Following the Roman Road on Mountain Konjuh near Kladanj

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Po sledeh rimske ceste na planini Konjuh pri Kladnju
V članku so predstavljeni rezultati raziskav rimske ceste na planini Konjuh (Bosna in Hercegovina). Gre za sledove cestnih komunikacij, ki so vodile skozi današnja naselja v občini Kladanj. Določena je dolžina odkritih (v celoti ali delno ohranjenih) odsekov ceste, nato njihova širina, naklon, višina nasipa ter vrsta kamna na očiščenih delih. Na podlagi najdenih sledi je bilo ugotovljeno, da je rimska cesta prihajala iz smeri Olova, nato pa se je preko prelaza Stara Karaula spustila v Kladanj po jugovzhodnih pobočjih planine Konjuh. En krak te ceste je vodil iz Kladnja skozi naselja Plahovci in Pauč do kraja Pekara (danes Moška voda), ki leži v dolini reke Drinjače. Na podlagi najdenih sledi rimske ceste in posnetka le-te ter avstro-ogrskih posebnih zemljevidov je bila izvedena njihova georeferenca.
Ključne besede: Konjuh, Kladanj, rimska cesta, Dobra voda, Metaljka

This paper presents research results of a Roman road on Mountain Konjuh (Bosnia and Herzegovina).
It documents the remnants of road communications in modern settlements in Konjuh municipality. We documented the length of the discovered road sections (completely or partially preserved), their width, slope angle, embankment height, and stone type on the cleaned parts. According to the found remains, we concluded that this Roman road went from the direction of Olovo, and that it passed the Stara Karaula pass and over the slopes of Konjuh and then arrived at Kladanj. One leg of this road led from Kladanj through the settlements of Plahovići and Pauč to Pekara locality (today known as Muška voda), in the river valley of Drinjača River. We performed its georeferencing according to the found marks of the Roman road, recording them and studying the Austro-Hungarian maps.
Key words: Konjuh, Kladanj, Roman road, Dobra voda, Metaljka

From June to September 2020, we have performed the first phase of the research of old road communications on Konjuh mountain. The project named "Reconnaissance of the old road (cobbled road) on Konjuh" was realized in the organization of Tuzla University. The field constituted of Doc. Dr. Mersiha Imamović, project leader; Prof. Emeritus Dr. Enver Imamović, consultant; Prof. dr. Bego Omerčević, consultant; History department graduates Nermina Bikić, Amina Parlić and Sedin Bedak from Philosophy Faculty of Tuzla University. Field exploration demanded cooperation and help from colleagues from other institutions, among those were: Prof. Dr Irena Lazar and Prof. Dr Zrinka Mileusnić from Primorska University in Koper; Prof. Dr Snežana Božanić from Novi Sad University and assistant Amela Mulahmetović form Tuzla University; Museum of Eastern Bosnia in Tuzla and Institute for Protection and Exploitation of Historical and Natural Heritage of Tuzla Canton (TK).

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Research Area Description

Konjuh is a mountain located in the northeast part of Bosnia and Herzegovina. It is bordered by rivers Seona, Turija, Litva and Oskova on the north, Gostelja and Tuzla-Sarajevo highway on the east, and Krivaja on the south and west. Together with Ozren, Javor or Javor Gora, Konjuh

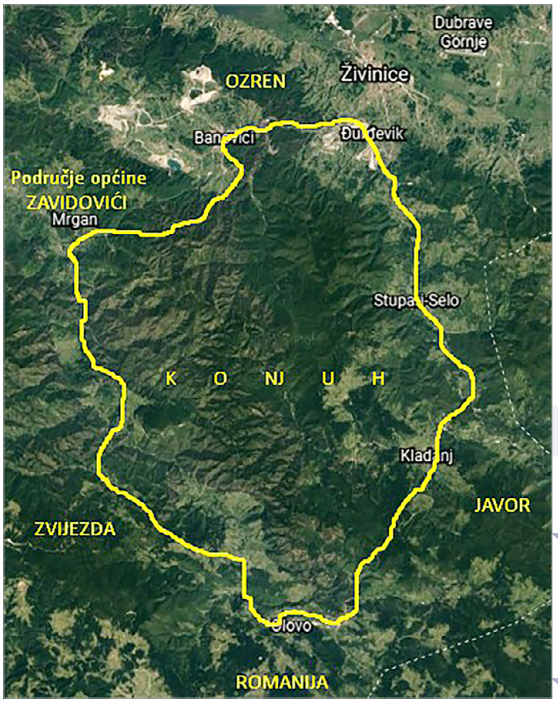

Figure 1. Position of Mountain Konjuh.

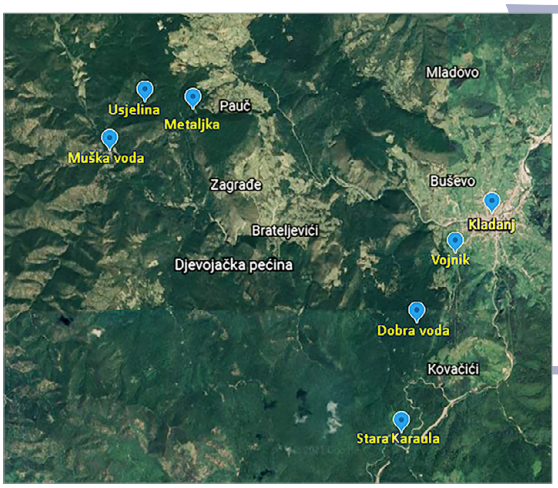

Figure 2. Sites in a broader geographical context.

constitutes a chain of bordering (higher) mountains which, together with Trebava and Majevica, represent a transition from Dinara mountain system to spacious Pannonian lowland. Konjuh mountain massif is a watershed between Krivaja, Spreča and Drinjača. Geologically observed,

it is constituted by serpentinite, diabase and tuff rocks. Konjuh spreads over five municipalities: Kladanj, Olovo, Zavidovići, Banovići and Živinice.

Mountain massif of Konjuh has a diverse flora and fauna. In the area of "Zaštićeni Pejsaž" (Protected landscape), four types of pine forests were determined and classified, some rare examples of spruce *(Piceetum montanum Illyricum),* then some mixed mesophilic forests, mostly deciduous (common hornbeam, European hop-hornbeam, common alder, European aspen, wych elm, sycamore maple, beech, large-leaved lime, fir, sessile oak), many medicinal and edible herbs are also found on Konjuh, and endemic species as: *Euphorbia gregersenii, Viola beckiana, Halacsya sendtneri*, *Fumana bonapartei*, *Gypsophyla spergulifolia, Potentilla visianii, Alyssum bertolonii* subsp. *Scutarinum* (Ouzounov et al. 2020, 15, 39-49). Bosnian iris (*Iris bosniaca*), can be found on the locality of Muška voda (Đug 2013, 300-301). Many species of invertebrates and bats, seven species of woodpecker, many mammal species, most important are: brown bear (*Ursus arctos*), wild cat *(Felix silvestris)* and grey wolf *(Canis lupus)* are part of rich fauna of Konjuh (Ouzounov et al. 2020, 69-86). Average height of the mountain is 1000 m. Higher than its average are the following peaks: Vina Kruška (1088 m), Brezina (1120 m), Šuplji Javor (1157 m), Zidine (1180 m), Suho Drvlje (1206 m), Bijeli Vrh (1272 m), Zečiji rat (1275 m) and the peak of Konjuh itself (1328 m).

Project Methodology

The methodology included geodetic, photographic, and descriptive documentation of the Roman road route. GIS (geographical information system) technology was also used to create databases and extensive fieldwork. This technology provided interoperability of data and created the graphic and alphanumeric database.

In the beginning, georeferencing of Austro-Hungarian maps (rasters) of the old survey of Kladanj area was performed on 15 maps which were set up for the first time in the State coordinates system of Bosnia and Herzegovina (Gauss Kruger projection – Bassel ellipsoid 1841.) and superimposed over the orthophoto template from 2018.

By using the vectorization method (creating the points and polygons) in GIS, on the MapInfo (shape file) software platform, we have created a model data of the road route and important sites. We have used the data to analyse and create descriptive and metric data inside the database (such as route length, coordinates, and other metric data).[1]

Review of some cultural-historical marks

The appearance of the first humans in the area of Kladanj dates back to prehistoric ages. The oldest confirmation about this is the drawings found in Djevojačka pećina, located near the modern settlement of Brateljevići (Basler, Mulaomerović 1984, 5-7). Drawings contain horse and deer riders, standing figures, and one everyday hunt scene. The drawings are damaged and were drawn over in later phases, complicating their complete reconstruction and determination. Some of them may date back to Bronze Age (Basler, Mulaomerović 1984, 7-9, T. I-IV).

Prehistorical fort ruins above the settlements provide compelling confirmations about humankind's presence on the Konjuh and in the Kladanj area. One of them is above Gojsalići. From the plateau of one of those forts, at 900 m elevation, it was possible to observe the events in the river valley of Drinjača. The fort is naturally protected from three sides, and the fourth side, almost on the same level, is connected to the surrounding high region of Konjuh. Access to the fort plateau is only possible from the north-eastern direction.[2] Plateau is 300 m long and 50 m wide. Descending from the plateau from the north-east direction towards the north, remnants of drywall are visible. It was constructed

1 Financial support was provided by Italian NGO CISP whose partners are Kladanj Municipality and Ministry of Spatial Planning and Environment TK.

2 Thanks to our local guide Rifet Ahmetspahić, nature and cultural heritage lover, who helped us visit the fort and its surroundings.

Figure 3 Gradina in Gojsalići, drywall remnants (photo M. Imamović).

from neatly laid down stones, and it is 15 m long, 1.10 m wide and 15 cm to 30 cm high.

Further, another part of drywall remains is 5 m long, 1.10 m wide, and 30 cm to 35 cm tall. Drywall contours are spreading from the north-northeast and are 100 m long (Imamović 2020). Near the fort in Gojsalići there is a

Figure 4. Gradina in Gojsalići, drywall remnants (photo M. Imamović).

spring named Dobrača. Three more forts exist in Kladanj municipality: one in Tuholj (Topographic map of Kladanj), another in Brgule and third between Pauč and Zagrađe (Register of PI Institute for Protection and Exploitation of Cultural and Historical Heritage TK).

Markings of fort settlements conclude that there were roads through the modern settlements in the Kladanj area, even in the prehistorical era. These roads usually went in natural directions. It is common knowledge that the oldest roads followed the well-trodden animal paths. Animals in their everyday foraging created those paths. Like that, humans from that age traced the first roads by moving instinctively and without a clear plan. Later, those roads would be repaired and maintained because of everyday human needs. Similar to their ancestors, it is quite possible that Romans, during their road construction in the area of Konjuh, followed the natural directions of roads, giving advantage to connecting of existing fort settlements. It was, in any case, the most convenient and the simplest way to lay the road routes. Terrain configuration also forced them to adhere to such rules. We also confirmed this by reconstructing Roman roads themselves

Several proofs are witnessing the human activity in the Kladanj area in medieval times. Several necropolises of stećak tombstones and sin-

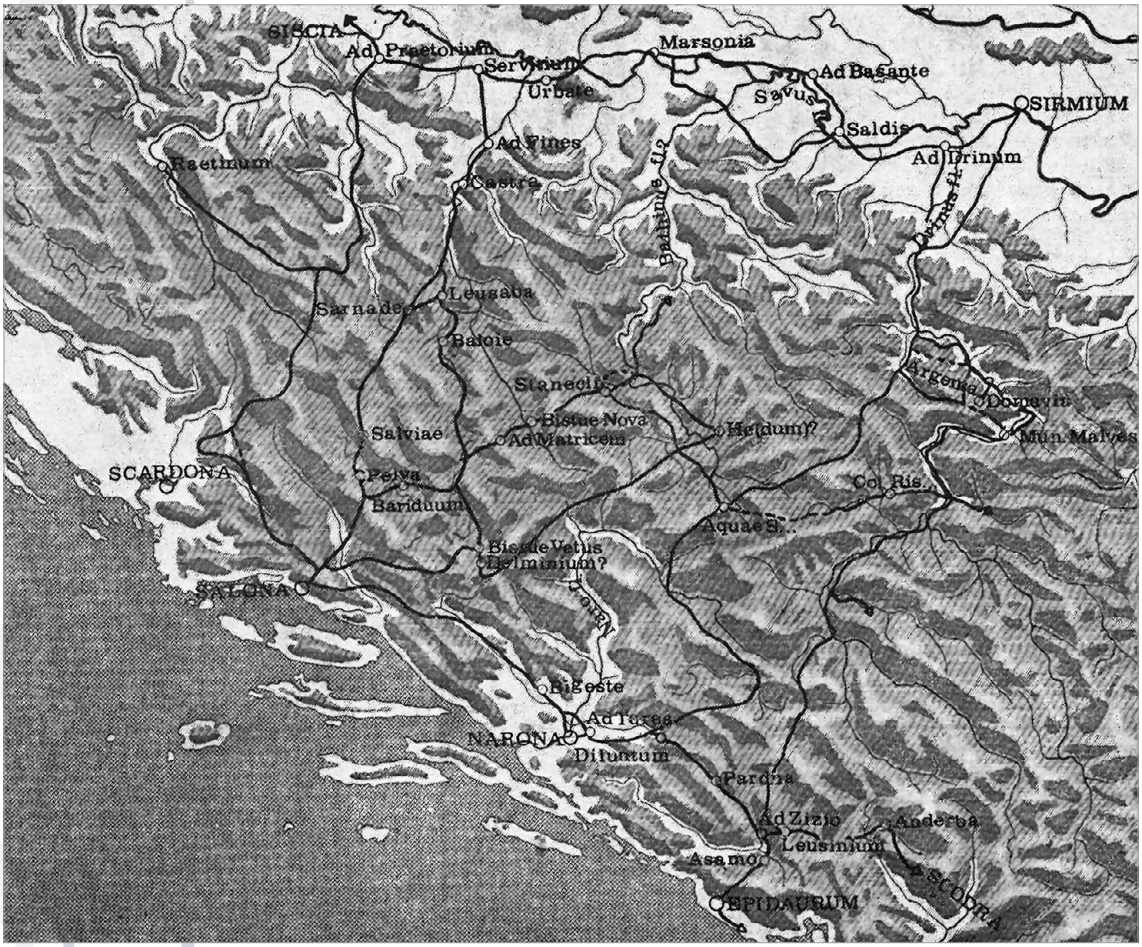

Figure 5 Significant Roman communications in Bosnia and Herzegovina (AL BiH 1988).

gle stećak tombstones were discovered, a total of around 430 (Lovrenović 2008,193). Necropolis with 46 stećak tombstones was documented in Gojsalići (AL BiH 1988, Tome 3, 70). This necropolis is 1000 m away by air from the fort. Several single stećak tombstones were found on the localities of Hrid, Pepići, Hajdari (Gojakovići), Stanovi (Mošulj), Vitalj and Lijehe, 1000 m to 2000 m away from the fort near Gojsalići.

Also, several Ottoman tombstones were discovered in the Kladanj area. These discoveries are important because they are located next to the remnants of communications dating back to Roman, Ottoman and Austro-Hungarian times.

Research Motives of Old Road Communications on Konjuh

I was inspired to research the old road communications on Konjuh by the assumptions of researcher E. Pašalić, who, in his time, was dedicated to studying this problem and gave a vast scientific contribution to the clarification of Roman roads built in the area of modern Bosnia and Herzegovina.

In his elaboration of the road Salona-Argentaria, E. Pašalić says: ”the road Salona-Argentaria in its ending part from the area of Breza-Dabravina-Vareš continued next to Olovo and Kladanj towards rivers Drinjača and Drina”, emphasizing that that direction is not explored

(Pašalić 1960, 70).[3] As called by Bojanovski, his assumption or dilemma is justified. He tried to solve it by asking: "what is the road Sarajevo-Romanija-Drinjača? Is it the connection between Salona and Argentaria, as if considered by Ballif and Domaszewski, or the road Salona-Argentaria should be looked for on the stretch Breza-Vareš-Olovo-Kladanj-Drinjača valley which had not been explored yet?" (Bojanovski 1974, 185; 1981, 165). Bojanovski, in contrast to Pašalić, thought that this direction does not lead to Drina, but towards the north, to Spreča valley and beyond (Bojanovski 1981, 166-170).

Some of the Peculiarities of Roman Road Construction

Military, political, and economic interests of the Roman Empire were of crucial importance considering the construction of good roads in modern Bosnia and Herzegovina. The construction of these roads largely depended on terrain configuration. High engineering expertise and construction operative, especially considering the workers' terrain and difficulties encountered. Romans tried to connect all significant places, settlements, or areas rich with natural resources. Considering that the subject of our research goes through mountain areas, roman builders encountered the circumstances requiring extreme technical solutions (Forbes 1934, 4; Davies 1998, 1-16; De Benedictis et al. 2018, 13-15; Dalgaard et al. 2020, 12-13).

Completed Roman roads in Bosnia and Herzegovina sometimes went through the shortest and most convenient directions and sometimes went against that technical principle. Discovered parts of Roman road on Konjuh tell us that it mostly went in a straight line, going through steep and challenging terrain. Because of that, high slope and ascent angles could not be avoided on some parts. So how these problems were solved? The practical solutions for this problem certainly existed. Two variants are possible. One is reloading to the second carriage or reducing the load from the main carriage on the spot of ascent. The second is boosting the carriage with one or more horse pairs (Carreras 2019, 280-293).

Romans did not have clearly defined rules regarding the slope angle at the beginning of the road construction. That slope angle depended on many factors, mostly terrain configuration, purpose and geological and topographical characteristics of the terrain (AL BiH 1988, Tome 2, 152). Thus such slopes cannot be taken as ultimately allowed. Such an example was found in Prud near Hardomolje, where the slope had an angle of 23% (Bojanovski 1977, 116).

Romans did not care much about the road slope angle when they were building the older roads in the area of modern Italy. However, starting from the 2nd century AD, rules regarding the acceptable slope had been changed, for example, the roads in modern Germany (Rhineland-Palatinate). Angles of the slopes there were around 8%. However, the measured slope angle on some parts was significantly higher, even from 16% to 20% (Herzog, Schröer 2019, 5).

Slope or ascent of the road was dictated by the terrain through which the road went. Higher slope angles were common in mountain areas. The research on Konjuh proved this. By elaborating the slope of the road E. Pašalić says that: "Roman road constructors did not shy away from leaving the straight road line when it should go through the plateau where the terrain is closed and protected from slides, they also very rarely avoided very steep slopes" (Pašalić 1975, 63-64).

Metaljka

The first information about the signs of road communication in the Kladanj area was obtained from local people, who based their accounts on stories and memories from childhood and gave their observations about the marks of

3 Argentaria is mentioned in Tabula Peuntigeriana where the road stations were marked in this order: *Salona - XVI - Tilurio - XXII - Ad - Libros - IX - In monte Bulsino - VI - Bistue vetus - XXV - Ad Matricem - XX - Bistue nova - XXIV - Stanecli - Argentaria*

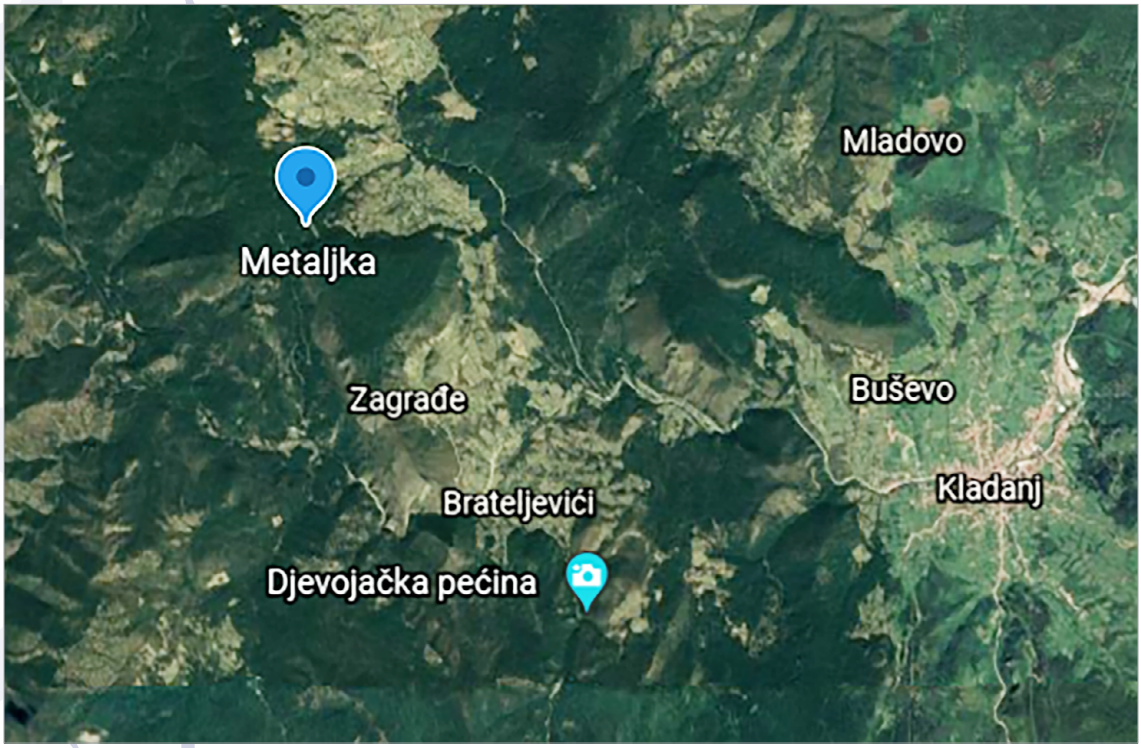

Figure 6. Location of the Metaljka site. 5

old roads.[4] Their stories mostly matched the existing condition on some of the localities.

One such location is Metaljka (Vrh),[5] located above the village of Pauč, at an elevation of 950 m. This locality spreads on the section of the separate leg of Roman road communication, which branched off from the main road in Kladanj, and then went over Plahovići, Pauč and Usjelina to Pekara locality (Muška voda today), located in the Drinjača valley. Based on the Austro-Hungarian special maps, we divided this leg of Roman road into three sections: the first one stretches from Kladanj to Metaljka locality with a length of 7.221 m; the second section stretches from Metaljka to Usjelina locality with a length of 1.760 m, and the third section stretches from Usjelina to Pekara locality with a length of 1.977 m. The combined length of this leg of Roman road is 10.958 m. On the location of Mramorak locality, one shorter leg of Roman road branched off, and it, following the Drinjača river upstream, led to the settlement of Brateljevići. The total length of that leg is 1.558 m. Unfortunately, except for the partially preserved route, we could not find any other signs of the road. After the first field observation, on the section of the road going from Metaljka to Usjelina locality, we discovered well preserved parts of the road, then partially preserved but mostly destroyed remnants of the road and in the end just the fragments of marks of the road communication.

After that, based on the performed recording, more detailed analyses, and reconstruction of the direction of the road route, we determined that it is a Roman road, which proved the hypothesis we set. This discovery represents the first and, in every sense, evident proof that it is a road built in the Roman era. Besides, this is a re-

4 Thanks to Esed and Mehmed Jusupović and Huso Halilović.

5 Toponym Metaljka can be connected with the fact that it is in the geographical area exposed to gusts of wind (Vidović 2011, 179).

liable testimony that Romans populated the area of modern Kladanj municipality in their times.

Save from the single incidental gold coin Pulcheria - originating from the Eastern Roman Empire (first half of 5th century AD), found in the 19th century (Patsch 1900, 562), other relics from the Antic Age have not been found so far. In his description of eastern Bosnia, Bojanovski put a particular accent on rich forests, thinking of Konjuh and Zvijezda mountains. Regarding that he says "there are almost no signs of Roman material culture" and that these areas "especially Drinjača valley are not examined very well archaeologically" (Bojanovski 1982, 129, note 10), even though Drinjača was the second most important traffic hub for Salona-Argentaria highway after the Drina (Imamović 1985, 43).

Unfortunately, even later, there was no improvement regarding scientific research. However, we believe that these localities and found remnants of Roman road communications will start the new archaeological examinations in the future.

On Metaljka locality, we found road remnants, which were considerably destroyed because of the forest exploitation. The road came from the direction of Pauč and Kladanj settlements. It stretched in the direction east-northwest. Two types of limestone were used to pave the carrier layer, larger for the curbs and smaller for the middle part. The margin stones (curbs) vary, ranging from 35 cm to 53 cm long, 23 cm to 41 cm wide and 10 cm to 15 cm high. Smaller stones were installed between the two curbs, with sizes from 10 cm to 32 cm long; 10 cm to 23 cm wide and 10 cm to 13 cm high. The height of the embankment on the Metaljka locality varies from 15 cm to 54 cm. The highest measured slope angle was 28% in the south-western part and 11% in the north-eastern part.

The measured and cleaned road section on Metaljka locality is 51.80 m long, and its width varies from 2.50 m and 2.90 m. This road section is only partially preserved in its original condition. On some sections, in its middle construction part, cobblestones are missing, and on the

Figure 7. Metaljka, cleaned Roman road (photo M. Imamović).

Figure 8. Metaljka, cleaned Roman road (photo M. Imamović).

remaining section, due to centuries-old vegetation and forest exploitation, it is pretty devastated and destroyed.

Intensified forest exploitation required the construction of so-called forest roads used for wood transport. Because of such circumstances, on the road leading from Metaljka locality towards Usjelina, the road is intersected by a forest road. Above the road, well-preserved parts were found, while beneath the road, in the length of 55 m, only the devastated remnants of the Roman road were found. This section of the road is visible, and there are scattered remains of stone slabs here. Also, only rare scattered remnants were found on the next section going all the way to Usjelina locality.

Figure 9. Metaljka, condition of Roman road as found (photo, M. Imamović).

to store goods, rest of people and transport livestock. The route of this road was challenging in some parts, but it was the only available solution in these mountain conditions. From Usjelina to Pekara locality, mostly just the road remnants were found, that is, planum (embankment), which goes the full distance of the road. Embankments were earlier determined in some other parts of Bosnia and Herzegovina (Bojanovski 1977, 99, 103, 116; 1978, 59, 74, 93; 1981, 164, 176, 186).

The road slope was an important condition for faster and easier traffic flow. Higher angle slope angle on some parts certainly created difficulties in the flow of carriage traffic, especial-

Figure 10. Lanište, Ottoman headstones (photo M. Imamović).

Usjelina locality is located at a 40 m higher elevation than Metaljka. Because of that, the angle of the slope of the road leading to Drinjača is much higher compared to road on the stretch Metaljka - Usjelina. By precise measuring, it was determined that slope angle was even up to 40% on some spots. Judging by the flattened terrain on Usjelina locality, on the spot where the sudden steep slope of the road begins, there probably was a building that could have been used

ly heavy wagons. Considering the upper level of animals' stamina pulling total weight burden, some researchers think that slopes or ascents up to 7% can be overcome and that they are safe for successful travel (Harger, Bonney 1919, 11-25)[6] and that every ascent above this percentage would create difficulties. Solutions for overcoming these problems are reloading the burden on pack animals while passengers continue their trip on foot. According to another researcher, the critical slope or ascent angle threshold is

6 *Via Egnatia* had a slope angle from 15% to 20% on some sections.

8-16% (Herzog 2013, 186). As such, this road was not appropriate for heavy carriages. However, in such circumstances, carriages were strengthened with more horses. In the summer period, fewer horses could pull carriages, and in the winter, their number was increased (Berechman 2003, 474). Every transport, human or goods demanded total safety and security. The maximum allowed load was determined to provide normal traffic flow and protect the road.

We also searched for the road from Metaljka (Vrh) towards Pauč, but unfortunately, we could not find other remnants except some incidental curb stone. Along with the road remnants, on Lanište locality, in Potpauč we found an almost destroyed Ottoman graveyard, with only a few preserved tombstones. Judging by the tombstones architecture, which does not contain any epitaphs or artistic motifs, we concluded that they probably come from the 16th and 17th centuries (Bejtić 1953, 285-289; Mujezinović 1974, 14). Next to this graveyard, Roman road used to pass. That road is remembered by locals Jusupović and Halilović, who say that today that road is destroyed, which we had a chance to prove ourselves.

Dobra voda Locality

During the research process on Metaljka locality, we met the workers of PI "Šume TK" PLC Kladanj. On that occasion, we talked to Edin Šuvalić, Graduate Engineer of Forestry, who told us that a much better preserved cobbled road ("Mary Theresa road")[7] s located south of Kladanj, at Dobra voda locality. Thanks to him and with the help of his colleagues Senad Kavazović and Rešad Ahmetović, who have been working in Forestry for a long time, we found the mentioned locality and route of Roman road. Without their help, it would be hard to find the road because of rugged terrain and the

Figure 11. Dobra voda, condition of Roman road as found (photo M. Imamović).

cobbled road covered by overgrowth and fallen wood. Besides, big spruce trees have grown with trunk diameters of up to 60 cm on the part of the road route.

In contrast to the cleaned Ottoman cobbled road on Miljkovac (130 m), where there is a table with "Roman cobbled road" inscription, which attracted the attention of many visitors, road remnants on Dobra voda locality were only visible on rare spots.[8]

Dobra voda locality is located on the route of Roman road stretching over the southeast slopes of Konjuh, from the Stara Karaula pass (Solara locality) to Kladanj. According to Austro-Hungarian special maps, its total length is 5.667 m. We divided the road route into three sections: first or upper section stretching from Solara locality to the start of the preserved part of Roman road (285 m above the Dobra voda locality), with the length of 1.903 m; second or middle section connects to the upper and leads to Vratnica locality (1.247 m under the Dobra voda spring), with the length of 1.532 m; and third or lower section going from Vranica locality to Kladanj, with the length of 2.232 m.

Dobra voda locality is specific in many regards. It is located at 929 m elevation. On the

7 We have heard almost identical stories from other locals, who in their accounts for the cobbled roads on other localities, told us that is "Mary Theresa road". These and similar accounts are present in the other parts of Bosnia and Herzegovina, and even wider, in neighbouring countries (Bojanovski 1981, 132, 159, 164, 170-175; 1984, 160, 167, 169-171).

8 Except Dobra voda, Metaljka locality was not cleaned, and only because of incidental stones, it could be glimpsed into what kind of road is there. Only after the cleaning process it could be concluded that it is a Roman road. In the future, probably the full route on the Dobra voda locality will be cleaned up.

Figure 12. Dobra voda, spring (photo M. Imamović).

Figure 13 Dobra voda, section 1 (photo,M. Imamović).

roadside, there is a strong water spring. Under the spring, there is a section of well-preserved road around 500 m long. Some parts are preserved and visible in the flattened area above the spring, on the mild ascent of the road, followed by mild bends. This part of the road is around

Figure 14. Dobra voda, section 1 (photo M. Imamović).

220 m long. Roman builders likely did that intentionally to achieve a uniform slope angle.

After removing low overgrowth, we uncovered the upper-final layer of road construction, with an average height of around 20 cm, orderly paved. At the Dobra voda locality, two road sections are completely cleaned with a length of 116.50 m. The first one is on the elevation, 52.90 m long with a slope angle of 9% to 16%. Its width varies from 2.40 m to 2.90 m.

Embankment height goes from 24 cm to 75 cm. At the steepest section of the route, there is a 7 cm high step whose purpose was probably to decrease the steepness of the slope. Besides this one, we also cleaned the section under the Dobra voda spring, which is 64m long with an average slope angle from 3% to 5%.[9] On some parts of it, it is completely preserved. The width of the road ranges from 2.40 m to 3.60 m. The height of the embankment varies from 1 m to 1.25 m.

Side parts of the road are paved with big, rounded stone slabs, 34 cm to 90 cm long, 23 cm to 50 cm wide and 10 cm to 17 cm high and with an average weight of 60-70 kg. In the middle part of the road, stones are built in dimensions of 15 cm to 60 cm long, 10 cm to 35 cm wide, and 4 cm to 12 cm high. Limestone stones[10] are built-in in the final-tread layer, which was prob-

9 Slope angle is 24% between sections 1 and 2 in the part which is grubbed up, but the cobbled road itself is not cleaned.

10 There is also a 3 m wide limestone cobbled road found in Bare, whose direction goes approximately Odžak-Gradačac (Bojanovski 1984, 242).

Figure 15. Dobra voda, the area between sections 1 and 2 (photo M. Imamović).

larly rectangular or square, and the middle part is filled with round, irregular stones of much smaller size.

On the flattened part of the road near Dobra voda, we found a channel 2.50 m long built under the slope angle of 5% (14:9 degrees), with the role of improving the flow of water. The width of the road on the spot where the channel is located is 3 m. On the same road section, we found the smaller broken stones on the part without stone plates, which were probably installed as a base for the tread layer of the road construction. On the cleaned-up parts of the road, especially on elevations, it is clear that there is a gentle

Figure 16. Dobra voda, section 2 (photo M. Imamović).

ably transported to locality Dobra voda from the quarry around 1 km away. Each plate is carefully formed - by using polishing technique and then installed.[11] Curb stones are mostly irregu-

slope in road construction on both sides, which was planned to diffuse water from the tread layer of the route. From Dobra voda, the road went, over the Vojnik locality, to the Drinjača valley, approximately on the spot of today's marketplace in Kladanj. According to the accounts of older locals, there was a natural river pass there, the so-called "gaz".

11 Finely polished cobbled road was found in Podrinje (Truhelka 1981, 244-245).

Figure 17. Dobra voda, section 2 - overflow channel (photo M. Imamović).

The width of the road could vary even in one single section (Dorsey 1991, 18-19). During Emperor Augustus age, rules for building primary and secondary roads were defined: decumanus maximus 40 feet (11.4 m), cardo maximus 20 feet (5.92 m); secondary roads 12 feet (3.55 m); and one lane roads 8 feet (2.37m) (Dorsey 1991, 18-19). The width of Dolabella's roads in hilly areas (around 4 m) and in flatlands (4.50 m to 5.50 m) completely matches Augustus' rules of the building of secondary (decumanus and cardo) roads in the province of Dalmatia (Bojanovski 1981, 164).

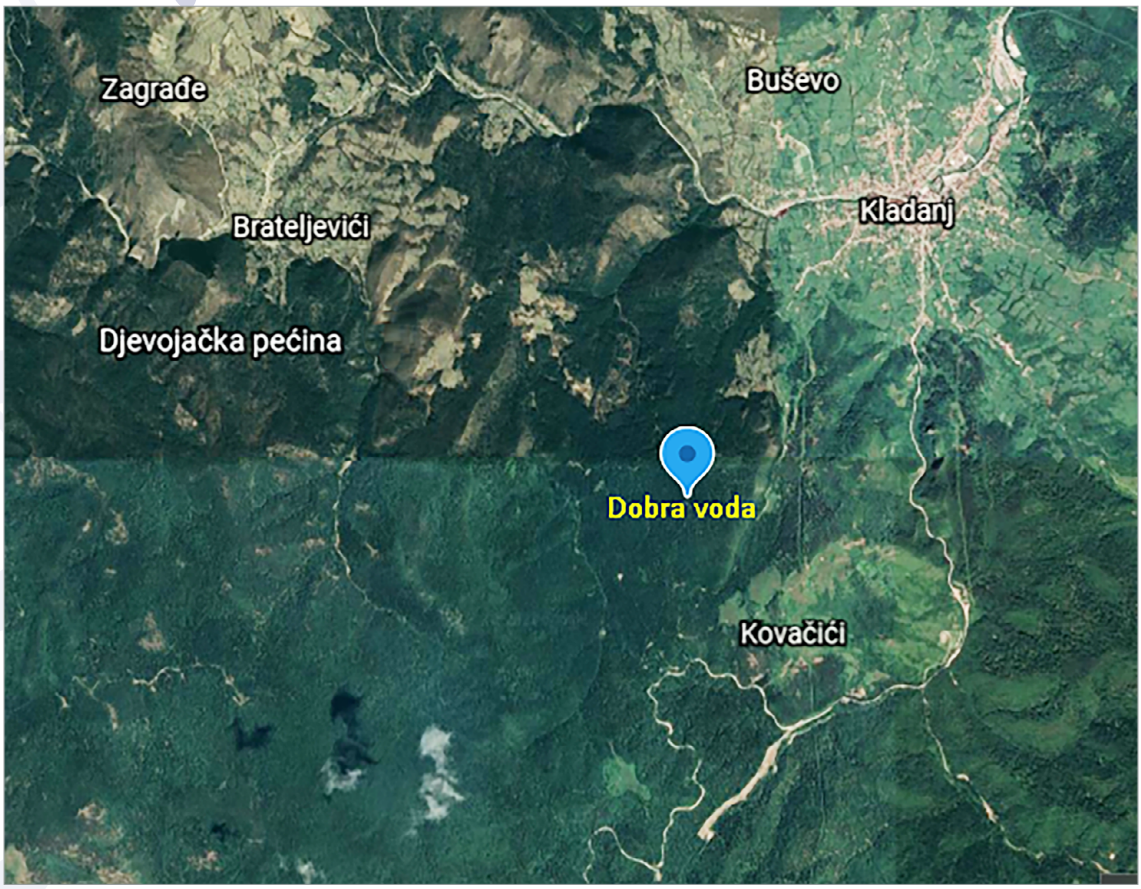

Figure 18. Location of the Dobra voda site.

Describing the construction of cobbled Roman roads in the area of modern Bosnia and Herzegovina, Ballif says, „/.../ I found the width of cobbled roads fluctuating in the range of 2.0

m to 4.0 m, mostly towards smaller size" (Ballif 1893, 9). The average width of the road on Konjuh is around 2.50 m. However, the road is much broader in some sections, which leads us to conclude that the road was adapted to terrain circumstances.

In Austro-Hungarian times, a new road was constructed on Stara Karaula - Kladanj, 6.920 m long. With some minor deviations, this road went over the Roman road route. These deviations could only occur because of the higher slope angle. For the construction of this road, the new builder probably used the final layer of the Roman road. This road still exists and is in use.

Near the Dobra voda locality, Austro-Hungarian road leaves Roman road and turns right, and it returns near the Vojnik locality and goes down the modern Drum street into Kladanj. Drum toponym tells us that the Ottomans also used this road communication. Today, in this part of town, there is a new road. Drum toponym, is also found near Runovići (Imotsko Polje). Besides, such toponyms can be found in many other modern Bosnia and Herzegovina areas. (Bojanovski 1977, 96; 1981, 156, 183; 1984, 192, 244).

Studying these problems, researcher E. Imamović assumes "that Tuzla was connected with ore mountains in middle Bosnia by the road for which Pašalić assumed to be a possible variant of highway segment of *Salona-Argnetaria* highway, on the relation Visoko-Breza, Olovo-Kladanj-Drinjača, where one road leg branched off towards the north, which went over Đurđevik[12] through Spreča valley, that is to Tuzla (Imamović 2019).[13] He also assumes that Tuzla, as a salt ore mining area, was connected to mining region in east Bosnia. The road went through Spreča valley towards Zvornik. It connected to the primary highway, which led upstream towards mining district Argentaria and downstream towards Sirmium, the capital of Pannonia province. Imamović also mentions another possible direction of the road. He assumes that there was a road going from Tuzla towards the northeast, in the direction of Priboj near Lopare. It continued towards Janja (Imamović 1985, 45). However, the assumptions of Bojanovski and Imamović that one road leg went towards Tuzla are still open and could be proved by new field research.

Based on the past scientific knowledge about Roman road construction in modern Bosnia and Herzegovina, the newly discovered Roman road on Konjuh belongs to the 1st century AD. It had primarily military and secondary economical importance for Roman Empire and today's Bosnian and Herzegovinian areas (Patsch 1906, 158; Bojanovski 1974, 35; Pašalić 1960, 50, 69-70, 74-75, 103-108; Imamović 1985, 31-52). In that regard: /.../ road altered the nature of space by connecting places that were divided by ranges of mountains /.../. In this sense, the road was a mechanism of Roman power that physically reshaped the landscape after Roman control had initially been asserted through military intervention. The road was a power that produced power that produced a distinctly Roman space across Europe and the Mediterranean (Laurence 1999, 197, 199).

Conclusions

In Kladanj, Roman road branches into two directions. One of them, probably, went through the Drinjača valley to Šekovići and further towards Drina, and from there downstream to the north, towards Sava and further towards the Roman province of Pannonia and upstream towards Argentaria (broader area of modern Srebrenica). Second branch went from Kladanj, over Plahovići and Plandište locality (near the bridge), over the weekend settlement Drinjača. Then over the Osica river and then it gets out to Mramorak locality where one branch led over the Ponijerak to Brateljevići, and other branch

12 Š. Bešlagić made an assumption in 1971 that there was a Roman fort in Đurđevik near Živinice (AL BiH 1988, Tome 2, 106).

13 In October 2019, in Gornja Tuzla, Roman aqueduct 11.15 m long was discovered. It is constructed from brick, and it does not contain ceramic or lead pipes inside which makes it very specific and rare (Imamović 2019).

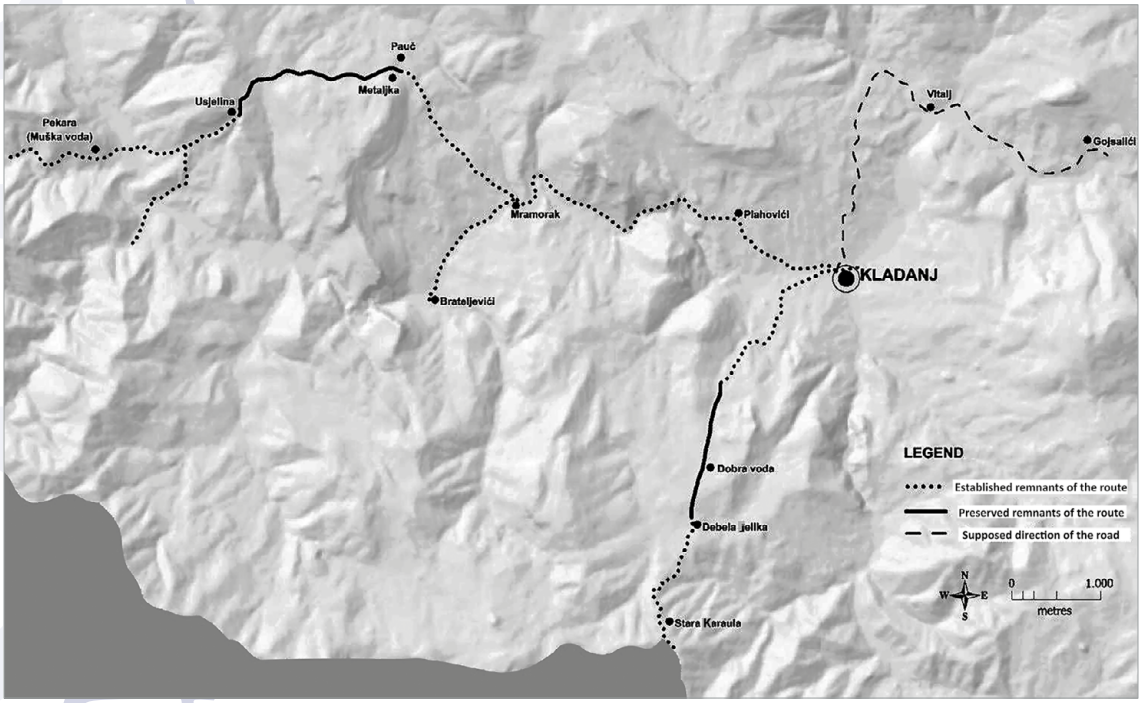

Figure 19. Roman road on mountain Konjuh (Kladanj area). Cartographic-informatical editing; M. Imamović, B. Omerčević, A. and E. Imamović.

Figure 20. Čavkunove Drinjače, the route above the weekend settlement - sub wall (photo M. Imamović).

Figure 21. River pass over the Osica river (photo M. Imamović).

went over the Pauč and Metaljka and Usjelina localities and then went down into Drinjača valley and got out at Pekara locality (Muška voda today).

There is a noticeable sub wall on the section of this road above the weekend settlement. However, it is unfortunately mostly destroyed, probably during the construction of the Austro-Hungarian road.

Bridge construction in the Roman age in modern Bosnia and Herzegovina is mostly unstudied. Based on past research, Romans consciously avoided building bridges from sturdier materials. They mostly used natural passes (spots on the river where the water level is low because of disunity of the river bed). They also used ferries and ships (Čelić, Mujezinović 1998, 182-183; Bojanovski 1984, 182-183). Following the routes of Roman roads in the area of Kladanj, we conclude that Romans exclusively used river passes to pass the rivers. One of such was over the Osica River, which today is unfortunately almost dried out.

We cannot eliminate the possibility of a wooden bridge somewhere in the Kladanj area because Romans often used wood for the bridge-building. Not only for bridges, but they also used wood for other objects lost over time. Also, wood boulders could be used as a sturdy and stable base to cross muddy and swampy terrains (Bojanovski 1984, 204).

Summary

Research on Konjuh resulted in new scientific discoveries. These discoveries are 1. Roman roads on Metaljka (Vrh) and Dobra voda localities and 2. Ottoman caravan roads on Miljkovac, Paljevac and Buševo localities. All these localities are in Kladanj municipality. Only Miljkovac was known from these localities, part of "Zaštićeni Pejsaž Konjuh", Kladanj municipality. According to oral accounts, there is a "roman cobbled road" in the area of this locality. However, these researches proved a road constructed in the Ottoman era. The Roman road was used in the middle ages and later during the Ottoman reign. From the end of the 19th century (during the Austro- Hungarian administration) until today, new roads have been built in the area of Kladanj. Some of them go over the routes of Roman roads or Ottoman caravan roads, which this research also proved. The Roman road, which connected some modern settlements in Kladanj, opens an important question - what could Romans use in the area of Kladanj? Was it some economic resource or military camp, or both? Until new research, these questions remain open.

The Roman road needs immediate and effective protection and support from competent institutions because it represents a precious and representative monument. As such, it has considerable tourist potential.

Povzetek

Raziskave na planini Konjuh so prinesle nova znanstvena dognanja. Gre za odkritja rimske ceste na najdiščih Metaljka (vrh) in Dobra voda ter otomanske karavanske poti na najdiščih Miljkovac, Paljevac in Buševo. Vsi kraji so del občine Kladanj. Od omenjenih nahajališč je bil znan le Miljkovac, ki je del zavarovanega področja planine Konjuh v občini Kladanj. Po ustnem izročilu se na območju tega kraja nahajajo "rimski tlakovci". Vendar je ta raziskava ugotovila, da gre za cesto, ki je bila zgrajena v osmanski dobi. Rimska cesta je bila uporabljana v srednjem veku in kasneje v času osmanske vladavine. Od konca 19. stoletja (v času Avsto-Ogrske) do danes so v okolici Kladnja zgrajene in še se gradijo nove ceste, ki se na posameznih predelih raztezajo s trasami rimskih cest ali osmanskih karavanskih poteh, kar je bilo s to raziskavo prav tako ugotovljeno.

Rimska cesta, ki je povezovala več današnjih naselij v občini Kladanj, postavlja pomembno vprašanje: Kaj so Rimljani lahko uporabljali na območju Kladnja? So to neki gospodarski viri ali vojaški tabor ali oboje? Do nove raziskave ostaja to vprašanje odprto.

Rimska cesta potrebuje nujno in učinkovito zaščito pristojnih inštitucij, saj je izjemno dragocen in reprezentativen spomenik in ima kot takšen velik turistični potencijal.

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