence resulting from pasture and cultivation, whose presence and importance are attested by the results of conducted bioarchaeological analyses and archaeological finds that can be associated with the economic activities, such as various stone tools and blades with sickle gloss. Zooarchaeological and archaeobotanical analyses have confirmed that raising domestic animals and growing crops became primary branches of industry, supplemented with hunting, fishing, and fruit gathering. Ovicaprids were dominant among the domestic animals, sheep in particular (Moore et al., 2019, pp. 56–76; Radović, 2011; Schwartz, 1988, 1996), and among the cultivated plants those were small (monococcum) and medium (dicoccum) spelt and barley (Huntley, 1996, pp. 187–189; Legge & Moore, 2011, pp. 188–189; Moore et al., 2019, pp. 47–55; Reed, 2014; Šoštarić, 2005).

Basic principles of the Neolithic economy gradually lead to the depletion of natural resources. For these reasons, chosen microlocations are periodically abandoned and new ones are used in order to restore a productive soil and have high yields again (Barton, Ullah, & Bergin, 2010, p. 5276; Halstead, 2006; Valmonti, 2007). A recent research focused on differences in animal diet used stable carbon and nitrogen isotope analyses of faunal remains from five open-air Neolithic sites in northern Dalmatia has shown that there were no differences in animal management practices at these Neolithic settlements (Zavodny, McClure, Culleton, Podrug, & Kennett, 2014). In other words, there is no evidence on seasonal movements of livestock between summer and winter pastures that have been common in Dalmatia until recently (Belaj, 2004). However, these results do not mean that Neolithic communities did not move. Almost complete uniformity of microlocation selection and economic activities of the early Neolithic communities in northern Dalmatia, as well as stratigraphic data and radiocarbon dates indicating limited use of most early Neolithic settlements, can lead to different conclusions. It seems that the early Neolithic communities did move, and that their movements were spatially determined by low karst folds of northern Dalmatia. In other words, it seems these movements happened in the fields. At the hypothetical level, it is possible to assume three forms of cyclical movement and exploitation of the given space and economic framework in the Early Neolithic of northern Dalmatia (Figure 5):

1. cyclical movement of one community;
2. movement of a number of separate communities;
3. existence of big, long-term (central) settlements and small, short-term (satellite) ones.

Figure 5: Three forms of cyclical movement (drawing: Luka Bogdanić).

Figure 6: Segment of damaged upper part of the deposit at Barice in Benkovac (photo: D. Vujević).

If we assume that one community moved within one valley, evenly spaced positions in the zone of visual contact might illustrate a certain form of exclusivity exercised by one community through several biological generations in controlling and using a certain area (one valley). In that case repeated occupation of one place for domestic purposes might mean that the settlements had become places of memory and tradition. Small distances between the sites located so far (ca. 2 km) support this idea, contradicting the old theoretical models about the radius in which sedentary communities used resources (Higgs & Vita-Finzi, 1972; Hodder & Oron, 1976, pp. 229–236; Keene, 1983). One valley could have been occupied by several different communities that occasionally changed micropositions in the field/fields. On the other hand, we should keep in mind radiocarbon dates from Pokrovnik that cover almost entire Early Neolithic. They overlap with dates from the other sites with shorter occupation. In that context, perhaps we should consider big, long-term (central) settlements and small, short-term (satellite) ones. Discussion whether it was one or several simultaneous communities/settlements remains limited since the state of research and lack of radiocarbon analyses aggravate precise attribution of the site to certain chronological segments of the Early Neolithic.

Available information definitely supports the second conclusion claiming that the settlement patterns in the Early Neolithic in northern Dalmatia were determined and aligned with natural conditions of the area considered and its resources. The most important crucial resources are water, quaternary deposits on which rich arable land developed, pastures, clay deposits, and forests as sources of firewood and building material. Proximity of these resources ensures an optimal position in the Early Neolithic of the discussed area, as attested by positions of all sites recovered thus far. They are preconditions and basis of development of the Neolithic communities in northern Dalmatia, and a starting point in interpretation of the character and dynamics of their development. It is a generally accepted behaviour pattern emerging at the beginning of the Neolithic, when all principles of “the Neolithic package” were fully accepted. Continuity in use of identical microlocations after the Early Neolithic testifies to the fact that these settlement patterns remain valid until the end of the Neolithic. This is not surprising, having in mind that big changes in lifestyle or economic strategies did not take place during Neolithic time in northern Dalmatia (Batović, 1990, p. 61). This type of changes can be recognized only in later prehistoric periods, starting from the Bronze Age, when prehistoric communities moved to elevated hillfort settlements (Batović, 1990, pp. 73–80).

As mentioned earlier, discovery of new Neolithic sites should be expected in immediate vicinity of critical resources in the northern Dalmatia region. Will they support or reject the proposed idea about the movements of the early Neolithic communities? Is it possible to obtain information to indicate the number of simultaneously existing communities in a single valley and which model is most acceptable? In search of answers to these questions, one should keep in mind two important things. The first one refers to the state of

preservation of archaeological remains. Namely, natural processes such as erosion and accumulation, also known to the Neolithic communities, changed significantly both the natural landscape and surface archaeological record, especially in case of the settlements built on mild slopes, and the ones whose cultural layer starts shallow under the present-day surface, on a shallow bedrock. In these cases, cultural layer tends to increase with the general slope inclination.

Formation and preservation of the surface archaeological record have been greatly affected by centennial agricultural activities such as deep plowing in the northern Dalmatia region, using heavy agricultural machinery. Long-term soil tillage has destroyed the upper part of the deposit, to the depth of 30–35 cm, at a number of archaeological sites which is why some archaeological finds are dislocated (Figure 6). On one hand, many Neolithic sites in northern Dalmatia have been discovered owing to agricultural activities, but on the other hand just as many have been destroyed. However, there are zones that have not been tilled for decades due to natural or geographic reasons, property law issues, etc. Probably, these places also hide Neolithic sites, possibly better preserved than the ones in extensively tilled land. The problem is that such sites are much more difficult to discover.

Systematic field surveys seem to be the first step in solving these problems, more specifically, a systematic field survey of one valley and two karst folds that enclose it. Special attention must be paid to lower parts of karst slopes that have the biggest deposits of erosive material. This approach should provide a better insight into the number and relations of the settlements situated in the fields and on the karst slopes. So far settlements in the field have been more numerous, which does not have to reflect the actual situation, primarily because of the mentioned processes that affect preservation and visibility of the archaeological record. Detailed mapping can discover regularities in location logics and adaptation practices in relation to natural surrounding. Integration of geophysical measurements would be an ideal solution to complement the field survey results as well as new sites with precise radiocarbon dates and interdisciplinary research. Focus of interdisciplinary research needs to be in obtaining information about palaeoenvironment. Since various economic, social, and cultural factors affected settlement patterns in addition to natural conditions that are hard to recognize in case of prehistoric communities, specific information about palaeoenvironment represents a basis for objective interpretations and avoiding geographic determinism. More attention should be paid to economic aspects, particularly use of sea resources and foreign raw materials that definitely indicate movements of the Neolithic communities at small and large distances. On the basis of data obtained from one valley, it is possible to make a comparison with other valleys, in order to obtain wider regional model. In addition to spatial comparison, acquired model can be elaborated chronologically to see if there are differences in settlement patterns from the beginning to the end of the Neolithic in the observed area.

4 Conclusion

Did available natural potentials affect the general consistency in the use of the apparently rational and optimal behaviour pattern adopted by the time of early Neolithic? What was the role of other factors, such as economic activities or memory and tradition, in the repeated occupation of one place through several Neolithic phases? These questions remain pending new research that will certainly fill in the existing gaps related to the settlement patterns of the early sedentary communities of the eastern Adriatic and indicate if the proposed model of movements of the early Neolithic communities within valleys is acceptable. Until then, available information about the Early Neolithic patterns should be an indicative sign for discovering new Neolithic sites in the region of northern Dalmatia, in particular alongside resources defined as critical.

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