

presented for the program Google Earth, and this chapter ends with a description of some other programs that could be applied for geostatistical or geographical (GIS) analyses, like Isatis, GRASS and Idrisi packages.

The last, fourth chapter, *A geostatistical mapping exercise*, is based on input data originated from analysed area of 10×10 km size, located near the town of Göttingen in central Germany. This area was explored in detail during several years, mostly with purpose of developing digital techniques for mapping soil variables. This example was analysed at the same time with all four packages – SAGA, ILWIS, R and Google Earth. Generally, the procedure starts with data analysis (descriptive statistics and point geometry analysis); it is followed by determination of secondary variables (*auxiliary predictors*) like DEM (*Digital Elevation Model*) parameters, satellite images of soil samples and geological strata, which are compiled into components useful for prediction of soil characteristics. Finally, predictions and simulations were made in the R

package and results exported into ILWIS, where they were modified for final presentation in Google Earth. This chapter also includes a description of regression modelling in the R language using several techniques and concluding if the secondary variables (*predictors*) can explain variation observed in target (primary) variables. Variogram modelling, as well as value prediction and simulation, were represented in the gstat program. Quality of such an estimation was described with two values (1) Mean Prediction Error (abbr. ME) and (2) Root Mean Square Prediction Error (abbr. RMSE). Results obtained with different input, caused by different cell size or sampling pattern are shown. Visualization of outputs was performed by ILWIS, and exported to Google Earth using the KLM format. The book ends with a bibliography consisting of 128 references, and an index of almost 250 English terms.

The book was published in 2007 by the *Joint Research Centre of the European Commission*, i.e. *Institute for Environment and Sustainability*. It was catalogued

as publication EUR 22904 EN, ISBN 978-92-79-06904-8 and ISSN 1018-5593. It is protected by the author's copyright, but also freely available as a PDF. The full, 146 page text can be downloaded from the following address: [http://eu-soils.jrc.it/ESDB\\_Archive/eusoils\\_docs/other/EUR22904en.pdf](http://eu-soils.jrc.it/ESDB_Archive/eusoils_docs/other/EUR22904en.pdf).

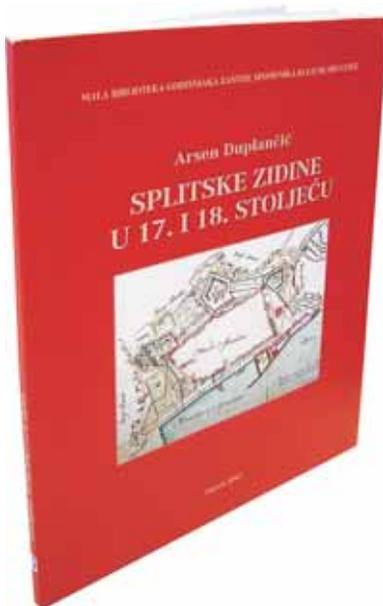
The author invested much knowledge, experience and effort into this book, which is a high quality scientific work for advanced users. Also, numerous procedures and program packages are described, which is why this book can also be a valuable guide for teams engaged in (geostatistical) mapping of different environmental variables (primarily from soil, but can also be applied to other regionalized variables from human environment, like geological, geographical, meteorological and other variables, ...). Such teams include professionals from different fields (data processing, cartography, computer programming), and this book covered each of them.

Tomislav Malvić

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## Split City Walls in the 17th and 18th Century

Arsen Duplančić



In 2007, the Administration for the Protection of Cultural Heritage of the Ministry of Culture of the Republic of Croatia published *Split City Walls in the 17th and*

*18th Century* as the 13th volume in the edition *Mala biblioteka Godišnjaka zaštite spomenika kulture Hrvatske* (Small Library of the Annual of Croatian Cultural Monument Protection). The author is Arsen Duplančić, a historian and librarian of the Archaeological Museum in Split. The book has 76 pages, A4 format, it is paperback, and has ISBN 978-953-6240-63-0.

The *Preface* written by Stanko Piplović states that the Split city walls from the 17th century were an extraordinary project comparable to the construction of Diocletian's Palace by work extent, resources invested and number of constructors. Their construction was critical for Split's existence and destiny in the most difficult times of its turbulent history. According to Piplović, this publication is the first significant attempt to comprehensively represent the city walls, with plentiful archive sources and graphical documents. He states there are several plans representing Split's baroque fortresses in various ways. He believes this leads to

considerations that some of the representations are incorrect, that some proposals were not realized or about states before the final decision. He adds that newer research offers interesting data about gradual transformation of Split's fortresses and the way its defence was reorganized.

The publication features a detailed chronological representation of Split's city walls construction based on written and pictorial material kept at libraries, archives, museums in Croatia and abroad. Book content is divided into following chapters:

- Situation before the beginning of the Candiot War in 1645
- Candiot War and fortification of Split
- Projects by C. Gonzaga and I. Conti
- City Gate
- Funds, house and church demolishing
- Situation and appearance of city walls after constructions

Göttingena u središnjoj Njemačkoj. To područje je detaljno istraživano niz godina, prvenstveno u cilju razvoja digitalnih tehnika za kartiranja varijabli mjenjenih u tlu. Primjer je obrađen usporedno kroz četiri programska paketa – SAGA, ILWIS, R i Google Earth. Načelno postupak započinje analizama podataka (deskriptivnom statistikom i analizom geometrije), zatim su određene pomoćne varijable (*auxiliary predictors*) poput parametra za DEM (*Digital Elevation Model*), satelitskih slika uzoraka u tlu i geoloških slojeva, te su pretvorene u komponente kojima se može predviđati karakteristike tla. Na kraju su pokrenute procjene i simulacije u paketu R, a rezultati preneseni u ILWIS gdje je pripremljen konačni izlaz za prikaz u Google Earthu. Opisano je regresijsko modeliranje unutar jezika R pomoću nekoliko tehnika te zaključivanje mogu li pomoćne varijable (*predictors*) objasniti varijacije opažene u ciljnim (primarnim) varijablama. Prikazano je variogramsko modeliranje programom Gstat, te procjena i

simulacija vrijednosti. Kvaliteta takve procjene opisana je kroz dvije vrijednosti (1) srednjom pogreškom predviđanja (*Mean Prediction Error – abbr. ME*) te (2) korijenom srednje kvadratne pogreške (*Root Mean Square Prediction Error – abbr. RMSE*). Prikazani su rezultati predviđanja dobiveni različitim ulaznim vrijednostima, zbog razlike u veličini čelije ili gustoći uzorkovanja. Vizualizacija izlaznih vrijednosti načinjena je s pomoću ILWIS-a, te kroz format KLM prenijeta u Google Earth. Knjiga završava bibliografijom od 128 referenci, te indeksom pojmova od gotovo 250 engleskih izraza.

Knjiga je priređena 2007. godine u izdanju *Joint Research Centre of the European Commission* (Zajedničkog istraživačkog centra Europske komisije), odnosno njezinoga *Institute for Environment and Sustainability* (Instituta za okoliš i održivost). Katagolizirana je pod oznakama EUR 22904 EN, ISBN 978-92-79-06904-8 te ISSN 1018-5593. Uz poštovanje zaštićenih autorskih prava slobodno

je dostupna u PDF-u. Cjeloviti tekst na 146 stranica dostupan je na mrežnoj adresi [http://eusoiils.jrc.it/ESDB\\_Archive/eusoiils\\_docs/other/EUR22904en.pdf](http://eusoiils.jrc.it/ESDB_Archive/eusoiils_docs/other/EUR22904en.pdf).

Autor je u knjigu uložio mnogo znanja, iskustva i truda, koja je sa znanstvene strane vrlo kvalitetno djelo za naprednije korisnike. Također, zbog brojnih postupaka i programskih paketa koji su opisani u knjizi, ona može biti vrijedan vodič timovima koji se bave (geostatističkim) kartiranjem različitih varijabli prikupljenih u čovjekovu okolišu (prvenstveno se to odnosi na tlo, ali se može primijeniti i na druge regionalizirane varijable u čovjekovoj okolini, poput geoloških, geografskih, meteoroloških, ...). Takvi timovi uključuju niz stručnjaka za pripremu podataka, kartografsku obradbu te programiranje aplikacija, a knjiga je obradila svako od tih područja.

Tomislav Malvić

## Splitske zidine u 17. i 18. stoljeću

### Arsen Duplančić

Uprava za zaštitu kulturne baštine Ministarstva kulture objavila je 2007. godine u ediciji *Mala biblioteka Godišnjaka zaštite spomenika kulture Hrvatske* kao 13. svezak publikaciju *Splitske zidine u 17. i 18. stoljeću*. Autor publikacije je Arsen Duplančić, povjesničar i knjižničar u Arheološkom muzeju u Splitu. Publikacija ima 76 stranica formata A4, meko je ukoričena, nosi oznaku ISBN 978-953-6240-63-0.

U *Predgovoru* što ga je napisao Stan-ko Piplović, navodi se da su splitske zidine iz 17. st. izuzetan graditeljski pothvat koji se po opsegu radova, uložnim sredstvima i broju graditelja može usporediti s izgradnjom Dioklecijanove palače. Njihova je izgradnja bila presudna za opstanak i sudbinu Splita u najtežim vremenima njegove burne povijesti. Prema njegovu mišljenju, tekst ove publikacije je prvi značajni pokušaj cjelovitog prikaza zidina koji je bogato potkrijepljen arhivskim izvorima i slikovnim dokumentima. Piše da je poznato više planova koji prikazuju splitske barokne utvrde na dosta

različite načine. Smatra da to navodi na razmišljanje da je u nekim slučajevima riječ o netočnim prikazima, o nekim prijedlozima koji nisu ostvareni ili o stanjima prije nego što se prišlo ostvarenju konačnog rješenja. Dodaje da novija istraživanja pružaju zanimljive podatke o postupnom preobražaju splitskih utvrda i o načinu reorganizacije obrane.

Publikacija donosi detaljni kronološki prikaz izgradnje splitskih zidina na temelju prikupljene pisane i slikovne građe što se čuva u knjižnicama, arhivima, muzejima u Hrvatskoj i inozemstvu. Sadržaj knjige podijeljen je na sljedeća poglavlja:

- Stanje prije početka Kandijskog rata 1645.
- Kandijski rat i utvrđivanje Splita
- Projekti C. Gonzage i I. Contija
- Gradska vrata
- Novčana sredstva, rušenja kuća i crkava
- Stanje i izgled zidina nakon izgradnje

- Zidine i prostor uz njih prelaze u ruke privatnika
- Propadanje zidina i počeci rušenja u 19. stoljeću
- Oporuke i sredstva za uzdržavanje zidina
- Utvrđivanje istočnog zida Dioklecijanove palače
- Zgrade uz istočni zid Dioklecijanove palače

Duplančić navodi da je Split na najstarijoj slici grada iz polovice 16. st. pa do slike s početka 17. st. bio prikazan unutar Dioklecijanove palače i zidina koje su obuhvaćale njegov dio proširen prema Marjanu. Spominje da se u izvješćima mletačkih predstavnika vlasti i inženjera ističe slaba obrambena moć Splita i nužnost da se ona poboljša. To se osjetilo neposredno prije Kandijskog rata započetog u lipnju 1645.

Važno razdoblje za utvrđivanje Splita je od 1656. do 1668. u kojem je ostvarena

- ❑ City walls and surrounding space become private property
- ❑ City wall deterioration and beginnings of demolishing in the 19th century
- ❑ Last wills and funds for city wall maintenance
- ❑ Fortification of the eastern wall of the Diocletian's Palace
- ❑ Buildings along the eastern wall of the Diocletian's Palace

Duplančić notes Split was represented within the Diocletian's Palace and city walls encompassing its part expanded toward Marjan from the oldest picture of the city from the middle of the 16th century to the picture from the beginning of the 17th century. He mentions that Venetian authority representatives' and engineers' reports point out weak defensive capabilities of Split and necessity of their improvement. This was felt prior to the Candiot (Cretan) War, which started in June 1645.

watercolours from 1782, published as copper-engravings in 1802. The city walls are also represented in plans by Francesco and Pietro Gironci from 1784, Gale's drawing from 1800, city plan produced around 1800, Barač's watercolours from 1818, a drawing by J. B. van Moer from 1858 and a drawing by an anonymous author from 1875.

A decrease in the defensive importance of the city walls resulted in some of their parts changing purpose and becoming private property during the 18th century. Based on available material, Duplančić lists persons who were leased parts of the city walls or land around them.

Never completely finished and insufficiently maintained, the baroque city walls gradually deteriorated. Partial demolishing of the city walls started at the beginning of the 19th century, during French administration. Graphical documentation about the city walls produced after the French had left is offered by city plans

18th and 19th century). Some of them were published for the first time in this publication. Each illustration is accompanied with a text in English and Croatian, and most have their authors listed. The illustrations are kept at the Croatian State Archive in Zagreb, Photo Collections of the Archaeological Museum in Split and the Split City Museum, the State Archive and the Marciana National Library in Venice, and in several private collections.

The book text is followed by two appendices. The first is a report transcript describing the state of the Split city walls in April 1692. The report is unsigned and is kept at the State Archive in Venice. During his stay in Venice in 1996, Duplančić transcribed the report and, after some research, concluded its author was Boucaut. The second appendix is a list of state buildings and lands on a lease. The list is undated, and Duplančić determined it is from 1791.

The appendices are followed by notes including bibliographic data about used sources, literature, as well as a number of transcriptions of letters, reports, legends from plans and front views and many other data, which can also serve for further research.

After the notes, there is a list of abbreviations, sources and references. This is followed by a list of authors (persons, archives, museums) of published illustrations. Duplančić also lists papers which contains previously published parts of front views and plan legends, and which were published in this book. Sources used can be found at the Croatian State Archive in Zagreb, the State Archive in Zadar, the State Archive, Capitular (Kaptol) Archive, Archbishop Archive, University Library, Archaeological Museum and Ethnographical Museum in Split, the Split City Museum, and the State Archive, the Correr Museum and the Marciana National Library in Venice. The reference list also contains 22 articles by Duplančić, which makes it clear he has been researching the history of Split for twenty years.

Finally, there is a comprehensive summary in English, which is actually a translation of most of the book, separately for each chapter, which enables foreign readers to find out about Split's city walls construction.

The publication can be useful to architects, art historians, cartographers and others as a source of numerous previously unknown archive data and images about Split's city walls. In addition, the book can be a base and an incentive for other researchers to research the history of city walls' construction in other Croatian cities.

*Ivka Kljajić*



The period from 1656 to 1668 is important for Split because the project created by general Camilo Gonzaga was started, and the project was modified by general Innocentio Conti.

City wall construction required exceptional efforts and funding. Observing preserved documents and various orders by general regent, one can see that constructors building the city walls came from the whole middle Dalmatia and its islands and that labour duty had been decreed. The author writes about funds required for constructing the city walls and why houses and churches had to be demolished.

The city walls were completed at the same time the Candiot War ended, in 1669. The appearance of Split's baroque city walls is represented in Santini's drawings of Split from 1666, Eraut's views and sections from 1682, Juster's plan and views from 1708, copper-engravings in a book by R. Adam from 1764, representing the situation from 1757, Cassas'

from 1817 and 1819, a ground plan by Visko Kurir from 1826, a cadastral plan from 1831, Andrić's plans from 1846 and 1847, and a view by Johann Högel Müller from around 1845. Demolishing continued during the 20th century, which influenced formation of the contemporary city of Split.

Based on several published last wills from Split, Duplančić assumed a regulation was made during the first half of the 15th century stating a will is invalid unless the person leaves a certain amount for construction and maintenance of the city walls, listing several examples of wills from 15th to 18th century.

The book text ends with a city walls plan, along with a legend containing names of fortresses and city gates represented in six plans by various authors and production years.

The text is supplemented with numerous illustrations (views, plans, ground plans and front views of Split from 17th,

započeta realizacija projekta što ga je izradio general Camilo Gonzaga, a preinake projektu napravio general Innocentio Conti.

Izgradnja zidina zahtijevala je izuzetne ljudske i novčane napore. Iz sačuvanih isplata i raznih naredbi generalnih providura vidljivo je da su radnici koji su gradili zidine dolazili iz cijele srednje Dalmacije s otocima i da je bila proglašena radna obveza. Autor piše o novčanim sredstvima koja su bila potrebna za izgradnju zidina i razlozima rušenja kuća i crkava tijekom izgradnje zidina.

Dovršetak zidina poklapa se sa završetkom Kandijskog rata 1669. Izgled splitskih baroknih zidina prikazan je na Santinijevim crtežima Splita iz 1666., Eratovoj veduti i presjecima iz 1682., Justerovom planu i veduti iz 1708., bakrorezima u knjizi R. Adama iz 1764., a prikazuju stanje iz 1757, Cassasovim akvarelima iz 1782., a objavljenima kao bakrorezi 1802. Također su zidine prikazane i na planovima Francesca i Pietra Gironcija iz 1784., Galeovom crtežu iz 1800., planu grada izrađenom oko 1800, zatim Baračevom akvarelu iz 1818., crtežu J. B. van Moera iz 1858. i crtežu nepoznatog autora iz 1875.

Smanjenje obrambene važnosti zidina dovelo je do toga da su tijekom 18. st. njihovi dijelovi počeli mijenjati namjenu i prelaziti u ruke privatnika. Na osnovi dostupne građe, Duplančić donosi imena osoba kojima su pojedini dijelovi zidina ili zemljište oko njih dani u najam.

Nikad u potpunosti dovršene i tijekom vremena nedovoljno održavane, barokne su zidine postupno propadale. Djelomično rušenje zidina započelo je početkom 19. st., u doba francuske uprave. Grafičku dokumentaciju o zidinama nastalu nakon odlaska Francuza pružaju planovi grada iz 1817. i 1819., tlocrt Vicka Kurira iz 1826, zatim katastarski plan iz 1831., Andrićevi planovi iz 1846. i 1847. te veduta Johanna Högelmüllera iz oko 1845. Rušenja su nastavljena i tijekom 20. st. što je utjecalo na oblikovanje suvremenog izgleda Splita.

Na osnovi nekoliko objavljenih splitskih oporuka, Duplančić je pretpostavio da je još u prvoj polovici 15. st. donesen propis po kojem oporuka ne vrijedi ako oporučitelj ne ostavi određeni iznos za izgradnju i održavanje zidina navodeći nekoliko primjera oporuka iz razdoblja od sredine 15. do 18. st.

Na kraju teksta publikacije priložen je plan zidina s legendom koja sadrži nazive

utvrda i gradskih vrata prikazanih na šest planova različitih autora i godina izrade.

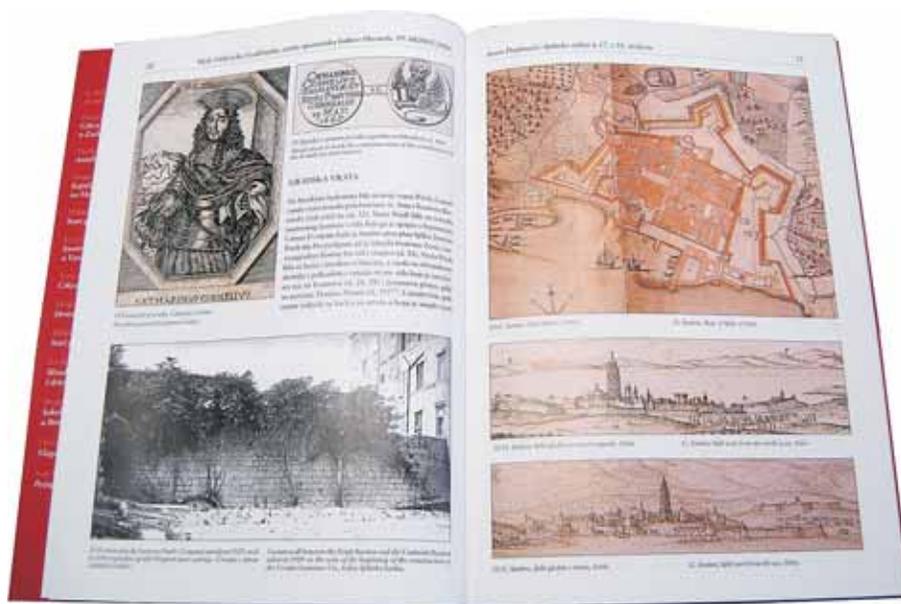
Tekst publikacije popraćen je mnogobrojnim ilustracijama (vedute, planovi, tlocrti i nacrti Splita iz 17., 18. st. i 19 st.). Neke od tih ilustracija po prvi su put objavljene u ovoj publikaciji. Uz svaku ilustraciju je tekst na hrvatskom i engleskom jeziku, a uz većinu njih su navedeni i njihovi autori. Ilustracije se čuvaju u Hrvatskom državnom arhivu u Zagrebu, Fototekama Arheološkog muzeja u Splitu i Muzeju grada Splita, Državnom arhivu i Nacionalnoj knjižnici Marciana u Veneciji, te u nekoliko privatnih zbirki.

Nakon teksta publikacije nalaze se dva priloga. Prvi od njih je prijepis izvještaja u kojem je opisano stanje splitskih zidina u travnju 1692. Izvještaj je nepotpisan i čuva se u Državnom arhivu u Veneciji. Za vrijeme boravka u Veneciji 1996. godine Duplančić je taj izvještaj prepisao te istraživanjem došao do zaključka da je

(osoba, arhiva, muzeja) objavljenih ilustracija. Duplančić donosi i popis radova u kojima su prethodno objavljeni dijelovi legendi nacrti i planova, a objavljeni su i u ovoj publikaciji. Korišteni izvori nalaze se u Hrvatskom državnom arhivu u Zagrebu, Državnom arhivu u Zadru, zatim Državnom arhivu, Kaptolskom arhivu, Nadbiskupskom arhivu, Sveučilišnoj knjižnici, Arheološkom muzeju i Etnografskom muzeju u Splitu, Muzeju grada Splita, te u Državnom arhivu, Muzeju Correr i Nacionalnoj knjižnici Marciana u Veneciji. U popisu literature su i 22 Duplančićeva članka. Iz toga je vidljivo da se već dvadesetak godina bavi istraživanjem povijesti Splita.

Na kraju publikacije je opširni sažetak na engleskom jeziku, zapravo prijevod većeg dijela teksta publikacije i to odvojeno za svako poglavlje, što omogućuje upoznavanje i inozemnih čitatelja s izgradnjom splitskih zidina.

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Boucaut autor tog izvještaja. Drugi prilog je popis državnih zgrada i zemljišta koji su dani u najam. Popis nije datiran, a Duplančić je utvrdio da je iz 1791.

Iza priloga slijede bilješke koje osim bibliografskih podataka o korištenim izvorima, literaturi, sadrže i veliki broj prijepisa pisama, izvješća, legendi s planova i nacrti te mnoge druge podatke, a mogu poslužiti i za daljnja istraživanja.

Nakon bilješki je popis kratica, izvora i literature. Zatim slijedi popis autora

Publikacija može poslužiti arhitektima, povjesničarima, povjesničarima umjetnosti, kartografima i drugima kao izvor mnogih dosad nepoznatih arhivskih podataka i slikovnih dokumenata o splitskim zidinama. Osim toga, publikacija može biti podloga i poticaj drugim autorima za istraživanja o povijesti izgradnje zidina ostalih hrvatskih gradova.

Ivka Kljajić