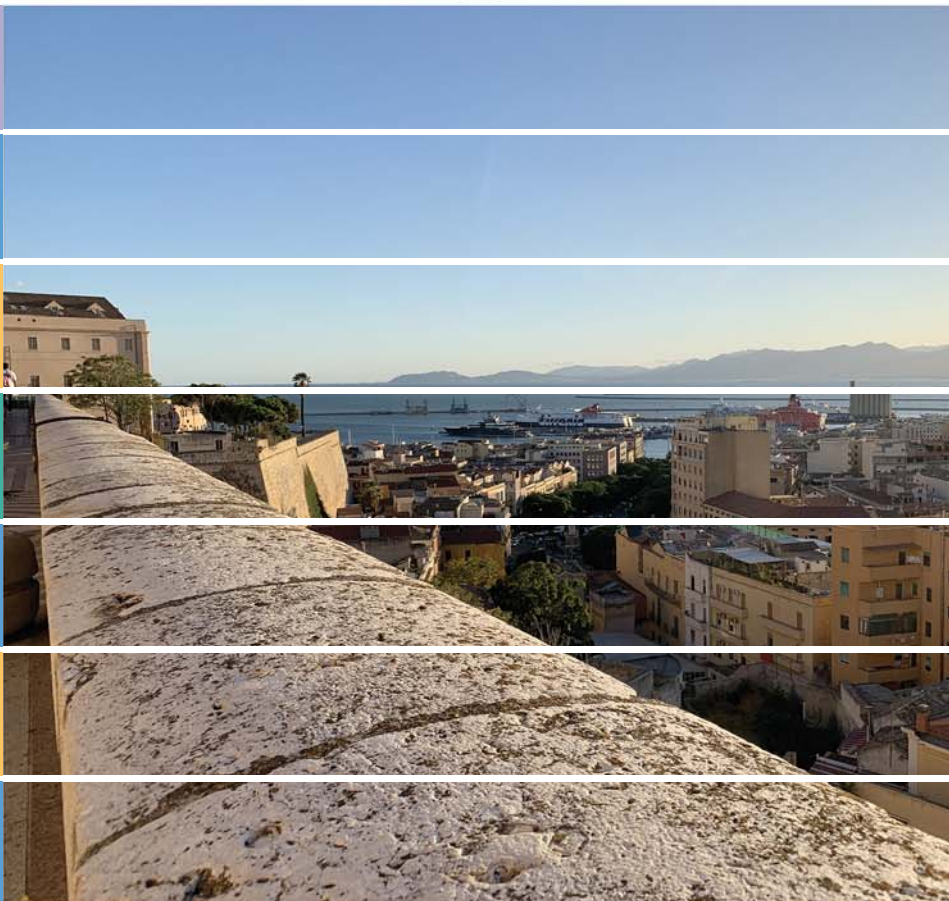


Carmela Gargiulo Corrado Zoppi
Editors

Planning, Nature and Ecosystem Services



INPUT TeMA Lab Dica UniNa



Federico II Open Access University Press



Planning, nature and ecosystem services / editors Carmela Gargiulo, Corrado Zoppi - Napoli: FedOAPress. 2019 - (Smart City, Urban Planning for a Sustainable Future. 5).

Web link:

<http://www.tema.unina.it/index.php/tema/Monographs>

ISBN: 978-88-6887-054-6

DOI: 10.6093/978-88-6887-054-6

Editor

Rocco Papa, University of Naples Federico II, Italy

Editorial Advisory Board

Mir Ali, University of Illinois, USA - Luca Bertolini, Universiteit van Amsterdam, Paesi Bassi - Luuk Boelens, Ghent University, Belgium - Dino Borri, Politecnico di Bari, Italia - Enrique Calderon, Universidad Politécnica de Madrid, Spagna - Roberto Camagni, Politecnico di Milano, Italia - Derrick De Kerckhove, University of Toronto, Canada - Mark Deakin, Edinburgh Napier University, Scotland - Aharon Kellerman, University of Haifa, Israel - Nicos Komninos, Aristotle University of Thessaloniki, Grecia - David Matthew Levinson, University of Sydney, Australia - Paolo Malanima, Magna Græcia University of Catanzaro, Italy - Agostino Nuzzolo, Università degli Studi di Roma Tor Vergata, Italia - Rocco Papa, Università degli Studi di Napoli Federico II, Italia - Serge Salat, Urban Morphology and Complex Systems Institute, France - Mattheos Santamouris, National Kapodistrian University of Athens, Greece - Ali Soltani, Shiraz University, Iran

Selection and double blind review under responsibility of INPUT aCADemy 2019 Conference Committee

© 2019 FedOAPress - Federico II Open Access University Press

Università degli Studi di Napoli Federico II

Centro di Ateneo per le Biblioteche "Roberto Pettorino"

Piazza Bellini 59-60 - 80138 Napoli, Italy

<http://www.fedoapress.unina.it>

Published in Italy

Gli E-Book di FedOAPress sono pubblicati con licenza

Creative Commons Attribution 4.0 International

Cover and graphic project: TeMALab

This book collects the papers presented at INPUT aCAdeMy 2019, a special edition of the INPUT Conference hosted by the Department of Civil and Environmental Engineering, and Architecture (DICAAR) of the University of Cagliari.

INPUT aCAdeMy Conference will focus on contemporary planning issues with particular attention to ecosystem services, green and blue infrastructure and governance and management of Natura 2000 sites and coastal marine areas.

INPUT aCAdeMy 2019 is organized within the GIREPAM Project (Integrated Management of Ecological Networks through Parks and Marine Areas), co-funded by the European Regional Development Fund (ERDF) in relation to the 2014-2020 Interreg Italy – France (Maritime) Programme.

INPUT aCAdeMy 2019 is supported by Società Italiana degli Urbanisti (SIU, the Italian Society of Spatial Planners), Istituto Nazionale di Urbanistica (INU, the Italian National Institute of Urban Planning), UrbIng Ricerca Scientifica (the Association of Spatial Planning Scholars of the Italian Schools of Engineering) and Ordine degli Ingegneri di Cagliari (OIC, Professional Association of Engineers of Cagliari).

SCIENTIFIC COMMITTEE

Dino Borri - Politecnico di Bari
Marta Bottero - Politecnico di Torino
Domenico Camarda - Politecnico di Bari
Arnaldo Cecchini - Università degli Studi di Sassari
Donatella Cialdea - Università del Molise
Giovanni Colombo - ISMB Istituto Superiore Mario Boella
Valerio Cutini - Università di Pisa
Andrea De Montis - Università degli Studi di Sassari
Romano Fistola - Università degli Studi del Sannio
Carmela Gargiulo - Università di Napoli "Federico II"
Davide Geneletti - University of Trento
Roberto Gerundo - Università degli Studi di Salerno
Paolo La Greca - University of Catania
Daniele La Rosa - University of Catania
Giuseppe Las Casas - University of Basilicata
Antonio Leone - Tuscia University
Sara Levi Sacerdotti - SITI
Giampiero Lombardini - Università degli Studi di Genova
Stefania Mauro - SITI
Giulio Mondini - Politecnico di Torino
Beniamino Murgante - University of Basilicata
Silvie Occelli - IRES Piemonte
Rocco Papa - Università di Napoli "Federico II"
Raffaele Pelorosso - Tuscia University
Alessandro Plaisant - Università degli Studi di Sassari
Bernardino Romano - Università degli Studi dell'Aquila
Francesco Scorza - University of Basilicata
Maurizio Tira - University of Brescia
Angioletta Voghera - Politecnico di Torino

LOCAL COMMITTEE

Ginevra Balletto - Università di Cagliari
Ivan Blečić - Università di Cagliari
Michele Campagna - Università di Cagliari
Ignazio Cannas - Università di Cagliari
Anna Maria Colavitti - Università di Cagliari
Sebastiano Curreli - Università di Cagliari
Maddalena Floris - Università di Cagliari
Chiara Garau - Università di Cagliari
Federico Isola - Università di Cagliari
Sabrina Lai - Regione Autonoma della Sardegna
Francesca Leccis - Università di Cagliari
Federica Leone - Università di Cagliari
Anania Mereu - Università di Cagliari
Marianna Agostina Mossa - Regione Sardegna
Salvatore Pinna - Università di Cagliari
Cheti Pira - Università di Cagliari
Daniela Ruggeri - Università di Cagliari
Laura Santona - Regione Sardegna
Corrado Zoppi - Università di Cagliari

Table of contents

Introduction <i>Corrado Zoppi</i>	15
Sessione 1 - Ecosystem services and spatial planning	
The Danube Riverside Development in the Iron Gates Gorge, Serbia, between Socio-economic needs and Protected Ecosystem <i>Branislav Antonić, Aleksandra Djukić, Milica Cvetanović</i>	17
From a species-centred to an ecosystem-based management approach, a case study of the saltmarshes of Hyères (Provence, France) <i>Patrick Astruch, Charles-François, Boudouresque, Thomas Changeux et al.</i>	29
Spatial evolutions between identity values and settlements changes. Territorial analyses oriented to the landscape regeneration <i>Donatella Cialdea</i>	39
Analyzing senior tourism. The role of ecosystem services to improve sustainable tourism destinations <i>Romano Fistola, Rosa Anna La Rocca</i>	52
Carbon sequestration and land-taking processes. A study concerning Sardinia <i>Maddalena Floris, Corrado Zoppi</i>	66
The impact of urbanization processes in landscape fragmentation. A comparison between coastal zones of Sardinia and Liguria <i>Giampiero Lombardini, Andrea De Montis, Vittorio Serra</i>	80
Areas of considerable public interest, territorial common goods and ecosystem services: an application case for the city of Cagliari <i>Marzia Morittu, Alessandro Plaisant</i>	86
A bottom up initiatives for biodiversity: ecologic representation for the inner areas of Sardinia <i>Giuseppe Roccasalva</i>	98
The soil matter between eco-systemic performance and spatial planning in metropolitan areas <i>Saverio Santangelo, Paolo De Pascali, Annamaria Bagaini, Clara Musacchio, Francesca Perrone</i>	111
Knowledge-building models for environmental planning: the case study of Bari <i>Stefania Santoro, Domenico Camarda, Pasquale Balena</i>	120
From Ecosystems to Ecosystem Services. A spatial methodology applied to a case study in Sardinia <i>Matilde Schirru, Simona Canu, Laura Santona, Sabrina Lai, Andrea Motroni</i>	130

Session: 2 - Integrated management of marine protected areas and Natura 2000 sites

Organize the management of protected areas according to an optimal framework. Experimental case <i>Aicha Bouredji</i>	142
A methodological approach to build a planning environmental assessment framework in the context of marine protected areas <i>Ignazio Cannas, Daniela Ruggeri</i>	152
An experimental methodology for the management of marine protected areas <i>Maddalena Floris, Federica Isola, Cheti Pira</i>	165
Marine Forests (Fucales, Ochrophyta) in a low impacted Mediterranean coastal area: current knowledge and future perspectives. A phycological review in Sinis Peninsula and the Gulf of Oristano (Sardinia Island, Italy) <i>Daniele Grech, Luca Fallati, Simone Farina, David Cabana, Ivan Guala</i>	176
Assessing the potential Marine Natura 2000 sites to produce ecosystem-wide effects in rocky reefs: a case study from Sardinia Island (Italy) <i>Paolo Guidetti; Pierantonio Addis; Fabrizio Atzori et al.</i>	185
Bottlenecks in fully implementing the Natura 2000 network in Italy. An analysis of processes leading to the designation of Special Areas of Conservation <i>Sabrina Lai</i>	201
Urban pressure scenario on the protected areas systems. The case study of Teatina adriatic coast <i>Alessandro Marucci, Lorena Fiorini, Carmen Ulisse</i>	212
Posidonia banquettes on the Mediterranean beaches: To what extent do local administrators' and users' perceptions correspond? <i>Paolo Mossone, Ivan Guala, Simone Simeone</i>	225
The ecosystem services cascade perspective in practice: a framework for cost-benefits analysis in Marine Protected Areas. The study case of Portofino Marine Protected Areas <i>Chiara Paoli, Paolo Povero, Giorgio Fanciulli et al.</i>	235
The contribution of the assessment of policy consistency and coherence to the definition of the legislative provisions of marine protected areas. The examples of the regulations of "Tavolara-Punta Coda Cavallo" and "Isola dell'Asinara" <i>Salvatore Pinna, Francesca Leccis</i>	251
Passive acoustics to monitor flagship species near boat traffic in the Unesco world heritage natural reserve of Scandola <i>Marion Poupard, Maxence Ferrari, Jan Schlüter et al.</i>	260
Use of ecological indices to assess the health status of <i>Posidonia oceanica</i> meadows in the Eastern Liguria. Influence of ecological status on natural capital <i>Ilaria Rigo, Monica Montefalcone, Carla Morri et al.</i>	271
Coastal governance and planning agreements for integrated management of marine protected areas in UE coasting project <i>Saverio Santangelo, Paolo De Pascali, Maria Teresa Cutri et al.</i>	281

Innovative management tools to survey boat traffic and anchoring activities within a Marine Protected Area 292
Thomas Schohn, Patrick Astruch, Elodie Rouanet et al.

SHADES. Sustainable and holistic approaches to development in European seabords 302
Francesco Vita, Fortunato Cozzupoli

Session 3 - Rural development and conservation of nature and natural resources

New local projects for disadvantaged inner areas. From traditional model to bio-regional planning 312
Anna Maria Colavitti, Alessio Floris, Francesco Pes et al.

Inclusion of migrants for rural regeneration through cultural and natural heritage valorization 323
Elisa Conticelli, Claudia de Luca, Aitziber Egusquiza et al.

Environmental and social sustainability of the bioenergy supply chain 333
Sebastiano Curreli

Proposals on the Agricultural Land Use in According to the Features of the landscape: The case study of Sardinia (Italy) 345
Pasquale Mistretta, Giulia Desogus, Chiara Garau

Common land(scape): morphologies of a multifunctional rural landscape in the Isalle Valley, Sardinia 356
Roberto Sanna

SheepToShip LIFE: Integration of environmental strategies with rural development policies. Looking for an eco-sustainable sheep supply chain 366
Enrico Vagnoni, Alberto Atzori, Giovanni Molle et al.

Session 4 - Geodesign, planning and urban regeneration

The territorial planning of European funds as a tool for the enhancement and sustainable development of natural areas: the experience of the Strategic Relevance Areas of the ERDF OP 2014-2020 375
Stefania Aru, Sandro Sanna

The International Geodesign Collaboration: the Cagliari case study 385
Michele Campagna, Chiara Cocco, Elisabetta Anna Di Cesare

A geodesign collaboration for the mission valley project, San Diego, USA 399
Chiara Cocco, Bruce Appleyard, Piotr Jankowski

University and urban development: The role of services in the definition of integrated intervention policies 410
Mauro Francini, Sara Gaudio, Annunziata Palermo, Maria Francesca Viapiana

Urban environment. An analysis of the Italian metropolitan cities <i>Giuseppe Mazzeo</i>	419
Recycled aggregates. Mechanical properties and environmental sustainability <i>Luisa Pani, Lorena Francesconi, James Rombi et al.</i>	431
Geodesign fast-workshops evidences. On field applications of collaborative design approach for strategic planning and urban renovation <i>Francesco Scorza</i>	443

Session 5 - Green and blue infrastructure

Green infrastructure as a tool of urban regeneration, for an equitable and sustainable planning. An application case at l'Eixample, Barcelona <i>Clara Alvau Morales, Tanja Congiu, Alessandro Plaisant</i>	453
The value of water: ecosystem services trade-offs and synergies of urban lakes in Romania <i>Denisa Lavinia Badiu, Cristian Ioan Iojă, Alina Constantina Hossu et al.</i>	465
A blue infrastructure: from hydraulic protection to landscape design. The case study of the village of Ballao in the Flumendosa river valley <i>Giovanni Marco Chiri, Pino Frau, Elisabetta Sanna et al.</i>	476
Municipal masterplans and green infrastructure. An assessment related to the Metropolitan Area of Cagliari, Italy <i>Sabrina Lai, Federica Leone, Corrado Zoppi</i>	488
The Ombrone river contract: A regional design practice for empowering river communities and envisioning basin futures <i>Carlo Pisano, Valeria Lingua</i>	502
Green infrastructures in the masterplan of Rome. Strategic components for an integrated urban strategy <i>Laura Ricci, Carmela Mariano, Irene Poli</i>	513

Session 6 - Smart city planning

Smart City Governance for Child-friendly Cities: Impacts of Green and Blue Infrastructures on Children's Independent Activities <i>Alfonso Annunziata, Chiara Garau</i>	524
Resilience, smartness and sustainability. Towards a new paradigm? <i>Sabrina Auci, Luigi Mundula</i>	539
Energy autonomy in symbiosis with aesthetics of forms in architecture <i>Pietro Curro</i>	549
Sharing governance and new technologies in smart city planning <i>Paolo De Pascali, Saverio Santangelo, Annamaria Bagaini et al.</i>	563

Smart Mapping Tools for the Balanced Planning of Open Public Spaces in the Tourist Town of Golubac, Serbia <i>Aleksandra Djukić, Branislav Antonić, Jugoslav Joković, Nikola Dinkić</i>	573
Towards a model for urban planning control of the settlement efficiency <i>Isidoro Fasolino, Francesca Coppola, Michele Grimaldi</i>	587
Somerville: Innovation City <i>Luna Kappler</i>	595
Urban regeneration for smart communities. <i>Caterina Pietra, Elisabetta Maria Venco</i>	605
Energy autonomy as a structural assumption for systemic development and circular economy <i>Manlio Venditelli</i>	619
 Session 7 - Water resources, ecosystem services and nature-based solutions in spatial planning	
Landscape and species integration for a nature-based planning of a Mediterranean functional urban area <i>Erika Bazzato, Michela Marignani</i>	630
Tourism and natural disasters: integrating risk prevention methods into the Plan for tourism <i>Selena Candia, Francesca Pirlone</i>	640
Integrated management of water resources. An operative tool to simplify, direct and measure the interventions <i>Vittoria Cugusi, Alessandro Plaisant</i>	649
Application of NbS to the city plan of Segrate Municipality: spatial implications <i>Roberto De Lotto</i>	660
Nature-Based Solutions impact assessment: a methodological framework to assess quality, functions and uses in urban areas <i>Claudia De Luca, Simona Tondelli</i>	671
The recognition of the Aspromonte National Park ecosystem networks in the urban structure project of Metropolitan City of Reggio Calabria <i>Concetta Fallanca, Natalina Carrà, Antonio Taccone</i>	679
Shaping the urban environment for breathable cities. <i>Michela Garau, Maria Grazia Badas, Giorgio Querzoli, Simone Ferrari, Alessandro Seoni, Luca Salvadori</i>	692
Defense, adaptation and relocation: three strategies for urban planning of coastal areas at risk of flooding <i>Carmela Mariano, Marsia Marino</i>	704
Thermal Urban Natural Environment Development <i>Francesca Moraci, Celestina Fazia, Maurizio Francesco Errigo</i>	714

A network approach for studying multilayer planning of urban green areas: a case study from the town of Sassari (Sardegna, Italy) <i>Maria Elena Palumbo, Sonia Palumbo, Salvatore Manca, Emmanuele Farris</i>	723
Urban areas morphometric parameters and their sensitivity on the computation method <i>Luca Salvadori, Maria Grazia Badas, Michela Garau, Giorgio Querzoli, Simone Ferrari</i>	734

Session 8 - Conservation and valorisation of architectural and cultural heritage

Preservation and valorisation of small historic centers at risk <i>Maria Angela Bedini, Fabio Bronzini, Giovanni Marinelli</i>	744
Material and immaterial cultural heritage: identification, documentation, promotion and valorization. The courtyards and hallways of merit in the Murattiano district of Bari <i>Antonia Valeria Dilauro, Remo Pavone, Francesco Severino</i>	757
Planning of historic centers in Sardinia Region: conservation versus valorization of architectural and cultural heritage <i>Federica Isola, Federica Leone, Cheti Pira</i>	767
Approach towards the "self-sustainability" of ancient villages <i>Francesca Pirlone, Ilenia Spadaro</i>	776
Fostering architecture efficiency through urban quality. A project for via Milano site in Brescia <i>Michela Tiboni, Francesco Botticini</i>	787

Session 9 - Accessibility, mobility and spatial planning

The role of community enterprises in spatial planning for low density territories <i>Cristian Cannaos, Giuseppe Onni</i>	800
Measuring multimodal accessibility at urban services for the elderly. An application at primary health services in the city of Naples <i>Gerardo Carpentieri, Carmen Guida, Housmand Masoumi</i>	810
Urban accessibility for connective and inclusive living environments. An operational model at support of urban planning and design practice <i>Tanja Congiu, Elisa Occhini, Alessandro Plaisant</i>	826
Improving accessibility to urban services for over 65: a GIS-supported method <i>Carmela Gargiulo, Floriana Zucaro, Federica Gaglione, Luigi Faga</i>	839
Cycle networks in Natura 2000 sites: the environmental assessment of the Regional Cycling Plan of Sardinia, Italy <i>Italo Meloni, Elisabetta Anna Di Cesare, Cristian Saba</i>	851

Improving regional accessibility through planning a comprehensive cycle network: the case of Sardinia (Italy) 859
Italo Meloni, Cristian Saba, Beatrice Scappini et al.

Vehicle routing problem and car-pooling to solve home-to-work transport problem in mountain areas 869
Antonio Pratelli, Massimiliano Petri

Session 10 - Tourism and sustainability in the Sulcis area

Wave, walk and bike tourism. The case of Sulcis (Sardinia -Italy) 881
Ginevra Balletto, Alessandra Milesi, Luigi Mundula, Giuseppe Borruso

Smart Community and landscape in progress. The case of the Santa Barbara walk (Sulcis, Sardinia) 893
Ginevra Balletto, Alessandra Milesi, Stefano Naitza et al.

A Blockchain approach for the sustainability in tourism management in the Sulcis area 904
Gavina Baralla, Andrea Pinna, Roberto Tonelli et al.

People and heritage in low urbanised settings: An ongoing study of accessibility to the Sulcis area (Italy) 920
Nađa Beretić, Tanja Congiu, Alessandro Plaisant

Place branding as a tool to improve heritage-led development strategies for a sustainable tourism in the Sulcis-Iglesiente region 928
Anna Maria Colavitti, Alessia Usai

Walkability as a tool for place-based regeneration: the case study of Iglesias region in Sardinia (Italy) 943
Chiara Garau, Gianluca Melis

The use of recycled aggregates in the implementation of Municipal Masterplans and Coastal Land-Use Plans. A study concerning Sulcis (Sardinia, Italy) 955
Federica Leone, Anania Mereu

Relationships between conservation measures related to Natura 2000 sites and coastal land use plans: a study concerning Sulcis (Sardinia, Italy) 971
Federica Leone, Corrado Zoppi

A Smart Planning tools for the valorisation of the Carbonia's building heritage via an energy retrofitting based approach 983
Stefano Pili, Francesca Poggi, Eusebio Loria, Caterina Frau

Special session 1 - Ecological networks and landscape planning

Resilient ecological networks. A comparative approach 995
Andrea De Montis, Amedeo Ganciu, Maurizio Mulas et al.

A complex index of landscape fragmentation: an application to Italian regional planning <i>Andrea De Montis, Amedeo Ganciu, Vittorio Serra</i>	1007
Measuring landscape fragmentation in Natura 2000 sites. A quantitative and comparative approach <i>Antonio Ledda, Andrea De Montis, Vittorio Serra</i>	1017
Regional ecological networks: theoretical and practical issues <i>Giuseppe Modica, Salvatore Praticò, Luigi Laudari et al.</i>	1028
Comparative ecological network analysis. Target and vector species and other naturalistic issues <i>Maurizio Mulas, Matteo Cabras, Andrea De Montis</i>	1038
Measuring connectivity in Natura 2000 sites. An application in Sardinia <i>Vittorio Serra, Andrea De Montis, Antonio Ledda</i>	1049



THE DANUBE RIVERSIDE DEVELOPMENT IN THE IRON GATES GORGE, SERBIA, BETWEEN SOCIO-ECONOMIC NEEDS AND PROTECTED ECOSYSTEM

BRANISLAV ANTONIĆ^a, ALEKSANDRA
DJUKIĆ^a, MILICA CVETANOVIĆ^b

^a Department of Urbanism
University of Belgrade, Serbia
e-mail: antonic83@gmail.com
adjukic@afrodita.rcub.bg.ac.rs
URL: <http://www.arh.bg.ac.rs/>

^b Department of Regional Geography
University of Belgrade, Serbia
e-mail: mimacvetanovic@gmail.com

How to cite item in APA format:

Antonić, B., Djukić, A. & Cvetanović, M. (2019). The Danube riverside development in the iron gates gorge, Serbia, between socio-economic needs and protected ecosystem. In C. Gargiulo & C. Zoppi (Eds.), *Planning, nature and ecosystem services* (pp. 17-28). Naples: FedOAPress. ISBN: 978-88-6887-054-6, doi: 10.6093/978-88-6887-054.6

ABSTRACT

The Iron Gates are the longest gorge of the Danube, a major waterway in Europe. For Serbia, the Danube is both important as a transport corridor and tourist route, which is also applied for the Iron Gates part. In the other side, the Iron Gates are the largest national park in Serbia, with protected river and mountain ecosystems, plus many cultural heritage sites, which significantly restricts riverside development. Third, it is also a region with its local population, settlements, and economy. This overlapping makes any future planning perspective for the Iron Gates Region very complex and with expected compromises. The current spatial plans for the Iron Gates recognise this complexity. This is particularly visible along the Danube riverside. The river is certainly the main access to the gorge and the main driver of desirable socioeconomic development for local communities thereof. However, the development along the river is impossible in many parts due to protected riverside areas or rough terrain. Remaining parts have the other problems with inadequate plot organisation. Therefore, the implementation of the plans carries many challenges at lower levels. The aim of this paper is to present this discrepancy and offer new ways for concrete solutions. It compares the main planning actions to facilitate local socio-economic development and the newest efforts of local authorities to implement them for riverside as a critical resource for the region. The final highlights are dedicated to the actions that are unorthodox and thereby innovative for riverside development in unique ecosystems.

KEYWORDS

Water Infrastructure; Riverfront Development; Tourism; Protected Ecosystem; the Danube; the Iron Gates

1 INTRODUCTION – DEVELOPMENT IN PROTECTED ECOSYSTEMS

Ecosystems and their sustainable use are always an 'old-new' topic for scholars. One of its simpler definitions explains that ecosystems are the specific systems formed in correlation between living organisms and their non-living surrounding in a particular area (CDO, 2019). In the other words, the meaning of a community instead of an individual (species) is in focus (Smith, 2013). Interestingly, this meaning can be expanded to some, at first very different systems, such as urban areas. Considering the structure of cities as a system created in interaction between humans and their built environment (Lynch, 1960), both systems show noticeable similarities in their functioning (Steinitz & Rogers, 1970; Stremke & Koh, 2010).

Completely natural and urban ecosystems are extremes in the meaning of an ecosystem. An academically more researched type is the natural ecosystems that require protection due to challenging natural-human relations. In their essence, all ecosystems are under the influence of different external and internal factors (Chapin, Matson & Vitousek, 2002). These factors can be purely natural, such as topography or climate, or from anthropogenic activities, such as settlements and economy. The ecosystems seen as protected areas are also a subject of international concern. The International Union for Conservation of Nature (IUCN) defines a protected area as a "clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley, 2008). This definition undoubtedly links ecosystems and protected areas.

The "hotspot" about protected ecosystems in the last decades is how properly managing them to meet protection needs and their viable utilization (Lackey, 1998; McDonald, 2018). Therefore, the IUCN (2010) prioritizes several types of protected areas in its current operative program. One of them is transboundary protection areas. In the case of Serbia, the most important example is the Iron Gates (Serb. Ђердап/Đerdap) protected area, halved between Romania to the north and Serbia to the south (Fig. 1). The Iron Gates are actually the greatest gorge on the Danube River, the second longest in Europe, which implies that this location had significance through history. The gorge with mountainous landscapes at both backsides is a large protected ecosystem. The protection encompasses numerous smaller sites of natural and cultural heritage, as well as the whole gorge as an entity. Hence, the Iron Gates are a sensitive area in which any kind of development must be carefully planned. In the recent years, this has been especially noticeable in the case of booming cultural tourism, because protected areas have preserved the particular character that attracts tourists (Adams, 2008).

An expected answer to the previous situation is to set adequate planning actions for an ecosystem, which must make a right balance between its ecological protection and spatial utilization (Steiner, 2002). A proper planning, including both functional and physical design, is a paramount task for the viability of protected ecosystems today (Stremke & Koh, 2010). This dichotomy can be applied for the national parks in Serbia (Jovičić & Ivanović, 2004). The current spatial plans for the Iron Gates Region also recognize this complexity. This is particularly visible along the riverside of the Danube, which is certainly the main access to the gorge and the main driver of desirable socio-economic development for local communities thereof. However, this type of development is forbidden or very limited in many parts due to protected riverside areas or rough terrain. Remaining parts have the other problems with inadequate plot organization. Therefore, the implementation of capital projects by plans carries many challenges at municipal and urban/settlement levels.

The aim of this paper is to present this discrepancy and offer new ways for concrete solutions. It compares the main planning actions to facilitate local socio-economic development and the newest efforts of local authorities to implement them for riverside as a critical resource for the region. For many of them, it can be easily concluded that "ordinary" planning actions cannot enable the capital projects in the Iron Gates. Hence, final highlights refer to the actions that are unorthodox and thereby innovative for riverside development in this unique ecosystem.

2 METHODOLOGY

The concrete subject of this research is the western third of the Serbian Iron Gates, around Golubac Town. The research is developed as a case study, followed by structure and used material. It combines three methods as separate analyses. Before them, the key elements of relevant theory are given.

The analyses are organised by three respective levels:

- the first analysis is the research of the main policy documents for investigated area, e.g. three spatial plans of regional and municipal levels. A special focus is on the capital projects in the Danube Riverside. The plans are: (i) spatial plan of the special-purpose area of the international waterway E80 –the Danube (Pan-European Corridor VII)[Serb. Просторни план подручја посебне намене међународног водног пута E80 – Дунав (Паневропски коридор VII)], (ii) spatial plan of the special-purpose area of "Đerdap" National Park [Serb.Просторни план подручја посебне намене Националног парка "Ђердап"], and (iii) spatial plan of Golubac Municipality (Serb.Просторни план Општине Голубац].

- the second analysis is a field research, including the communication with local experts and representatives from Golubac, regarding the implementation of the capital projects. It links municipal and urban/settlement levels (Golubac Municipality and Golubac Town as its seat);
- the third analysis pertains to plot organisation in the riverside part of Golubac Town, with the emphasis on its (in)compatibility with the capital projects planned for this area.

All three analyses are a matter for a mutual discussion after their explanation. The main findings from this discussion lead to the introduction of the aforementioned “unorthodox” approach proposed by Golubac Municipality, which deals with resolving the implementation of capital projects at the local level.

3 CASE STUDY –THE IRON GATES GORGE IN SERBIA

A case study is the area around Golubac Town, which also administratively concurs with the eastern half of Golubac Municipality. Golubac Town itself is located at the western entrance of the Iron Gates gorge – it has strategic position between Pannonian Plain (west) and the Iron Gates Gorge (east). Nearby Golubac Fortress marks the unique position of the dramatic landscapes change (Fig. 1a).

The Iron Gates are a large transboundary protection area, protected separately by both countries; it is a “Đerdap” National Park in Serbia and “Porțile de Fier” Natural Park in Romania. Serbian park is older, established in 1974, and it is the largest national park in country (Stanković, 2002). Romanian park was established in 1990 and it is the second largest natural park in country (Toniuc et al., 1992). The total surface of both areas is 1,794 km². This coverage roughly corresponds to the Iron Gates Region.

The entire region presents a huge and rich ecosystem. First, the gorge is not uniform; it contains of four inner gorges (“narrows” or canyons) and three inter-valleys. This allows the change of the elements of natural and cultural landscape with many specific segments of the scenery (Fig. 1b). Geologically, “the Danube [in the gorge] offers a rare, unique glimpse in the geology of the South Carpathians, as it crosses transversally the folded structures of this alpine chain” (Popa et al., 2004, p. 7).). Unique flora and fauna, mostly emphasised in the deciduous forests follow this (Niculae, 2002). On the other side, human-made parts of landscape are visible, but with a different impact across the gorge. The most important change by humans is certainly the formation of large Iron Gates artificial lake in the early 1970s. This led to the flooding the lowest part of the gorge with all previous islands and the reallocation of several settlements (Orșova, Donji Milanovac) and the most valuable heritage

sites (Tabula Traiana, “Lepenski Vir” archaeological site), leaving old settlements to be flooded. The destiny of “Lepenski Vir” with the remnants of the oldest permanent settlement along the Danube is particularly interesting (Fig. 1c). Its site is dislocated by 100 meters away from its original location, with the intention to preserve the previous ambient in ecosystem (Pavlović, 2017). The artificial lake is thereby a prominent new element of landscape (Stanković, 2002). Accordingly, formation of the lake formed a new riverside, too. These lower parts of the gorge, next to the Danube are more under human influence, which mirrors through settlement formation and agriculture, especially orchards and pastures (Niculae, 2002). At the end, the historic remoteness and contemporary socio-economic problems have made the region more attached to tradition and with preserved tradition and local customs (Antonić & Đukić, 2018). Therefore, human influence in the Iron Gates can be considered as mixed – both positive and negative (Popa et al., 2004).



Fig. 1 The Đerdap (Iron Gates) National Park: its position in Serbia and the location of the main heritage sites in it, including the most prominent ones: Golubac Fortress (a), Kazani Narrows (b) and “Lepenski Vir” archaeological site (c) (Author: B. Antonić; Author of photos: B. Antonić; Supplementary maps: Google Maps).

4 ANALYSES AND RESULTS

4.1 ANALYSIS 1: THE INPUTS ABOUT CAPITAL PROJECTS FROM STRATEGIC PLANS

The first analysis considers Golubac area from national perspective, because all three mentioned plans are developed at national level.

Spatial plan of the special-purpose area of the international waterway E80 – the Danube (Pan-European Corridor VII) (Hereinafter: the Danube Plan): In this spatial plan from 2013, it was mentioned that a passenger dock at Golubac Fortress will be built (as it was done). Within this area, there is already cargo dock in Golubac (in bad state, for reconstruction). It was also planned to build a nautical centre in the central part of the Danube Riverside in the Iron Gates gorge (Serbia), but this has not yet been implemented. Several minor projects, such as marinas and new border crossings for ferry transfers, are also mentioned and mapped. The Danube plan also underlines the direct positive effects of the corridor development of the Danube waterway and its surroundings are expected from tourism. For the development of sustainable tourism, it is necessary to provide the marking of directions of movement through the forest complex, to build the necessary infrastructure facilities, to present the tourist offer and to monitor the visit (NASP, 2010).

Spatial plan of the special-purpose area of "Đerdap" National Park (Hereinafter: Đerdap Plan): This plan was purposely created and enacted for the park in 2012. It foresees several capital projects for the area. One visitor centre was built (more is planned), the Golubac Fortress is reconstructed, with new road bypass. Priority is given to the development of conservation conditions and projects for the preservation, improvement and sustainable use of immovable cultural assets and their protected environments in the context of tourism development. The construction and modernization of the road network, the development of river passenger traffic, the promotion and development of cycling traffic within EuroVelo 6 corridors is planned (and partly implemented). In terms of tourism, the realisation of nautical-tourist infrastructure (marinas, docks and nautical centres) is planned and this is accomplished with a minor part. Five tourist spots are planned on the "Road of the Roman Emperors" section in the gorge. One of the priorities is the construction of tourist facilities with respect to ecological criteria, bio-climatic architecture, the use of renewable energy sources, and compliance with the landscape (NASP, 2009).

Spatial plan of Golubac Municipality (hereinafter: Municipal Plan): This spatial plan (2011) prioritise the improvement of Golubac Town as a municipal seat, primarily with public services and tourist facilities. Priority activities in rural settlements along the Danube are: increase of traffic accessibility, development of eco-agriculture, start of development of capacities in the field of rural tourism (renovation, arrangement and equipping of villages suitable for the development of eco, ethno and gastronomic tourism). These types of tourism would play a major role in the development of cultural tourism by learning about the local tradition and cuisine of this region. Rural tourism in the Iron Gates is still underrepresented, but incentives for Dobra village are mentioned. The main projects are: the town marina, new border crossing, new tourist pier for the fortress, and the

modernisation of the town beach in its western outskirts (Arhiplan, 2011). The summary map of the capital projects in Golubac area (Fig. 2) distinctly presents where national level should control the development of the area. It is obvious that most of these projects are located on the Danube Riverside and that they are functionally dependent of the river. Nevertheless, the prioritisation of the projects varies between the plans. Finally, some collisions about the location or character of intervention (new/renewal) are also noticeable in these plans. For illustration, it is questionable by the plans should the pier of Golubac Fortress be new or renewed or where is an exact location for a new marina in Golubac Town – in the existing western of eastern small ports.



Fig. 2 The summary map of capital projects in Golubac area from strategic plans (Author: B. Antonić).

2.2 ANALYSIS 2: FIELD RESEARCH

Field research was conducted in 2017 and 2018, integrating two types of research: fieldwork with data collecting and professional communication with local representatives and experts. The topic was the general development of the Danube Riverside in Golubac Municipality. The outcomes of this research show a stance from local/municipal tier. One of the main observations is the distinction of the development potential regarding the areas inside and outside the national park (Fig. 2 – green area), due to the regulation of a protected ecosystem.

The main goal of local representatives and experts is certainly the development of tourism, with a special emphasis on cultural tourism. The reconstruction of Golubac Fortress is in progress but has already fuelled tourism; according to a local tourist guide, about 50 cruisers docked in front of the fortress and about 80,000 tourists visited the fortress in 2018. However, the main problem in local tourism is that the majority of tourists just pass through the town to reach the fortress, where they spend maximum 2-3 hours. They rarely spend more time in this area due to still weak supportive tourist service and infrastructure. Thus, local revenues are still low comparing the attractiveness of Golubac Fortress and the

Iron Gates in its background, which is an issue for this shrinking community. The main local observations regarding new capital projects for Golubac urban zone are:

- the reconstruction of Golubac Fortress with the construction of supplementary visitor centre with parking and cruiser pier is almost completed. The last step is the revitalisation of the fortress vicinity, including an apartment village (“fishermen village” project);
- new big-format tourist facilities in Golubac Town are a very challenging issue for a municipality. “Golubački Grad” Hotel on the main town square from the 1980s was privatised after 2000. However, new owners are not capable to modernise it, so the hotel offer is substandard. Public sector has a limited influence in the private ownership. Hence, municipal authorities estimate that the construction of a completely new hotel in a different location in Golubac is a more probable solution;
- the proposed project for the main road bypass around the town is contested, too. The town is currently under the pressure of dense traffic because the Iron Gates Main Road (National Road No 34) passes through the centre of Golubac. However, this road also brings travellers and tourists and support local retail;
- a new 7-km long quay with pedestrian and cyclist path along the Danube Riverside in Golubac is 70% done. The path is a part of “EuroVelo 6” Route. The remaining part between the town and the fortress, which is technically the most complex due to cliff terrain, is left for the future;
- a project for a new marina is the first stage of preparation. After long negotiation, western port was chosen for this facility, but available land is too small for the format of a modern marina;
- a new border crossing by ferryboat is almost completed in the western outskirts of the urban zone (Usije). Serbian part was completed, but Romanian border crossing is still in preparation;
- the upgrading of the town beach in Vinci weekend-house zone at the north-western edge of the urban area is a long-waiting project. The existing beach is used, but mostly by the local population. This upgrading for tourism purposes request a complex technical intervention, to secure the beach facilities from strong winds and waves during winter months.

2.3 ANALYSIS 3: MAPPING OF LAND ORGANISATION

The previous section scrutinises local view on the capital projects in Golubac area. Capital projects, such as a new marina or a hotel, certainly require large land plots. The problem is

the current land organisation (Fig. 3). In the town centre, all available plots are small and individually inadequate for any capital project thereof. The process of land consolidation among many owners is very complicated in Serbia, so it is always the last option. Several larger plots along the riverside are suitable by size, but they are in public ownership and in public use (town park, local education centre). Outside Golubac centre, the only large land plots are at its eastern outskirts. Nevertheless, these plots are in state ownership and belong to "Đerdap" National Park, which defines them as the part of a protected ecosystem and restricts their future use and development without any construction.

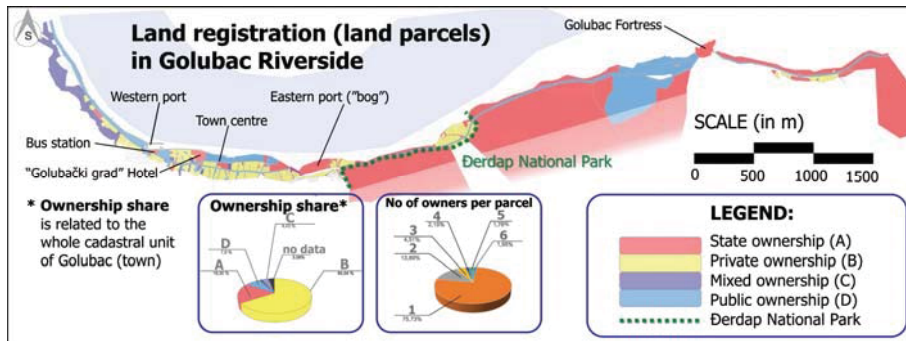


Fig. 3 The map of land registration (land parcels) in Golubac Riverside / Resource: Municipal cadastre (Authors: N. Mandić, M. Kostadinović & S. Mićanović /Customised by B. Antonić).

5 INSTEAD OF AN ORDINARY CONCLUSION. INNOVATIVE APPROACHES TO ACQUIRE A LAND FOR THE NEW RIVERSIDE DEVELOPMENT

A general notion from three elaborated analyses presents a sharp dichotomy between national and local levels. To summarize, the capital projects in analyzed spatial plans are generally greeted by national level as a key element to the foster long-awaited socio-economic development of Golubac. In the other side, their implementation faces big obstacles at urban level, considering the current land organisation in Golubac. Knowing that small municipal government, such as Golubac, has limited resources, possible ways for land consolidation are even more questionable. This situation demonstrates significant discrepancies between different vertical levels of "classic" territorial planning. Golubac municipality thereby aspires to find some "unorthodox" solutions for its capital projects. This is related to a unique position at the end of artificial Iron Gates Lake, where the current Danube Riverside is also new, from the 1970s. Without this limit, land reclamation is proposed as a model to fully or partly obtain land plots for capital projects from the lakebed. This is also an innovative approach for Serbia. Some on-going projects have already used

land reclamation; the new visitor centre of Golubac Fortress was built on reclaimed land. Local authorities are planning the following land-reclamation interventions:

- the land for a new big-format hotel with more exclusive facilities should be developed on the land reclaimed from the town eastern 'port', which is actually a bog and without any use today. The position of this new land is excellent for this type of a hotel, because it is next to the main road and between the town centre with historic fabric (western) and the national park and the fortress (eastern);
- in the case of the town road bypass, a middle solution is backed by local level. This refers to the new bypass road just for the most problematic transport (heavy vehicles like regional buses and lorries), while the other vehicles will use the current route, to support local economy;
- the last and the technically most contested eastern part of the Danube quay with pedestrian-cyclist path is to be resolved by the construction of a bracket-structured path, inclined in the cliffs along the river;
- a project for a new marina is already in preparation. The location is the existing (western) port, which will be further enlarged and upgraded with the new technical and leisure facilities. A part of the future complex will be built on the land reclaimed from the riverbed;
- the new border crossing is intentionally built at the western part of Golubac area – Usije Settlement, to make balance in the spatial development of the Danube Riverside. The municipality dedicated a bigger plot for the border crossing, as a reserve for the future needs;
- similarly, the existing beach in Vinci northwest area is to be resolved through land reclamation. This is less drastic, in the form of a several-meters wide "belt" with concrete sand boxes that will gradually descend to water and preserve the sand from strong winds and waves.

Many of explained interventions are still in the form of proposals. It is also evident that most of them are financially, technically, and professionally demanding due to compromise with the protected ecosystem of the gorge. This means that local level cannot implement them without external influence. Therefore, the next step for local authorities is to promote these projects and related interventions externally, but not just to national government. New approaches should be made to access to the private incentive, which will bring a new energy in local development.

REFERENCES

- Adams, K. (2008). Cultural tourism. In M. Guha (Eds.), *International encyclopedia of the social sciences (2nd edition)* (pp. 201-202). Detroit: Emerald. DOI: 10.1108/09504120810905060.
- Antonić, B. & Đukić, A. (2018). Cultural Tourism as a New Driving Force for a Settlement Revitalisation: The Case of Golubac Municipality in Iron Gates Region, Serbia. In: A. Krstić-Furundžić, M. Vukmirović, E. VaništaLazarević & A. Djukić (Eds.), *Proceedings of 5thInternational Academic Conference on Places and Technologies* (pp. 814-822). Belgrade: Faculty of Architecture.
- Arhiplan (2011). *Просторни план Општине Голубац [Spatial plan of Golubac Municipality]*. Golubac: Official Gazette, No 3/11.
- Cambridge dictionaries online – CDO (2019). Retrieved from <https://dictionary.cambridge.org/>
- Chapin S., Matson, P. & Vitousek, P. (2002). *Principles of Terrestrial Ecosystem Ecology (2nd edition)*. New York, NY: Springer.
- Dudley, N. (Ed.) (2008). *Guidelines for Applying Protected Area Management Categories*. Gland, CH: IUCN.
- International Union for Conservation of Nature – IUCN (2010). *External Strategic Review of the IUCN Programme on Protected Areas*. Gland, CH: IUCN.
- Jovičić, D. & Ivanović, V. (2004). Menadžment turizma u nacionalnim parkovima [Tourism Management in National Parks]. *Tourism and Hospitality Management*, 10(3-4), 93-105.
- Lackey, R. T. (1998). Seven pillars of ecosystem management. *Landscape and Urban Planning*, 40(1-3): 21-30. DOI: 10.1016/S0169-2046(97)00095-9.
- Lynch, K. (1960). *The Image of the City*. Cambridge, MA: MIT Press.
- McDonald, T. (2018). Valuing expertise in ecosystem management. *Ecological Management & Restoration*, 19(2), 97. DOI: 10.1111/emr.12313.
- National Agency for Spatial Planning – NASP (2009). *Просторни план подручја посебне намене Националног парка "Бердап" [Spatial plan of the special-purpose area of "Berdap" National Park]*. Belgrade: Official Gazette No 16/09.
- National Agency for Spatial Planning – NASP (2010). *Просторни план подручја посебне намене међународног водног пута Е80 – Дунав (Паневропски коридор VII) [Spatial plan of the special-purpose area of the international waterway E80 – the Danube (Pan-European Corridor VII)]*. Belgrade: Official Gazette No 03/10.
- Niculae, M-I. (Ed.) (2002). *Study on the methodology for identification, characterization and classification of landscapes from the cross-border area Iron Gates Natural Park and Djerdap National Park*. Retrieved from <http://www.bioregio-carpathians.eu/>.
- Pavlović, H. (2017, 20 August). Тајне Лепенског Вира – Први град у Европи [The Secrets of Lepenski Vir – The First City in Europe]. *Politika*, p. 20.
- Popa, M. E., Pătroescu, M., Popescu, V. & Tetelea, C. (2004). *Geological heritage of Iron Gates Natural*

Park: between preservation and destruction. Retrieved from https://www.researchgate.net/publication/265507981_Geological_heritage_of_Iron_Gates_Natural_Park_between_preservation_and_destruction.

Smith, M. (2013). Ecological Community, the Sense of the World, and Senseless Extinction. *Environmental Humanities*, 2, 21-41. retrieved from <http://www.environmentandsociety.org/node/6305>.

Stanković, S. (2002). The Djerdap National Park – The Polyfunctional Centre of the Danube Basin. *Geographica Pannonica*, 6, 38-44.

Steiner F. (2002). *Human Ecology: Following Nature's Lead*. Washington, DC Island Press.

Steinitz, C. & Rogers, P. (1970). *A Systems Analysis Model of Urbanization and Change: An Experiment in Interdisciplinary Education*. Cambridge, MA: MIT Press.

Stremke, S. & Koh, J. (2010). Ecological concepts and strategies with relevance to energy-conscious spatial planning and design. *Environment and Planning B: Planning and Design*, 37(3), 518-532. DOI: 10.1068/b35076.

Toniuc, N., Oltean, M., Romanaca, G. & Zamfir, M. (1992). List of protected areas in Romania (1932-1991). *Ocotirea naturii și a mediului înconjurător*, 36(1), 23-33.

ACKNOWLEDGEMENTS

This paper is done within the Project DANUrB – a regional network building through tourism and education to strengthen the “Danube” cultural identity and solidarity. The project is co-financed by INTERREG EU Programme. It present a part of the research published under the official project report. The authors also thanks to the following students: Nevena Mandić, Mladen Kostadinović and Srđan Mićanović.

AUTHOR'S PROFILE

Branislav Antonić is a teaching assistant at the Department of Urbanism, University of Belgrade – Faculty of Architecture, Serbia. His scientific and pedagogical interests are urban and spatial planning, with a special focus on the planning of medium-size and small communities, as well as the spatial aspect of housing and tourism. He is an active participant in scientific conferences and exhibitions. He is also a licensed urban and spatial planner with professional involvement in more than 30 spatial and urban plans and urban design projects.

Aleksandra Djukić is an associate professor at the Department of Urbanism, University of Belgrade – Faculty of Architecture, Serbia. Her scientific and pedagogical interests are urban planning and design, with a special respect on urban morphology and urban renewal and regeneration. She is an active participant in scientific conferences and exhibitions. She is also a licensed urbanist, planner and architectural designer – she was the leader of member of working team in numerous documents in urban planning and design, as well as in architectural design and spatial planning.

Milica Cvetanović is a PhD student of geography, narrower scientific field regional geography, at University of Belgrade – Faculty of Geography, Serbia. Her scientific interests are regional geography, tourism and sustainable development, with a focus on researching the importance of tourism in the sustainable development of the regions. She is primarily involved in the research of the regions in Serbia. She participated with scientific papers at national and international conferences and published several papers in journals of national importance.