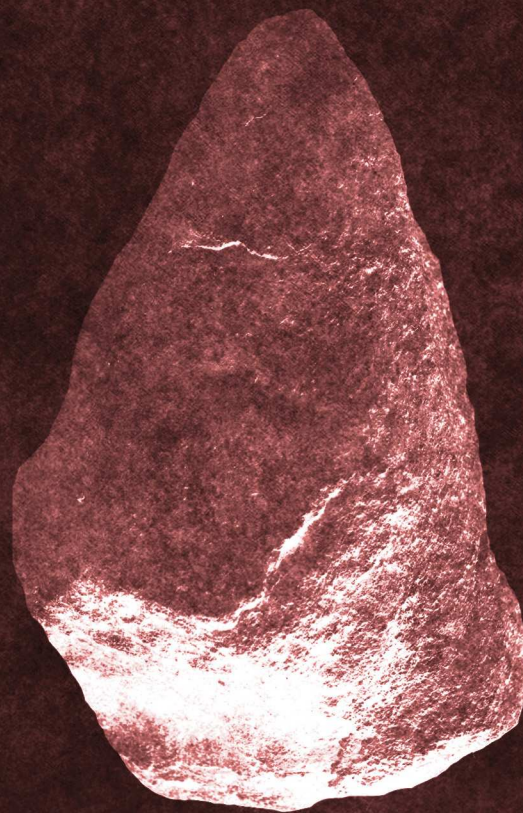


ARCHAEOLOGY STUDIES *raw material exploitation from prehistory to the Middle Ages*

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*raw material exploitation from prehistory  
to the Middle Ages*



**Editors**

*Selena Vitezović*

*Dragana Antonović*

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# **STUDIJE ARHEOTEHNOLOGIJE:**

**Eksploatacija sirovina  
od praistorije do srednjeg veka**

**Urednici:**

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**Beograd, 2017**

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## RAW MATERIAL MANAGING AND EXPLOITATION IN THE PAST

Archaeology studies material remains of the past, and the question of raw material from which they were made is often the very first, initial research question.

Raw materials include food and water for humans and animals, as well as materials for making tools, shelter, clothes, other daily objects such as vessels, storage containers, etc., and also for objects of art, ritual and cult. Their origin and method of acquiring are often interlinked and are connected into a complex network of mutual relation. For example, food remains, such as animal bones, skin, tendons, are used for artefact production, non-edible parts of plants may serve for other purposes, such as stems for roofs or for covering the floor, fresh running water is important for human and animal consumption but also for numerous production processes, gathering in the woodlands may encompass diverse resources, such as wood for basketry, plant and animal food, and so on. The system and the organization of acquiring and exploiting of different raw materials represent the most important part of every economy and economical system. The questions such as availability of some of the raw materials, the degree of their exploitation versus their availability, the mode of exploitation as well as the method of their extracting, connected with the technological choices, are particularly important for studying not only economic, but also other social aspects.

Analyses of raw material may provide information on the exploitation of the environment and human-environment relations; the relative distance of the sources from the settlement may point to the territory used or controlled by certain group, routes of trade and exchange, or, in a case of hunter-gatherers, routes of migration and/ or territory covered. Technology of extracting some raw materials, such as stones or ores, may indicate the level of technological knowledge



and the organization and the overall economic system within a community that explored them.

Furthermore, some materials can be considered as luxurious and prestigious among some human groups; this is often, but not exclusively related to the rarity of the given raw material or to the difficulties in its extracting and/or working. Some materials may be used for both daily and ritual objects, some not, thus revealing some aspects of the perception of the environment, both landscape and animal world.

The analysis of raw material acquiring and managing has a special place within the technological analysis. Technology (from Greek word τέχνη, meaning skill) is a conceptual approach to the material culture studies, that encompasses all the human actions upon a matter, from individual level (body gesture, embodied knowledge in crafting) to the social and cultural setting of production (cf. Inizan *et al.* 1999, also Miller 2007 and references therein). Technology or technological systems can be roughly described as processes and practices associated with production and consumption, from design to discard (Miller 2007: 5). The view of technology as a cultural-driven phenomenon implies that there is usually more than one technique that satisfies the minimum requirements for any given task. Therefore, the technological choices may be strongly influenced by beliefs, social structure and tradition within the given society – it is important to analyse why specific manufacturing techniques were employed and not another ones, why some objects are quickly discarded and other repaired several times, etc. (cf. Lemonnier 1992, 1993, see also Killick 2004).

As for raw materials, the question is why a specific material was chosen and not some other. Some raw material may be readily available or exist in the environment and yet remain unused. Raw material choices are influenced by factors that can be roughly described as external – namely, the availability (including available quantities and possibilities for extractions with available technology), physical and mechanical properties, and internal – social, cultural preferences, etc., traditions, etc.

Careful choices of raw materials, and not random usage of first that come at hand, may be noted since very early stages of human past. Careful selection of particular raw materials, even targeted

search for adequate materials, their collecting, transporting, hoarding for later use, etc., can be traced back very deep into our past. Studies on lithic raw material demonstrated that already in the Middle Palaeolithic period tool provisioning and management strategies show clear organization and planning depth (Meignen et al. 2009).

The studies of raw material acquiring and managing are not important only for studies of economy; they can have great influence on other fields of research as well. As L. Meignen and co-authors noted, „Analyses of Middle Paleolithic technological behaviors – and by extension of Neandertal cognitive capacities and mobility organization – have been revolutionized by theoretical perspectives devised from lithic technological and raw material investigations“ (Meignen *et al.* 2009: 15)

Today, studies of raw materials must also include diverse multi- and interdisciplinary approaches. Throughout the 20th century, most of the studies were focused on the discovery of the sources of a certain raw material, especially lithic and metal. Lithics are probably the most studied raw material (e. g., Antonović 1997, 2003, Biró 1998, Gatsov 2006, Gurova 2011, Šarić 2014, to mention just a few examples from Balkan archaeology), although they are far from being exhausted. In past few decades, however, may be noted both the improvements in methodology as well as an increased interest and increased variety in raw material studies. For example, we may quote the studies on amber (e.g., du Gardin 2002, Murillo-Barroso and Martín-Torres 2012), or salt (Cavruc and Harding 2012, Saile 2012, Weller 2012).

Interest in osseous raw materials especially increased in past three decades or so, both in Europe and other continents (e. g., Guthrie 1983, Scheinsohn and Ferretti 1995, Margaris 2012, Allentuck 2013; see also Schibler and Choyke 2007, Choyke 2013). One of the classical studies on symbolic value of raw materials is the one on the osseous raw materials, by Robert McGhee (1977), on raw material choices within the Thule culture in arctic Canada. McGhee clearly demonstrated that the use of antler, ivory and bone for specific artefacts is by no means accidental, and is in fact strictly linked to the worldview. From the relations between the raw material and their products, McGhee reconstructed oppositions land/sea, summer/winter, man/woman, antler/ivory.

\* \* \*

This volume is the result of several thematic sessions that took place at Annual meetings of the Serbian archaeological society, especially sessions *Exploitation of raw materials, exchange and trade in prehistory*, and *Technology of raw material exploitation from prehistory to the Middle Ages*.

The first paper by M. Mitrović presents a study on knapped raw materials from a new, interesting point of view – it discusses the aesthetic qualities of flint materials. The next two papers are focused on osseous raw materials; V. Krištofić analyses the osseous raw material choices in the Neolithic period, on the case study of the site of Jakovo-Kormadin, while S. Vitezović looked into the usage of osseous materials for ornaments in times when metals entered into wider use, on the case study of the Mokrin necropolis.

The next three papers are dealing with metals from different perspectives. R. Balaban discusses early copper artefacts and their symbolic value. D. Antonović and V. Dimić offered new results from very interesting, but at the same time challenging research on early mining activities and they present the results from the investigations of the site of Prljuša on the Rudnik mountain. Paper by T. Sekelj Ivančan and T. Marković is a leap forward in time, into the Middle Ages, and they are focused on the iron processing along the Drava river. Finally, the book is closed by analysis of clay raw materials in the Middle Ages using the area of medieval Ras as model for raw material procurement strategy and organization of pottery production, by V. Bikić and U. Vojvodić.

Editors would like to thank to everyone who helped in creating this book, authors and all participants at Annual meetings of the Serbian Archaeological Society, members of the editorial board and reviewers, as well as to the Serbian Archaeological Society, and, last but not least, to translators, Jelena Vitezović and Miloš Krnetić.

**Selena Vitezović  
Dragana Antonović**

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## POTTERY DISTRIBUTION AND RAW MATERIAL RESOURCES IN THE AREA OF MEDIEVAL RAS

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Uglješa Vojvodić  
Institute of Archaeology, Belgrade

**Abstract:** *Technological properties of ceramic vessels from medieval sites in the area of Ras reveal a unique production trend, including well defined technological choices with respect to raw materials, workmanship and firing procedures, whereas preliminary results of petrographic analyses are indicative of local sources of raw materials. By combining all available data, both archaeological and archaeometric, including environmental features and characteristic toponyms, this article proposes a framework for a strategy for obtaining raw materials and organizing pottery production in the greater area of Ras from the beginning of the thirteenth to the beginning of the fifteenth centuries, relying on ethnographic and ethno-anthropological investigations and established threshold models.*

**Keywords:** *pottery, raw material selection, landscape, resources, ceramic ecology*

**Apstrakt:** *Tehnološke odlike keramičkog posuđa sa srednjovekovnih nalazišta na prostoru Rasa pokazuju jedinstven proizvodni trend, uključujući i definisane tehnološke izbore u pogledu sirovina, primenjenih tehnika izrade i procedura pečenja, dok preliminarni rezultati petrografskih analiza upućuju na lokalne izvore sirovina. Ukrštanjem svih raspoloživih podataka, arheoloških i arheometrijskih, uz analizu građe iz pisanih dokumenata, odlike prirodnog okruženja i karakteristične toponime, u tekstu se predlaže okvir za strategiju nabavke sirovina i organizaciju proizvodnje keramike na širem prostoru Rasa u razdoblju od početka 13. do početka 15. veka, oslanjajući se na etnografska i etnoantropološka istraživanja i ustanovljene modele procesa proizvodnje keramike.*

**Ključne reči:** *keramika, izbor sirovina, pejzaž, resursi, keramička ekologija*



## Introduction

The procurement of raw materials for the production of pottery not only represents the beginning of the chain of operation, but is also an indicator of a production context that includes a number of social, behavioral, technical and ambient factors (*cf.* Arnold P. 1991; 2017; Costin 2000). In this respect, a strategy for obtaining raw materials for the production of pottery yields a series of data important for a better understanding of not only the technology itself, but of the economic and social background of a period and the organization of a community as well. Existing research, primarily that of Dean E. Arnold (*cf.* Arnold D. 1971; 1975; 2016; 2017), has yielded a number of results that allow for establishing a broader theoretical and methodological framework for the strategy and thereby for pottery production as a whole. Even though they are primarily applicable to prehistoric communities, the proposed threshold models also prove to be an inevitable starting point for studying certain phenomena in historical epochs, such as the period of the Late Middle Ages in this case.

We shall discuss the issues related to the raw materials for the production of pottery on the example of medieval Ras, an area yielding such results of archaeological investigations as make it a model for investigating “ceramic ecology”, a concept dealing with the relationship between the natural environment and pottery as a sociocultural phenomenon (Arnold D. 1975; 2000; Albero Santacreu 2014: 129-145). In our investigation, we shall be moving “backwards”, from the final product, i.e. ceramic vessels that, owing to their properties, represent indicators for studying sources of raw materials. Furthermore, data on potters and the organization of the craft of pottery in written sources will lead to an analysis of the landscape and the natural environment in which the potters lived in order that we may view all the results in the context of the existing ceramic resources threshold model and establish a general framework for a strategy of raw material procurement, that is, a model of the organization of pottery making communities in the Balkans during the Middle Ages.

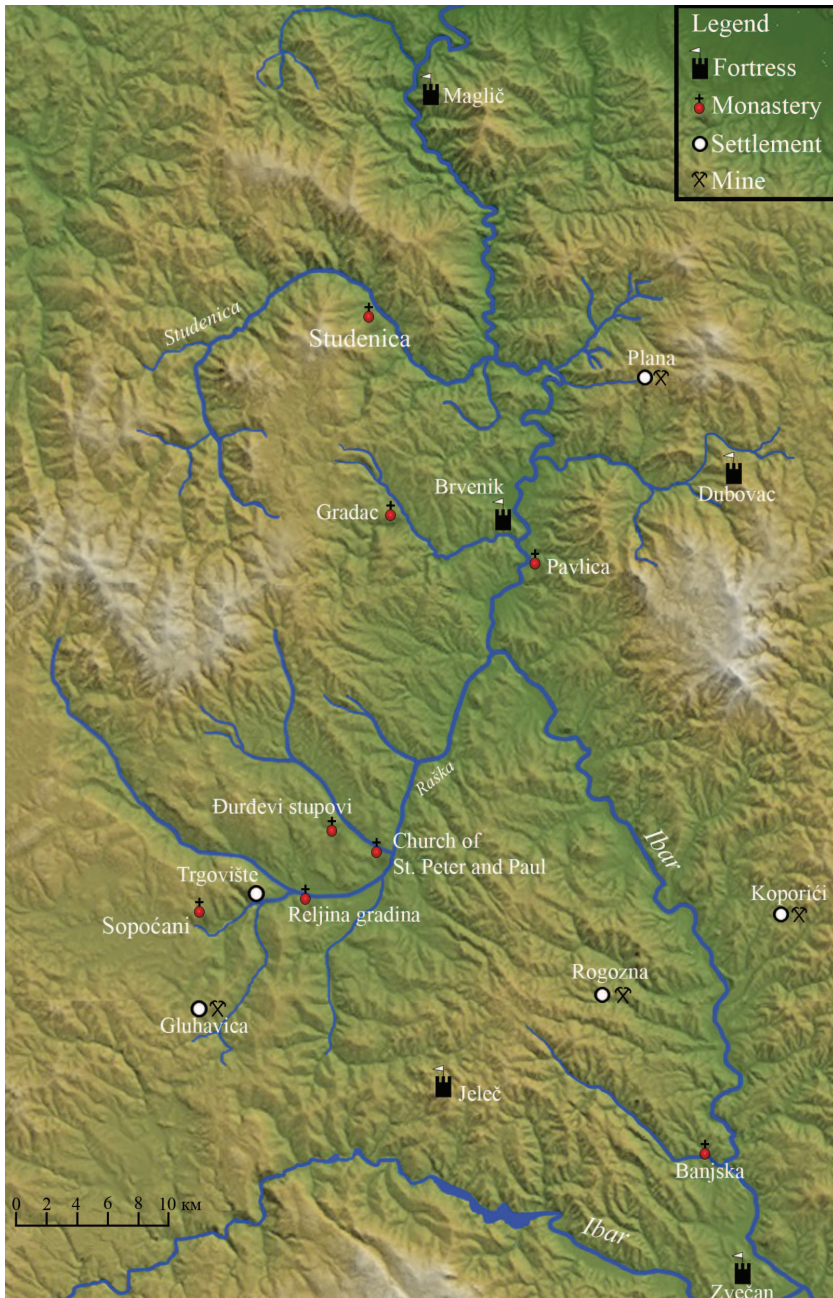
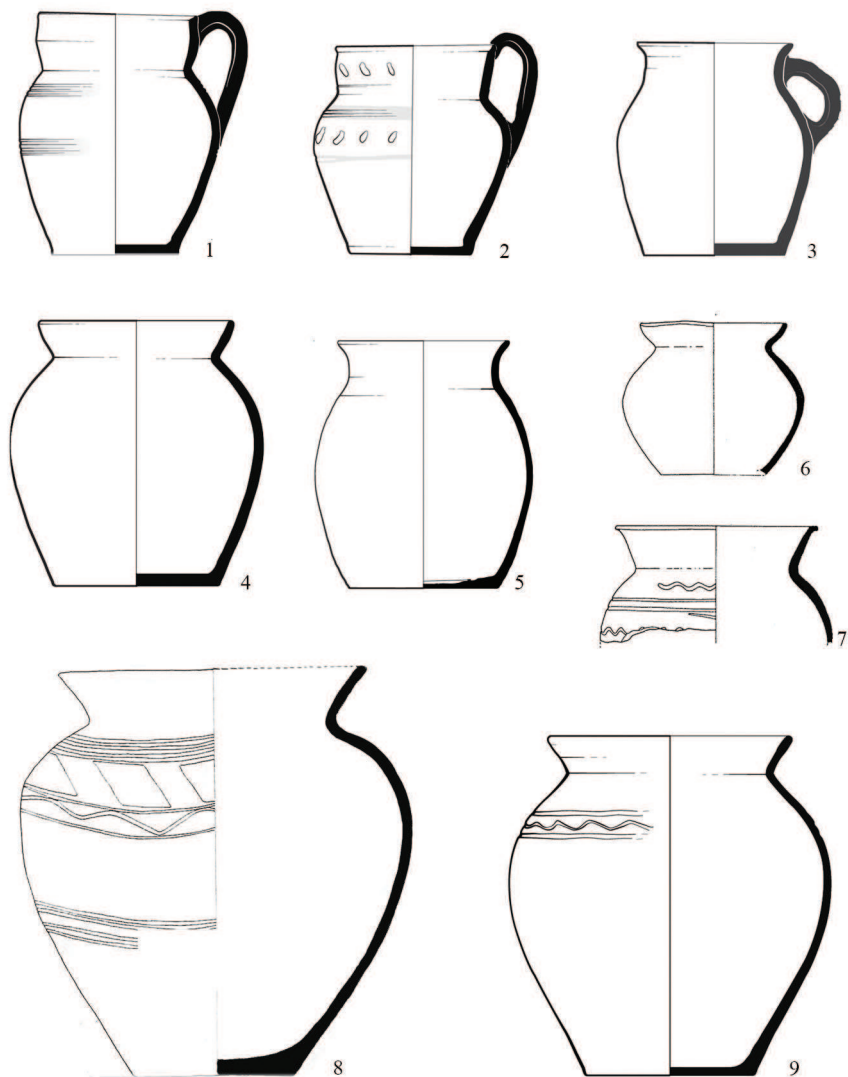


Fig. 1. Medieval monasteries in region of Raška.  
 Sl. 1. Manastiri na području srednjovekovnog Rasa.

The starting point for the study of ceramic ecology is contained in the premise that the composition of pottery reflects the composition of the raw material used, which includes raw clay, organic and/or inorganic tempers, water, wood (fuel for firing pottery), as well as pigments and glazes obtained from minerals and ores (Arnold D. 1976: 92-94). On the other hand, a potter consciously selects raw materials in order to make a vessel with quite particular characteristics. By all means the most important among them are clay, water and fuel, whilst non-plastic inclusions are desirable but not required (Arnold D. 1985: 20-30). Some of the raw clays already contain certain amounts of the “ingredients” that make all the difference between raw clay and potter’s clay, primarily quartz, sand, feldspar and lime, but this does not necessarily mean that they are suitable for pottery (Arnold D. 2017: 16). Thus a potter’s unique selection of raw materials reveals his experience in recognizing the clay of certain properties – by its color, presence of shimmering tempers, plasticity or salinity – as well as his ability to visualize the final product (Arnold D. 2016: 3-4; 2000: 240-242).

The very term *majdan* (quarry) of clay has multiple meanings and indicates various phenomena, such as an area or geographic region, or the community that exploits it, depending on local practices and traditions. A source of raw materials can be one or several places at varying distances and with clays of slightly different compositions, which a potter can mix in order to obtain the required characteristics, so that raw clay with temper carries both natural and cultural information (Arnold, Neff, Bishop 1991: 84-88; Costin 2000: 380-382). Furthermore, it should be borne in mind that the very addition of temper may mean a divergence from the original composition of clay, which is then reflected in the similarities or differences of composition between the clay and pottery (Arnold, Neff, Bishop 1991: 74). Over time, suitable clay may have been exhausted, as attested by documents in the Dubrovnik Archive on a land lease by the Dubrovnik town council for the purpose of producing bricks (Динић 2003: 66-72). Likewise, sources of raw materials change over time due to erosion, change of owner or mine exhaustion, which may be further reflected in clay composition and the organization of the pro-



**Fig. 2.** Ceramic vessels from medieval monasteries in region of Raška: 1-6, 9. Studenica monastery; 7. Đurđevi stupovi; 8. Gradac monastery.  
**Sl. 2.** Keramičke posude iz srednjovekovnih manastira u Raškoj oblasti: 1-6, 9. Studenica; 7. Đurđevi Stupovi; 8. Manastir Gradac.

duction of ceramic vessels as a whole (Arnold D. 2000: 346-351). It is therefore necessary for researchers to define the “profile” of the composition of raw materials by taking samples from various clay mines and vessels from various functional groups. In this respect, preliminary sampling in the area of medieval Ras has yielded positive results (Damjanović *et al.* 2011: 825-828).

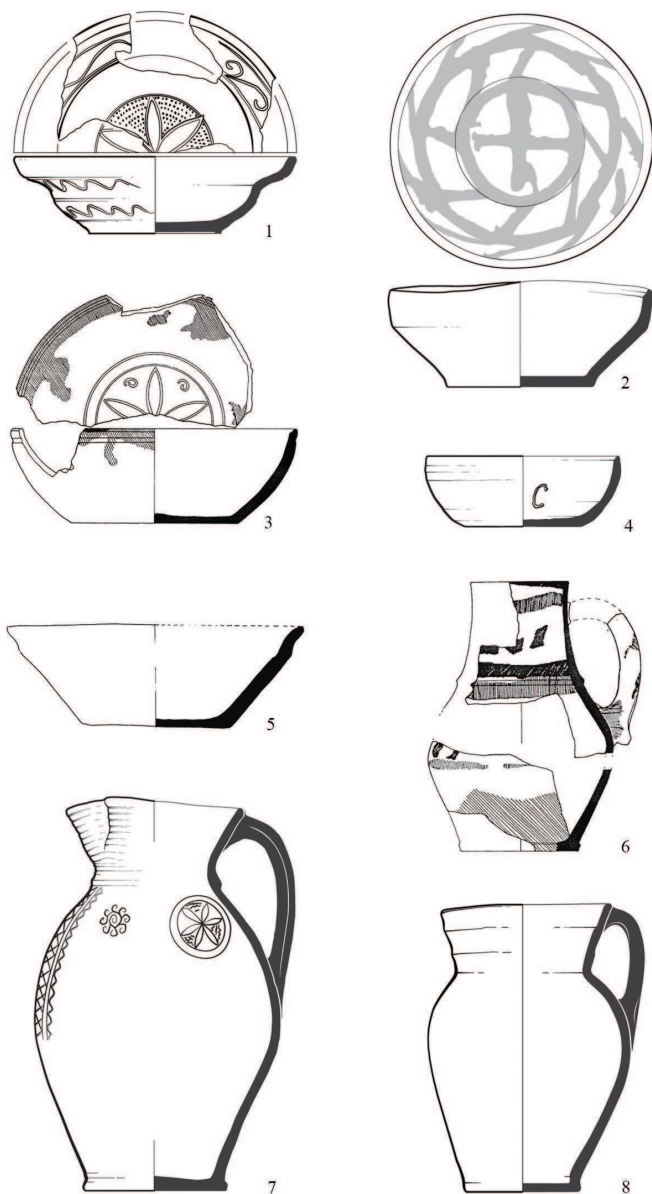
The distribution of raw material resources provides clear indications of the organization of pottery activities, as it contains data on the geological matrix, climate, hydrology, and thus indirectly not only on the order, intensity and volume of production and the technology involved, but on the economic and social environment as well (Costin 1991: 13-15; Arnold P. 1991: 4-5). Besides, the presence of specialist potters, also attested in the territory of medieval Serbia (Bikić 2016: 170-171), reveals a degree of standardization and regional variability in production (Costin 1991: 33-43).

### **Vessel properties – technological choices and specialization in ceramics**

Representative sets of ceramic vessels from the area of medieval Ras have mostly come from monastic complexes (Fig. 1), because they have been most thoroughly investigated and, in some cases, precisely dated. Monastic communities, like other settlements, show certain patterns of ceramic vessel consumption. At the same time, the vessels reflect production tendencies, that is, clear technological choices expressed through a set of formal properties in each functional category, including the choice of raw materials and firing procedures (Бикић 2015b).

In the area observed, there are substantial similarities in the ceramic material, not only on the technological plane, but on the morphological one as well (Зечевић & Радичевић 2001: 29-32; Поповић 2015: 211- 218; Викић 2015а; Јуришић 1989: 28-33, 37-42; Јуришић 1991: 71-85). As regards morphology, the assemblages of vessels, particularly those in the group of cooking vessels, demonstrate a certain constancy (Fig. 2). Moreover, patent uniformity is evident in the group of glazed cooking pots, which are also of a sim-





**Fig. 3.** Ceramic vessels from medieval monasteries of Ras region:

1-2,4,7-8. Studenica; 3, 6. Đurđevi stupovi; 5. Gradac.

**Sl. 3.** Keramičke posude iz srednjovekovnih manastira u Raškoj oblasti:

1-2,4,7-8. Studenica; 3, 6. Đurđevi stupovi; 5. Gradac.



ilar medium size, i.e. volume of 2-3 liters on average. More variety is exhibited by tableware, primarily jugs and pitchers, which are characterized by a particular production process and artistic expression (Fig. 3). Being luxury products, they were made in small series and were often custom-made.

As a rule, cooking pots and matching lids were made with pastes to which tiny mineral tempers had been added. After firing, the vessels were of brown shades, from brownish red to gray. Besides the said glazed cooking vessels, some of the smaller series have hardy, but comparatively thin walls. Almost identical to those of unglazed cooking pots are the characteristics exhibited by water pitchers, which were discovered in rather large quantities in the monastic complex of Studenica (Поповић 2015: сл. 96/5, 97/25, 26, 123/13, 14, 132/14). Of a slightly coarser texture, with larger grain sand as a temper, are storage vessels, as well as *vršnik* clay ovens, which, for now, have only been found in more substantial quantities in parts of the monastic complexes of Studenica and Nova Pavlica (Поповић 2015: сл. 82/8, 94/6, 7, 96/14, 15131/12-13; Јуришић 1991: 71). Both of these types of vessel have thicker walls and frequently also reinforcements in the form of applied strips, which enhanced their durability.

Substantially different in the group of hearth vessels are *crepulja* baking pans, characterized by a broad and shallow receptacle and flat walls (Fig. 2; Поповић 2015: figs. 97/19-22; 119/4-8; Јуришић 1989: 32-33). They were made from clay mixed with tempers of large granulation, such as large grain sand, gravel and pebbles. They also have thick walls. Unlike in the case of other vessels, the firing of *crepulja* baking pans takes place when they are used for cooking for the first time (Филиповић 1951). All the above characteristics are directly linked with their purpose, which is baking bread/flatbread over open fire or in a cooking stove, and their resistance to sudden temperature changes, the so-called "thermal shock", and mechanical pressure (Kilikoglou, Vekinis & Maniatis 1995; Tite, Kilikoglou & Vekinis 2001: 304; Schiffer & Skibo 1987: 607).

Unlike kitchen pottery, tableware is of a finer texture and, in most cases, of red color (Зечевић & Радичевић 2001: 35, 47, 51, 54-

55, figs. 5, 14, 15; Поповић 2015: 215; Бикић 2015а; Јуришић 1989: 37, figs. 39-44; Јуришић 1991: figs. 64-66). In addition to increasing the working quality of clay, small grain mineral tempers (predominantly sand), noticeable on cross sections, also improve their mechanical performance during firing and their overall durability (Rye 1981: 27, 31-35; Kilikoglou, Vekinis & Maniatis 1995). On the other hand, the homogenous fine grained paste allows the forming of a surface suitable for decoration using sgraffito technique and painting, as it makes it possible to apply high precision strokes. The process is rounded off by double firing, that is, before (the so-called “biscuit” firing) and after glazing.

According to all the parameters, presented here in a summary form, the medieval pottery from the area of Ras exhibits the characteristics of specialized production (Bikić 2016: 170-173). The selected categories of vessels exhibit comparatively small variability in raw materials, technology and morphology, which leads to the conclusion that several sources of raw materials in the area were being utilized, not only those of clay and mineral tempers, but also of the pigments/glazes that were extracted from ores, predominantly copper, iron and lead. The utilization of local sources is also confirmed by the preliminary results of petrographic and physico-chemical analyses (Damjanovic *et al.* 2011). In all likelihood, the raw materials for the manufacture of pottery that were being extracted from ores were also of local provenance, from the mines whose exploitation had begun in the last decades of the thirteenth and the early fourteenth centuries, primarily the ones at Brskovo (1254), Rudnik (1293), Тrepča, Rogozna and Gračanica (1303) and, some time later (from 1346), also from the mines of Kопorić, Plana and Ostrava on Mount Kopaonik (Ćirković 1979: 42-44).

### **Potters and their craft in written sources**

Potters and their craft are first mentioned in medieval deeds of donations by Serbian rulers of the fourteenth century, most notably in King Milutin's *Saint Stephen Chrysobull*, written between 1313 and 1318 (Светостефанска хрисовуља: 23, 124),

King Milutin's chrysobull issued to the estate of the Monastery of Saint George, near Skopje (Грујић 1936: 25), King Stefan Dečanski's chrysobull to the Dečani monastery (Ивић & Грковић 1976: 308), and Emperor Dušan's chrysobull of 1348 for the Monastery of the Holy Archangels (Мишић & Суботин-Голубовић 2003: 89, 120). We learn from these charters that, in addition to villages and estates, rulers as *ktetores* (donators) also donated artisans to their foundations, who then owed their services to the monastery to which they had been assigned. These documents also defined the rights and obligations of potters within the complexities and layers of the Serbian medieval society. The most important among the provisions are those stating that, in addition to all the activities related to his craft, a potter is obliged to plough and scythe, as if he were also a *sokalnik*, a member of the social category whose obligations mostly involved working the land (Бубало 1999: 680-682; Динић 1962: 149-157). Moreover, only one son could inherit his father and continue in his craft, whilst any other sons had to join the *sokalnik* class. (Светостефанска хрисовуља, 123). This piece of regulation expressed the tendency both to preserve a craft and to strengthen the *sokalnik* class (Bajalović-Hadžić-Pešić 1981: 12; Новаковић 1965: 59). The said data indirectly lead to the conclusion that these two groups – the artisans and the *sokalnik* – occupied rather similar positions within the social hierarchy.

The surviving sources provide meager data on the organization of the craft of pottery in medieval Serbia. The provisions of the said charters do mention the existence of potters in villages, particularly in areas where the natural conditions were suitable for pottery production. Potters supplied with their products a broad area, not just the neighboring villages, but also towns and monasteries. One of the known instances of this refers to a potter supplying Novo Brdo with earthenware from a nearby village (Ковачевић 1964: 527-528). An important reference is also that to the potter called Lješa, from Prizren, who, together with his sons, supplied the Monastery of the Holy Archangel with vessels (Шафарик 1862: 270).

As attested in the Dubrovnik archival material, in order to limit the number of producers of certain goods, regulate the manner of a product's manufacture, its quality and price, and fight competition, city craftsmen organized themselves in guilds (Byčo 1954: 1-2). However, Dubrovnik potters had no guild of their own. Between 1477 and 1480, they were included in the painters' guild, together with other artisans whose work involved the use of paint, varnish, wood, leather and other materials (Bajalović-Hadžić-Pešić 1981: 12-13). Of particular importance in this respect is a request from the year 1489 of a Dubrovnik citizen, Alegretto, for a certificate of specialization in the craft of pottery. He stresses the difficult character of his occupation and the fact that, unlike common citizens, the nobility demands particularly sumptuous items, whose production requires the services of a potter specializing in painting (Bajalović-Hadžić-Pešić 1981: 13). A similar situation prevailed in Serbia until as late as the middle of the nineteenth century, when, trying to fend off the competition of village and foreign potters, town-based potters organized themselves in guilds. However, even at this late date, potters were still members of mixed guilds (Byčo 1954: 22-78). According to V. Karić, the craftsmen engaged in the production of items made with *earth* at that time included potters, clay pan makers (*crepuljari*), tile makers (*crepari*) and brick makers (*ćeramidžije* and *cigljari*), with potters living exclusively in towns and tile makers in villages (Karić 1997: 408).

### **Potters in the natural environment**

The production of pottery implies certain natural conditions, among which clear skies and dry weather are by all means a desirable convenience, particularly during vessel drying and firing processes (Arnold D. 1975: 193-194). In that respect, a moderate continental climate prevailing in the mountains, characterized by short, cool summers and long, harsh winters, such as in the area of Ras, must have been a limiting factor. On the other hand, a number of other favorable factors, such as the geological matrix, streams and forests, as well as the accessibility of mining resources, complete the list of re-

quirements necessary for the establishment and continuance of the craft of pottery in the area of Ras.

The county (župa) of Ras covered the area between the Raška river and the southern slopes of Mount Golija, that is the valleys of the Ljudska, Deževska and Tušimska rivers, whereas the territory of the land of Ras was much larger and probably coincided with the territory under the jurisdiction of the Bishopric of Ras (Мишић 1997: 133). This mountainous area is characterized by a high degree of dissection, with the slopes of Mount Golija in the north and northwest and Mount Rogozna in the south and southeast making communication between villages difficult. Albeit meager, the surviving medieval sources, primarily the *Chrysobull to the Monastery of Banjska*, indicate that there were a large number of villages and hamlets in the area of the county of Ras in medieval times (Светостефанска хрисовуља: 219). On the other hand, the existence of a large number of rural settlements in the nearby counties of Brvenik and Zvečan is attested in Emperor Uroš's charter of 1363, which affirms the exchange of counties between Prince Vojislav Vojinović and Palatine (čelnik) Musa (Шуица 2003: 143-166). This information suggests that there was a large market that required a substantial quantity of earthenware, mostly kitchen vessels. On the other hand, there were also communities, such as monasteries, forts/towns and manors, which commissioned luxurious products of artistic workmanship.

The area encompassed by the county of Ras is characterized by good road communications with the other parts of the medieval Serbian state. The so-called "Dubrovnik road", which ran from the direction of Rožaj and Gluhavica, to Novi Pazar, to Banja, and then through Izbica, Pasji Potok, Vučja Lokva led to Gornji Kalin and further on to Beluće and across the Ibar river to Ostrać, Belo Brdo and Đerekari and beyond, down the valley of the Lim river towards Niš (Шкриванић 1974: 109, 126-127). This road intersected the road that connected Belgrade and Skopje, through Mount Rudnik and the valley of the Ibar river (Шкриванић 1974: 103-114). From Kraljevo, the road mostly followed the valley of the Ibar river, passing next to Maglič, Brvenik and Zvečan. One of its branches started at the Monastery of Banjska and ran over Mount Rogozna to present-day Novi

Pazar. Still another major road communication entered the county of Raška from the northwest, from the direction of Croatia and Bosnia. It ran through Prijepolje to Sjenica and then down the valleys of the Ljudska and Raška rivers through Zvečan and Kosovo Polje to Skopje or Niš (Шкриванић 1974: 123-128). The so-called "Zeta road" ran through Sjenica to the county of Ras. It connected Ras with Scutari and the cities on the Adriatic coast (Шкриванић 1974: 67-68).

Given the dependence of the craft of pottery on natural resources, it has been surmised that communities of pottery makers founded settlements right in the center of an area rich in pottery resources, most notably clay sources (Arnold D. 1985: 35-37). Traces of settlements and remains of pottery activities in the area of medieval Ras are rare. Despite the generally accepted paradigm on the local production of ceramic vessels, virtually the only archaeologically attested production site is in the area of the Monastery of Studenica and dates from the first half of the thirteenth century (Bikić 2015). However, indirect testimony to old crafts is borne by a number of toponyms that have survived since the Middle Ages. Thus, the names of the villages of Grnčari and Lončari, in the vicinity of Novi Pazar, which are indicative of organized production of ceramic vessels, have been preserved until the present day (Bajalović-Hadži-Pešić 1981: 12).

Good quality clay was regarded as an important resource in the Middle Ages. This is evident in the fact that sometimes the name given to a village was linked to a clay source within the village boundaries, such as the village of Gnila (Gnjila), mentioned in the *Charter to the Monastery of Žiča* as monastery property in the county of Jelci (the village, which has retained its name to this day, is situated south of Tutin, on the right bank of the Vidrenjak river). Namely, the term *gnila/gnjila* in the Serbian language denotes soil suitable for the production of ceramic vessels (Караџић 1969, 90, 103). Also, the importance of sources of good quality clay is also evident from the provisions of the earlier mentioned charters of fourteenth century Serbian rulers. Namely, when a monastic estate was being established, great attention was paid to who and under which conditions could be granted the right to exploit it. For instance, a



special provision of King Milutin's hereditary charter written for the Monastery of Saint George, near Skopje, sets compensation in the event that a potter utilized clay from monastery land, i.e. he would have to give a share of his products to the monastery (Грујић 1925: 69).

Further confirmation that the toponym *Gnila* indicates a place where clay suitable for working was mined is provided by geomorphological tests of the soil. The areas called *Gnila/Gnjila* are characterized by clay sediments in the form of clay shale and clay limestone that were deposited in the vicinity of Novi Pazar during the Paleozoic and formed during the Tertiary and the Upper Cretaceous periods (Пајковић 1992: 219-220). Many of the clay deposits, which formed through decomposition of the flysch series and partial re-sedimentation, are still exploited by the Sloga construction material industry (Пајковић 1992: 226).

### **Procurement of raw materials – model application**

Raw materials procurement is a complex process that involves several stages, including understanding an area, not merely its topographic features, but also the social and cultural contexts in which ceramic objects are made (Arnold D. 2017: 16). The starting point in analyzing the strategy for the procurement of raw materials and the organization of pottery activities in the area of medieval Ras related to it is based on the premise that local resources were exploited, which served as a basis for the development of a threshold model on a micro plane, based on the "ceramic resource threshold model" (Arnold D. 1985: 35-57). According to this model, which resulted from ethnographic research in South America, the estimated distance of the source of raw material to the place of dwelling or workshop is up to seven kilometers for raw clay and temper, which corresponds to a distance that can be covered on foot in both directions in a single day, carrying a load of approximately 50 kg, whereas in the case of the supplies of slips, paints and glazes the distance can be greater and they can be replenished less often (Arnold D. 2000: 343-344; 2006: 4-7). If carts or rowing boats are used,

the distance to resources increases, as does the quantity of the raw material transported (Arnold D. 1976: 94-95; 2017: 17). This model has several applications in archaeology: along with ceramic paste data, to locate sites and pottery making communities and also to identify the organization of pottery production and the model of trade and exchange between communities in a region (Arnold D. 1975: 193-194; 2006: 8).

In our attempt to apply the above model to the area of old Ras, we started at the locales called Gnila/Gnjila, which, as we have stated above, got their name from the sources of good quality clay exploited in the past by local craftsmen. A certain confirmation was also provided by a previous scrutiny of geological maps, which established that the said locales are characterized by layers of clay sediments in the form of clay shale and clay limestone, which were deposited during the Paleozoic and formed during the Tertiary and Upper Cretaceous periods, as well as those that resulted from a decomposition of the flysch series. Clay sediments in these locales were being exploited until recently by local craftsmen. One of them, the locale of Gnila-Rupe, is in the area of the village of Donje Oholje (Fig. 4). According to the inhabitants of the village, until recently a bowl maker from the nearby village of Znuš mined green, sandy clay, which they also occasionally use in their day-to-day work.<sup>1</sup> Another area of the same name is located slightly more to the south, between the villages of Vrapče and Jablanica. The inhabitants of the village of Vrapče also remember that good quality yellow clay was mined in that area for the manufacture of ceramic vessels. When we drew circles of seven kilometers in radius from the places where clay was exploited, the said villages of Znuš and Lončare were at their intersection, as was the village of Grnčare, northeast of Gnjila.

The same method was applied to the area around the Monastery of Studenica. Given the existence of a workshop for the production of ceramic vessels (Bikić 2015), the monastery was marked as the center of an area rich in ceramic resources. This area contains deposits of shale, formed within ophiolitic *mélange* formations in the

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<sup>1</sup> We owe a debt of gratitude to archaeologist Vladan Vidosavljević, curator of the archaeological collection of the Ras Museum at Novi Pazar, for this information.

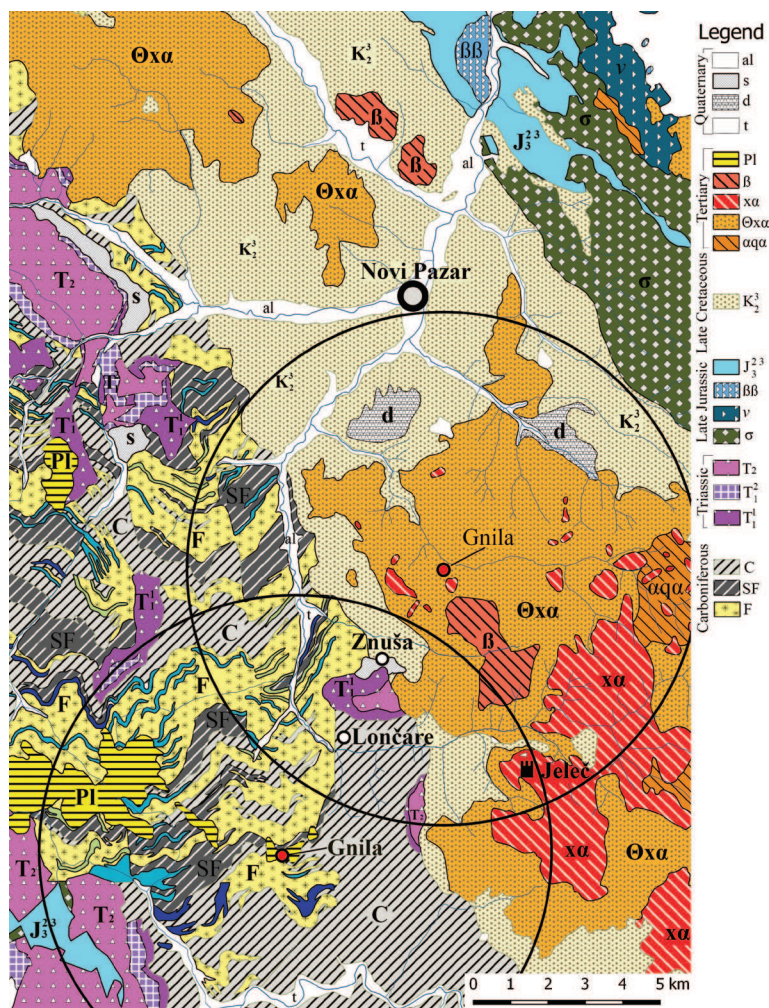


Fig. 4. Geomorphological map of Raška river and Municipality of Novi Pazar city:

1. Aluvium; 2. Rockslide; 3. Deluvium; 4. River bank; 5. Gravels, sands, clays; 6. Andesit-basalts; trahit-basalts and basalts; 7. Quartz latite; 8. Pyroclastic quartz latite; 9. Dacite-andesite; 10. Flysh sequence of sandstones, marlstones and clay stones; 11. Diabase-chert formations; 12. Diabase and spilites; 13. Gabbro and rodingite; 14. Harzburgite; 15. Limestones and dolomites; 16. Oolitic and clayish limestones; 17. Quartz conglomerates and sandstones; 18. Sandstones; 19. Slates, phyllites and sandstones; 20. Phyllites.

SI. 4. Geomorfološka karta doline reke Raške i opštine Novi Pazar: 1. Aluvijum; 2. Sipar; 3. Deluvijum; 4. Rečna terasa; 5. Šljunkovi, peskovi, gline; 6. Andezitbazalti, trahitbazalti i bazalti; 7. Kvarclatiti; 8. Piroklastiti kvarclatita; 9. Dacito-andeziti; 10. Flišna serija peščara, laporaca i glinaca; 11. Dijabaz-rožnjačka formacija; 12. Dijabazi i spiliti; 13. Gabrovi i rodingiti; 14. Harcburgiti; 15. Krečnjaci i dolomiti; 16. Oolitični i glinoviti krečnjaci; 17. Kvarcni konglomerati i peščari; 18. Peščari; 19. Argilošisti, filiti i peščari; 20. Filiti.

Upper Jurassic, to the north and southeast of the monastery (Fig. 5)<sup>2</sup>. Along with results of archaeometric analyses of ceramic vessels, the planned field trip and analyses of samples from the locations that yielded results during the preliminary sampling should provide an answer to the question of raw clay resources and thus contribute to discussions on the organization of pottery activities in the area of the Monastery of Studenica.

According to the proposed model, the place for the production of ceramic vessels for the Monastery of Djurđevi Stupovi, the Church of Saints Peter and Paul, and the Monastery of Sopoćani should be searched for in the immediate vicinity of the zone of ceramic resources. In this case, the latter would be the earlier mentioned sediments in the valleys of the Raška and Deževska rivers, formed during the Tertiary and Upper Cretaceous periods, as well as those formed by a decomposition of flysch series. In the vicinity of Brvenik, the zone of conglomerations of shale, sandstone and marl, which could be suitable for exploitation, spreads to the north and east of the Monastery of Gradac, in the direction of Baljevac.

Pigments extracted from ores and used in the production of glazes, paints and slips by all means belong among the raw materials necessary to produce pottery in the Late Middle Ages. Unlike clay and mineral tempers, these raw materials were used less frequently and therefore their procurement was organized in a different manner and, in all likelihood, at longer intervals (Arnold D. 1985: 37). Nevertheless, the distance to these resources should also be borne in mind when considering the strategy for the procurement of resources needed for the production of ceramic vessels. The closest mines, with deposits of iron, lead, zinc, copper and, to a lesser extent, silver, were situated at Gluhavica, on Mount Rogozna, on the southern slopes of Mount Golija, and in the vicinity of the Monastery of Sopoćani (Симић 1975: 66-77).

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<sup>2</sup> Analyses of pottery samples, including potential raw materials, from the Monastery of Studenica are underway. Our gratitude for the data goes to Prof. Kristina Šarić and Prof. Suzana Erić (Faculty of Mining and Geology, Belgrade University).



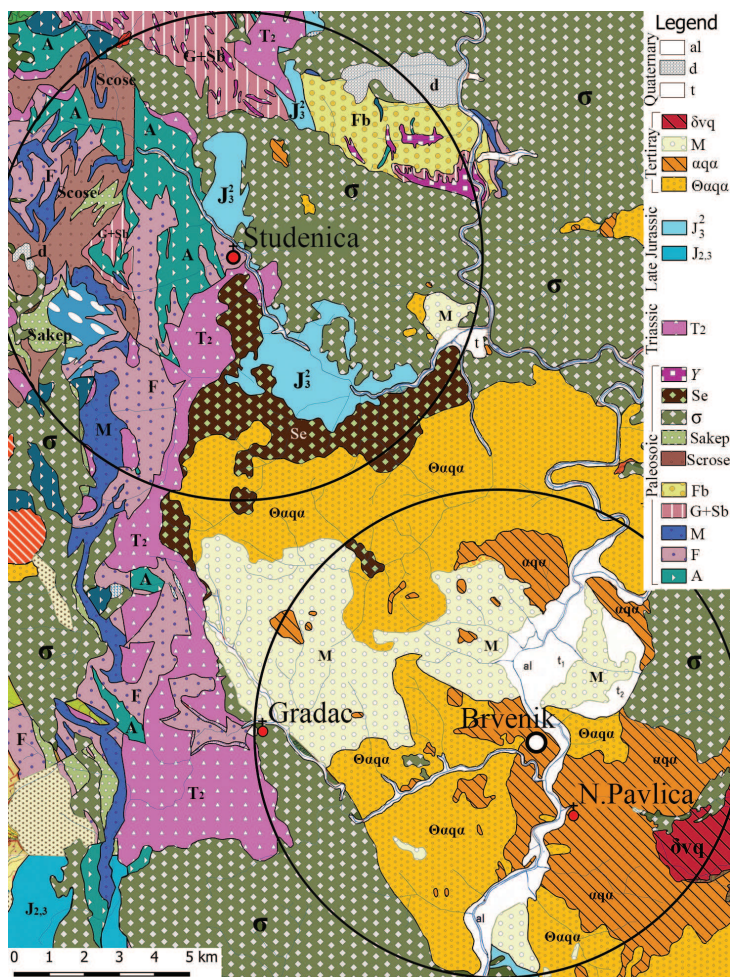


Fig. 5. Geomorphological map of Studenica and Ibar river valleys:

1. Aluvium; 2. Deluvium; 3. River bank; 4. Finegrained granodiorite and quartzdiorite; 5. Conglomerates, sandstones, clay stones and marlstones; 6. Dacite-andesite; 7. Pyroclastic dacito-andesite; 8. Diabase-chert formations; 9. Sandstones, clay shales, cherts; 10. Limestones and dolomites; 11. Granite; 12. Serpentinite; 13. Harzburgite; 14. Actinolite-chlorite epidotic shales; 15. Chlorite-sericite shales; 16. Biotitic phyllites; 17. Gneiss and biotic shales; 18. Marbles; 19. Sericite-chlorite shales; 20. Amphibolic shales.

SI. 5. Geomorfološka karta doline Studenice i Ibra:

1. Aluvijum; 2. Deluvijum; 3. Rečna terasa; 4. Sitnozrni granodioriti i kvarcdioriti; 5. Konglomerati, peščari, glinci i laporci; 6. Dacito-andeziti; 7. Piroklasti dacito-andezita; 8. Di-jabaz-rožnjačka formacija; 9. Peščari, glinoviti škriljci, rožnjaci; 10. Krečnjaci i dolomiti; 11. Graniti; 12. Serpentin; 13. Harzburgiti; 14. Aktinolit-hlorit epidotski škriljci; 15. Hlorito-sericitski škriljci; 16. Biotitisani filiti; 17. Gnajsevi i biotički škriljci; 18. Mermeri; 19. Serija sericit-hloritskih škriljaca; 20. Amfibolitski škriljci.

## Final considerations

Substantial uniformity of raw materials, texture, color and shapes supports the view that there existed a certain standard that applied to ceramic vessels of the thirteenth and fourteenth centuries. At the same time, it is a clear indicator of their organized production, which took place in unique political, economic, social and cultural circumstances. The properties of vessel assemblages, primarily those from monastic complexes, as well as the remains of a kiln in the Monastery of Studenica, triggered a program of petrographic and physico-chemical tests that will provide answers to questions related to technological choices – the choice of raw materials and certain procedures involved in making vessels of different purposes and questions related to the provenance of the raw materials. However, the raw material procurement strategy allows for looking at the manner of the organization of pottery activities within a broader framework. The framework, defined by the term “ceramic ecology,” establishes a link between the environment and the cultural milieu within which a potter operates.

Already Stojan Novaković (Новаковић 1965: 57) observed that the type of soil on which a village was erected often determined which economic activity the villagers would pursue. The analysis of the information contained in charters has revealed that the variety of crafts in a given place was affected by the latter’s geography and climate, and probably also by its tradition (Фостиков 2013: 65). In that regard, the development of organized pottery manufacture in a village is directly related to soil morphology, that is, the existence in the surrounding area of deposits of clay suitable for producing ceramic vessels. In medieval Serbia, there were several types of settlements with craftsmen, that is, places with developed craft production activities: local workshops in villages, in the vicinity of monasteries, settlements of artisans of different crafts, villages with artisans of the same craft, settlements near large installations (e.g. mines, smelters), towns as economic or administrative centers (Фостиков 2013: 65). In any case, the establishment of artisan villages was conditioned by the needs of a ruler’s court or a feudalist/landowner, and also of a



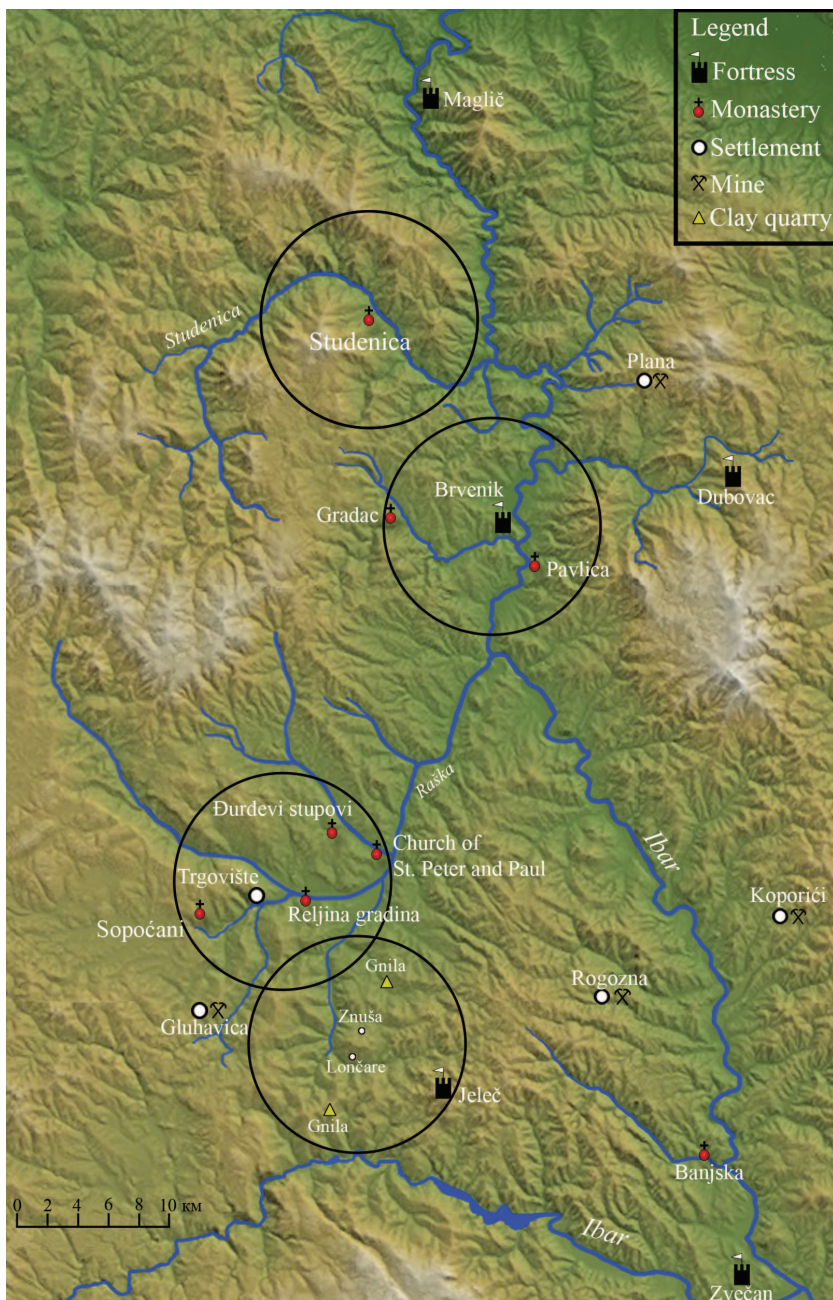
monastery as the economic center of an estate (Фостиков 2013: 65). It would be unfounded to claim that all the inhabitants of a specialized village engaged in the craft implied by the name of the village, as the primary occupation of medieval villagers was cultivation of animals and plants. In addition to their obligations related to these economic activities, the inhabitants of medieval villages had to perform a number of other jobs necessary for the normal operation of their households, such as procuring firewood and timber, building houses and outbuildings, spinning flax, hemp and wool, making clothes and footwear, etc. (Новаковић 1965: 56).

It is evident on the basis of the said information from surviving historical sources that deposits of good quality clay could be within monastic estates (Грујић 1925: 69). Due to the lack of written data, we cannot be absolutely sure that these sources of raw materials became part of a monastic estate separately or together with the village in whose territory they were located. If they used to belong to a village, the earlier mentioned provision in the charter to the Monastery of Saint George, near Skopje, indicates that after donation they became monastery property. For this reason, local potters had to give to the monastery a share of their production in exchange for the right to exploit the source. The provision also highlights the importance of the clay deposit and the donor's explicit desire to establish a controlled exploitation of raw materials and ensure for his foundation an additional source of income in the form of a compensation for use. Earlier investigations of the style of production of tableware lead in the same direction, that is, support the views on the role of local nobility in the organization of pottery activities, given their dual role as patrons/consumers of the production and owners of the land, that is, raw materials (Bikić 2016: 172-173).

The mention of a potter by name is suggestive of the existence of production within a household or workshop, whereas names of settlements are indicative of the existence of some sort of production center with a community of potters producing pottery according to certain standards. The analysis of ceramic vessels and preliminary results of the analysis of raw materials support the view of a planned approach to the organization of pottery production (Bikić 2016: 172).

Given the natural environment and spatial arrangement of settlements, in this case predominantly monasteries, this was, in all probability, a complex workshop district with several communities of potters sharing the same tradition of producing ceramic vessels, that is, a whole set of cognitive and practical rules related to the sources and selection of raw materials and tempers (Arnold, Neff, Bishop 1991: 72). The model for the organization of production arose at the Monastery of Studenica, which in addition to its religious role, being the temple and mausoleum of Stefan Nemanja, the progenitor of the Nemanjić dynasty, also served as an economic center for the inhabitants of the surrounding areas, with an organized production of pottery in the first half of the thirteenth century (Bikić 2015: 139-140). With Studenica as a model, production of vessels may have been organized in several other places (Fig. 6). One of them may have been in the area of the fortified city of Brvenik, which was also an important spiritual center, with its monasteries of Stara Pavlica, Nova Pavlica and Gradac and several churches dedicated to Saint Nicholas at Šumnik, Radošić, Baljevac and Končulić, respectively (Булић 2011: 62-74, Т. 8-12). Another place of production may have been in the area of the county of Ras, that is, in the territory between the Monastery of Djurđevi Stupovi, the Church of Saints Peter and Paul and the Monastery of Sopoćani. A little later, in the center of this area was the settlement at Trgovište (Милошевић 1997: 87-97, with a bibliography). The herein discussed toponyms, Gnjila/Gnila, located in the area of the county of Jelci, are suggestive of a third production zone. Unlike Studenica, where the exploited clay deposits were retraced from the only so far attested production center, in the other cases, of which the county of Jelci is the best example, the starting points for the discovery of the location of production centers were the clay deposits that were surmised to have been exploited in the Middle Ages.

When the results of the analyses of the pottery, topography, soil morphology and information in written sources are entered into the ceramic resource threshold model, they provide good guidelines for establishing the existence of organized pottery production in the area of medieval Ras. In order to double-check and further confirm the proposed method, it would be necessary to conduct a reconnais-



**Fig. 6.** Ceramic manufacture areas (according to the presented model).  
**Sl. 6.** Područja keramičke proizvodnje (prema predloženom modelu).

sance survey of the said area, which would also involve interviews with local people aimed at locating the sources of clay known to them, as well as obtaining samples for archaeometric analyses. Completed results, including earlier samples of pottery and raw materials from the complex of the Monastery of Studenica and the fort of Ras (Damjanovic *et al.* 2011; 2017), would provide more specific indicators for the location of sources of raw materials and spatial contexts of production, which would bring us closer to an understanding of the social contexts of production in the area of medieval Ras (Costin 2000: 384-385; Sinopoli 2003: 24-28).

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## **DISTRIBUCIJA KERAMIKE I IZVORI SIROVINA NA PROSTORU SREDNJOVEKOVNOG RASA**

U okviru procesa proizvodnje keramike nabavka sirovina predstavlja početak operativnog lanca, ali i pokazatelj određenog proizvodnog konteksta koji uključuje niz socijalnih, bihejvioralnih, tehničkih i ambijentalnih faktora. S tim u vezi, strategija nabavke sirovina za izradu keramike donosi niz podataka značajnih za bolje razumevanje ne samo tehnologije, već i privredne i društvene pozadine jednog vremena i organizacije određene zajednice. Dosadašnja istraživanja, pre svih Dina Arnolda, donela su niz rezultata koji su omogućili uspostavljanje šireg teorijsko-metodološkog okvira te strategije time i proizvodnje keramike u celini. Ponuđeni ekonomski modeli (*threshold model*), iako prevashodno primenljivi na zajednice iz razdoblja praistorije, pokazuju se kao nezaobilazno polazište za razmatranje datih pojava i u istorijskim epohama, u ovom slučaju u razdoblju zrelog srednjeg veka.

U ovom radu, razmotrena su pitanja u vezi sa sirovinama za izradu keramike na primeru srednjovekovnog Rasa (sl. 1). U tom ispitivanju krenuli smo „unazad“, od finalnog proizvoda, tj. keramičkih posuda. Dosada uočena znatna uniformnost u pogledu sirovine, fakture i boje, kao i u oblikovnom pogledu, upućuje na mišljenje o postojanju određenog standarda za keramičko posuđe u razdoblju 13-14. veka (sl. 2, 3). Istovremeno, to je jasan pokazatelj postojanja organizovane i planske proizvodnje koja se odvijala u jedinstvenim političkim, privrednim, društvenim i kulturnim okolnostima. Odlike setova posuda pre svega iz manastirskih kompleksa, kao i ostaci grnčarske peći u manastiru Studenica, prethodno su pokrenule program petrografskih i fizičko-hemijskih ispitivanja, koja su pružila preliminarno pozitivne rezultate.

Analiza podataka iz povelja ukazala je da na raznovrsnost zanata u datom mestu utiču različita geografska sredina i klima, a

verovatno i tradicija date oblasti. U tom smislu, i nastajanje organizovane grnčarske proizvodnje u okviru sela direktno je povezano sa morfologijom tla, to jest postojanjem ležišta gline pogodne za izradu keramičkog posuđa u okviru seoskog atara (sl. 4, 5). Takvo okruženje neophodno je grnčaru koji svesno bira sirovine u cilju izrade posude sasvim određenih karakteristika, među kojima su svakako najvažnije glina, voda i gorivo za pečenje, dok su neplastični dodaci poželjni, ali ne i neophodni. S tim u vezi je i ideja da jedinstven izbor sirovine otkriva iskustvo grnčara da prepozna glinu određenog kvaliteta – po boji, prisustvu svetlucavih primesa, lepljivosti ili salinaciji, kao i njegovu sposobnost da percipira finalni proizvod.

Na osnovu rezultata obavljenih analiza ponuđen je model organizacije keramičke proizvodnje. Ona je, po svemu sudeći, započela u prvoj polovini 13. veka u Studenici, koja je pored verskog imala i ulogu ekonomskog središta za žitelje bliže i dalje okoline. Po uzoru na Studenicu, proizvodnja posuđa mogla je biti organizovana na još nekoliko mesta (sl. 6). Jedno od njih moglo je biti u arealu utvrđenog grada Brvenika, koji je takođe i značajno duhovno središte, sa manastirima Stara Pavlica, Nova Pavlica i Gradac i nekoliko crkava posvećenih svetom Nikoli, u Šumniku, Radošiću, Baljevcu i Končuliću. Drugo mesto proizvodnje je moglo biti na prostoru župe Ras, to jest na području koje uokviruju manastir Đurđevi Stupovi, Crkva sv. Petra i Pavla i manastir Sopoćani. Nešto kasnije, u središtu ovog areala nalazi se naselje u Trgovištu. Ovde razmatrani toponimi Gnjila/Gnila, koji se nalaze na području župe Jelci, upućuju na treću zonu proizvodnje. Za razliku od Studenice, gde se od jedino potvrđenog proizvodnog centra tragalo ka ležištima gline koja su bila eksploatisana, u ostalim slučajevima, a što se najbolje ogleda na primeru župe Jelci, pošlo se od ležišta gline za koje se pretpostavlja da su korišćena tokom srednjeg veka, kako bi se ustanovio položaj proizvodnog centra.

Ugrađeni u *ceramic resource threshold model* rezultati analize keramike, topografije, morfologije tla i podataka iz pisanih dokumenata pružaju dobre smernice za utvrđivanje organizacije grnčarske proizvodnje u oblasti srednjovekovnog Rasa. U cilju provere i daljih potvrda predloženog metoda, neophodno bi bilo obaviti rekognosciranja pomenutog prostora, koja bi podrazumevala razgovore sa me-

štanima u cilju pronalaženja njima poznatih izvora gline, takođe i uzimanja uzoraka za arheometrijske analize. Kompletirani rezultati, uključujući i ranije uzorke keramike i sirovine iz kompleksa manastira Studenica i tvrđave Ras, pružili bi konkretnije indikatore za mesta izvora sirovina i proizvodnih zona (*spatial contexts of production*), što bi nas približilo razumevanju društvenog konteksta proizvodnje na prostoru srednjovekovnog Rasa.



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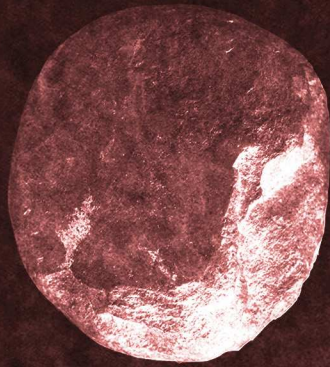
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