

PROSTORNA ANALIZA ZNAČAJA I ULOGE TVRĐAVE IMPERIJAL U OBRANI DUBROVNIKA U DOMOVINSKOM RATU 1991. GODINE

SPATIAL ANALYSIS OF THE SIGNIFICANCE AND ROLE OF THE FORT IMPERIAL DURING THE DEFENCE OF DUBROVNIK IN THE 1991 CROATIAN HOMELAND WAR

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KLJUČNE RIJEČI: odlučujući teren, Dubrovnik, ključni teren, KOCOA, vojna geografija, OAKOC

In addition to the defensive ring around the old town of Dubrovnik, fortifications like fortresses and walls were erected between the 14th and 19th centuries in strategically vital locations of the then-Republic of Ragusa. We conducted a military geographical analysis of battleground around Dubrovnik during the Croatian Homeland War. OAKOC procedure and GIS tools were used to reconstruct the impact of terrain and employed military tactics during the military operations of 1991. The military-geographical elements were examined to ascertain the signifi-

cance and role of the fort Imperial in the successful defence of Dubrovnik, as well as the failure of the attackers. The analysis uncovered several critical factors for the successful defence. Firstly, there was only one avenue of approach for attackers to reach the fort Imperial, greatly favouring the defence. Secondly, the fortress's placement facilitated excellent surveillance and monitoring of both friendly and hostile forces. Thirdly, logistical support relied on a single footpath leading directly to the heart of Dubrovnik, concealed from the attackers' view, ensuring that defenders were never without supplies. Holding the hill Srđ with the fort Imperial in the hands of the defenders proved to be a key and decisive terrain during the siege of Dubrovnik. Although the evolution of warfare has diminished the significance of traditional defensive fortifications, the example of the fort Imperial demonstrates that they can still be of crucial importance even in the era of modern conventional warfare.

KEYWORDS: decisive terrain, Dubrovnik, key terrain, KOCOA, military geography, OAKOC

UVOD

Povijesni pregled

Uzme li se u obzir navode mnogobrojnih povjesničara, osnutak i početak razvoja grada Dubrovnika datira u 5. i 6. stoljeće (Beritić, 1955, p. 9-10). Time se može pratiti i njegova utvrđenja zasnovana na tadašnjem stjenovitom otočiću Lausu. Odabrani položaj, prema pučini okružuju visoke i teško pristupačne hridi. Tijekom povijesti fortifikacijski objekti su planski ojačavani, kontinuirano dograđivani i povezivani zidinama, a time se proširivala i jezgra starog grada. Paralelno s razvojem obrambenog prstena oko stare gradske jezgre razvijani su i fortifikacijski objekti u vidu tvrđava i zidina kod grada Stona i tvrđave Sokol iznad konavoskog polja. Fortifikacije su smještene na granicama tadašnje Dubrovačke Republike, odnosno na strateški bitnim položajima kako bi se mogao osigurati promet dobara i spriječiti direktni upadi neprijatelja na sjedište Republike.

Brdo Srđ¹ je u svim povijesnim razdobljima Dubrovačke Republike uvijek imalo važnu ulogu u obrambenom sustavu. Prvi put se spominje u zaključcima donesenim na sjednici Malog vijeća 1441. godine kada je izdan nalog za popravak krovništva stražarnice na današnjem mjestu tvrđave Imperijal (Beritić, 1955, p. 63-104). Tehnološkim razvojem i evolucijom doktrine uporabe topništva u 17. i 18. stoljeću, što se posebno odrazilo na povećanje dometa i učinkovitost vatrenog djelovanja topništva, postalo je jasno da obrambeni prsten oko stare gradske jezgre Dubrovnika više nije dostatna zaštita za grad. Kada je Francuska vojska pod maršalom Marmontom, koji je dobio titulu vojvoda od Dubrovnika (franc. *Duc de Raguse*), zauzela Dubrovnik, počinju opsežni fortifikacijski radovi na utvrđivanju Srđa (Marmont, 1984). Marmont je inicirao početak izgradnje tvrđave Imperijal (Sl. 1.), a novoizgrađena tvrđava mogla je zbog svojih dimenzija i naoružanja primiti više

¹ Do 9. stoljeća brdo je imalo naziv Vergatum – *Vergo* (lat.) što se uzdiže, nagiba, nagnje, spušta, uspinje. U spomen prvobitnih zaštitnika Dubrovnika sv. Srđa i Bakha na vrhu brda izgrađena je crkva sv. Srđa i Bakha, te se od tada i brdo naziva Srđ.

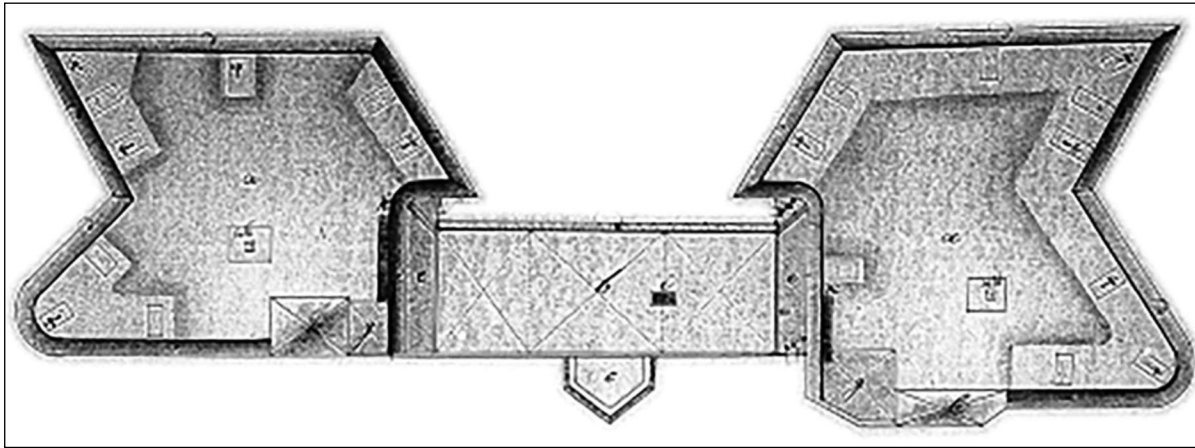
INTRODUCTION

Historical overview

Numerous historians agree that the foundation and early development of Dubrovnik can be traced back to the period between the 5th and 6th centuries (Beritić, 1955, p. 9-10). This historical timeframe allows us to trace the origins of Dubrovnik's fortifications, which were established on the former rocky island of Laus. The chosen location is surrounded by high and difficult-to-reach seaside cliffs. Throughout its history, a network of fortresses interconnected by walls was constructed, leading to the constant extension and expansion of the fortifications, thereby enlarging the core of the ancient city. The existing fortresses were systematically reinforced, and additional sections of walls were continuously added as part of planned expansions. Concurrent with the enlargement of the defensive perimeter around the old city core, fortifications in the form of both fortresses and walls were erected around the city's outskirts, including the city of Ston and the Sokol Grad fortress above Konavle field. The fortifications were built along the borders of the then-Republic of Ragusa, in strategically important positions to secure the movement of goods and prevent direct enemy attacks and incursions into the Republic's headquarters.

Throughout the historical epochs of the Republic of Ragusa, Srđ hill¹ has consistently held a pivotal defensive role. Its earliest documented mention dates to the 1441 session of the Republic's governing body, the Minor Council, where an order was issued for the repair of the guardhouse roof at the current site of the fort Imperial (Beritić, 1955, p. 63-104). With the technological advancements in artillery and the evolution of artillery doctrine during the 17th and 18th centuries, which particularly resulted in increased range and effectiveness on targets, it became evident that the defensive ring around the old city of Dubrovnik no longer offered adequate protection for the city. Following the conquest of Dubrovnik by the French army under Marshal Marmont, who was given the title of Duke of Dubrovnik (French: *duc de*

¹ By the 9th century, the hill was named Vergatum (from the Latin word *Vergo*, meaning *to rise, incline, lean, descend, ascend*). In memory of the original protectors of Dubrovnik, St. Srđa and Bacchus, a small church dedicated to St. Srđa and Bacchus was built on the top of the hill, and since then the hill itself has been called Srđ.



SLIKA 1. *Tvrđava Imperial, prvotni tloris, 1806. – 1812.*

FIGURE 1 *Imperial Fortress, original ground-plan, 1806–1812*

Izvor: Austrijski državni arhiv – Ratni arhiv, Beč (preuzeto iz Vuković, 2020) / Source: Austrian State Archives – War Archives, Vienna (acquired from Vuković, 2020)

vojnika i vojne opreme, čime je postala strateška uporišna točka obrane Dubrovnika s njegove sjeverne strane. Svrha njezine izgradnje bilo je sprječavanje mogućnosti djelovanja neprijateljskog topništva prema gradu u podnožju (Piplović, 2012; Vuković, 2000). Od njezine izgradnje pa sve do Domovinskog rata nije iskorištena u svrhu za koju je i izgrađena. Maršal Marmont je razvoj obrambenog sustava (sklopa) utvrda u užem području oko Dubrovnika konceptijski povezao s obranom kopnenih i morskih putova od Dubrovnika prema zapadu, odnosno prema dubini tadašnje Ilirske provincije. Naložio je i izgradnju nove tvrđave iznad grada Stona, čime je obrambeni sustav Dubrovnika pretvoren u zaokruženu cjelinu zajedno s topničkim bitnicama na otocima Daksi, Koločepu, Lopudu i Šipanu. Obrana navedenih otoka i grada Stona dio su Marmontova koncepta zaštite unutarnjih morskih putova, a grad Ston je imao i dodatnu ulogu odmorišta i komunikacijske točke između Dubrovnika i središnje Dalmacije (Marmont, 1984, p. 277).

OPERATIVNI KONTEKST OBRANE DUBROVNIKA U DOMOVINSKOM RATU

Oružani napad potkraj 1991. godine izolirao je Dubrovnik i njegovu širu regiju od ostatka Republike Hrvatske (RH), čime je započeta realizacija strateškog plana Jugoslavenske narodne

Raguse), significant fortification efforts were initiated to secure Srđ hill. Marmont initiated the construction of the fort Imperial (Fig. 1), designed to accommodate a substantial number of soldiers and military equipment due to its size and armament. It consequently became a strategic stronghold for the defence of Dubrovnik's northern flank. The primary aim of the construction was to thwart enemy artillery assaults targeting the city at its base (Piplović, 2012; Vuković, 2000). Until the Homeland War, the structure was not utilized for its intended purpose. Marshal Marmont envisioned the development of a comprehensive defence system of fortifications within the immediate vicinity of Dubrovnik, encompassing the defence of both land and sea routes extending westward towards the Illyria province. Dubrovnik's defence system constituted a cohesive entity, with artillery battalions stationed on the islands of Daksa, Koločep, Lopud, and Šipan, along with the establishment of a new fortress overlooking the town of Ston. The defence strategy for the islands and the town of Ston was integral to Marmont's vision for safeguarding internal sea routes, while Ston also served as a crucial resting place and communication point between Dubrovnik and central Dalmatia (Marmont, 1984, p. 277).

THE OPERATIONAL CONTEXT OF THE DEFENCE OF DUBROVNIK IN THE HOMELAND WAR

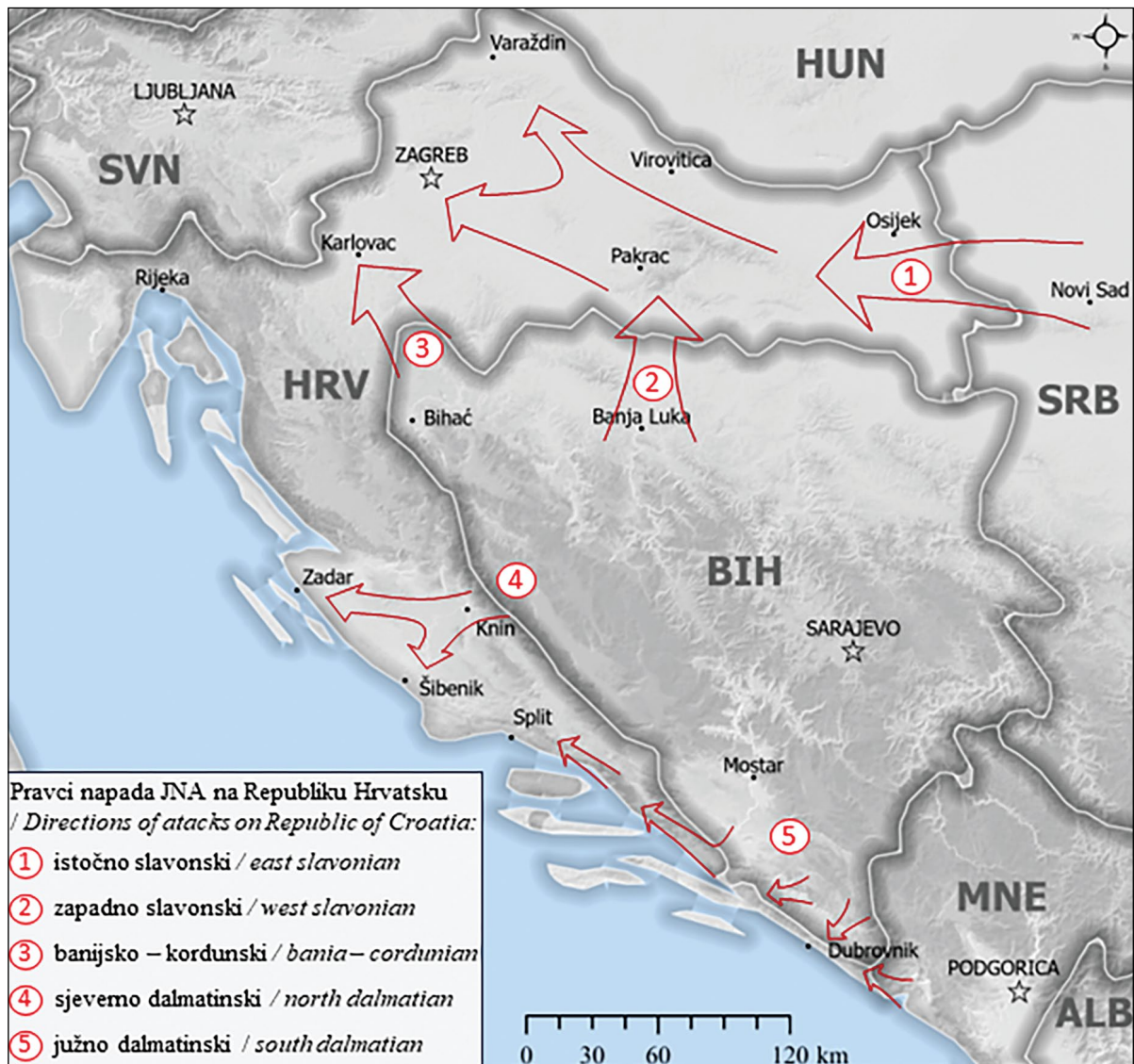
The late 1991 assault on Dubrovnik, which isolated the greater Dubrovnik area from the rest of the Re-

armije (JNA) s ciljem gušenja otpora oružanih snaga RH. Primarni cilj bio je opovrgnuti neovisnost i međunarodno priznanje RH kao neovisne države unutar važećih granica država bivše Socijalističke Federativne Republike Jugoslavije. Strategija JNA uključivala je nekoliko glavnih pravaca napada na teritorij RH iz smjerova (prema Sl. 2.):

1. Vojvodina prema Baranji (hrvatski dio) i Istočnoj Slavoniji,
2. Banja Luka prema Virovitici i granici s Republikom Mađarskom. Snage su se potom na pravcima „1“ i „2“ trebale spojiti i nastaviti napad prema Zagrebu i Varaždinu,
3. Bosna i Hercegovina kroz Banovinu i Kordun prema Karlovcu i granici s Republikom Slove-

public of Croatia, initiated an implementation of the Yugoslav People's Army (JNA) broader strategy aimed at overpowering Croatian forces. The objective was to impede the process of independence and the international acknowledgment of the Republic of Croatia as a sovereign entity within the boundaries it held as one of the republics within the former Socialist Federal Republic of Yugoslavia. The strategy of JNA involved establishing several lines of attack from (Fig. 2):

- 1) Vojvodina towards Baranja (Croatian part) and East Slavonia;
- 2) Banja Luka towards the city of Virovitica and the border with the Republic of Hungary. As per plan, lines 1 and 2 in some moment consolidate and attack should reach Zagreb and the city of Varaždin;



SLIKA 2. Skica planiranih strateško-operativnih pravca napada na RH od strane JNA

FIGURE 2 Scheme of planned strategic-operational directions of attacks on the Republic of Croatia by the JNA

nijom,

4. Knin prema Zadru i Šibeniku s ciljem izbijanja na Jadransku obalu,
5. Desno krilo iz Hercegovine rijekom Neretvom prema Pločama i Splitu. Lijevo krilo napada iz Hercegovine i Crne Gore trebalo je izbiti na obalu istočno kod Dubrovnika i Slanog (sjeverozapadno od Dubrovnika).

Grad Dubrovnik bio je jedna od glavnih meta napada ovoga plana, čijim bi osvajanjem i izbijanjem na Jadransku obalu snage JNA odcijepile i stavile najjužnji dio RH pod svoju kontrolu.

VOJNO-GEOGRAFSKA ANALIZA TERENA – PRIMIJENJENE METODOLOGIJE I DOSADAŠNJA ISTRAŽIVANJA

Mnogobrojna primijenjena istraživanja u vojnoj praksi istražuju utjecaj geografskih značajki terena na planiranje i izvođenje vojnih operacija. Proces obavještajne pripreme bojišta ističe se kao ključni alat za opisivanje i razumijevanje određenoga geografskog područja (Headquarters, 2019). Vojna analiza u operativnom planiranju obuhvaćena je akronimom METT-Tc – misija, neprijatelj, dostupne postrojbe, teren i vrijeme (meteorološko), snage, raspoloživo vrijeme (kronološko) i civilna razmatranja. Standardna vojno-analička procedura, OAKOC ili KOCOA – motrenje i polja vatre, avenije prilaza, ključni ili odlučujući teren, prepreke prirodne ili umjetne, zaštita i prikrivanje – obuhvaća teren i vremenske prilike. Povjesničari, geografi i arheolozi također primjenjuju OAKOC za istraživanje ishoda bitaka tijekom povijesti. Razvoj GIS-a unaprijedio je istraživanja u području vojne analize terena (Headquarters, 2017). Istraživanja koja sadržavaju GIS metode prostorne analize i standardnu OAKOC proceduru proveli su Borisov i sur. (2010), Brown (2021), Cvijanović i sur. (2018), Fleming i sur. (2009), Grindle i sur. (2004), Pahernik & Kereša (2007), Spennemann (2020) i Zečević i sur. (2017).

Mnogi se radovi bave procjenom utjecaja zemljišta na bitke iz prošlosti, a radi boljeg sagledavanja i razumijevanja utjecaja zemljišta na

- 3) Bosnia and Herzegovina to Banovina and Kordun towards the city of Karlovac and the border with the Republic of Slovenia;
- 4) Knin towards Zadar and Šibenik, with a goal of the outbreak on the Adriatic coast;
- 5) Right flank from Herzegovina along Neretva River valley towards the town of Ploče and the City of Split. The left wing of the attack from Herzegovina and Montenegro was supposed to reach the coast east of the City of Dubrovnik and at the town Slano (northwest of Dubrovnik).

The City of Dubrovnik represented one of the main targets in this plan, with its conquest and breakthrough onto the Adriatic coast aiming to bring the southernmost part of Croatia under the control of the JNA forces.

MILITARY-GEOGRAPHIC ANALYSIS OF THE TERRAIN: APPLIED METHODOLOGIES AND PREVIOUS RESEARCH

There is a significant amount of applied research for military practice that delves into the impact of geographic terrain features on the planning and execution of military operations. The Intelligence Preparation of the Battlefield manual stands out as a pivotal tool for describing and comprehending a given geographic area (Headquarters, 2019). Military analysis in operational planning is encapsulated in the acronym METT-Tc (Mission, Enemy, Terrain and Weather, Troops and Support Available, Time Available, and Civil Considerations). The standard military analysis procedure, known as OAKOC or KOCOA (Observation and Fields of Fire, Avenues of Approach, Key or Decisive Terrain, Obstacles – both man-made and natural, Cover and Concealment), encompasses terrain and weather considerations. Historians, geographers, and archaeologists also use OAKOC to study the outcomes of battles throughout history. The development of GIS has advanced research in the field of military terrain analysis (Headquarters, 2017). Studies employing GIS spatial analysis methods and the standard military OAKOC process were conducted by: Borisov et

vojne operacije u budućnosti (Roskin, 2020; Roskin & Dekel-Dolitzky, 2020). No malo je radova koji poput ovoga istraživanja primjenjuju GIS i metodologiju vojne geografske prosudbe prostora temeljene na vojnim načelima. Bitkama u povijesti strateški položena utvrđenja donijela su značajnu prevagu u njihovu razvoju. Tako npr. Nicolle (1998) i Nurul Shahirah binti Majlan & Alatas (2022) opisuju važnost utvrde Alhambre, čiji je položaj na uzvišenom i preglednom mjestu omogućio uspostavu obrambenog uporišta i kontrolu komunikacija u gradu Granadi (1491. – 1492.). Međutim Alhambra nije korištena u obrambene svrhe u modernome ratovanju. Postoji sličnost u taktičkoj važnosti i pozicijskoj prednosti kao i geološkoj građi zemljišta utvrđenih položaja na krškom zemljištu u operacijama vođenim u različitim povijesnim razdobljima: u obrani Gibraltara, istočne obale Bokokotorskog zaljeva 1914. godine i Monte Cassina 1944. godine.

Gibraltarski poluotok je stjenovita vapnenačka uzvisina sa strmim padinama sačinjena od jurskih dolomitiziranih vapnenca. Površina i unutrašnjost (mreža podzemnih hodnika/tunela) premrežena mu je različitim fortifikacijskim objektima koje su tijekom različitih povijesnih razdoblja u različitim oblicima gradili i nadograđivali Mauri, Španjolci i Britanci. Gibraltar je zabilježio 15 velikih opsada od 1309. do 1989. godine (Rose, 2001). Bio je važno je pomorsko uporište tijekom Drugoga svjetskog rata s jakim britanskim garnizonom, lučkom infrastrukturom i aerodromom.

Austro-ugarske utvrde Goražda (njem. *Werk Gorazda*), Vrmac (njem. *Werk Vermac*) i Trašte (njem. *Werk Traste*) činile su dio obrambenog sustava koji je štutio Bokokotorski zaljev i omogućavao sigurno baziranje Austro-ugarske flote u ratnoj luci Boka kotarska. Navedene utvrde izgrađene na krškom zemljištu štatile su istočni bok Bokokotorskog zaljeva i izdržale su, u listopadu 1914. godine, napade i granatiranja crnogorskog topništva s planine Lovćen topovima kalibra 120 i 155 mm no nisu pretrpjele funkcionalno značajna oštećenja na utverdama bez mogućnosti brzog popravka (Martinović, 2015).

Položaj opatije Monte Cassino dominira nad

al. (2010), Brown (2021), Cvijanović et al. (2018), Fleming et al. (2009), Grindle et al. (2004), Pahernik & Kereša (2007), Spennemann (2020) and Zečević et al. (2017).

There are numerous studies that assess the impact of terrain on battles fought in the past, aiming to understand better its influence on future military operations (Roskin, 2020; Roskin & Dekel-Dolitzky, 2020). However, there are few studies like this one that use GIS and a methodology of military geographic assessment based on military principles. Throughout history, strategically positioned fortifications have provided significant advantages in the outcomes of battles. For example, Nicolle (1998) and binti Majlan and Alatas (2022) describe the significance of the Alhambra fortress, whose position on elevated and prominent terrain enabled the establishment of a defensive stronghold and control of communications in the city of Granada (1491-1492). However, Alhambra was not used for defensive purposes in modern warfare. There is a similarity in tactical importance, positional advantage, and geological structure of fortified positions on karst terrain in operations conducted during different historical periods such as: the defence of Gibraltar, the eastern coast of the Bay of Kotor in 1914, and Monte Cassino in 1944.

Gibraltar Peninsula was formed on a rocky mass with steep slopes, composed of Jurassic dolomitized limestone. Its surface and the interior (network of underground passages/tunnels) are interlaced with various fortification structures constructed and upgraded in different forms by the Moors, Spanish and British throughout various historical periods. Gibraltar experienced 15 major sieges between the years 1309 and 1989 (Rose, 2001). It was an important naval stronghold during World War II, with a strong British garrison, port infrastructure, and an airport.

The Austro-Hungarian fortresses of Goražda (German: *Werk Gorazda*), Vrmac (German: *Werk Vermac*), and Trašte (German: *Werk Traste*) were part of the defensive system protecting the Bay of Kotor and ensuring a safe base of the Austro-Hungarian fleet in the naval port of Boka Kotorska. The fortresses were built on karst terrain, protecting the eastern side of the Bay of Kotor. During October 1914, they endured attacks and shelling from Montenegrin artillery on Mount Lovćen, using 120 mm and 155 mm calibre cannons, without suffering significant func-

obližnjim gradom Cassinom i nadzire doline rijeka Liri (avenija prilaza prema Rimu) i Rapido. Rijeka Rapido okružuje grad Cassino i ujedno je predstavljala vodenu prepreku kretanju tijekom manevra Savezničkih snaga (vojska SAD-a, snage slobodne Francuske, poljska vojska, Velika Britanija i snage Britanskog Carstva). Uzvišenje izgrađeno od mezozojskih karbonatnih stijena (pretežito vapnenaca i dolomita) na kojem se nalazi opatija Monte Cassino ključno je zemljište na „Gustavovoj liniji“. Obrambenu liniju sačinjavao je sustav utvrđenih položaja u planinama koja se protezala od Jadranskog do Tirenskog mora (Ciciarelli, 1994). Položaje ispod opatije Monte Cassino branili su dijelovi njemačke padobranske divizije. Nakon razaranja u zračnim napadima ruševine opatije pretvorene su u dobro utvrđene obrambene položaje. Njemačke snage dodatno su osnažile svoj položaj poplavlivanjem doline rijeke Rapido, čime je stvorena prirodna prepreka prema ključnom terenu iznad grada Cassinom. Tijekom 1944. godine (od veljače do svibnja) Savezničke snage su izvršile četiri pokušaja zauzimanja utvrđenih položaja kod Monte Cassina. Tri puta su odbijeni, te su u četvrtom pokušaju uz velike gubitke zauzele ruševine Monte Cassina.

Središnja točka ovoga rada je tvrđava Imperijal, koja je bila glavno uporište obrane Dubrovnika (Pezo, 2015). Njezin je značaj temeljen smještajem na vrhu brda Srđ s kojega ima pregled nad čitavim gradom Dubrovnikom i širom okolinom. Za izradu ovoga članka autore je motivirala činjenica da postoji mali broj radova iz područja vojne geografije koji obrađuju vojno-geografske elemente u Domovinskom ratu.

METODE, PODACI I VOJNO GEOGRAFSKA OBILJEŽJA PODRUČJA ISTRAŽIVANJA

Svi događaji, vremenski okviri, pozicije snaga i oružja preuzeti su iz citirane literature, pri čemu je najviše referenci preuzeto iz Pezo (2015). Uz potporu GIS alata, OAKOC analiza primijenjena je kao osnovni alat za razumijevanje razvoja bitaka na terenu. Prostornom analizom voj-

ništvo damage to the forts that could not be quickly repaired (Martinović, 2015).

The position of the Monte Cassino abbey dominates over the nearby town of Cassino and overlooks the valleys of the Liri River (the avenue of approach towards Rome) and the Rapido River. The Rapido River encircles the town of Cassino, and it was a water obstacle during the movement of Allied forces (US Army, Free French Forces, Polish Army, British Army, and forces of the British Empire) manoeuvres. The elevated point built from Mesozoic carbonate rocks (mostly limestone and dolomite), on which the Monte Cassino abbey is located, represented key terrain on the ‘Gustav Line’. This defensive line was a system of fortified positions in the mountains that stretched from the Adriatic to the Tyrrhenian Sea (Ciciarelli, 1994). The positions below Monte Cassino abbey were defended by portion of the German parachute division. After the abbey was destroyed in air raids, the ruins were turned into well-fortified defensive positions. The German forces further strengthened their position by flooding the Rapido River valley, creating a natural barrier towards the key terrain above the town of Cassino. During 1944 (from February to May), the Allied forces made four attempts to capture the fortified positions at Monte Cassino. They were repelled three times, and in the fourth attempt, with heavy losses, they captured the ruins of Monte Cassino.

The focus of the paper is on the fort Imperial, deemed the primary stronghold in the defence of Dubrovnik (Pezo, 2015). Its significance is underscored by its elevated location atop Srđ, overlooking the city of Dubrovnik and its surroundings. The authors were prompted to write this article by the lack of literature addressing the importance of military geographical elements during the Homeland War in Croatia.

METHODS, DATA, AND MILITARY GEOGRAPHICAL CHARACTERISTICS OF THE STUDY AREA

All events, timelines, positions of troops and weapons were taken from literature cited in the paper, with most references taken from Pezo (2015). With the support of GIS tools, OAKOC analysis was used

no-geografskih čimbenika istraženi su i istaknuti geografski elementi koji su utjecali na razvoj i ishode sukoba tijekom napada na Dubrovnik i njegovo šire područje potkraj 1991. godine. Analiza terena i događanja tijekom obrane Dubrovnika krajem 1991. godine provedena je OAKOC procedurom, metode koja se primjenjuje u vojnoj profesiji radi rekonstruiranja utjecaja terena i primijenjenih vojnih taktika u vojnim operacijama (Department of the Army, 2003; Headquarters, 2017). Neki znanstvenici koriste i druge permutacije akronima OAKOC, odnosno OCOKA ili KOCOJA u svrhu arheoloških istraživanja bojišta (Brown, 2021).

Prostorne analize provedene su softverom Global Mapper 20 i ArcMap 10.5 s proširenjem Spatial Analyst. Prostorna analiza provedena u ovom radu zasnovana je na digitalizaciji nekoliko analognih karata i modela terena. Pri tome je korištena službena topografska karta RH u mjerilu 1:25000, Hrvatska osnovna karta mjerila 1:5000 i vojni model terena rasterske rezolucije ćelije 5x5 metara.

Za utvrđivanje vidljivosti s pojedinih lokacija korišten je digitalni model terena (DMT), koji uz DMR uključuje visine vegetacije i stvarne visine izgrađenih objekata radi dobivanja realnih rezultata prostornih analiza. Tijekom analiza vidljivosti upotrijebljene su pretpostavljene visine pokrova zemljišta, pri čemu je šumama dodijeljena visina od 15 metara, a grmlju visina od 3 metra. Kao izvor podataka za pokrov i vegetaciju korišteni su podaci CORINE projekta, stanje iz 1990. godine (European Environment Agency, 2023).

Polja vatri predstavljena su u skladu maksimalno mogućem dometu oružja. Tijekom prosudbe prohodnosti zemljišta za tenk T-55 (jedinu tip tenka kojim se JNA koristila u operaciji), uključeni su čimbenici koji uključuju nagib reljefa, vode, vegetaciju, tlo, meteorološke uvjete i antropogene objekte (Heštera & Pahernik, 2018). Svakom čimbeniku dodijeljen je koeficijent usporenja u rasponu vrijednosti između 0 i 1, pri čemu 0 predstavlja nemogućnost pokreta vozila, dok čimbenik 1 označava maksimalnu moguću brzinu kretanja po zemljištu (40 km/h), u skladu s metodologijom opisanom u Heštera (2021). U skladu s pokret-

as the base for the explanations of courses of action during battles. As part of the spatial analysis of military geographic factors, we delved into the primary geographic elements that shaped the development and outcome of the conflict during the assault on the city of Dubrovnik and its environs in late 1991. The analysis of the terrain and events during the defence of Dubrovnik towards the end of 1991 was executed using the OAKOC analysis procedure, a method employed in the military profession to reconstruct the influence of terrain and applied military tactics in military operations (Department of the Army, 2003; Headquarters, 2017). Some scientists use other permutations of the acronym OAKOC, such as OCOKA or KOCOJA during archaeological battlefield research (Brown, 2021).

The spatial analysis was carried out with ArcMap 10.5 together with the Spatial Analyst extension, as well as Global Mapper 20. The spatial analysis conducted in this paper was based on the digitization of several key maps and military terrain models, providing a comprehensive foundation for our research. To be more specific, the official Topographic map of the Republic of Croatia at a scale of 1:25,000, the base map of Croatia at a scale of 1:5,000, and military terrain models with a raster cell resolution of 5 × 5 metres were used.

In order to generate realistic spatial analysis outcomes, we employed the Digital Terrain Model (DMT) to assess the visibility of individual locations. This model, which encompasses the Digital Model of Relief (DMR), incorporates data on vegetation height and the actual height of built structures. Approximate values for the height of land cover were assigned in visibility analysis, with forests estimated at 15 meters and bushes at 3 meters. Furthermore, for vegetation and land use analysis, CORINE land cover data from 1990 was used (European Environment Agency, 2023).

Fields of fire were presented based on the maximum potential range of weapons. Terrain trafficability of the T-55 tank (the only type of tank used by JNA in operation) was evaluated considering factors such as relief slope, water bodies, vegetation, soil, weather conditions, and man-made structures (Heštera & Pahernik, 2018). Each factor was assigned a vehicle deceleration rate from 0 to 1, where 0 represents immobility and 1 denotes the maximum off-road speed

ljivosti tenka T-55, teren je kategoriziran u četiri kategorije prohodnosti: prohodno, teško prohodno, vrlo teško prohodno i neprohodno (Heštera, 2021).

Kombinacija sinergije prirodnih elemenata i razvijenih fortifikacija omogućila je Dubrovniku višestoljetno uspješno odolijevanje opsadama i napadima raznih napadača. U uvodnom dijelu opisani su fortifikacijski objekti i njihov razmještaj u području Dubrovnika. Tijekom Domovinskog rata osnovno taktičko-operativno obilježje ovoga područja je iznimna plitkoća teritorija koji ograničava manevar postrojbi prema dubini. Područje oko Dubrovnika predstavlja tipičan mediteranski krajolik sa zaštićenim prirodnim preprekama, odnosno strmim padinama okolnih brda i strmim stjenovitim obalama koje ograničavaju pristup napadačima s mora. Poluotočni položaj grada u prirodnoj luci sa stoljetnim zidinama dodatno je obrambeno osnažen dinarskim smjerom pružanja reljefa (pravac sjeverozapad-jugoistok), koji je zapravo paralelan s državnom granicom prema Bosni i Hercegovini. Geološke i geomorfološke značajke područja definirane su krškom vapnenačkom, dolomitnom i flišnom podlogom s vrlo tankim pedološkim slojem. Područje, osim rijeke Omble, nema značajniji površinski vodotok, pri čemu dominira podzemno otjecanje padalina, a pitka voda crpi se iz ograničenih podzemnih izvora i umjetnih cisterni. Tlo i klima karakterizirana vrućim ljetima i blagim vlažnim zimama osnovni su uzroci dominacije niskog raslinja i slabo razvijene šumske vegetacije. Dubrovnik je glavno urbano (gotovo 50 000 stanovnika 1991. godine), administrativno, političko i gospodarsko središte, ostala naselja smještena su uglavnom uz obalu, a nekoliko se naselja nalazi na uzvišenjima unutar uravnjenih flišnih zona. Prema etničkom sastavu 1991. godine, dominirali su Hrvati (78 %), dok su Srbi bili najznačajnija manjina (9 %) (Republički zavod za statistiku, 1992). Cestovna mreža ograničena je na uski obalni pojas, željeznice nema, a zračna luka nalazi se u zaleđu 20 kilometara od grada u Konavoskom polju. U slučaju rata Dubrovnik predstavlja gravitacijsko središte i strateški bitan grad za cijelu južnu Dalmaciju i njegovim osvajanjem RH gubi nadzor nad čitavom regijom.

(40 km/h), following Heštera (2021) methodology. Possible T-55 tank movement was categorized into four terrain trafficability categories: GO, Slow GO, Very Slow GO, and NO GO (Heštera, 2021).

The combination of the synergy between natural elements and developed fortifications ensured Dubrovnik withstood sieges and attacks by various aggressors for centuries. Fortification structures and their arrangement in the Dubrovnik area were described in the introduction. During the Homeland War, the primary tactical-operational characteristic of this area was the extreme tactical shallowness of the territory, which limited the manoeuvring of units in depth. The area around Dubrovnik represents a typical Mediterranean landscape protected by natural barriers, including the steep slopes of the surrounding hills and rugged rocky shores that limit access to attackers from the sea. The peninsular position of the city in a natural harbour, with its centuries-old walls, is further defensively strengthened by the Dinaric orientation of the terrain (northwest-southeast direction), which is basically parallel with national border to Bosnia and Herzegovina. The geological and geomorphological features of the area are defined by karst limestone, dolomite, and flysch bedrock with a very thin soil layer. Apart from the Ombla river, the area lacks significant surface watercourses, with underground runoff of precipitation predominating. Drinking water is sourced from limited underground springs and artificial cisterns. The soil and climate, characterized by hot summers and mild humid winters, are the primary reasons for the dominance of low vegetation and poorly developed forest cover. Dubrovnik is the main urban (nearly 50,000 inhabitants in 1991), administrative, political, and economic centre. Other settlements are mainly located along the coast and within levelled flysch zones in hinterland. Considering the ethnic composition in 1991, Croats dominated (78%), while Serbs were the most significant minority (9%) (Republički zavod za statistiku, 1992). The road network is limited to the narrow coastal strip, there are no railways, and the airport is located 20 km inland from the city in Konavle field. In the event of war, Dubrovnik represents a gravitational centre and a strategically important city for the entire southern Dalmatia, and had it been conquered, for Croatia it would mean loss of control over the entire region.

REZULTATI

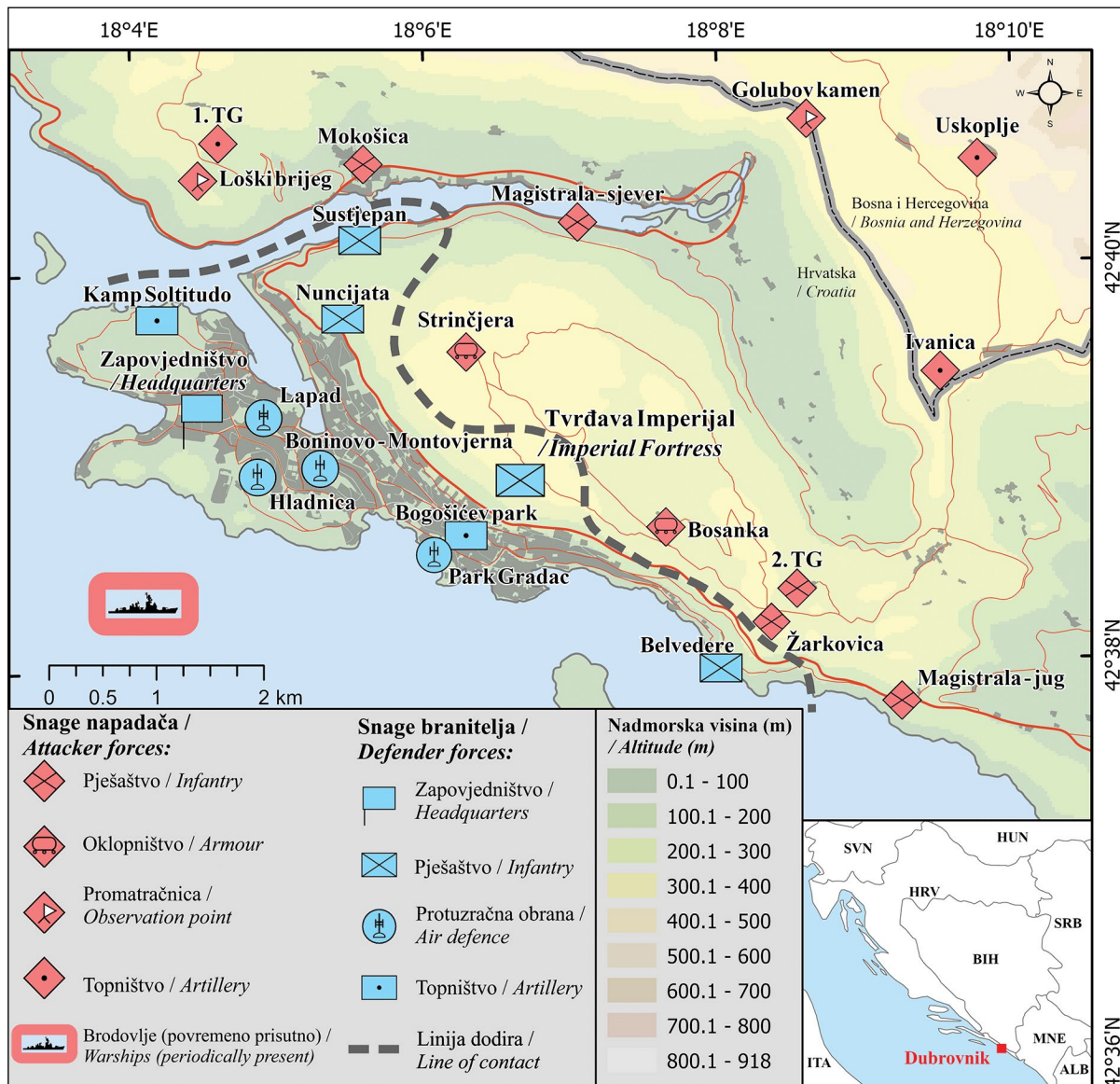
Operativni kontekst i položaji postrojbi

Mogućnost obrane Dubrovnika i širega dubrovačkog područja (Dubrovnik sa zaleđem) determinirana je njegovim, po obranu, vrlo nepovoljnim položajem, jer je prostor od Neuma do Prevlake dug nešto više od 90 kilometara, a dubina hrvatskog teritorija na najširem dijelu iznosi tek 14 kilometara, a na najužem tek kilometar. Stoga obrana Dubrovnika i širega dubrovačkog područja, u slučaju napada sa sjevera i sjeveroistoka, zbog male dubine prostora nema mogućnost razvoja niza pričuvnih položaja po dubini i zahtijeva upornu (ustrajnu) obranu ključnog zemljišta, koje u slučaju Srđa predstavlja zadnju crtu obrane.

RESULTS

Operational context and troop positions

The ability to defend Dubrovnik and its environs is severely constrained by its highly disadvantageous defensive position. The stretch from Neum to Prevlaka spans slightly over 90 kilometres, with the Croatian territory at its widest point measuring only 14 km while at its narrowest point it is just 1 km. Consequently, in the event of an attack from the north and northeast, the defenders of Dubrovnik and the surrounding region would find it challenging to establish a network of reserve positions due to the scarce depth of the area. This demands a resolute defence of the critical terrain, which represents the final line of defence, notably Srđ.



SLIKA 3. Raspored snaga potkraj 1991. godine
 FIGURE 3 Force deployment at the end of 1991

Prema zapovijedi admirala JNA Mile Kandića od 20. rujna 1991. godine, u dijelu teksta koji se odnosi na napad na Dubrovnik naznačeno je da 472. motorizirana brigada JNA treba: „... što prije izbiti na Jadransku magistralu u širem području Dubrovnika, deblokirati vojni objekt Kupari, zaposjesti objekt Srđ, blokirati grad Dubrovnik i odsjeći ga od ostalog dijela teritorije Republike Hrvatske“ (Pezo, 2015, p. 103). Iz namjere zapovjednika „Vojno-pomorske oblasti“ izražene kroz zapovijed za napad vidi se važnost osvajanja Srđa i fortifikacijskog objekta Imperijal za provedbu agresije JNA u jugoistočnom dijelu RH. Gubitak Srđa doveo bi do sigurne predaje Dubrovnika. Slikom 3. shematski se opisuje situaciju na bojištu potkraj 1991. godine. Tadašnja situacija za Dubrovnik bila je izrazito nepovoljna, jer je grad prometno izoliran i ostao je samo uskim dijelom vezan za kopno. Preostali dio teritorija činio je poluotok okružen napadačem koji je zauzeto istaknuta uzvišenja u široj okolici, pri čemu je jedino tvrđava Imperijal ostala pod kontrolom branitelja. Potrebno je istaknuti da točne veličine i snage postrojbi nisu sa sigurnošću točne, jer su obje strane preuveličavale brojnost i veličine postrojbi.

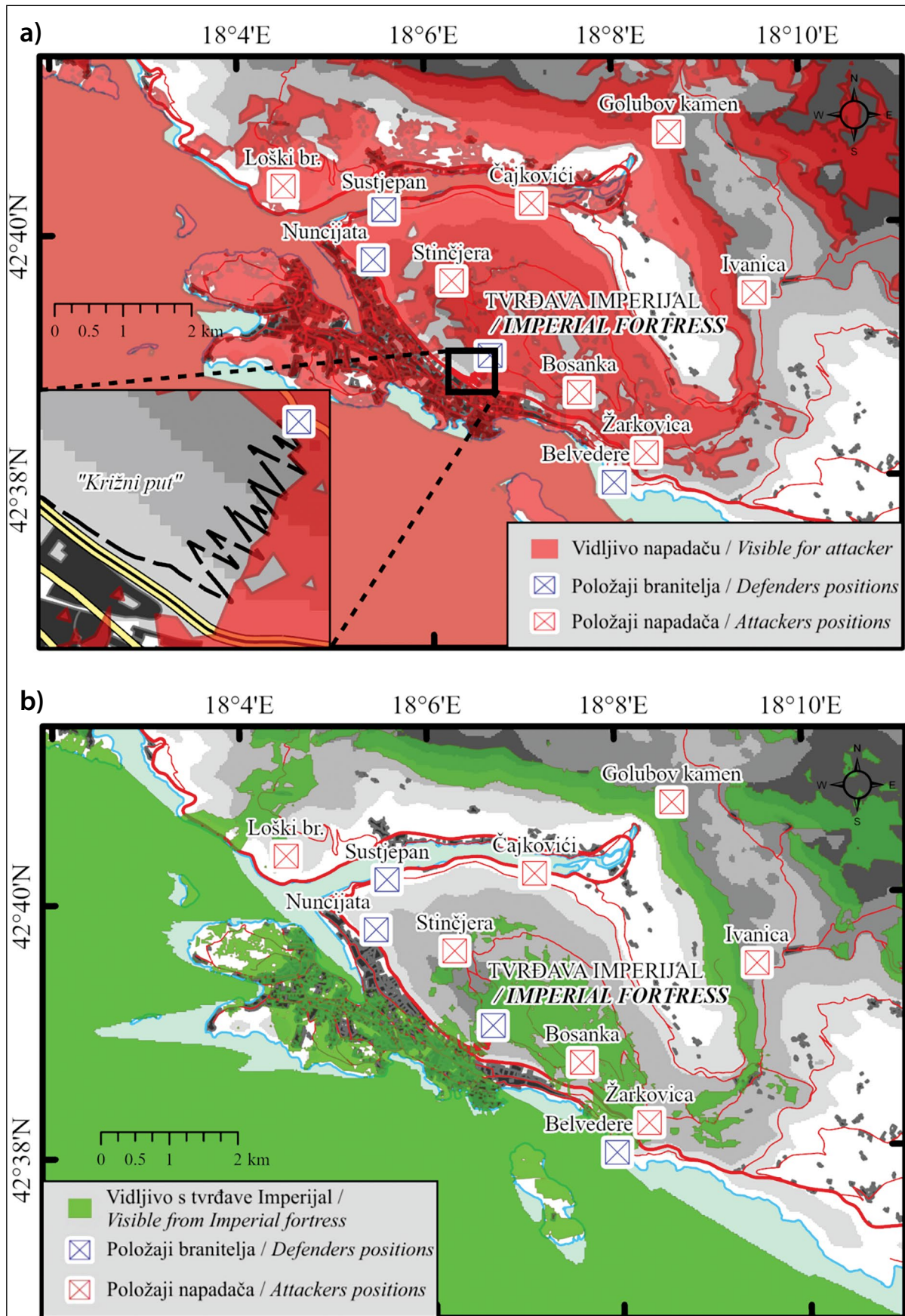
OAKOC: MOTRENJE I POLJA VATRE

Motrenje, odnosno vizualni nadzor područja osigurava nadzor nad aktivnostima i kretanjem protivničkih i vlastitih snaga. Vizualnom kontrolom nad područjem izbjegavaju se iznenadni napadi, što omogućuje vlastitim snagama bolju i dulju pripremu obrane. Na mogućnost motrenja utječu topografija, vegetacija, izgrađenost područja i meteorološke prilike. Na toj lokaciji nije bilo podzemnih linija komunikacije. Postoje brojna ograničenja, ali uobičajeno je da uzvišeni teren pruža bolje mogućnosti motrenja. Napadači su zaposjeli sve istaknute vrhove rubnog dijela planinskog lanca i sve položaje na platou Srđ, osim tvrđave Imperijal (Sl. 4b.). Sa zaposjednutih položaja imali su vizualnu kontrolu nad čitavim poluotokom grada Dubrovnika. Jedini prostor koji za napadače nije bio vidljiv ni

According to the JNA commander, Admiral Mile Kandić, the 472nd Motorized Brigade was entrusted with the task of “... breaking out as soon as possible on the Adriatic road in the broader Dubrovnik area, unblocking the Kupari military installation, occupying the Srđ installation, blocking the city of Dubrovnik, and isolating it from the rest of the territory of the Republic of Croatia.” (Pezo, 2015, p. 103). The importance of capturing Srđ and the fort Imperial for the implementation of JNA aggression in the south-eastern part of the Republic of Croatia can be inferred from the intention of the commander of the military maritime area (‘vojnopomorska oblast’) expressed through the order for the attack. Upon the capture of Srđ, Dubrovnik was anticipated to surrender. Figure 3 illustrates the approximate battlefield situation in late 1991. The situation for Dubrovnik at that time was extremely unfavourable, as the city remained isolated in terms of transportation and was narrowly connected to the mainland. The remaining territory consisted of a peninsula surrounded by the attacker, who had occupied prominent high ground in the wider area, with only fort Imperial remaining under the control of the defenders. It should be noted that the precise size of the force remains unknown as both sides exaggerated their troop numbers.

OAKOC: OBSERVATION AND FIELDS OF FIRE

Observation, or visual control of the area, facilitates the monitoring of enemy and friendly forces’ activities and movements, thus preventing unexpected attacks and enabling friendly forces to prepare their defence more effectively. Topography, vegetation, buildings, and meteorological conditions all influence surveillance capacity. In this location, there are no underground communication lines. Typically, elevated terrain offers optimal observation points, yet intervisibility lines may impose limitations. The attackers seized all prominent peaks in the marginal part of the mountain range and occupied all positions on Srđ plateau, except for the fort Imperial (Fig. 4b). From these occupied positions, they exercised visual control over the entire peninsula of the city of Dubrovnik. The only area not visible to the attackers from any



SLIKA 4. Mogućnost motrenja s pozicija: a) napadača; b) tvrđave Imperijal
 FIGURE 4 Possibility of observation from: a) attackers' positions; b) Imperial Fortress



SLIKA 5. Pogled iz perspektive napadača iz sela Bosanka prema tvrđavi Imperijal
 FIGURE 5 Attacker's view from the village Bosanka to the Imperial Fortress

s jednog njihova položaja bila je pješačka staza („Križni put“) koja povezuje grad i tvrđavu Imperijal. Sa svojim položajem u blagoj udolini na velikom nagibu, staza je vidljiva jedino s morske strane ili iz grada, čime je ostala zaklonjena od pogleda napadača (Sl. 4a. i Sl. 5.). Potrebno je napomenuti da je motrenje bilo moguće jedino s brodova, ali njih nije bilo konstantno u vodama ispred Dubrovnika.

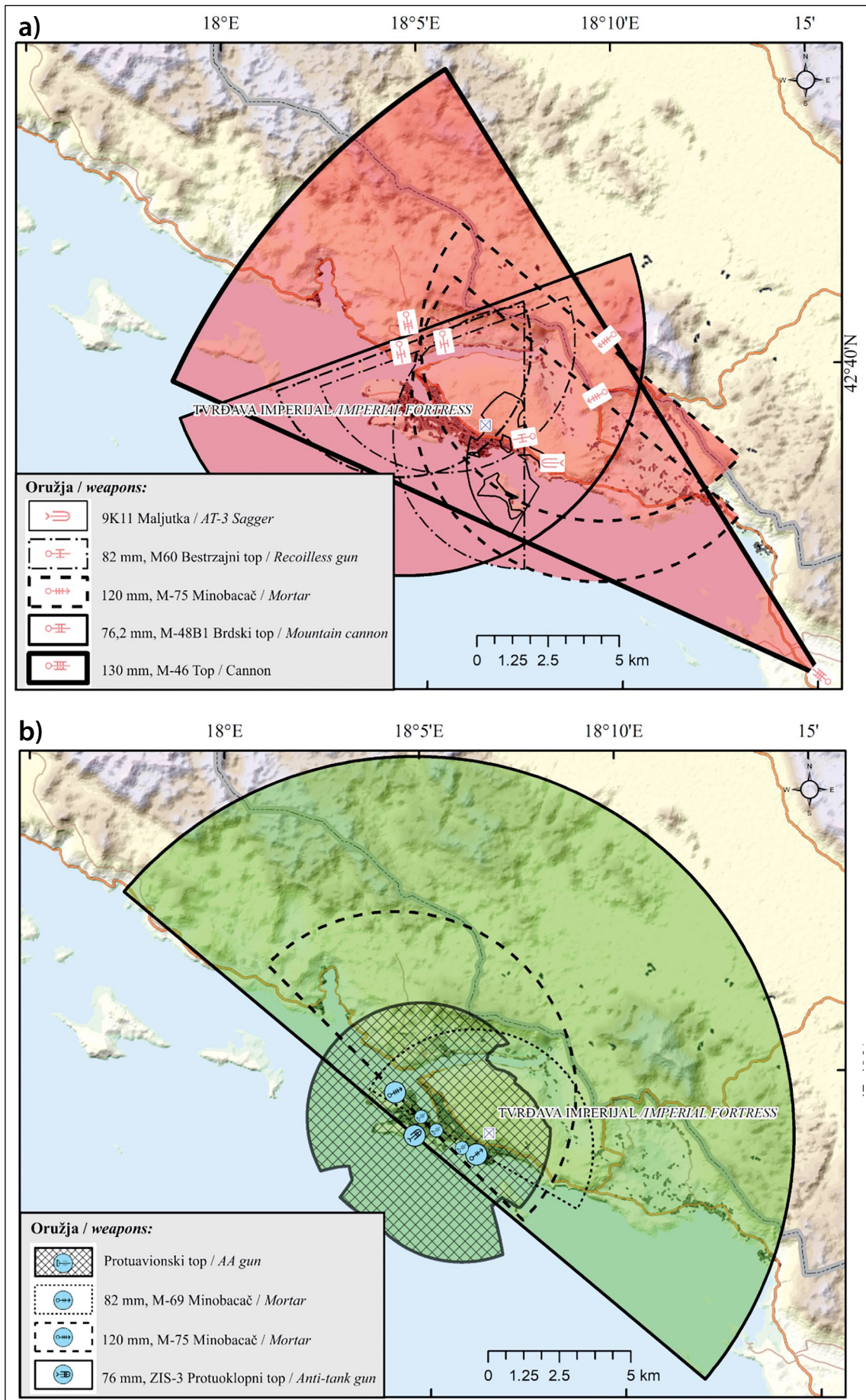
Tvrđava Imperijal sa svojim položajem na rubu strme padine iznad gradskog poluotoka omogućavala je braniteljima motrenje područja u svim smjerovima (Sl. 4b.). S tog položaja branitelji su imali široki brisani prostor, s kojega su mogli motriti gotovo cijeli grad Dubrovnik, cijeli plato Srđa te sve padine i vrhove visoravni od sjeverozapada do istoka. Tijekom obrane 1991. godine tvrđava se nalazila na otvorenom terenu (najbliža vegetacija nalazi se na udaljenosti od 500 metara od tvrđave) i svaki pokret napadača nije mogao biti nezapažen.

Polja vatre su područja na koje oružje može učinkovito djelovati sa zauzetog položaja. Napadači su tijekom napada na Dubrovnik imali iznimnu nadmoć nad braniteljima u vidu vatrene potpore. Vatrene potpora napadača sastojala se od topničkog, minobacačkog i protuoklopnog

of their positions was the footpath named ‘Križni put’ (‘Way of Suffering’) connecting the city to the fort Imperial. Situated in a gentle valley on a steep slope, the path is only visible from the seaside or the city itself, rendering it concealed from the attacker's perspective (Fig. 4a and Fig. 5). It should be noted that surveillance was only possible from ships, but they were not constantly present in the waters near Dubrovnik.

Positioned on the far edge of the steep slope above the city peninsula, the fort Imperial allows defenders a comprehensive vantage point to observe the surrounding area in all directions (Fig. 4b). From this strategic position, the defenders had a sweeping view encompassing almost the entirety of Dubrovnik, the narrow expanse surrounding the city on Srđ plateau, and the slopes and peaks of the plateau extending from northwest to east. During the 1991 attack, the fort stood on open ground, ensuring that no assault could transpire unnoticed. Moreover, the fort Imperial lay at least 500 meters away from the nearest vegetation.

Fields of fire denote areas from which weapons can be effectively deployed from a given position. During the attack on Dubrovnik, the attackers enjoyed significant superiority over the defenders in



SLIKA 6. Paljbeni položaji i polja vatre (maksimalni dometi oružja): a) napadač; b) branitelj
 FIGURE 6 Fire positions and Fields of fire (maximum ranges): a) attackers; b) defender

naoružanja (Pezo, 2015) (Sl. 6a.). Vatrene položaji napadača omogućavali su izvrsnu učinkovitost i djelotvornost oružja. Njihova polja vatri pokrivala su čitav prostor tijekom napada te su pružala mogućnost višestrukog izbora i simultanog djelovanja na obrambene položaje i ostale ciljeve na području Dubrovnika.

Na platou Srđ, polja vatre s tvrđave Imperijal ograničena su na 500 metara prema istoku, i linije motrenja prema sjeveru i jugoistoku do 1000 metara. Zbog velike strmine padine jugoistočno od tvrđave Imperijal, neposredna vatrena potpora nije bila izvediva, već je bila ograničena na minobacače s mogućnošću djelovanja „ubacnom putanjom“ (Sl. 6.). S druge pak strane, s pozicije na rubnom dijelu platoa, s tvrđave Imperijal moglo se vatreno djelovati gotovo po cijelom Dubrovniku.

Vatrena potpora kojom su raspolagali branitelji Dubrovnika bila je vrlo skromna. Iako je djelotvorno djelovanje prisutnog oružja omogućavalo ostvarivanje vatre na položaje napadača duboko u njihovoj pozadini (Sl. 6b.), gotovo sva vatra bila je usmjerena na branjenje vlastitih snaga. Ograničen broj minobacača i topova sudjelovao je u davanju vatrene potpore oko područja tvrđave Imperijal.

OAKOC: AVENIJE PRILAZA

Avenija prilaza predstavlja pravac zračne ili kopne rute preko kojeg vojne snage mogu relativno neometano doći do ključnog zemljišta ili nekoga drugog cilja u području operacije. Prohodnost i pokretljivost snaga na nekom prostoru uvjetovana je izgrađenošću prometne infrastrukture, reljefom, vegetacijom, hidrografskom mrežom i stanjem tla.

Dubrovniku se može pristupiti morskim putem ili Jadranskom magistralom, priobalnom cestom koja vodi na sjever prema mjestima Slanom (35 kilometara), na jugoistok prema Gornjem Brgatu (5 kilometara) i Cavtatu na jug (17 kilometara). Konfiguracija terena u području Dubrovnika ne omogućuje borbeni raspored i manevar motoriziranih postrojbi, već je pokret ograničen na postojeće ceste. U tom području ne postoji željeznička mreža. Brdo Srđ, koje nadvisuje Dubrovnik, omogućuje

terms of fire support, which comprised artillery, mortars, and antitank weaponry (Pezo, 2015), as illustrated in Figure 6a. The firing positions of the attackers allowed excellent efficiency and effectiveness of the weapons. Their fields of fire blanketed the entire area during the assault, allowing for the simultaneous engagement of defensive positions and other targets in the vicinity of Dubrovnik.

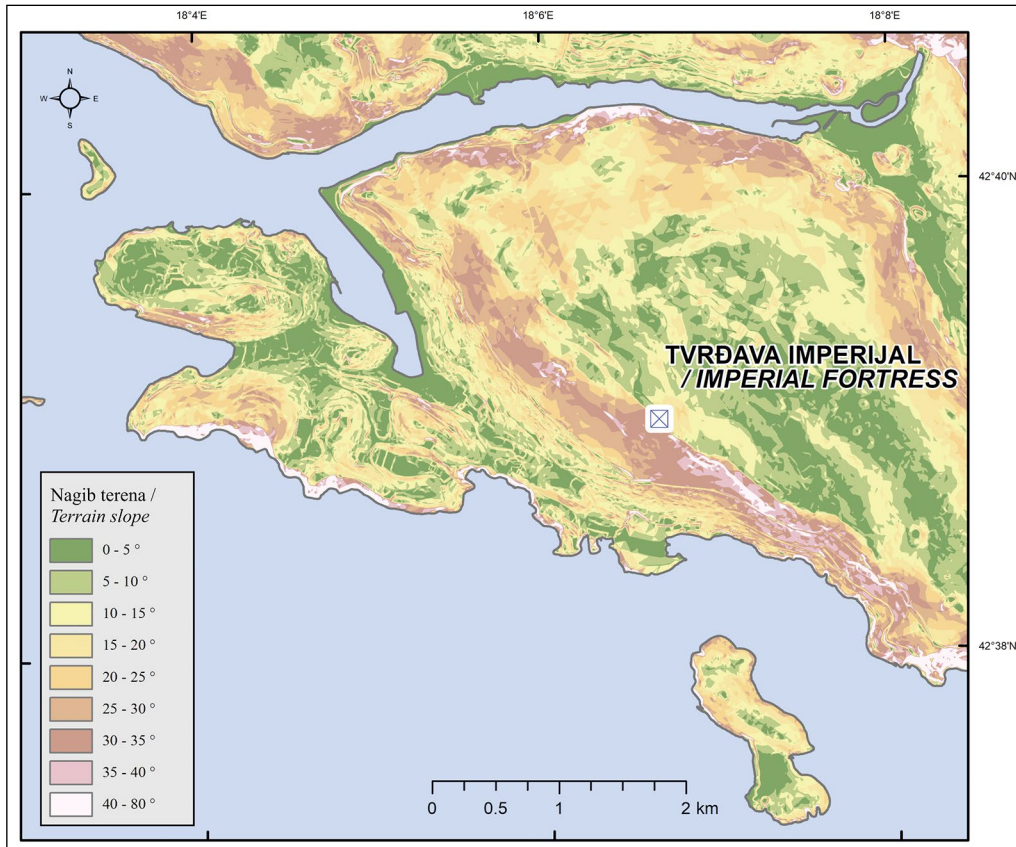
On Srđ plateau to the east, the field of fire from the fort Imperial faced limitations imposed by the eastern forest (500 meters) and intervisibility lines to the north and southeast (1000 metres). Moreover, due to the steep hill situated southwest of the fort Imperial (Fig. 6), the use of flat trajectory weapons from the city towards Srđ was restricted; instead, it was limited to mortar fire with the capability of ‘plunging fire’. Nevertheless, positioned at the very edge of the plateau, the fort Imperial was a spot where nearly the entire city of Dubrovnik could be targeted from.

In contrast, the fire support available to the defenders of Dubrovnik was notably modest. Although the effective range of the weapons at their disposal allowed for targeting deep rear positions of the attackers, most of these weapons were allocated for city defence (Fig. 6b). A limited number of mortars and flat trajectory cannons provided supplementary fire support in the vicinity of the fort Imperial.

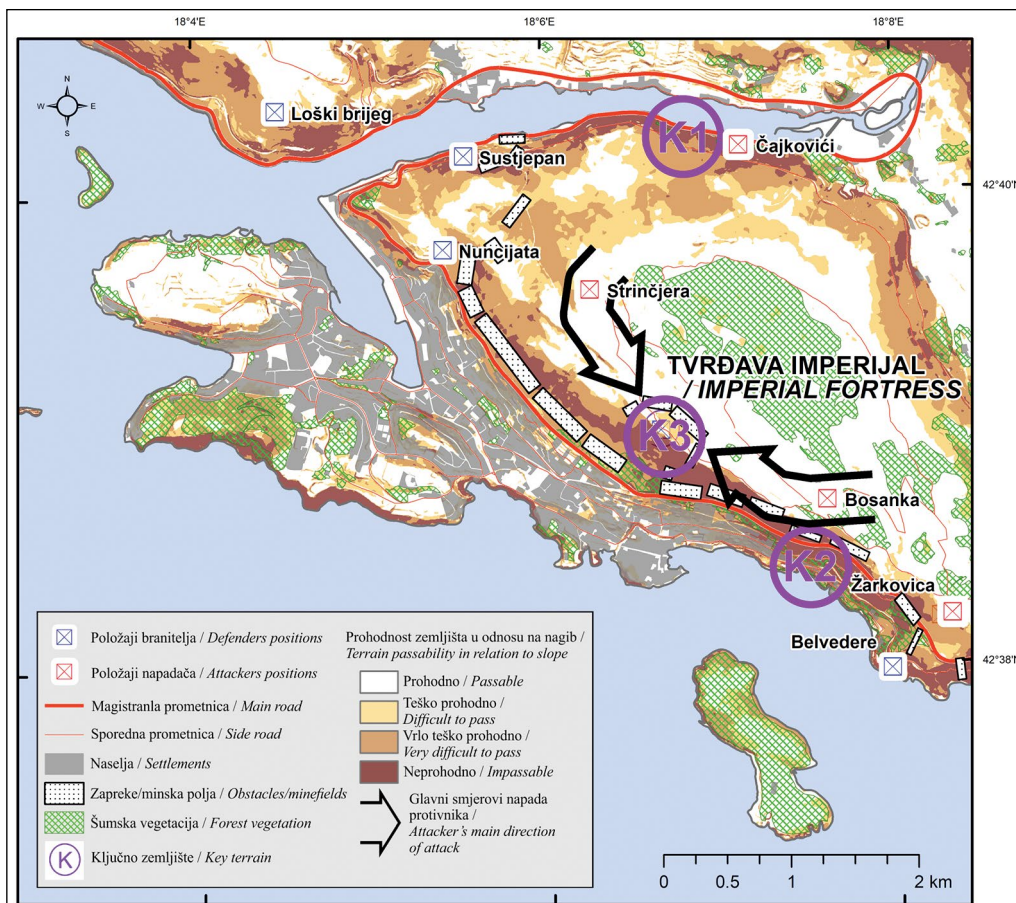
OAKOC: AVENUES OF APPROACH

An avenue of approach denotes a relatively unobstructed air or land route through which military forces can advance towards key terrain or other objectives within the area of operations. The transport infrastructure, relief features, vegetation, hydrographic networks, and soil condition all impact the trafficability and mobility of forces and vehicles in an area.

Dubrovnik is accessible via sea or via ‘Jadranska magistrala,’ a coastal road leading from the north to towns Slano (35 km), Gornji Brgat to the southeast (5 km), and Cavtat to the south (17 km). The terrain leading to Dubrovnik doesn’t accommodate movement for motorized units in battle formations and is only suitable for road travel. Moreover, there is no rail network in this region. Srđ plateau, overlooking Dubrovnik, permits



SLIKA 7. Nagibi terena u okolici grada Dubrovnika
 FIGURE 7 Terrain slope around city of Dubrovnik



SLIKA 8. Ključni tereni, prohodnost zemljišta i avenije prilaza prema tvrđavi Imperijal
 FIGURE 8 Key terrains, trafficability of terrain, and avenues of approach leading to the Imperial Fortress

manevar borbenih postrojbi, ali ono je okruženo i odsječeno strmim padinama, stoga je pristup vozilima ograničen na jugoistočnu blago položenu padinu iz pravca Gornjeg Brgata (Sl. 7.). Prilaz tvrđavi Imperijal moguć je jedino iz smjera jugoistoka preko dviju makadamskih cesta: iz Bosanke i kružnom obilaznom rutom oko šume koja prelazi preko vrha Stinčjere (Sl. 8.). Ta dva koridora, širine oko 500 metara i dubine oko 1000 metara, upotrijebljeni su kao glavni pravci napada. Na njima se može rasporediti postrojba veličine satnije, koja sadržava tri voda s tridesetak vojnika, a njihov prosječni razmakom može biti 5 metara (Headquarters, 2019, p. 53). U najintenzivnijem napadu na tvrđavu Imperijal sudjelovalo je pješništvo s dva tenka koji su nadirali iz smjera Bosanke i jednim tenkom iz pravca Stinčjere. S obzirom na konstantnu mogućnost motrenja branitelja, napadači su se koristili dimnim zavjesama i poduzimali pokrete noću kako bi prikrili svoje manevre.

OAKOC: KLJUČNI TEREN

U mnogim slučajevima tijekom vojne povijesti, geografska obilježja terena određivala su stratešku važnost određenih regija na bojištu, pružajući strani koja se brani značajnu taktičku prednost nad protivnikom. U tom kontekstu, dvije prilazne ceste i vrh Srđa izdvajaju se kao tri ključna terena ključna za preuzimanje kontrole nad Dubrovnikom.

Oba ključna kopnena pravca napadači su učinkovito blokirali prekinuvši logističku opskrbu grada. Napadač je izolirao Dubrovnik, koji je ostao odsječen od opskrbe s hrvatskoga kopna zbog kontrole sjeverne rute, prikazane na Sl. 3., kao 'Magistrala – sjever' i kao Ključni teren 1 – "K1" (Sl. 8). Napadač je imao pod kontrolom i južnu rutu, Ključni teren 2 – "K2" (Sl. 8) ili 'Magistrala – Jug' (Sl. 3.), koja je povezivala grad s lokalnim aerodromom i gradom Cavtatom na jugu. S oba zatvorena pravca, jedini preostali put opskrbe bio je sporadična opskrba brzih brodova koja se odvijala uglavnom u noćnim satima. Tvrđava Imperijal na vrhu platoa Srđ predstavljala je treći ključni teren – "K3" (Sl. 8.). Osvajanje platoa koji nadvisuje Dubrovnik omogućilo bi napadačima usmjeravanje

movement for battle formations but is encircled by steep hills on all sides except for the possible vehicle access from southeast via Gornji Brgat (Fig. 7). Access to the fort Imperial is attainable from the southeast via two loose surface roads: the route from the village Bosanka and a detour route circumventing the forest and traversing over the top of Strinčjera (Fig. 8). These two corridors, each approximately 500 meters wide and 1000 meters deep, served as the primary routes of attack. They accommodate company-level battle formations, consisting of three platoons of about 30 individuals each, with an average soldier spacing of approximately five meters (Headquarters, 2019, p. 53). During the most intense assaults on the fort Imperial, two tanks advanced from Bosanka and one from Strinčjera, accompanied by infantry. Given that observation positions favoured the defenders, the attackers resorted to using smoke screens and the cover of night to conceal their movements.

OAKOC: KEY TERRAIN

In numerous instances throughout military history, geographical features of terrain have dictated the strategic significance of certain regions on the battlefield, providing the holding side with a significant tactical advantage over the opposition. In this context, two access roads and the summit of Srđ emerge as the three key terrains crucial for gaining control over Dubrovnik.

Two crucial land routes were effectively blocked by the attackers, severing the city's logistical supply. Dubrovnik remained cut off from supplies from the Croatian mainland due to the control of the northern route, depicted in Figure 3 as 'Magistrala – sjever,' and Figure 8 as Key terrain 1 – 'K1,' by the attackers. The attacker also controlled the southern route, key terrain 2 – 'K2' (Fig. 8), or 'Magistrala – South' (Fig. 3), which connected the city with the local airport and the town of Cavtat in the south. With both routes closed, the only remaining supply route was the sporadic supply by fast boats, which took place mainly during the night. The fort Imperial atop the Srđ plateau represented the third key terrain – 'K3' (Fig. 8). The capture of the plateau overlooking Dubrovnik

vatre prema gradskim objektima, pristupnim putevima, gotovo svim položajima obrane i dolazećim brodovima. Čak ni s najprominentnije pozicije JNA (Žarkovica), motritelji nisu mogli dosegnuti sve dijelove Dubrovnika (Sl. 4a.). Imajući na umu spoznaju o nemogućnosti motrenja svih područja grada hrvatske snage su postavile minobacače oko kampa Solitudo radi prikrivanja paljenih položaja (Sl. 3.). Nadalje, pozicija Žarkovica nije ometala pristupne rute brodova prema Dubrovniku.

Srđ, sa tvrđavom Imperijal, ne predstavlja samo ključni tren već sadržava i sva obilježja dominantnog terena. Odnosno zbog svoje visine, nagiba, dimenzija i položaja omogućuje kvalitetno motrenje i pruža vatrene sektore preko zemljišta koje ga okružuje. Stoga prema svojim obilježjima tvrđava Imperijal sadržava sve značajke odlučujuće točke na zemljištu, unatoč tome što nije jedini ključni teren u području operacija.

OAKOC: PREPREKE

Prepreke, umjetne i prirodne, odigrale su važnu ulogu u obrani. Branitelji su strateški postavili nekoliko pješačkih minskih polja u području tvrđave Imperijal i na padinama Srđa. Protutenkovska oružja postavljena su uzduž glavnih prilaznih cesta prema gradu (Sl. 8.). Ove prepreke na glavnim prometnicama su osigurale kontrolu prometa i onemogućile ulazak motoriziranih snaga napadača u grad. Minska polja podno brda Srđ postavljena su radi sprječavanja brzog i lakog upada pješačkih snaga prema urbanoj jezgri Dubrovnika. Krševit i raščlanjen teren predstavljao je velike izazove za prikrivanje mina kod postavljanja minskih polja. Prilikom priprema napada, napadači su mogli pod okriljem noći ukloniti minska polja oko sjevernog dijela tvrđave Imperijal. Ovakvim rasporedom umjetnih prepreka uloga tvrđave Imperijal dodatno je pojačana i istaknuta kao centralno uporišno mjesto obrane Dubrovnika.

Reljef šireg područja Dubrovnika karakterizira brdovit i neprohodan teren, te velika vertikalna raščlanjenost reljefa od obale prema unutrašnjosti kopna. Srđ sa zaleđem povezuje blaga padina na jugoistočnoj strani, budući da je sa svih ostalih strana okružen strmim padinama (Sl. 7.). Jugoi-

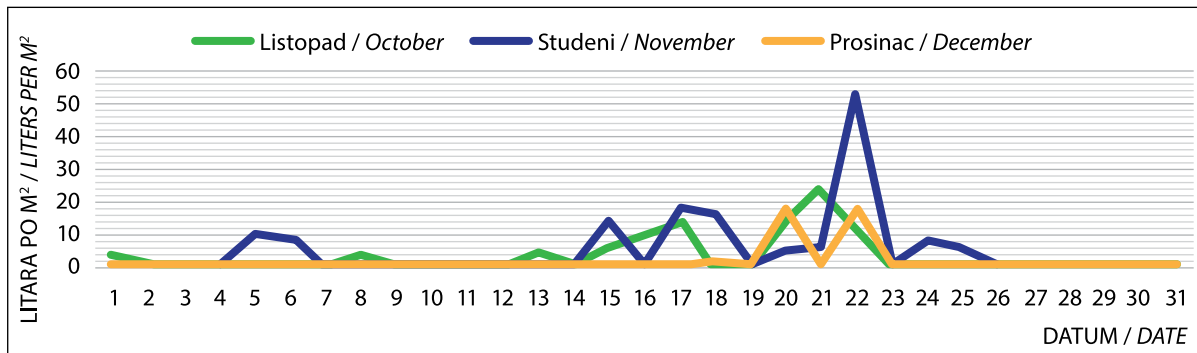
would have enabled the attackers to direct fire at city facilities, access routes, nearly all defender positions, and incoming ships. Even from the most advanced JNA position (Žarkovica), observers could not reach all parts of Dubrovnik (Fig. 4a). Considering the inability to observe all areas of the city, Croatian forces positioned mortars around 'Kamp Solitudo' to conceal firing positions (Fig. 3). Furthermore, Žarkovica position did not obstruct the boat access routes to Dubrovnik.

Srđ, along with the fort Imperial, not only constitutes a key terrain but also embodies all the characteristics of a dominant area. That is, due to its height, slope, dimensions, and position, it enables quality observation and provides firing sectors over the surrounding terrain. Therefore, the fort Imperial, with its characteristics, contains all the features of a decisive point on the terrain, even though it is not the only key terrain in the area of operations.

OAKOC: OBSTACLES

Obstacles, whether man-made or natural, played a critical role in the defence strategy. Defenders strategically positioned several minefields for infantry and anti-tank weapons along important traffic routes leading to the city, along the main road, in vicinity of the fort Imperial, and on the slopes of Srđ (Fig. 8). These obstacles on the main road facilitated traffic control by impeding the arrival of attackers motorized units. To deter infantry from swiftly infiltrating the centre of Dubrovnik, minefields were established at the foothill of Srđ. The rugged and uneven terrain posed challenges for concealing mines. In preparation for morning attacks, the attackers could clear minefields at the north of the fort Imperial under the cover of night. The installation of these barriers further underscored the position of the fort Imperial as the primary bastion of Dubrovnik's defence.

The relief of the wider Dubrovnik region is characterized by hilly and impassable terrain, highly vertically dissected from the coast to the mainland interior. Only a gentle slope on the south-eastern side of Srđ connects it to the hinterland, as it is surrounded by steep slopes from all other sides (Fig. 7). The south-eastern portion of the plateau of Srđ is accessible by vehicle. The sole road used by the at-



SLIKA 9. Padaline na području grada Dubrovnika krajem 1991. godine

FIGURE 9 Rainfall in the city of Dubrovnik at end of 1991

Izvor: Hrvatski Hidrometeorološki zavod / Source: Croatian Meteorological and Hydrological Service

stočni dio platoa Srđa omogućava pristup vozilima. Jedini put kojim su napadači održavali povezanost sa svim položajima na platou Srđ prolazio je kroz jugoistočni dio Gornjeg Brgata. Topološki, Srđ, kojem nedostaje istaknutih vrhova, podsjeća na kamenitu ravnicu koja ne priječi manevar vojnih vozila. Međutim, napadaču je krševiti teren otežavao pokret vojnika i svih vrsta vozila. Šumska pokrov i stijene učinile su centralni dio platoa Srđ neprohodnim za vozila, dok je makija utjecala na pokretljivost vojnika.

Čvrsta stijena na površini i prisutnost plitkih tala u području Dubrovnika olakšali su kretanje vozila. Prisutnost smeđih, crnih i crvenih glina dolomitskog podrijetla karakterizira ovo krško područje. Prisutne tipove tla karakterizira automorfno vlaženje, pri čemu padaline slobodno prodiru kroz solum, što osigurava dobru drenažu tla (Husnjak, 2014). Važno je napomenuti da su napadači imali vrlo povoljne vremenske uvjete tijekom napada, pri čemu padaline nisu utjecale na pokrete postrojbi (Sl. 9.). Naoblaka, magla, ekstremne temperature i naleti vjetrova imali su zanemarive učinke na planiranje ili provedbu vojnih operacija.

OAKOC: ZAŠTITA I PRIKRIVANJE

Pod pojmom „zaštita“ u vojno-geografskom kontekstu podrazumijeva se mogućnost zaštite od neprijateljskih vatri, pri čemu se vatrom može djelovati izravno i/ili granatiranjem. Zaštitu mogu pružiti izgrađeni objekti, rovovi, kanali ili zidovi. Bojište u širem području Dubrovnika i platoa Srđ predstavlja; krški teren, sa vrlo plit-

tackers to maintain connectivity to all positions on the plateau of Srđ traversed the south-eastern part of village Gornji Brgat. Topologically, Srđ is lacking prominent peaks, resembles a rocky plain that makes it easy for military vehicles to manoeuvre. However, the rocky terrain hampered the mobility of personnel and all vehicle types, impeding their progress. The forest cover and rocks rendered the central part of the plateau of Srđ impassable, while the remaining vegetation minimally affected troop mobility, except for the maquis, which restricted infantry movement.

The solid rock at the surface and the prevalence of shallow soils in Dubrovnik facilitated vehicle movement. The presence of brown, black, and red clays derived from dolomite-based soils characterizes this rugged karst region. These soil types exhibit an automorphic moistening, whereby rainfall freely percolates through the soil's solum, ensuring optimal drainage (Husnjak, 2014). Notably, the attackers encountered highly favourable weather conditions during the attack, with precipitation posing no impediment to troop movement (Fig. 9). Cloud cover, fog, temperature extremes, and wind variations had negligible effects on military operations planning or execution.

OAKOC: PROTECTION AND CONCEALMENT

The term 'protection' in a military-geographical context pertains to the defenders' capacity to withstand enemy fire, which may manifest as direct fire or bombardment. Structures like buildings, trenches, canals, and walls serve as protective measures. The battlefield in the wider area of Dubrovnik and

kim pedološkim slojem (svega nekoliko centimetara), a vrlo često i bez pedološke podloge, sa izloženom vapnenačkom ili dolomitnom stijenom na površini (Jakšić & Martinović, 1984; Marković, 1971). Učinak topništva po ciljevima na takvoj podlozi (otvoreno krško zemljište sa vapnenačkom ili dolomitnom stijenom na površini, te rijetkom i niskom vegetacijom) je značajno veći nego na zemljištu sa dubokim pedološkim slojem i bujnom (gustom) vegetacijom (Zečević & Jungwirth, 2007). Visoka učinkovitost rasprskavajućih granata na otvorenom krškom terenu (fragmenti rasprsnutih granata i ekspozijom rasprsnuti oštri komadi stijena), te intenzitet granatiranja utjecao je na povlačenje JNA sa tog, minobacačkoj vatri, izloženog područja. U takvom krškom okolišu sa stjenovitom podlogom bilo je teško brzo izraditi fortifikacijske objekte na Srđu (bez teške mehanizacije i eksploziva), stoga su branitelji koristili postojeće fortifikacijske objekte. U tom kontekstu kvaliteta i položaj tvrđave Imperijal predstavljala je značajnu prednost za hrvatske snage. Od svih postojećih utvrda na Srđu, jedino je tvrđava Imperijal bila funkcionalna, te je u njoj bilo zapovjedništvo obrane Srđa. Ostali obrambeni položaji zauzeti su na ruševinama utvrda koje se nalaze u blizini tvrđave Imperijal. Branitelji su koristili ostatke utvrda Delgorgue na Žarkovici, Strinčjera i objekte u području sela Bosanka. S druge pak strane, po napadača su otežavajuće okolnosti bile učinkovitost braniteljskih vatri tijekom manevra po otvorenom krškom zemljištu, te nemogućnost brze izgradnje rovova i zaklona, odnosno utvrđivanja zauzetih položaja.

RASPRAVA

U bitci za Dubrovnik kao ključni tereni su se istakli Srđ s tvrđavom Imperijal i dvije pristupne ceste prema gradu. Područje Srđa, oko tvrđave Imperijal, predstavlja i odlučujući teren, jer bi osvajanje napadaču omogućilo stratešku prednost, dopuštajući mu da neutralizira ili uništi snage branitelja, poremeti logističku potporu grada i vatrom ugrozi bilo koju točku unutar grada. U takvim uvjetima, odsječeni od linija opskr-

the Srđ plateau consists of karst terrain, with a very shallow soil layer (only a few centimetres), and very often without any soil cover, exposing limestone or dolomite rock on the surface (Jakšić & Martinović, 1984; Marković, 1971). The effect of artillery on targets in such terrain (open karst land with limestone or dolomite rock on the surface, and sparse low vegetation) is significantly greater than on land with a deep soil layer and lush (dense) vegetation (Zečević & Jungwirth, 2007). The high efficiency of fragmentation grenades in open karst terrain (fragments from exploded grenades and sharp rock pieces scattered by explosions), along with the intensity of shelling, influenced the withdrawal of the Yugoslav People's Army (JNA) from that exposed area under mortar fire. In such karst environment with rocky terrain, it was difficult to quickly construct fortifications on Srđ (without heavy machinery and explosives), so defenders utilized existing fortification structures. In that context, the quality and position of the fort Imperial represented a significant advantage for the Croatian forces. Among all existing fortifications on Srđ, only the fort Imperial remained functional, serving as the command centre for the defence of Srđ. Other defensive positions were established among the ruins of other fortifications located near the fort of Imperial. The defenders utilized the remnants of the Delgorgue fortifications on Žarkovica, Strinčjera, and structures around the village of Bosanka. The attackers faced challenging conditions due to the effectiveness of the defenders' fire during manoeuvres over the open karst terrain. They also struggled with the inability to quickly construct trenches and shelters or to fortify the captured positions.

DISCUSSION

Srđ, with the fort Imperial, emerged as a key terrain in the Battle of Dubrovnik, along with other key terrains in the vicinity, notably the two access roads to the city. The territory of Srđ, centred around the fort Imperial, holds as decisive terrain, as its capture would grant the attackers strategic advantages, allowing them to neutralize or annihilate the defenders' forces, disrupt the city's logistical support, and target any point within the city. In such conditions, cut off

be i nebranjani, branitelji grada bi se vjerojatno predali nakon izvjesnog perioda zbog nedostatka osnovnih resursa.

Strateški značaj Srđa istaknut je i zapovijedi zapovjedništva JNA, u kojoj je admiral Mile Kandić naglasio da je osvajanje Srđa ključni cilj za uspjeh operacije (Pezo, 2015, p. 103). Intencija napadača naglašava ulogu Srđa ne samo kao ključnog terena, već i kao odlučujuće točke na terenu, kako je definirano prema Jomini (1838).

Najveći problem branitelja uz mali broj dalekometnog oružja bila je mala količina streljiva. Uzrok tome bio je prekid transportnih linija i općeniti nedostatak logističke potpore, što je imalo izravan utjecaj paljbenu moć na svim lokacijama. S obzirom da su obje ceste prema Dubrovniku kontrolirali napadači, logistička potpora bila je povremena i uglavnom je ovisila o povremenim dopunama koje su pristizale gliserima iz Odreda naoružanih brodova. Ti su gliseri nisu dostavljali samo materijalne i tehničke resurse, već su prenosili vijesti i informacije u grad pod opsadom (Pezo, 2015). Držeći pod kontrolom dva od tri ključna terena koja okružuju grad, tvrđava Imperijal je postala ultimativni cilj napadača.

Jedina veza koja spaja grad Dubrovnik i tvrđavu Imperijal ostala je pješaka staza „Križni put“. Nijedan od položaja napadača nije omogućavao nadzor te staze, budući da je bila vidljiva samo iz Dubrovnika i s mora. S druge pak strane, da u napadači preuzeli kontrolu nad tvrđavom i Dubrovnik bi pao u njihove ruke. Nemogućnost nadzora te pješačke staze bila je ključna za obranu Dubrovnika. Ova veza osigurala je popunu i izmjenu ljudstva i logističke potpore braniteljima u tvrđavi Imperijal. Nadzor iz zraka nije bio moguć zbog prisustva protuzračnih topova unutar grada. Nadzor s mora također je bio ograničen, jer bi svaki brod u blizini Dubrovnika bio otkriven i time izložen vatrama branitelja. Iako je grad povremeno bio meta napada brodova, pješaka staza ostala je izazov za gađanje zbog svoje kosine i ograničene mogućnosti motrenja. Po završetku jednog od najintenzivnijih napada, dana 12. studenog 1991. godine nakon gubitka položaja na Strinčjeri, povukli su se i svi branitelji iz tvrđave Imperijal. Na taj način glavna uporišna točka obrane – tvrđava Imperijal, tijekom dva dana

from supply lines and undefended, it is likely that the city would have surrendered after a certain period due to the lack of basic resources.

The strategic significance of Srđ was underscored by JNA command order, where Admiral Mile Kandić emphasized the capture of Srđ as a crucial objective for the operation's success (Pezo, 2015, p. 103). The attackers' intention underscores the role of Srđ as not only a key terrain but also a decisive point on the ground, as defined by Jomini (1838).

The defender's biggest issue along quantity of long-range guns was ammunition. This arose due to transportation disruptions and insufficient logistical support, affecting ammunition and weaponry across all locations. With both roads to Dubrovnik controlled by the attackers, the logistic support was sporadic, mainly relying on occasional provisions delivered by speedboats from the Armed Ships Detachment. These boats not only delivered material and technical resources but also conveyed news and information to the besieged city (Pezo, 2015). With two of the three key terrains encircling the city falling under attacker control, the fort Imperial became their ultimate objective.

A single footpath 'Križni put' remained as the sole link connecting the city of Dubrovnik to the fort Imperial. None of the attacker's positions allowed for surveillance of this path, as it was visible only from Dubrovnik and the sea. Conversely, had the attackers seized control of the fortress, Dubrovnik would have fallen into their hands. The inability to monitor this footpath was crucial for Dubrovnik's defence. This link facilitated the delivery of both personal and logistical support to the defenders in the fort Imperial. Air surveillance was unfeasible due to the positioning of anti-aircraft guns within the town. Surveillance from the sea also posed limitations, as any ship detected near Dubrovnik would likely face continuous fire. Although the city was occasionally targeted by ships, the footpath remained a challenge for targeting due to its slope and concealment from the attackers' view. On 12 November, 1991, following one of the most intense attacks and the loss of the position at Strinčjera due to supply shortages, all defenders withdrew from the fort Imperial for that one night. The main bastion of defence stood undefended for two days (Pezo, 2015, p. 701). However, the defenders returned on

ostala prazna i nebranjena (Pezo, 2015, p. 701). Branitelji su se 14. studenog 1991. godine vratili natrag u tvrđavu Imperijal. Izostanak vizualne kontrole ovog komunikacijskog pravca nameće se kao jedino objašnjenje neosvajanja tvrđave od strane protivnika. U suštini, zbog izostanka nadzora opskrbe rute, napadači nisu imali informaciju o broju branitelja i količini naoružanja u tvrđavi.

Napadač nije mogao koncentrirati snage u neposrednoj blizini tvrđave. Prostrani otvoreni prostor širine oko 500 metara omogućavao je upotrebu vojnih snaga do razine satnije. Da je napadač odlučio uključiti dodatne snage imao pri pregust raspored i one bi bile izloženije topničkoj ili minobacačkoj vatri. U najintenzivnijem boju 6. prosinca 1991. godine, napadač je izveo napad na tvrđavu Imperijal iz dva smjera, podržan topničkom potporom, pješastvom i tenkovskim vodom s tri sovjetska tenka T-55. Napadač je uspio zauzeti krovni dio tvrđave, dok su branitelji ostali „zarobljeni“ u nižim katovima tvrđave. Na inzistiranje branitelja unutar tvrđave iz grada Dubrovnika pružena je vatrena potpora na samu tvrđavu dok su i branitelji bili u njoj. Stjenoviti teren i rasprsnuti komadi stijena uslijed eksplozija pojačali su učinak vatrene potpore. Tvrđava je štitila hrvatske vojnike na nižim razinama, a vatrena potpora iz grada nanijela je teške gubitke snagama napadača, što ih je prisililo na prekid napada.

Ishod napada možda bi bio drugačiji da je napadač bolje koncentrirao združene vatre prema tvrđavi Imperijal. Napadač je imao na raspolaganju veliku vatrenu moć (i zračne snage), ali tijekom napada vatrena potpora nije bila efikasna. Gađani su i objekti bez vojnog značaja, a količina vatre utrošena na tvrđavu Imperijal nije bila dovoljna za njenu neutralizaciju (Pezo, 2015, p. 608–617). Prema izvješćima Instituta za obnovu Dubrovnika, oštećeno je ukupno 594 objekta koji se nalaze unutar povijesne jezgre grada koja je pod zaštitom UNESCO-a od 1972. godine (Blagoje, 2009), pri čemu bi broj mogao biti i veći, zbog nekih neprocesuiranih objekata. Za osvajanje tvrđave napadači je mogao angažirati i specijalne snage, ali nije poznato jesu li napadači imali raspoložive specijalne snage za sudjelovanje u bitci.

14 November, 1991. The attacker's failure to capture the fortress was solely attributed to the lack of visual control over this crucial communication line. Essentially, due to the lack of control over the supply route, the attackers did not have information about the number of defenders and the amount of weaponry in the fortress.

The attackers' forces couldn't gather in the immediate vicinity of the fortress due to the expansive open space spanning about 500 meters wide, accommodating the presence of company-level soldiers. If the attackers had opted to strike with additional troops, these forces would have been highly vulnerable to artillery or mortar fire, given the difficulty of separating men effectively. In the climactic battle on 6 December, 1991, the attackers launched a strike on the fort Imperial from two directions, backed by artillery support, infantry, and a tank platoon comprising three T-55 Soviet-era tanks. Despite gaining access to the fortress's upper levels, the defenders sought refuge in the basement. At the insistence of the defenders within the fortress, fire support was provided from the city of Dubrovnik directly onto the fortress while the defenders were inside. The rocky terrain and burst rock fragments from explosions reinforced the impact of the fire support. The fortress shielded the Croatian soldiers at lower levels, and the city's fire support inflicted severe casualties on the attackers' forces, compelling them to abandon their assault.

The outcome could have differed had the attackers directed their firepower towards the fort Imperial during the assaults. During the attack on the city despite possessing ample firepower, including air support, they utilized it inefficiently by targeting objects devoid of military significance, making it challenging to ascertain the necessary firepower to neutralize the fortress (Pezo, 2015, p. 608–617). According to the reports of the Institute for the Restoration of Dubrovnik, 594 objects within the city's historic core, under UNESCO protection since 1972, sustained damage (Blagoje, 2009), though the actual figure could be higher, considering unaccounted objects. The invader could have deployed Special Forces to breach the fortress but opted against it. It's unknown if the attackers had Special Forces available to engage in the battle.

Usprkos činjenici da je tvrđavu Imperijal branio relativno mali broj vojnika (oko 30), obrambene snage uspješno su osujetile napadače. Oružje najvećeg kalibra koje je korišteno pri obrani tvrđave Imperijal bila je teška strojica. Doprinos tvrđave u obrani bio bi i znatno veći da su branitelji imali pristup moćnijem oružju, slično onome koje je imao u posjedu protivnik.

Tvrđava Imperijal je odlučujući teren, jer njenim zauzimanjem branitelju više ne bilo moguće ni na koji način nadzirati pokret napadača. Branitelji više ne bi mogli rukovati topničkim vatrama zbog izostanka korekcija vatri. Opskrba s morske strane više ne bi bila sigurna i moguća, je bi napadač mogao neposredno i posredno djelovati na luku i plovila u njoj. Opisani scenarij bi sa velikom vjerojatnošću doveo do odluke da se nakon pada tvrđave Imperijal Dubrovnik preda u ruke napadača. Gubitkom Srđa ponovio bi se jedini slučaj kroz povijest kada je Dubrovačka Republika poražena u oružanom sukobu, tada je zaposjedanje Srđa rezultiralo predajom grada u ruke vojske Napoleona Bonaparte.

Kroz povijest je postojao veliki broj fortifikacijskih objekata ili obrambenih sustava utvrda na sličnom ili istom tipu zemljišta kao tvrđava Imperijal. Neke od njih su ispunile i svoju ulogu u modernome ratovanju od kojih su, u ovome radu već spomenuti, obrambeni sklop Gibraltara, utvrđeni položaj na Monte Cassinu, obrambeni sustav utvrda u istočnom dijelu Boko Kotorskog zaljeva (Goražda, Vrmac i Trašte) i tvrđava Imperijal na Srđu.

ZAKLJUČAK

Analizom je utvrđeno da je pristup gradu Dubrovniku bio moguć jedino morskim putem i putem dva uska kopnena pravca. Ključni element bitke je brdo Srđ, koje je vrlo blizu grada i pruža kontrolu nad cijelim područjem. Jedna tvrđava iz doba Napoleona smještena na rubu visoravni bila je dovoljna da zaustavi napredovanje neprijatelja. Sljedeći faktor pobjede obrane bila je konstantna logistička potpora tvrđave jednom jedinom pješačkom stazom koju niti jedan napadački položaj nije mogao nadzirati. Napadač nije uspio

Despite being defended by a relatively small contingent (around 30 soldiers), the defence forces successfully thwarted the attackers. The heaviest weapon employed from the fort Imperial was the heavy machine gun. The fortress's impact would have been more substantial had the defenders possessed access to more potent weapons akin to those used by the adversary.

The fort Imperial is decisive terrain because its capture would have made it impossible for the defenders to monitor the attackers' movements in any way. The defenders would no longer have been able to command and control artillery fire. Supply from the seaside would no longer have been safe or possible, as the attacker could have directly and indirectly affected the harbour and the vessels in it. The described scenario would very likely have led to the decision to surrender Dubrovnik to the attackers after the capture of the fort Imperial. The loss of hill Srđ would mirror the only case in history when the Republic of Dubrovnik was defeated in armed conflict; at that time, the occupation of Srđ resulted in the city being handed over to the army of Napoleon Bonaparte.

Throughout history, there have been numerous fortification objects or defensive systems fortresses on similar or identical land as where the fort Imperial is situated. Some of them fulfilled their role in modern warfare, of which, already mentioned in this paper, are the defensive complex of Gibraltar, a fortified position at Monte Cassino, the defence system of the fortresses in the eastern part of the Bay of Kotor (Goražda, Vrmac and Trašte) and the fort Imperial on the hill Srđ.

CONCLUSIONS

The analysis showed that the city of Dubrovnik was accessible only by two narrow land routes, apart from the sea. The main element of the battle is hill Srđ, which is close to the city and provides control over the entire area. One Napoleonic-era fortress situated on the edge of a plateau was enough to stop the attackers' advances. Another contributing factor on the defending side was the fact that the fortress' logistic supply was carried out using only one footpath, and no position held by the invader could have provided surveillance of that pathway. The attacker failed

nadzirati jedini opskrbeni put s mora, a korištenje dronova u to vrijeme bilo je, blago rečeno, vrlo ograničeno.

Da je JNA zauzela primarnu i najjaču utvrdu na Srđu – tvrđavu Imperijal, uspješna obrana Dubrovnika bila bi dovedena u pitanje. Pad grada bi omogućio agresoru kontrolu nad južnom Dalmacijom, gurajući RH u delikatan vojni i diplomatski položaj. Brdo Srđ, s tvrđavom Imperijal u svojem središtu, istaknulo se kao ključni i odlučujući teren za operaciju. Neosvojena tvrđava Imperijal i grad Dubrovnik omogućili su kasnije operacije oslobađanja Konavala i okolnog područja Dubrovnika. Tadašnja situacija je posljedično omogućila oslobađanje cijelog južnog bojišta u Domovinskom ratu tijekom 1992. godine.

Evolucija ratovanja istisnula je značaj tradicionalnih utvrda zbog napretka topništva, zrakoplovstva i mehaniziranih snaga. Međutim, primjer tvrđave Imperijal prikazuje da obrambene utvrde mogu imati presudnu važnost i u doba modernog konvencionalnog vođenja rata.

Autorski doprinos: Znanstveni doprinos Hrvoja Heštere odnosi se na kreiranje koncepta istraživanja, postavljanje hipoteza, osmišljavanje metodologije istraživanja te pisanje i prevođenje glavnine teksta. Sudjelovao je u prikupljanju literaturnih izvora, prikupljanju, obradi, strukturiranju, analizi i vizualizaciji geoprostornih podataka te u izradi svih grafičkih i tabličnih priloga. Znanstveni doprinos Dalibora Gernhardta ogleda se u suradnji na pripremi i provedbi OAKOC analize zemljišta, iznošenju dijela rezultata istraživanja, izradi dijela grafičkih priloga te prijevodu teksta na engleski jezik. Znanstveni doprinos Marka Zečevića odnosi se na sudjelovanje u kreiranju hipoteza i nacrtu istraživanja. Proveo je pregled dosadašnjih istraživanja i prikupio dio literaturnih izvora.

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Sukob interesa: Autori izjavljuju da nema sukoba interesa.

to monitor the only supply route by the sea, and the usage of drones at the time was, at least very limited.

If JNA had seized the fort Imperial as the primary and strongest fortification on Srđ, Dubrovnik's defence would have been significantly compromised. The city's fall would have granted the aggressor control over southern Dalmatia, plunging the Republic of Croatia into a precarious military and diplomatic predicament. Hill Srđ, with the fort Imperial at its heart, emerged as the key and decisive terrain for the operation. The unconquered fort Imperial and the city of Dubrovnik enabled subsequent operations to liberate Konavle and the surrounding Dubrovnik area. In essence, it facilitated the liberation of the entire southern theatre in the Homeland War of 1992.

The evolution of warfare has diminished the significance of traditional fortresses due to advancements in artillery, aviation, and mechanized forces. However, the example of the fort Imperial demonstrates that defensive fortifications can still have crucial importance in the era of modern conventional warfare.

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