

Lecture Notes in Networks and Systems 482

Francesco Calabrò

Lucia Della Spina

María José Piñeira Mantiñán *Editors*

New Metropolitan Perspectives

Post COVID Dynamics: Green and Digital Transition, between Metropolitan and Return to Villages Perspectives

 Springer

Lecture Notes in Networks and Systems

Volume 482

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María José Piñeira Mantiñán
Editors

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Post COVID Dynamics: Green and Digital
Transition, between Metropolitan and Return
to Villages Perspectives

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Editors

Francesco Calabrò
Dipartimento PAU
Mediterranea University of Reggio Calabria
Reggio Calabria, Reggio Calabria, Italy

Lucia Della Spina
Mediterranea University of Reggio Calabria
Reggio Calabria, Italy

María José Piñeira Mantiñán
University of Santiago de Compostela
Santiago de Compostela, Spain

ISSN 2367-3370

ISSN 2367-3389 (electronic)

Lecture Notes in Networks and Systems

ISBN 978-3-031-06824-9

ISBN 978-3-031-06825-6 (eBook)

<https://doi.org/10.1007/978-3-031-06825-6>

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This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

This volume contains the proceedings for the fifth International “NEW METROPOLITAN PERSPECTIVES. Post COVID Dynamics: Green and Digital Transition, between Metropolitan and Return to Villages’ Perspectives”, scheduled from May 25–27, 2022, in Reggio Calabria, Italy.

The symposium was promoted by LaborEst (Evaluation and Economic Appraisal Lab) of the PAU Department, Mediterranea University of Reggio Calabria, Italy, in partnership with a qualified international network of academic institution and scientific societies.

The fifth edition of “NEW METROPOLITAN PERSPECTIVES”, like the previous ones, aimed to deepen those factors which contribute to increase cities and territories attractiveness, both with theoretical studies and tangible applications.

This fifth edition coincides with what is most likely the end of the COVID pandemic that began in 2020. The global health emergency, despite having been a phenomenon limited in time, has acted as an accelerator of some changes in behavior and in the organization of activities associated with the ever-increasing spread of ICT.

The phenomena are too recent and still ongoing to fully understand the implications they will have on settlement systems, but the conclusion reached at the previous edition of New Metropolitan Perspectives seems to be confirmed: from many of the works presented at the Symposium, a reduction in the relevance of the localization factor emerges with ever greater clarity, at least in the ways known so far from the times of the Industrial Revolution, bringing to light more and more a paradigm shift in the center-periphery dualism.

In fact, the phenomenon that in the past led to the birth of the modern city, the need to concentrate people and activities in small areas, seems to be decreasing: the progressive spread of smart working and the digital modality for the provision of services (just think, e.g., of the digital services of the Public Administration or online commerce) significantly reduces the gaps in terms of accessibility to goods and services between metropolitan cities and marginalized areas, such as inland areas.

But this edition of the symposium also coincides with the start of a new phase for European policies, guided toward the green and digital transition, for the period 2021-27, by the European Green Deal, especially through the tool of the Next Generation EU.

The links between new technologies and sustainability tend to focus on the role played and that can play the city at EU level in fighting climate change.

Many of the contributions collected in this volume address the issue of the green transition through multidisciplinary points of view, dealing with very different issues such as, for example: infrastructures and mobility systems, green buildings and energy communities, ecosystem services and the consumption of soil, providing interesting information on the main trends in progress.

The changes in individual behavior and social organization, associated with the digital transition, are illustrated by the contributions that have addressed the issue of rules and of social innovation practices that are prefiguring new forms of governance for the regeneration of settlement systems. In this context, the issues of the new declinations of the concept of citizenship were also addressed, also with reference to the need to create favorable contexts for individual initiative and entrepreneurship, especially for young people, as a possible response to the challenge of employability for the new generations.

In this context, territorial information systems take on a leading role, together with apps capable of making territories increasingly smart.

The substantial investments planned by the EU to support the green and digital transition in the coming years require multidimensional evaluation systems, capable of supporting decision makers in selecting the interventions most capable of pursuing the objectives. The financial resources used for the implementation of the policies are borrowed from future generations, to whom we will have the obligation to be accountable for our work.

Unfortunately, at the time of writing we must also register serious concerns for the future of humanity, stemming from the risks of the spread of the conflict between Russia and Ukraine. In addition to the obvious concerns about the suffering that was always cause to civilian populations, this situation makes future scenarios even more uncertain: It is clear that the circulation of goods, people and ideas will be increasingly conditioned by future geopolitical balances.

The ethics of research, in the disciplinary sectors that the Symposium crosses, invites us to feed, with scientific rigor, policies and practices that make the territory more resilient and able to react effectively to catastrophic events such as the pandemic or the war: We hope to know the outcomes of these courses in the next editions of the New Metropolitan Perspectives symposium.

For this edition, meanwhile, the more than 300 articles received allowed us to develop 6 macro-topics, about “Post COVID Dynamics: Green and Digital Transition, between Metropolitan and Return to Villages’ Perspectives” as follows:

1. Inner and marginalized areas local development to re-balance territorial inequalities

2. Knowledge and innovation ecosystem for urban regeneration and resilience
3. Metropolitan cities and territorial dynamics. Rules, governance, economy, society
4. Green buildings, post-carbon city and ecosystem services
5. Infrastructures and spatial information systems
6. Cultural heritage: conservation, enhancement and management.

And a Special Section, Rhegion United Nations 2020-2030, chaired by our colleague Stefano Aragona.

We are pleased that the International Symposium NMP, thanks to its interdisciplinary character, stimulated growing interests and approvals from the scientific community, at the national and international levels.

We would like to take this opportunity to thank all who have contributed to the success of the fifth International Symposium “NEW METROPOLITAN PERSPECTIVES. Post COVID Dynamics: Green and Digital Transition, between Metropolitan and Return to Villages’ Perspectives”: authors, keynote speakers, session chairs, referees, the scientific committee and the scientific partners, participants, student volunteers and those ones that with different roles have contributed to the dissemination and the success of the Symposium; a special thank goes to the “Associazione ASTRI”, particularly to Giuseppina Cassalia and Angela Vigliani, together with Immacolata Lorè, for technical and organizational support activities: without them the Symposium couldn’t have place; and, obviously, we would like to thank the academic representatives of the University of Reggio Calabria too: the Rector Prof. Marcello Zimbone, the responsible of internationalization Prof. Francesco Morabito, the chief of PAU Department Prof. Tommaso Manfredi.

Thank you very much for your support.

Last but not least, we would like to thank Springer for the support in the conference proceedings publication.

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Contents

Inner and Marginalized Areas Local Development to Re-Balance Territorial Inequalities	
The Valuation of Unused Public Buildings in Support of Culture-Led Inner Areas’ Small Villages NRRP Strategies: An Application Model in Southern Italy	3
Giuseppina Cassalia and Francesco Calabrò	
Communities’ Involvement for the Reuse of Historical Buildings. Experiences in Italian Marginal Areas	16
Caterina Valiante and Annunziata Maria Oteri	
Action Research for the Conservation of Architectural Heritage in Inner Areas: Towards a Methodological Framework	26
Marco Rossitti	
Community-Driven Initiatives for Heritage Acknowledgement, Preservation and Enhancement in European Marginal Area	37
Oana Cristina Tiganea and Francesca Vigotti	
Hydrological Drivers and Effects of Wildfire in Mediterranean Rural and Forest Ecosystems: A Mini Review	47
Domina Delač, Bruno Gianmarco Carrà, Manuel Esteban Lucas-Borja, and Demetrio Antonio Zema	
Agro-Food Wastewater Management in Calabria and Sicily (Southern Italy): A General Overview and Key Case Studies	56
Demetrio Antonio Zema	
River Transport in Calabrian Rivers	66
Giandomenico Foti, Giuseppe Barbaro, Giuseppe Bombino, Giuseppina Chiara Barillà, Pierluigi Mancuso, and Pierfabrizio Puntorieri	

The Impact of Spatial Location of Function Inside Building to Improve Distinguishing Architectural Forms as an Urban Landmark	75
Al Khafaji Ibtisam Abdulelah Mohammed and Maha Haki	
Shaping Evolving Rural Landscapes by Recovering Human-Nature Harmony Under the Beautiful Countryside Construction in China	86
Yapeng Ou	
Cultural Democracy, Cultural Ecosystems and Urban Development: Grassroot Initiatives at the Crossroads of Social and Cultural Goals in Bologna	94
Francesca Sabatini	
Re-think Building Codes for Indoor Air Quality	105
Alberto De Capua	
Design Opportunities Towards the Ecological Transition of Villages, Cities, Buildings and Dwellings	120
Lidia Errante	
Green Transition Towards Sustainability. Design, Architecture, Production	136
Alberto De Capua and Lidia Errante	
<i>Take Care. The Body of Architecture, the City and the Landscape</i>	146
Francesca Schepis	
Service Innovation: A Literature Review of Conceptual Perspectives	154
Giulia Freni	
Garden Cities 2.0 and Revitalization of Depopulated Rural Communities. A Net Positive Resource Production Approach	164
Ruggero Todesco	
(Un)earth Vulnerable Chile	173
Carlotta Olivari and Margherita Pasquali	
Exploring the Resilience of Inner Areas: A Cross-Dimensional Approach to Bring Out Territorial Potentials	182
Diana Rolando, Manuela Rebaudengo, and Alice Barreca	
Fostering Resilience in Inner Areas. The Sicani Case Study in Sicily . . .	191
Barbara Lino and Annalisa Contato	
“Fit to 55”: Financial Impacts of Italian Incentive Measures for the Efficiency of the Building Stock and the Revitalization of Fragile Areas	201
Manuela Rebaudengo, Umberto Mecca, and Alessia Gotta	

Human/Urban-Scapes and the City Prospects. An Axiological Approach	211
Cheren Cappello, Salvatore Giuffrida, Ludovica Nasca, Francesca Salvo, and Maria Rosa Trovato	
Development Processes in European Marginal Areas: An Investigation in the UNESCO Gastronomic Creative City of Östersund in Sweden	221
A. Julia Grisafi	
Lifestyle Migration and Rural Development: The Experience of Kaxås in the Periphery of Sweden	234
Matilda Meijerborg, Fanny Sandström, and Daniel Laven	
Craft Breweries and the Corona Crisis—Exploring the Scandinavian Context.	246
Wilhelm Skoglund and Øystein Rennemo	
Cultural Heritage Digitalisation Policy as a Co-creation of Public Value. Evaluation of the Participatory Digital Public Service of Uffizi Galleries in Italy During the COVID-19.	257
Maria Stella Righettini and Monica Ibba	
The Necessary Digital Update of the Camino de Santiago	268
Rubén C. Lois-González and Xosé Somoza-Medina	
A Project of Enhancement and Integrated Management: The Cultural Heritage Agency of Locride	278
Francesco Calabrò, Giuseppina Cassalia, and Immacolata Lorè	
New Technologies for Accessibility and Enhancement of Cultural Heritage Sites. The Archaeological Areas of Locride	289
Francesco Calabrò, Giuseppina Cassalia, Paolo Fragomeni, and Immacolata Lorè	
Accessible Culture: Guidelines to a Cultural Accessibility Strategic Plan (C.A.S.P.) for MARC Museum	301
Giuseppina Cassalia, Claudia Ventura, Francesco Bagnato, Francesco Calabrò, and Carmelo Malacrino	
Economic Feasibility of an Integrated Program for the Enhancement of the Byzantine Heritage in the Aspromonte National Park. The Case of Staiti	313
Giovanna Spatari, Immacolata Lorè, Angela Viglianisi, and Francesco Calabrò	
Mobility as a Service (Maas): Framework Definition of a Survey for Passengers' Behaviour	324
Giuseppe Musolino, Corrado Rindone, and Antonino Vitetta	

Evaluation of the Structural Health Conditions of Smart Roads Using Different Feature-Based Methods	334
Rosario Fedele, Filippo Giammaria Praticò, Giuseppe Cogliandro, and Filippo Laganà	
Framework of Sustainable Strategies for Monitoring Maintenance and Rehabilitation of Secondary Road Network to Guarantee a Safe and Efficient Accessibility	346
Marinella Giunta and Giovanni Leonardi	
Accessibility and Internal Areas - Rural Towns of Calabria and the Local Road Network	356
Francis M. M. Cirianni, Marinella Giunta, Giovanni Leonardi, and Rocco Palamara	
Strategies and Measures for a Sustainable Accessibility and Effective Transport Services in Inner and Marginal Areas: The Italian Experience	363
Francis M. M. Cirianni, Giovanni Leonardi, and Angelo S. Luongo	
Optimization of Local Road Network Quality	377
Francis M. M. Cirianni and Giovanni Leonardi	
Knowledge and Innovation Ecosystem for Urban Regeneration and Resilience1 - Inner and Marginalized Areas Local Development to Re-Balance Territorial Inequalities	
Adapting Outdoor Space for Post COVID-19	387
Chro Hama Radha and Sivan Hisham Taher Al-Jarah	
Reshaping Public Spaces Under Impacts of Covid-19	396
Sivan Hisham Taher Al-Jarah, Chro Ali Hama Radha, and Rebaz Jalil Abdullah Abdullah	
Where Do the Children Play? Taxonomy of Children’s Play Areas and Role of the City of Culture in Santiago de Compostela	406
María de los Ángeles Piñeiro-Antelo, Lucrezia Lopez, and Miguel Pazos-Otón	
A Triadic Framework for Sustaining Metaphorical Conceptualization to Automate Urban Design Creativity	418
Mohammed Mustafa Ahmed Ezzat	
Sustainability Frameworks and the Recovery and Resilience Plan. Challenges from the Italian Context	432
Lavinia Pastore, Luigi Corvo, and Luca Tricarico	
Investigation on Limits and Opportunities of Rural Social Innovation in the Belluno Dolomites	450
Maurizio Busacca	

Culture Leading to Urban Regeneration. Empirical Evidence from Some Italian Funding Programs 461
 Francesco Campagnari, Ezio Micelli, and Elena Ostanel

Strengthening Community-Based Organizations Through Social Impact Readiness: Lessons from “Periferiacapitale” 471
 Luca Tricarico, Luigi Corvo, Lavinia Pastore, and Arda Lelo

Social Innovation or Societal Change? Rethinking Innovation in Bottom-Up Transformation Processes Starting from Three Cases in Rome’s Suburbs 483
 Luca Brignone, Carlo Cellamare, Marco Gissara, Francesco Montillo, Serena Olcuire, and Stefano Simoncini

Pandemic, Fear and Social Innovation 494
 Federica Scaffidi

Impact Assessment for Culture-Based Regeneration Projects: A Methodological Proposal of Ex-post Co-evaluation 501
 Maria Cerreta, Ludovica La Rocca, and Ezio Micelli

“As Found”. The Reuse of Existing Buildings with an Identity Character as a Fundamental Element of Regeneration in the New Community Centers’ Design. A Brutalist Building as a Case Study 512
 Francesca Ripamonti

Consideration of the Potential Strategic Role of the New Community Center. Some International Case Studies: Themes and Design Practices 522
 Stefania Varvaro

Investigating the Health-Planning Nexus in Italy: A Survey on Local and Metropolitan Plans 531
 Luca Lazzarini

An Experimental Approach for the City of Health 541
 Antonio Taccone

Toward the Development of a Planning Protocol for Public Space for Improving Health and Wellbeing of Communities 549
 Concetta Fallanca and Elvira Stagno

The Eco-Neighbourhoods: Cases to Learn in the Transition Toward Urban Sustainability 559
 Maria Fiorella Felloni

Cultural Heritage Enhancement for Health Promotion and Environment Salubrity 570
 Rossana Gabaglio

Beyond the Official City Planning. Tirana Next Pilot for Healthier and Safer Urban Open Spaces in the Post-2020 580
 Fabio Naselli and Klaudia Tufina

Cyclical Covid Evolution and Transition Towards a Symbiosis Between Metropolitan Model and Widespread Settlement Model 594
 Maria Angela Bedini and Fabio Bronzini

The Community Health Centers: A Territorial Service in the Post-pandemic City 603
 Marco Mareggi and Michele Ugolini

Healthy Cities with Healthy Streets, Towards a New Normal of Urban Health and Well-Being 612
 Antonio Taccone and Antonino Sinicropi

Ecological Networks in the Spatial Planning of Campania Region Towards Green Infrastructures 622
 Salvatore Losco and Claudia de Biase

Cultural Heritage as a Right to Well-Being and an Engine of Urban Regeneration 636
 Chiara Corazzieri

Cities and Territories Theatres of the Recovery of the Country System 645
 Concetta Fallanca

Urban Regeneration and Real Estate Dynamics: A Non-linear Model of the Break-Even Analysis for the Assessment of the Investments 655
 Francesco Tajani, Pierluigi Morano, Felicia Di Liddo, Rossana Ranieri, and Debora Anelli

An Automatic Tool for the Definition of a Sustainable Construction Investment Index 664
 Francesco Tajani, Lucy Hayes-Stevenson, Rossana Ranieri, Felicia Di Liddo, and Marco Locurcio

Urban Regeneration Strategies According to Circular Economy: A Multi-criteria Decision Aiding Approach 676
 Lucia Della Spina

Resilience of Complex Urban Systems: A Multicriteria Methodology for the Construction of an Assessment Index 690
 Debora Anelli and Rossana Ranieri

Evaluating the Impact of Urban Renewal on the Residential Real Estate Market: Artificial Neural Networks Versus Multiple Regression Analysis 702
 Gabriella Maselli

A Bio Ecological Prototype Green Building Toward Solution of Energy Crisis 713
 Domenico Enrico Massimo, Vincenzo Del Giudice, Mariangela Musolino, Pierfrancesco De Paola, and Francesco Paolo Del Giudice

Green Building to Overcome Climate Change: The Support of Energy Simulation Programs in Gis Environment 725
 Domenico Enrico Massimo, Vincenzo Del Giudice, Mariangela Musolino, Pierfrancesco De Paola, and Francesco Paolo Del Giudice

Attractiveness and Problems in a Rural Village Restoration: The Umbrian Case of Postignano 735
 Marco Pizzi, Paola de Salvo, and Cristina Burini

Fostering the Renovation of the Existing Building Stock. Operational Models and Evaluation Tools 746
 Fabrizio Battisti and Orazio Campo

Towards a More Sustainable Use of Land. A Comparative Overview of the Italian Regional Legislation 754
 Donato Casavola and Giancarlo Cotella

Minimum Environmental Criteria, Estimation of Costs and Regional Prices: Preliminary Considerations 764
 Laura Calcagnini, Fabrizio Finucci, and Mariolina Grasso

An Integrated Model to Assess the Impact on World Heritage Sites. The Case Study of the Strategic Plan for the Buffer Zone of the UNESCO Site “Pompeii, Herculaneum and Oplontis” 774
 Alessio D’Auria and Irina Di Ruocco

Preliminary Approach for the Cost-Benefit Analysis in the Building Envelope: Study and Comparison of Actions 786
 Giovanna Acampa, Fabrizio Finucci, Mariolina Grasso, and Antonio Magarò

Implementation Tools for Projects Cost Benefit Analysis (CBA) 795
 Giovanna Acampa and Giorgia Marino

Photovoice and Landscape: Participatory Research-Action to Led Young People to Monitor Policies and Landscapes 803
 Pietro Bova

The Mediation Role of the University Tutor to Promote Student Empowerment: A Student Voice Survey Through Documentary Writing 815
 Viviana Vinci

‘Work’/‘World of Work’ and Primary Teacher Training 826
 Laura Sara Agrati

Developing Students' Empowerment Through Health Education for Future-Oriented Curricula and Sustainable Lifestyles	840
Stefania Massaro	
Identification, Validation and Certification of Previous Skills to Support Vulnerable Worker in Post Pandemic Dynamics	849
Daniela Robasto	
Students' Role in Academic Development: Patterns of Partnership in Higher Education	858
Anna Serbati, Valentina Grion, Juliana Elisa Raffaghelli, and Beatrice Doria	
How Can University Promote Eco-Literacy and Education in Environmental Sustainability? A Third-Mission Best Practice at the University of Bari	868
Alessia Scarinci and Alberto Fornasari	
Educational Interventions for Civil and Democratic Society: A Research-Training Project on Bullying and Cyberbullying at Apulian Schools	878
Loredana Perla and Ilenia Amati	
Digital Competence for Citizenship: Distance Learning Before and During the Covid-19 Emergency	887
Maria Sammarro	
Juveniles and Mafias: The Project Free to Choose for <i>Growing up Differently</i>	896
Giuseppina Maria Patrizia Surace	
Is City Love a Success Factor for Neighbourhood Resilience? Results from a Microcosmic Analysis of Rotterdam	904
Karima Kourtit, Peter Nijkamp, Umut Türk, and Mia Wahlstrom	
Agents of Change and Window of Locational Opportunity (WLO) in Crypto Valley in Zug, Switzerland	914
Arnault Morisson and Clara Turner	
Using Digitalization to Boost Lucanian Agriculture	924
Maria Assunta D'Oronzio and Carmela Sica	
Metropolitan Cities and Territorial Dynamics. Rules, Governance, Economy, Society	
Sustainable Policies in a Latin-American Context	935
Daniela Santana Tovar, Sara Torabi Moghadam, and Patrizia Lombardi	

The Never-Ending Story of the Metropolitan Area of Vigo (Galicia, Spain) 946
 Alejandro Otero-Varela and Valerià Paül

Assessing the SDG11 on a Neighborhood Scale Through the Integrated Use of GIS Tools. An Italian Case Study 957
 Francesca Abastante and Marika Gaballo

Methodological Proposal for the Sustainability of Sports Events 968
 Tiziana Binda, Sara Viazzo, Marta Bottero, and Stefano Corgnati

Sustainable Development Goals (SDGs) Evaluation for Neighbourhood Planning and Design 979
 Valeria Saiu and Ivan Blečić

Around Cosenza 988
 Francesca Moraci, Celestina Fazia, and Dora Bellamacina

Tackling the COVID-19 Pandemic at the Metropolitan Level. Evidence from Europe 999
 Giancarlo Cotella and Erblin Berisha

Regulating Urban Foodscapes During Covid-19 Pandemic. Privatization or Reorganization of Public Spaces? 1009
 Anita De Franco

How Covid-19 Pandemic Has Affected the Market Value According to Multi-parametric Methods 1018
 Laura Gabrielli, Aurora Greta Ruggeri, and Massimiliano Scarpa

Adapting Anti-adaptive Neighborhoods. What is the Role of Spatial Design? 1028
 Elena Porqueddu

Types of Uncertainty: Cities from a Post-pandemic Perspective 1039
 Daniele Chiffi and Francesco Curci

Urban Change in Cities During the COVID-19 Pandemic: An Analysis of the Nexus of Factors from Around the World 1048
 Hussaen A. Kahachi, Marwah Abdulqader Ali, and Wahda Shuker Al-Hinkawi

Local Authorities and Pandemic Responses in Perspective. Reflections from the Case of Milan 1059
 Carolina Pacchi

Credentials as Regulatory Tools in the COVID Era 1065
 Giuseppe Lorini and Olimpia G. Lodo

Healthy City for Organizing Effective and Multifaceted Actions at the Urban Level	1072
Roberto De Lotto, Caterina Pietra, Elisabetta Maria Venco, and Nastaran Esmaeilpour Zanjani	
Real Estate Values and Urban Quality: Definition of an Indicator	1082
Sebastiano Carbonara, Lucia Della Spina, and Davide Stefano	
Co-evolutionary, Transformative, and Economic Resilience During the COVID-19 Pandemic Crisis. Evidence-Based Experiences of Urban Community Design in Turin (Italy)	1091
Coscia Cristina and Voghera Angioletta	
Institutional Logics and Digital Innovations in Healthcare Organizations in Response to Crisis	1102
Stefania De Simone and Massimo Franco	
Sustainable Strategic Mobility Plans Towards the Resilient Metropolis	1110
Bruno Monardo and Chiara Ravagnan	
A GIS Application for the Hospitalization of COVID-19 Patients	1122
Michele Mangiameli and Giuseppe Mussumeci	
Influence of Near Fault Records on the Optimal Performance of Isolated Continuous Bridges	1130
Elena Miceli	
Safety Management of Infrastructures Through an Organizational Approach: Preliminary Results	1140
Roberta Troisi, Paolo Castaldo, and Monica Anna Giovanniello	
Evaluation of Seismic Reliability for Isolated Multi-span Continuous Deck Bridges	1148
Guglielmo Amendola	
The Effect of Local Emergency Policies on the Performance of the Italian Regional Health Care System	1158
Gaetano Alfano	
Fundamental Rights Implications of Covid-19. Religious Freedom and Resilience During the Pandemic	1166
Angela Iacovino and Milena Durante	
Multi-stakeholder Governance in Social Enterprises: Self-organization, Worker Involvement and Client Orientation	1176
Ermanno C. Tortia	
Topsis Techniques to Select Green Projects for Cities	1188
Antonio Nesticò, Piera Somma, Massimiliano Bencardino, and Vincenzo Naddeo	

Human Smart Landscape: An Integrated Multi-phase Evaluation Framework to Assess the Values of a Resilient Landscape 1197
 Lucia Della Spina and Claudia Giorno

Hydrogeological Damage: An Overview on Appraisal Issues 1209
 Antonio Nesticò, Gabriella Maselli, and Federica Russo

Urban Sustainability: Reporting Systems and Dataset in the European Union 1218
 Giorgia Iovino

Territorial Dynamics Emerged During the Festival “Terra2050 Credenziali per Il Nostro Futuro” 1229
 Maria Laura Pappalardo

The Role of the Institutional Dimension in Defining Sustainable Development Policies in Italy 1243
 Massimiliano Bencardino, Antonio Nesticò, Vincenzo Esposito, and Luigi Valanzano

The Role of the Coordination Models in Urban Resilience Against Covid-19 1252
 Roberta Troisi, Gaetano Alfano, and Rocío Blanco-Gregory

The Financial Sustainability a Cultural Heritage Adaptive Reuse Project in Public-Private Partnership 1262
 Lucia Della Spina, Sebastiano Carbonara, and Davide Stefano

Migrants, Retail Properties and Historic Centre. Urban and Economic Resilience in Palermo (Italy) 1273
 Grazia Napoli and Simona Barbaro

Dam Break-Induced Urban Flood Propagation Modelling with DualSPHysics: A Validation Case Study 1284
 Salvatore Capasso, Bonaventura Tagliaferro, and Giacomo Viccione

Transport Infrastructures and Economic Development of the Territory 1293
 Antonio Nesticò and Federica Russo

Spatial Patterns of Blue Economy Firms in the South of Italy 1303
 Massimiliano Bencardino, Vincenzo Esposito, and Luigi Valanzano

Electrification of Commercial Fleets: Implementation Practices 1313
 Franco Corti

Medium-Long Term Economic Sustainability for Public Utility Works 1319
 Luigi Dolores, Orlando Giannattasio, Maria Macchiaroli, Gianluigi De Mare, and Rosa Maria Caprino

A GIS-BIM Approach for the Evaluation of Retrofit Actions in Urban Planning. A Methodological Proposal	1328
Gabriella Graziuso, Michele Grimaldi, and Carla Giordano	
Economic-Financial Sustainability and Risk Assessment in the Water Sector in Italy	1337
Maria Macchiaroli and Luigi Dolores	
Awareness Campaigns and Sustainable Marketing for an Efficient Use of Territorial Resources	1347
Luigi Dolores, Maria Macchiaroli, and Gianluigi De Mare	
Infrastructure Accessibility Measures and Property Values	1355
Gabriella Maselli, Stefano de Luca, and Antonio Nesticò	
The Smart City NEOM: A Hub for a Sustainable Raise of Economy and Innovation	1366
Elena Merino Gómez, Renato Benintendi, and Gianluigi De Mare	
Where is the City? Where is the Countryside? The Methods Developed by Italian Scholars to Delimit Urban, Rural, and Intermediate Territories	1373
Valentina Cattivelli	
A Multicriteria Evaluation of Blockchain-Based Agrifood Chain in the New Scenario Post-Covid 19	1384
Alessandro Scuderi, Roberta Selvaggi, Luisa Sturiale, Giovanni La Via, and Giuseppe Timpanaro	
Experiences of Online Purchase of Food Products in Italy During COVID-19 Pandemic Lockdown	1400
Luisa Sturiale, Alessandro Scuderi, Biagio Pecorino, and Giuseppe Timpanaro	
Metropolitan Food Systems at the Test of Covid-19: Changes, Reactions, Opportunities Between Food Insecurity and New Needs	1415
Valentina Cattivelli	
Designing Food Landscape in the 15-Min Post-covid City. Imagining a New Scenario for Low-Density Spaces in Metropolitan Areas	1425
Catherine Dezio and Mario Paris	
Turning ‘Food to Be Wasted’ into Food Security and Multi-ethnic Integration	1437
Alessandra Narciso	
Food (in)security in a Nordic Welfare State: The Impact of COVID-19 on the Activities of Oslo’s Food Bank	1448
Julia Szulecka, Nhat Strøm-Andersen, and Paula Capodistrias	

Green Buildings, Post Carbon City and Ecosystem Services

Valuation and Design for Economic and Social Value Creation 1465

Isabella M. Lami, Beatrice Mecca, and Elena Todella

Projecting the Underused. Increasing the Transformation Value of Residential Spaces Through Their Adaptive Reuse 1476

Elena Todella, Caterina Quaglio, and Isabella M. Lami

Back to School. Addressing the Regeneration of the Italian School Building Stock in the Latent Pandemic Contingency 1486

Caterina Barioglio and Daniele Campobenedetto

Post-covid City: Proximity Spaces, Sharing Economy and Phygital 1496

Federica Marchetti

Digital Platforms, Imaginaries and Values Creation: Opportunities for New Urban Dynamics 1505

Maria Cerreta, Fernanda Della Mura, and Eugenio Muccio

Grid Governance Between Spatial Efficiency and Social Segregation: Chinese Gated Communities Socio-spatial Responses Amidst COVID-19 Outbreak 1516

Edoardo Bruno and Francesco Carota

Proposal for Mapping Social Housing Needs. The Apulia Region Case Study 1526

Giulia Spadafina and Giovanna Mangialardi

Barcelona’s Challenge to Supply Affordable Housing. Innovative Tenure Alternatives to Improve Accessibility 1536

Maria José Piñeira-Mantiñán, Ramón López-Rodríguez, and Francisco R. Durán Villa

Urban Planning and Urban Morphology Variables in Defining Real-Estate Sub-markets 1546

Konstantinos Lykostratis and Maria Giannopoulou

Housing Values Defined by Urban Morphology Characteristics 1557

Konstantinos Lykostratis and Maria Giannopoulou

Integrated Evaluation Methodology for Urban Sustainable Projects . . . 1567

Pierluigi Morano, Francesco Sica, Maria Rosaria Guarini, Francesco Tajani, and Rossana Ranieri

Proposal of an Environmental-Economic Accounting System for Urban Renewal Projects 1578

Maria Rosaria Guarini, Pierluigi Morano, Francesco Tajani, and Francesco Sica

The *Extended House* as Response to the Post-pandemic Housing Needs: Hints from the Real Estate Market 1587
Francesca Torrieri, Davide Di Ceglie, and Marco Rossitti

An Integrated Model for the Estimation of the Emissions of Pollutants from Traffic in the Urban Area 1596
Domenico Gattuso, Gian Carla Cassone, and Domenica Savia Pellicanò

Structural Equation Modelling for Detecting Latent “Green” Attributes in Real Estate Pricing Processes 1610
Elena Fregonara and Alice Barreca

Designing Forms of Regeneration. Spatial Implication of Strategies to Face Climate Change at Neighborhood Scale 1621
Kevin Santus, Emilia Corradi, Monica Lavagna, and Ilaria Valente

Investigating the Effect of Form and Material of Spatial Structures on Energy Consumption in Hot and Dry Climates *Case Study: Kerman City* 1631
Zinat Javanmard and Consuelo Nava

Green Building Strategy Supported by PostgreSQL and ArcGis System 1643
Carlo Bernardo

Climate Change Adaptation of Buildings Using Nature-Based Solutions: Application in Alentejo Central - LIFE myBUILDINGisGREEN 1658
Teresa Batista, Ricardo Barros, José Feroso Domínguez, Raquel Marijuan Cuevas, Jordi Serramia Ruiz, and Salustiano Torre Casado

The Use of Plants for Building Purposes in the Popular Tradition 1664
Miriam Patti, Carmelo Maria Musarella, Valentina Lucia Astrid Laface, Ana Cano-Ortiz, Ricardo Quinto-Canas, and Giovanni Spampinato

Urban Transformation of the Coastline from a Landscape Perspective. Analysis of Cases on the Costa del Sol (Spain) 1671
Alessandro Malerba, Hugo Castro Noblejas, Juan Francisco Sortino Barrionuevo, and Matías Mérida Rodríguez

The Teaching of Environmental Sciences in Secondary Education, High School and University to Fight Against Climate Change 1683
Ana Cano-Ortiz, Carmelo Maria Musarella, José Carlos Piñar Fuentes, Ricardo Quinto-Canas, Jehad Igbareyeh, Valentina Lucia Astrid Laface, and Eusebio Cano

Urban Spaces as a Phytogenetic Reserve 1692
Mauro Raposo, Maria da Conceição Castro, and Carlos Pinto-Gomes

Improving the Efficiency of District Heating and Cooling Using a Geothermal Technology: Underground Thermal Energy Storage (UTES) 1699
 Jessica Maria Chicco, Dragi Antonijevic, Martin Bloemendal, Francesco Cecinato, Gregor Goetzl, Marek Hajto, Niels Hartog, Giuseppe Mandrone, Damiano Vacha, and Philip J. Vardon

A Multi-criteria Assessment of HVAC Configurations for Contemporary Heating and Cooling Needs 1711
 Ilaria Abbà and Giulia Crespi

Vanadium Redox Flow Batteries: Characteristics and Economic Value 1721
 Cinzia Bonaldo and Nicola Poli

The Role of Quality Management Services (QMSs) in Aligning the Construction Sector to the European Taxonomy: The Experience of the QUEST Project 1732
 Marta Bottero and Federico Dell’Anna

A Multi-dimensional Decision Support System for Choosing Solar Shading Devices in Office Buildings 1742
 Maria Cristina Pinto, Giulia Crespi, Federico Dell’Anna, and Cristina Becchio

A Multi-criteria and Multi-domain Model to Support the Comprehensive Assessment of Building Performance 1752
 Giulia Vergerio, Giulio Cavana, Federico Dell’Anna, Cristina Becchio, Sara Viazzo, and Marta Bottero

Evaluating Positive Energy Districts: A Literature Review 1762
 Tiziana Binda, Marta Bottero, and Adriano Bisello

Neighbourhood Energy Community: Norms, Actors and Policies. The Case of Pilastro-Roveri 1771
 Federica Rotondo, Giancarlo Cotella, and Isabella M. Lami

Dimensions of Social Acceptance in Energy Transition 1780
 Paolo Bragolusi and Maria Stella Righettini

Strategies for the Valorisation of Small Towns in Inland Areas: Critical Analysis 1790
 Emanuela D’Andria, Pierfrancesco Fiore, and Antonio Nesticò

From Condominium to Energy Community: Energy and Economic Advantages with Application to a Case Study 1804
 Concettina Marino, Antonino Francesco Nucara, Maria Francesca Panzera, Matilde Pietrafesa, and Federica Suraci

Energy Requalification of a Neighbourhood of Reggio Calabria with a View to an Energy District	1818
C. Marino, A. Nucara, M. F. Panzera, M. Pietrafesa, and A. Votano	
Environmental Assessment of a Hybrid Energy System Supporting a Smart Polygeneration Micro-grid	1830
Giovanni Tumminia, Davide Aloisio, Marco Ferraro, Vincenzo Antonucci, Maurizio Cellura, Maria Anna Cusenza, Francesco Guarino, Sonia Longo, Federico Delfino, Giulio Ferro, Michela Robba, and Mansueto Rossi	
Drainage Layer in Green Roofs: Proposal for the Use of Agricultural Plastic Waste	1842
Stefano Cascone	
Towards the Environmental Sustainability of the Construction Sector: Life Cycle Environmental Impacts of Buildings Retrofit	1850
Simona Rosaria La Mantia, Roberta Rincione, Francesco Guarino, Sonia Longo, Marina Mistretta, and Maurizio Cellura	
Reversible, Sustainable and Circular Constructive Systems: Buildability Conditions	1860
Tecla Caroli, Andrea Campioli, and Monica Lavagna	
Advanced Circular Design, a Life Cycle Approach	1870
Domenico Lucanto	
Design Strategies Toward Low-Carbon Buildings and Neighborhoods. The Use of LCA to Support a Project Proposal for Reinventing Cities	1879
Monica Lavagna, Andrea Campioli, Anna Dalla Valle, and Serena Giorgi	
Regenerative Design and Hybrid Buildings to Address Climate Change	1889
Consuelo Nava	
Infrastructures and Spatial Information Systems	
Outdoor Green Walls: Multi-perspective Methodology for Assessing Urban Sites Based on Socio-environmental Aspects	1905
Nicole Agnolio, Matilde Molari, Laura Dominici, and Elena Comino	
Systemic Decision Support Tool for Online Application to Aid NBS Co-creation	1916
Fábio Matos, Rita Mendonça, Peter Roebeling, Piersaverio Spinnato, Giovanni Aiello, Rúben Mendes, Maria Isabel Bastos, Max López-Maciel, and Antonino Sirchia	
An Evaluation Approach to Support Urban Agriculture Implementation in Post-covid19 Cities: The Case of Troisi Park in Naples	1926
Marco Rossitti, Chiara Amitrano, Chiara Cirillo, and Francesca Torrieri	

Green Roof Benefits and Technology Assessment.
A Literature Review 1937
 Astrid Carolina Aguilar Fajardo, Gabriela Bacchi, Jorge Alexis Cusicanqui Lopez, Giovanni Gilardi, Damodar Maggetti, and Luca Tommasi

A Proposal to Assess the Benefits of Urban Ecosystem Services 1947
 Alessandra Oppio, Marta Dell’Ovo, Caterina Caprioli, and Marta Bottero

Intra-scale Design and Benefit Assessment of Green Stormwater Infrastructures 1956
 Roberto Bosco, Savino Giacobbe, Salvatore Losco, and Renata Valente

Urban Green Space to Promote Urban Public Health: Green Areas’ Design Features and Accessibility Assessment in Milano City, Italy 1966
 Maddalena Buffoli, Francesco Villella, Nasko Stefanov Voynov, and Andrea Rebecchi

Social Environmental Profitability Index (SEPI) and BIM to Support Decision-Making Processes in Public Green Infrastructure Investments 1977
 Marcellina Bertolinelli, Lidia Pinti, and Serena Bonelli

Assessing Tangible and Intangible Values of Cultural Ecosystem Services for Sustainable Regeneration Strategies 1990
 Maria Cerreta, Eugenio Muccio, and Giuliano Poli

The Use of the Adoption Prediction Outcome Tool to Help Communities Improve the Transition Towards the Implementation of Nature-Based Solutions 2000
 Max López-Maciel, Peter Roebeling, Rick Llewellyn, Elisabete Figueiredo, Rita Mendonça, Rúben Mendes, Fábio Matos, and Maria Isabel Bastos

Traffic Monitoring Using Intelligent Video Sensors to Support the Urban Mobility Planning 2012
 Domenico Gattuso and Domenica Savia Pellicanò

Cultural Heritage Recovery Interventions Through Steel Endoskeletons: A Case Study 2024
 Antonino Fotia, Francesco Caccamo, and Rocco Buda

Sant’Aniceto Castle from the Survey to the Enhancement 2035
 Francesco Amodeo, Davide Rocco Castagnoli, Daniele Marino, Pasquale Repaci, and Antonino Siclari

GIS Roads Cadastre, Infrastructure Management and Maintenance . . . 2045
 Silvia Simonetti, Agostino Currà, Salvatore Minniti, and Maurizio Modafferi

OBIA to Detect Asbestos-Containing Roofs	2054
Giuliana Bilotta	
Geomatic Techniques: A Smart App for Cultural Heritage	2065
Ernesto Bernardo, Giuliana Bilotta, and Adila Sturniolo	
Use of Big Data and Geomatics Tools for Monitoring and Combating Pandemics	2073
Vincenzo Barrile, Ernesto Bernardo, and Stefano Bonfa	
Modern Tools of Geomatics as an Indispensable Support to the Public Administration for the Protection, Restoration, Conservation and Dissemination of Cultural Heritage	2083
Ernesto Bernardo	
Virtual Reality Approach for Geoparks Fruition During SARS-Cov2 Pandemic Situation: Methodological Notes and First Results	2093
Salvatore Praticò, Marco Neves, Angelo Merlino, Raimondo Tripodi, Peppuccio Bonomo, Paulo Barreira, and Giuseppe Modica	
Geographic Information and Socio-Economic Indicators: A Reading of Recent Territorial Processes in the Test Area of Basilicata Region	2104
Valentina Santarsiero, Gabriele Nolè, Francesco Scorza, and Beniamino Murgante	
Methods and Tools for a Participatory Local Development Strategy ...	2112
Priscilla Sofia Dastoli and Piergiuseppe Pontrandolfi	
On the Use of Big Earth Data in the Copernicus Era for the Investigation and the Preservation of the Human Past	2122
Rosa Lasaponara, Carmen Fattore, Nicodemo Abate, and Nicola Masini	
FIRE-SAT System for the Near Real Time Monitoring of Burned Areas and Fire Severity Using Sentinel-2: The Case Study of the Basilicata Region	2132
Rosa Lasaponara, Carmen Fattore, Nicodemo Abate, Angelo Aromando, Gianfranco Cardettini, Guido Loperte, and Marco Di Fonzo	
The Influence of Potential Flood Hazard Areas for Urban Adaptation to Climate Change	2146
Simone Corrado, Luigi Santopietro, Francesco Scorza, and Beniamino Murgante	
Preliminary Results in the Use of WorldView-3 for the Detection of Cork Oak (<i>Quercus Suber L.</i>): A Case in Calabria (Italy)	2153
Gaetano Messina, Giovanni Lumia, Salvatore Praticò, Salvatore Di Fazio, and Giuseppe Modica	

Towards Quantifying Rural Environment Soil Erosion: RUSLE Model and Remote Sensing Based Approach in Basilicata (Southern Italy) 2163
 Valentina Santarsiero, Gabriele Nolè, Antonio Lanorte, and Beniamino Murgante

A Simplified Design Procedure to Improve the Seismic Performance of RC Framed Buildings with Hysteretic Damped Braces 2173
 Eleonora Bruschi, Virginio Quaglini, and Paolo M. Calvi

Saltwater and Alkali Resistance of Steel Reinforced Grout Composites with Stainless Steel 2183
 Sara Fares, Rebecca Fugger, Stefano De Santis, and Gianmarco de Felice

Freeze/Thaw Effect on the Mechanical Properties of FRCM System . . . 2192
 Salvatore Verre and Alessio Cascardi

Structural Assessment of a Heritage Building in the UNESCO Site of Alberobello 2203
 Francesco Micelli, Alessio Cascardi, and Salvatore Verre

Mechanical Properties of Mortars for Structural Restoration of Historic Masonry Buildings 2213
 Maria Teresa Cristofaro, Angelo D’Ambrisi, Mario De Stefano, and Marco Tanganelli

A New Compatible and Sustainable FRLM Composite for the Seismic and Energetic Upgrade of Historic Buildings 2223
 Valerio Alecci, Mario De Stefano, Antonino Maria Marra, Fabrizio Pittau, Dora Pugliese, Rosa Romano, and Gianfranco Stipo

Experimental Investigation on the Effectiveness of Masonry Columns Confinement Using Lime-Based Composite Material 2233
 Valerio Alecci, Mario De Stefano, Stefano Galassi, Raymundo Magos, and Gianfranco Stipo

Preliminary Italian Maps of the Expected Annual Losses of Residential Code-Conforming Buildings 2248
 Eugenio Chioccarelli, Adriana Pacifico, and Iunio Iervolino

Structural Safety Assessment of Existing Bridge Decks: Numerical Analysis Assisted by Field Test Results 2258
 Dario De Domenico, Davide Messina, and Antonino Recupero

Safety Management of Existing Bridges: A Case Study 2268
 Antonino Fotia, Maria Rosa Alvaro, Francesco Oliveto, and Raffaele Pucinotti

Seismic Retrofit of Concrete Reinforced Existing Buildings by Insertion of Steel Exoskeleton: A Case Study 2278
 R. Buda, M. R. Alvaro, and R. Pucinotti

Impact of Graphene-Based Additives on Bituminous Mixtures: A Preliminary Assessment	2289
Filippo Giammaria Praticò, Eliana Zappia, and Giuseppe Colicchio	
Cultural Heritage: Conservation, Enhancement and Management	
Local Development Through the Connection Between Roots Tourism, Local Food and Wine	2301
Sonia Ferrari, Tiziana Nicotera, Anna lo Presti, and Ana Maria Biasone	
Focus on the Role and Point of View of Municipal Administrations in the Apulia Region on the Phenomenon of Roots Tourism Through a Factor Analysis	2313
Nicolaia Iaffaldano, Angela Maria D’Uggento, and Vito Roberto Santamato	
The Management Models of a Tourist Destination in Italy	2325
Angela Vigliani and Francesco Calabrò	
Cultural Tourism in Historic Towns and Villages as Driver of Sustainable and Resilient Development	2335
Paolo Motta	
Economic Feasibility of a Project for the Reuse of the Old Hospital of Nicotera as a Center for Eating Disorders and for the Enhancement of the Mediterranean Diet	2347
Luca Santucci, Giuseppina Cassalia, and Francesco Calabrò	
The ICOMOS Draft International Charter for Cultural Heritage Tourism (2021): Reinforcing Cultural Heritage Protection and Community Resilience Through Responsible and Sustainable Tourism Management. New Approaches to Global Policies, Challenges and Issues Concerning Cultural Heritage Preservation and Enjoyment Within Tourism	2361
Celia Martínez Yáñez	
The Haenyeo Community: Local Expert Facilitator for Tangible- Intangible Cultural Heritage and Its Economic Contributions to the Jeju Society, Korea	2371
Hee Sook Lee-Niinioja	
“Experts and Professionals”: Intangible Cultural Heritage Custodians and Natural Resource Management in Poland and Canada	2383
Agnieszka Pawłowska-Mainville	
The Role of the Expert in Holistic Approach to ICH: Case Study in the Community of “Sites Remarquables du Goût (Outstanding Sites of Taste)” in France	2393
Catherine Virassamy	

The Cultural Routes of the Council of Europe and the Journey of Ulysses: Shared Values and Good Practices 2404
 Roberta Alberotanza, Francesco Calabrò, Mariangela Monaca, and Carmela Tramontana

The Journey of Ulysses: A Cultural Itinerary Among the Shores of the Mediterranean for the Promotion of Dialogue and Sustainable Development as Tools for Peace and Territorial Growth 2417
 Roberta Alberotanza, Francesco Calabrò, Mariangela Monaca, and Carmela Tramontana

In the Wake of the Homeric Periples: Escapes, Rejections, Landings and Emergencies in Italy from the Second Post-war Period Up to the Pandemic Times 2428
 Salvatore Speciale

Proposal for the Enhancement of Archaeological Sites and Places of Spirituality, in the Territories of the Colonne Magnogreche of the Province of Reggio Calabria 2438
 Maria Savrami

Fortifications for the Control of the Early Medieval Valdemone 2449
 Fabio Todesco

The Church of San Sebastiano in the Valley of Pagliara (Messina) Formerly the “Priorato di Santa Maria di Billimeni in Terra di Savoca” in the Byzantine Mediterranean 2460
 Francesca Passalacqua

On the Roads of Bruttium Between Italia and Kalavria. Rediscovering Ancient and New Cultural Landscapes 2470
 Mauro Mormino, Mariangela Monaca, Francesco Calabrò, and Emanuele Castelli

Sustainable Tourism and Its Role in Preserving Archaeological Sites 2485
 Dimah Wahhab Ajeena

Sustainable Transportation for Healthy Tourist Environment: Erbil City-Iraq a Case Study 2496
 Shahad Ali Dawood and Wahda Sh. Al-Hinkawi

The Urban Blue Space as a Wellness Tourism Destination 2505
 Reema Hamza Yassin and Rawaa Fawzi Naom Abbawi

Sequere Pecuniam! 2516
 Christer Bengs

Re-thinking the Resilience Paradigm in Cultural Heritage 2526
 Zachary M. Jones

Subsidence Monitoring in the Duomo di Milano: Half a Century of Measuring Activities	2535
Luigi Barazzetti, Mattia Previtali, and Fabio Roncoroni	
An Integrated Method to Assess Flood Risk and Resilience in the MAB UNESCO Collina Po (Italy)	2545
Carlotta Quagliolo, Vanessa Assumma, Elena Comino, Giulio Mondini, and Alessandro Pezzoli	
Innovative Tools for Green Heritage Management: The Case of the Historic Gardens of Savoy Royal Residences of Piedmont (Italy)	2556
Vanessa Assumma, Daniele Druetto, Gabriele Garnerò, and Giulio Mondini	
Assessing the Economic Value of the Unmovable Cultural Assets for Improving Their Resilience: The Case Study of the Church of Santa Maria dei Miracoli	2565
Giulia Datola, Vanessa Assumma, and Marta Bottero	
Mountain Hamlet Heritage Between Risk and Enhancement	2575
Elisabetta Colucci	
Study of the Cloisters of the Historical Center of Florence: Methodological Approach for the Definition of Restoration Intervention Priorities	2587
Giovanna Acampa, Carlo Francini, and Mariolina Grasso	
Post-fire Assessment of Heritage Timber Structures	2597
Dante Marranzini, Giacomo Iovane, Veronica Vitiello, Roberto Castelluccio, and Beatrice Faggiano	
Oil Heritage in Iran and Malaysia: The Future Energy Legacy in the Persian Gulf and the South China Sea	2607
Asma Mehan and Rowena Abdul Razak	
Digital Transformation in the Preservation of Cultural Heritage in Cities: The Example of Love Bank	2617
Katarína Vitálišová, Kamila Borseková, and Anna Vaňová	
Circular Economy of the Built Environment in Post-pandemic Era; A Disignerly Proposal for the Future Generation of Workspaces	2628
Hassan Bazazzadeh, Masoud Ghasemi, and Behnam Pourahmadi	
A Healthy Approach to Post-COVID Reopening of Sugar Factory of Kahrizak, Iran	2638
Mohsen Ghomeshi, Mohamadreza Pourzargar, and Mohammadjavad Mahdavinejad	

Approaches Proposal for Tools Coordinating in Maintenance and Reuse of Architectural Heritage. A Case Study on Urban Complexes of Modern Architectural Heritage 2648
 Marco Zerbinatti and Sara Fasana

Beyond Culture and Tourism: Conservation and Reuse of Architectural Heritage in a Productive Perspective 2659
 Nino Sulfaro

Special Event: Region United Nations 2020–2030

II Edition Rregion UN 2030: Towards a New Space’s ORMA Opportunity and Risks of New Modalities of Anthropization Between Sustainability, Innovation and Fragility for the Territory 2671
 Stefano Aragona

Climate Change and “Local Nature Based Solution” Towards Resilience 2680
 Fabiola Fratini

Climate-Proof Planning: Water as Engine of Urban Regeneration in the Ecological Transition Era 2692
 Carmela Mariano and Marsia Marino

Rethinking the South in Humanistic, Social and Pedagogical Perspective. Rethinking the Relationship Between Local and Global . . . 2701
 Rossella Marzullo

Big Data and Cultural Heritage 2708
 Vincenzo Barrile and Ernesto Bernardo

Combining the Ecological and Digital Transitions: *Smart Villages* for New Scenarios in the EU Rural Areas 2717
 Gabriella Pultrone

Rethinking New Communities. Moving Towards a Science of Cities . . . 2727
 Ferdinando Verardi

Hypothesis of Recovery and Redevelopment in the Territories of the Stilaro 2737
 Nunzio Bruno Palermo

Small Rural Towns and Farmhouses of the Opera for Valorizzazione of Sila in Calabria. Narrated Memory from the Past and the Present, Research for Possible Sustainable Scenarios. 2747
 Maria Rossana Caniglia

Ecopolis vs Megacity: A Post-crises Regional-Urban Vision Towards 2050 2757
 Sandro Fabbro

Reversible Building Technologies and Unconventional Materials for the Circular and Creative Reuse of Small Centers 2778
Francesca Giglio, Sara Sansotta, and Evelyn Grillo

Green Infrastructures and Water Management. Urban Regeneration Strategies to Face Global Change 2790
Irene Poli and Paola N. Imbesi

Application of Crowd Sensing for Sustainable Management of Smart Cities 2800
Ilaria Pigliautile and Myriam Caratù

Ecological Transition and Planning Strategies 2809
Stefano Aragona

Urban Happiness Planning Through Interactive Chorems 2822
Marco Romano

A Preliminary Model for Promoting Energy Communities in Urban Planning 2833
Roberto Gerundo, Alessandra Marra, and Michele Grimaldi

Author Index 2841



Integrated Evaluation Methodology for Urban Sustainable Projects

Pierluigi Morano¹, Francesco Sica²(✉), Maria Rosaria Guarini², Francesco Tajani²,
and Rossana Ranieri²

¹ Department of Science of Civil Engineering and Architecture, Polytechnic University of Bari,
126 Amendola Street, 70126 Bari, Italy

² Department of Architecture and Design, Sapienza University of Rome, 359 Flaminia Street,
00196 Rome, Italy

francesco.sica@uniroma1.it

Abstract. The projects for cities' development must comply with multiple instances defined according to the sustainability dimensions, i.e. economic, social and environmental ones. Even in the light of the most demanding international governmental and other current provisions for climate-change adaptation, initiatives of public and/or private interest must be evaluated on the basis of their performance level in the perspective of economic growth, environmental protection and social well-being.

The present paper focuses on the following issues: *i*) the economic-sustainable evaluation of urban design-solutions; *ii*) how to carry out integrated evaluations that systematically include multiple aspects while respecting the interests involved.

The use of multi-criteria analysis methods if, on the one hand, contributes to the achievement of commingling among dissimilar semantic-assessment fields, on the other hand, it is characterized by the difficulty of taking into account the interests of all the stakeholders able to affect the intervention priority among investment alternatives in urban context.

The work aims at describing an integrated evaluation methodology based, on the one hand, on the syntactic-operational formalism of the Analytic Hierarchy Process (AHP), and, on the other one, on the implementation of an analytical technique of a descriptive-participatory type (SWOT analysis + focus group) for the definition of evaluation criteria and relative weights for the sustainable evaluation of projects.

Keywords: Urban sustainable development · Integrated evaluation framework · AHP · SWOT analysis · Focus group

1 Introduction

Facing the climate changes is the most difficult challenge nowadays [1]. Globally, climatic conditions are rapidly evolving, worsening the effects on cities in terms of quality of life, mean urban temperature, capability to respond to natural disaster, etc. [2]. The attention given to the issue of implementing the sustainability in every sector and as

global issue is risen in the past fifteen years. Indeed, the United Nations (UN) develop a specific Agenda for Sustainable Development, in which the issues addressed are multiple and interrelated, in order “[...] to achieve a better and more sustainable future for all”. Specific objectives are recognised in seventeen goals (Sustainable Development Goals – SDGs) with a focus on cities in Goal 11 “Make cities and human settlements inclusive, safe, durable and sustainable” [3]. Furthermore, in a perspective of monitoring the vulnerability of the cities in 2015, the Third UN World Conference adopted the “Sendai framework”, with the support of the United Nations Office for Disaster Risk Reduction (UNISDR) [4]. In the Sendai report the shift from “disaster management” to “disaster risk management” is highlighted through the statement of prevention activities consistent with the seventeen SDGs. Furthermore, the building’s design process is characterized by new approaches with an emphasis on the integration and the protection of natural components in the project, such as biophilic design - as a strategy for promoting positive connections between people and nature -, or the *archinature*, i.e. the complex and articulated interweaving in which nature and artifice should collaborate in the construction of buildings and landscape [5–7]. This typology of design aims to sustain the resilience of natural systems over the time, modifying many components of the environmental conditions of a building or landscape in the short term, in order to support, in the long term, an ecologically robust and sustainable natural community [8, 9]. Furthermore, in the European Union (EU) there is a particular attention for the integration of environmental criteria into all phases of the purchasing process, encouraging the diffusion of technologies and environmentally sound products. The European Commission has developed the Green Public Procurement (GPP) [10], encouraging member States to adopt action plans for the integration of environmental requirements into public procurement and, subsequently, issued specific Guidelines for the drafting of a National Action Plans on GPP. In Italy, for example, the Procurement Code [11] has introduced the obligation to follow the minimum environmental criteria (CAM) – defined consistently with the GPP - in the planning of new interventions on the territory. Through this approach, the projects must consider the life cycle of products, services and concessions and has to be measured by objective criteria capable of weighing the environmental, energetically, social and economic performance on a medium and long analysis term.

Considering all the issues described above, it is possible to state that understanding the impact that climate change will have on cities is complex, because it involves many different factors hard to quantify [12]. In order to support and guide the planning and design of sustainable and resilient cities, it is necessary to develop methods, methodological approaches and tools able to assess urban sustainability criteria and appropriate performance indicators.

The research aims at developing an integrated evaluation methodology based on: *i*) the use of one of the main tools found in the literature for solving ranking problems – Analytic Hierarchy process (AHP) [13] – *ii*) the synergic implementation of a participatory process aimed at empirically quantifying the weights of the criteria involved in the evaluation flow of the examined projects.

The work is organized as follows: Sect. 2 contains a brief literature review in order to contextualize the research carried out; in Sect. 3 the evaluation methodology adopted

is illustrated; in Sect. 4 the methodology is applied to a case study, in order to highlight its potentialities; in Sect. 5 the conclusions are discussed.

2 Sustainable Criteria and Supporting Assessment Methods

The selection of a set of proper criteria, indicators and/or index for the assessment of the sustainability of urban transformation projects is quite complex. Analyzing the current literature, a lack of consensus is noticeable, not only on the whole conceptual framework of reference, but on the selection and optimal number of indicators. Also, there is a lack of uniformity in identifying the relative weights to be attributed to sustainability criteria and indicators [14]. Early in 2002 Warhurst [15] - referring to the mining, metals and energy sectors - highlighted the need to structure links among sustainable development and corporate social, economic and environmental performance. Nowadays, a recent study carried out by Morano et al. [16] point out the heterogeneity both in the adoption of criteria and indicators, in the methodology approach and in the tools that could be used. Furthermore, Tanguay et al. [17] highlight that, according to the reference territory, there are different classifications and categorizations of Sustainable Development Indicators (SDI); moreover, the ambiguous definition of sustainable development makes hard the selection of methods and difficult the accessibility of qualitative and quantitative data.

In order to respond to this state of the art, many studies and research have been developed on the subject. With reference to the construction sector, Ayman and Wafaa [18] carried out a review in order to establishing an International Sustainability Index. In United Kingdom, Boyko et al. [19] defined a toolkit that establishes the relative sensitivity of sustainability indicators to facilitate the use of scenarios in any urban context and at any scale of reference. In the Indian context, Anand et al. [20] developed a study to assess various sustainability criteria in smart cities using a fuzzy-AHP method. With specific reference to the selection of sustainable materials in the construction sector, Figureido et al. [21] also adopted a framework that involved the integration of Life Cycle Sustainability Assessment (LCSA), fuzzy-AHP, and Building Information Modeling (BIM) to choose suitable materials, by creating a system of 52 indicators of urban sustainable development that could address economic growth and efficiency, ecological and infrastructural construction, environmental protection, social and welfare progress. Other research tried to systematize the use of many indicators throughout the development of integrated tools like the Dashboard of Sustainability (DS) [22, 23], that is a mathematical and graphical tool that is able to create concise evaluations to support the decision-making process; or the methodology proposed by Fernández-Sánchez and Rodríguez-López [24], aimed at identifying a specific set of sustainability indicators in construction project management.

3 Integrated evaluation methodology for sustainable projects

In the light of literature review evidence in Sect. 2, it seems appropriate to be able to apply “mixed” evaluation methodologies in order *i*) to address, manage and translate multiple design-assessment aspects of projects, taking into account the logical-functional relationships in sustainable perspective, *ii*) to create a system of multi-scalar analysis

that highlights the socio-economic and environmental characteristics of projects, as well as their sustainable effects for territorial growth. The proposed evaluation methodology allows for multi-dimensional assessments of alternative designs solutions based on a participatory and explicit information structure [25]. The novelty of the proposed methodological approach is identifiable in the mixture between the implementation of a participatory process according to a logic of direct functionality with respect to the multi-criteria evaluation method designed to solve the ranking problems between alternatives.

By considering a panel (I) of design solutions ($i = 1, \dots, n$) to be evaluated from a sustainable perspective, the proposed methodology is constituted by the following sequential steps:

Step 1_SWOT analysis for sustainable criteria recognition: definition of the evaluation criteria ($j = 1, \dots, m$) to be used to quantitatively and/or qualitatively measure the effects of the i -th intervention to be carried out in the urban area of reference from the point of view of sustainable development. The systematic process of the main performance criteria to be used in the evaluation phase of the i -th project alternative is carried out according to the logic of SWOT analysis. This highlights strengths, weaknesses, opportunities and risks that characterize the set of projects (I). The comparison among the different SWOT analysis carried out for each i -th alternative project is used to identify appropriate evaluation criteria in order to choose of a specific project consistent to the programmatic goals of sustainability at international level. The criteria (j -th) are directly derived by examining the SWOT analysis developed for each project, and identifying the keywords that are most frequently recurrent in the i -th alternative;

Step 2_Focus group for weighting-criteria: weighting in correspondence with the j -th evaluation criteria by Step 1 for the i -th project solution.

The weighting of the criteria is developed through the engagement of focus group practice, namely a group interview involving a small number of similar people or participants who have common experiences in urban sustainable studies;

Step 3_AHP analysis: measurement of the relative weights (w_{ij}) among design solutions i with respect to the j -th evaluation criterion by Step 1.

This with the Analytic Hierarchy Process that provides: *i*) the construction of the pairwise comparisons matrix between alternative projects; *ii*) the determination of relative local weights. The local weights of each project are multiplied by those of the corresponding via focus group activity. The products thus obtained are summed in global weights (or priorities value) of the analysis elements. To verify whether the weights obtained in the Step 2 are comparable to the judgments of the AHP, the Consistency Ratio (CR) for each comparison matrix, as ratio between Consistence Index and Random Index [26] must be defined;

Step 4_Evaluation problem solving: the outcomes obtained by previous Steps could support the solving of multiple operative decision-making systems, e.g. the creation of the ranking lists, total and relative to each evaluation criterion, between project alternatives, or the selection of best project to finance for the urban sustainable development.

The proposed evaluation algorithm is tested on case study aimed to structure a ranking among alternatives related to urban regeneration projects located in different countries of the world. The application of the methodological framework is aimed at testing the flexibility of the proposed analysis scheme, even in the situation of having to evaluate examples of projects implemented in settlement contexts of different economic, social and environmental feature. In Sect. 4 the description of the case study under examination is presented.

4 A Ranking Case Between World-Wide Urban Renewal Projects

The case study takes into account a set of 13 projects, of diverse affiliation country, aimed to the urban renewal and recovery of property of historical and architectural significance. The projects are spread worldwide: five in Europe (two in Italy, one in France, one in Belgium, one in Slovakia), two in North Africa (Egypt and Morocco), two in middle east/Mediterranean (Lebanon, Turkey), four in western Asia (Iran). The identification of 13 case-studies was performed according to relative construction year, investment costs and capacity to pursue sustainability goals in the urban context where they are located.

The objective is to individuate which of this projects are able to determine the best financial, social, cultural and environmental benefits in sustainable perspective on their territory. Below descriptions of the steps of the proposed evaluation methodology with regard to the ranking case-study are reported.

Step 1: SWOT analysis for sustainable criteria recognition

The specificities of the several cities in the world where the *i-th* project is located, and the availability of information on the interventions examined, led to the description of each project according to the logic of SWOT analysis. The comparison among *i-th* SWOT analysis allows to identify key evaluation aspects – *sustainable evaluation criteria* – on the basis of which is possible to frame the ranking case-study. By the process of comparing alternative solutions, the evaluation of the projects set could be made according to the following sustainable evaluation criteria: C1) economic impact; C2) historical value; C3) environmental aspect; C4) location and relationship with the urban core of the city; C5) creation of open space; C6) private/public collaboration; C7) social sustainability; C8) cultural boost; C9) technological features; C10) correspondence to national and international strategies of sustainable development.

Step 2: Focus group for weighting-criteria

To establish weights-criteria for the *i-th* project examined, a focus group activity is carried out. A small-group discussion of 4 members that have knowledge on the project set and sustainability objectives, guided by a trained leader, is created. Through online means (video-chat, web-forum) the participatory evaluation among group-components is performed. Each component is called to express own judgment on importance degree for *j-th* criteria in correspondence to *i-th* project alternative. The evaluation process of importance degree attribution is made on the basis of the evaluation scale [0, 3, 5, 7] which stands as follows: not at all meaningful (0); low meaningful (3); quite meaningful (5); high meaningful (7). In Table 1 the outcomes of focus group activity for weighting-criteria are reported.

Table 1. Criteria-weights values

Project alternatives	Sustainable evaluation criteria									
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
P1. Navile Market	3	5	7	7	7	5	3	3	0	5
P2. Regeneration of Maspero Triangle	5	5	5	7	5	5	3	0	3	3
P3. Progetto Manifattura	5	5	7	5	7	5	5	7	5	5
P4. Iran Mall	7	0	3	5	3	3	5	5	7	3
P5. Waterfront City	7	0	3	5	7	7	5	0	5	7
P6. Twin City	7	0	5	7	7	3	7	3	7	7
P7. Rabat City Train Station	7	7	0	7	5	7	3	0	5	3
P8. Galataport	7	0	0	7	5	5	7	5	7	3
P9. Chitgar Lake	3	3	3	7	5	3	5	5	0	0
P10. Naghsh E Jahan	5	7	0	5	3	3	5	3	3	0
P11. Charbagh Street	5	5	7	7	0	3	3	0	3	3
P12. Tivoli Greencity	3	0	7	3	3	3	7	0	0	5
P13. Philharmonie	0	0	3	5	0	3	3	7	7	3

Step 3: AHP analysis

The measurement of the relative weights among design solutions *i* with respect to the *j-th* evaluation criterion by Step 1 is made via AHP analysis. Ten comparison matrices among alternative projects for each evaluation criterion are performed. As evaluation scale of reference the follows is adopted: 3 (low meaningful versus other alternative); 5 (quite meaningful versus other alternative); 7 (high meaningful versus other alternative). In spite of the well-established *Saaty* scale (1, 3, 5, 7, 9), this smaller range value scale has been adopted in order to preserve operational uniformity with the previous Step and corresponding evaluation process.

Table 2 reports an example of comparison matrix among project alternatives for the C1 (economic impact criterion).

To verify the judgments consistency of Step 3 and those underlying the AHP, the Consistence Ratio (CR) is calculated for *j-th* comparison matrix as in Table 3.

As noted via literature studies on AHP, a CR index value < 0.1 is considered permissible; when the CR value exceeds a threshold equal to 10%, the deviation from the perfect consistency condition is considered unacceptable [26]. For the case-study, the follows range values for CR index are considered (Table 4). The minimum and maximum CR values ($CR_{min} = 0.130$; $CR_{max} = 0.360$), as well as the intermediate benchmark ($\overline{CR} = 0.245$) were obtained by assuming the *j-th* comparison matrix consists entirely of the minimum, middle and maximum values (3, 5, 7) of the rating AHP scale. In accordance with the range values as in Table 4 the CR outcomes by AHP analysis of reference case-study are quite acceptable.

Table 2. Comparison matrix between project alternatives regarding economic impact criterion

C1.Economic impact	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
P1	1,00	7	7	7	7	7	5	5	5	7	7	5	3
P2	0,14	1,00	5	7	7	7	7	7	3	5	5	3	3
P3	0,14	0,20	1,00	7	7	7	7	7	3	5	5	3	3
P4	0,14	0,14	0,14	1,00	5	5	5	5	3	3	3	3	3
P5	0,14	0,14	0,14	0,20	1,00	5	5	5	3	3	3	3	3
P6	0,14	0,14	0,14	0,20	0,20	1,00	5	5	3	3	3	3	3
P7	0,20	0,14	0,14	0,20	0,20	0,20	1,00	5	3	3	3	3	3
P8	0,20	0,14	0,14	0,20	0,20	0,20	0,20	1,00	3	3	3	3	3
P9	0,20	0,33	0,33	0,33	0,33	0,33	0,33	0,33	1,00	7	7	5	3
P10	0,14	0,20	0,20	0,33	0,33	0,33	0,33	0,33	0,14	1,00	5	3	3
P11	0,14	0,20	0,20	0,33	0,33	0,33	0,33	0,33	0,14	0,20	1,00	3	3
P12	0,20	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,20	0,33	0,33	1,00	3
P13	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	1,00

Table 3. Consistence Ratio (CR) values

	Sustainable evaluation criteria	CR
C1	Economic impact	0.349
C2	Historical value	0.322
C3	Environmental aspect	0.277
C4	Location	0.339
C5	Open spaces	0.290
C6	Public/Private collaboration	0.326
C7	Social sustainability	0.367
C8	Cultural boost	0.308
C9	Technological features	0.364
C10	Sustainable development	0.326

Table 4. CR range values

CR range value	Meanings
$0.130 \leq CR \leq 0.245$	High acceptable
$0.246 \leq CR \leq 0.360$	Quite acceptable
$CR \geq 0.361$	Not acceptable

Step 4: Ranking problem outcomes.

By previous steps total priority list and relative ones for *j*-th criterion are obtained, respectively in the Tables 5 and 6 following.

Table 5. Total priority list

	P1	P5	P8	P3	P2	P4	P6	P9	P10	P7	P11	P13	P12
i-th Global weight	0.184	0.139	0.130	0.101	0.096	0.084	0.072	0.059	0.046	0.040	0.034	0.028	0.022

Table 6. Relative priority lists

Relative priority lists									
C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
P4	P1	P1	P1	P1	P1	P4	P3	P4	P1
P2	P2	P3	P2	P3	P5	P6	P4	P6	P5
P1	P7	P2	P4	P2	P2	P1	P1	P8	P6
P5	P3	P6	P7	P5	P7	P3	P9	P3	P3
P7	P10	P12	P9	P6	P3	P2	P8	P2	P2
P6	P11	P11	P3	P7	P4	P8	P13	P5	P4
P3	P9	P4	P6	P9	P8	P5	P6	P7	P12
P8	P4	P5	P5	P4	P6	P12	P10	P13	P7
P10	P5	P9	P8	P8	P9	P9	P2	P10	P8
P11	P6	P13	P11	P10	P10	P10	P5	P11	P11
P9	P8	P7	P10	P12	P11	P7	P12	P1	P13
P12	P12	P8	P13	P11	P12	P11	P7	P9	P10
P13	P13	P10	P12	P13	P13	P13	P11	P12	P9

5 Conclusions

Assessing the sustainability of projects requires the implementation of methodologies to express the projects performance according to the three dimensions of sustainability, namely economic, social and environmental ones. This should also be carried out by taking into account the decision-making context, in particular the interests related to the stakeholders involved in the life cycle of the projects to be assessed [27, 28]. The integrated evaluation methodology for urban sustainable projects [29, 30] described in this contribution attempts to comply, on the one hand, with the need to carry out assessments that respect the points of view of multiple stakeholders, and, on the other one, to

formulate judgments according to a logical-operational process that is as rational and sequential as possible. The development of SWOT analysis, as first step, and then the implementation of focus group provides qualitative-quantitative input information data for the applicability of evaluative procedures (e.g., AHP), in order to support ranking cases among alternatives for the sustainable city development. The testing and checking phase of the applicability of the proposed evaluation framework on the set of 13 urban renewal projects in world-wide context allow to make some reflections. Namely, the proposed framework on which to set up the integrated evaluation of projects in sustainable key can change according to: *i*) the type of evaluation problem to be solved, *ii*) the category and number of stakeholders (public and/or private) involved in the project initiatives. The combination of these factors (type of evaluation problem, territorial analysis and stakeholders involved) defines the degree of detail and accuracy of the evaluation framework, as well as the level of accuracy of the evaluation system proposed, supporting the resolution of multiple evaluation cases of interest. Limitations of the research lie in the measurement of the weights of each criterion through a participatory process, and thus in the randomness of computing this data in the AHP evaluation process. Outlines of future researches will regard the integration of proposed methodological framework with different multi-criteria decision tools, and its applicability to diverse type of investments in circumscribed contexts of analysis.

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Author Index

A

Abastante, Francesca, 957
Abate, Nicodemo, 2122, 2132
Abbà, Ilaria, 1711
Abdul Razak, Rowena, 2607
Abdulah Mohammed, Al Khafaji Ibtisam, 75
Abdullah Abdullah, Rebaz Jalil, 396
Acampa, Giovanna, 786, 795, 2587
Agnolio, Nicole, 1905
Agrati, Laura Sara, 826
Aguilar Fajardo, Astrid Carolina, 1937
Ahmed Ezzat, Mohammed Mustafa, 418
Aiello, Giovanni, 1916
Alberotanza, Roberta, 2404, 2417
Alecci, Valerio, 2223, 2233
Alfano, Gaetano, 1158, 1252
Al-Hinkawi, Wahda Shuker, 1048
Ali Dawood, Shahad, 2496
Ali, Marwah Abdulqader, 1048
Aloisio, Davide, 1830
Alvaro, Maria Rosa, 2268, 2278
Amati, Ilenia, 878
Amendola, Guglielmo, 1148
Amitrano, Chiara, 1926
Amodeo, Francesco, 2035
Anelli, Debora, 655, 690
Angioletta, Voghera, 1091
Antonijevic, Dragi, 1699
Antonucci, Vincenzo, 1830
Aragona, Stefano, 2671, 2809
Aromando, Angelo, 2132
Assumma, Vanessa, 2545, 2556, 2565
Astrid Laface, Valentina Lucia, 1683

B

Bacchi, Gabriela, 1937
Bagnato, Francesco, 301
Barazzetti, Luigi, 2535
Barbaro, Giuseppe, 66
Barbaro, Simona, 1273
Barillà, Giuseppina Chiara, 66
Barioglio, Caterina, 1486
Barreca, Alice, 182, 1610
Barreira, Paulo, 2093
Barrile, Vincenzo, 2073, 2708
Barros, Ricardo, 1658
Bastos, Maria Isabel, 1916, 2000
Batista, Teresa, 1658
Battisti, Fabrizio, 746
Bazazzadeh, Hassan, 2628
Becchio, Cristina, 1742, 1752
Bedini, Maria Angela, 594
Bellamacina, Dora, 988
Bencardino, Massimiliano, 1188, 1243, 1303
Bengs, Christer, 2516
Benintendi, Renato, 1366
Berisha, Erblin, 999
Bernardo, Carlo, 1643
Bernardo, Ernesto, 2065, 2073, 2083, 2708
Bertolinelli, Marcellina, 1977
Biasone, Ana Maria, 2301
Bilotta, Giuliana, 2054, 2065
Binda, Tiziana, 968, 1762
Bisello, Adriano, 1762
Blanco-Gregory, Rocío, 1252
Blečić, Ivan, 979
Bloemendal, Martin, 1699
Bombino, Giuseppe, 66

Bonaldo, Cinzia, 1721
 Bonelli, Serena, 1977
 Bonfa, Stefano, 2073
 Bonomo, Peppuccio, 2093
 Borsková, Kamila, 2617
 Bosco, Roberto, 1956
 Bottero, Marta, 968, 1732, 1752, 1762, 1947, 2565
 Bova, Pietro, 803
 Bragolusi, Paolo, 1780
 Bruno, Edoardo, 1516
 Brignone, Luca, 483
 Bronzini, Fabio, 594
 Bruschi, Eleonora, 2173
 Buda, R., 2278
 Buda, Rocco, 2024
 Buffoli, Maddalena, 1966
 Burini, Cristina, 735
 Busacca, Maurizio, 450

C

Caccamo, Francesco, 2024
 Calabrò, Francesco, 3, 278, 289, 301, 313, 2325, 2347, 2404, 2417, 2470
 Calcagnini, Laura, 764
 Calvi, Paolo M., 2173
 Campagnari, Francesco, 461
 Campioli, Andrea, 1860, 1879
 Campo, Orazio, 746
 Campobenedetto, Daniele, 1486
 Caniglia, Maria Rossana, 2747
 Cano, Eusebio, 1683
 Cano-Ortiz, Ana, 1664, 1683
 Capasso, Salvatore, 1284
 Capodistrias, Paula, 1448
 Cappello, Cheren, 211
 Caprino, Rosa Maria, 1319
 Caprioli, Caterina, 1947
 Caratù, Myriam, 2800
 Carbonara, Sebastiano, 1082, 1262
 Cardettini, Gianfranco, 2132
 Caroli, Tecla, 1860
 Carota, Francesco, 1516
 Carrà, Bruno Gianmarco, 47
 Casado, Salustiano Torre, 1658
 Casavola, Donato, 754
 Cascardi, Alessio, 2192, 2203
 Cascone, Stefano, 1842
 Cassalia, Giuseppina, 3, 278, 289, 301, 2347
 Cassone, Gian Carla, 1596
 Castagnoli, Davide Rocco, 2035
 Castaldo, Paolo, 1140
 Castelli, Emanuele, 2470

Castelluccio, Roberto, 2597
 Castro Noblejas, Hugo, 1671
 Cattivelli, Valentina, 1373, 1415
 Cavana, Giulio, 1752
 Cecinato, Francesco, 1699
 Cellamare, Carlo, 483
 Cellura, Maurizio, 1830, 1850
 Cerreta, Maria, 501, 1505, 1990
 Chicco, Jessica Maria, 1699
 Chiffi, Daniele, 1039
 Chioccarelli, Eugenio, 2248
 Cirianni, Francis M. M., 356, 363, 377
 Cirillo, Chiara, 1926
 Cogliandro, Giuseppe, 334
 Colicchio, Giuseppe, 2289
 Colucci, Elisabetta, 2575
 Comino, Elena, 1905, 2545
 Contato, Annalisa, 191
 Corazzieri, Chiara, 636
 Corgnati, Stefano, 968
 Corradi, Emilia, 1621
 Corrado, Simone, 2146
 Corti, Franco, 1313
 Corvo, Luigi, 432, 471
 Cotella, Giancarlo, 754, 999, 1771
 Crespi, Giulia, 1711, 1742
 Cristina, Coscia, 1091
 Cristofaro, Maria Teresa, 2213
 Cuevas, Raquel Marijuan, 1658
 Curci, Francesco, 1039
 Currà, Agostino, 2045
 Cusenza, Maria Anna, 1830
 Cusicanqui Lopez, Jorge Alexis, 1937

D

D'Ambrisi, Angelo, 2213
 D'Andria, Emanuela, 1790
 D'Auria, Alessio, 774
 D'Oronzio, Maria Assunta, 924
 D'Uggento, Angela Maria, 2313
 da Conceição Castro, Maria, 1692
 Dalla Valle, Anna, 1879
 Dastoli, Priscilla Sofia, 2112
 Datola, Giulia, 2565
 de Biase, Claudia, 622
 De Capua, Alberto, 105, 136
 De Domenico, Dario, 2258
 de Felice, Gianmarco, 2183
 De Franco, Anita, 1009
 De Lotto, Roberto, 1072
 de Luca, Stefano, 1355
 De Mare, Gianluigi, 1319, 1347, 1366
 De Paola, Pierfrancesco, 713, 725

de Salvo, Paola, 735
De Santis, Stefano, 2183
De Simone, Stefania, 1102
De Stefano, Mario, 2213, 2223, 2233
Del Giudice, Francesco Paolo, 713, 725
Del Giudice, Vincenzo, 713, 725
Delač, Domina, 47
Delfino, Federico, 1830
Dell'Anna, Federico, 1732, 1742, 1752
Dell'Ovo, Marta, 1947
Della Spina, Lucia, 676, 1082, 1197, 1262
Dezio, Catherine, 1425
Di Ceglie, Davide, 1587
Di Fazio, Salvatore, 2153
Di Fonzo, Marco, 2132
Di Liddo, Felicia, 655, 664
Di Ruocco, Irina, 774
Dolores, Luigi, 1319, 1337, 1347
Domínguez, José Fermoso, 1658
Dominici, Laura, 1905
Doria, Beatrice, 858
Druetto, Daniele, 2556
Durán Villa, Francisco R., 1536
Durante, Milena, 1166

E

Errante, Lidia, 120, 136
Esposito, Vincenzo, 1243, 1303
Esteban Lucas-Borja, Manuel, 47

F

Fabbro, Sandro, 2757
Faggiano, Beatrice, 2597
Fallanca, Concetta, 549, 645
Fares, Sara, 2183
Fasana, Sara, 2648
Fattore, Carmen, 2122, 2132
Fazia, Celestina, 988
Fedele, Rosario, 334
Felloni, Maria Fiorella, 559
Ferrari, Sonia, 2301
Ferraro, Marco, 1830
Ferro, Giulio, 1830
Figueiredo, Elisabete, 2000
Finucci, Fabrizio, 764, 786
Fiore, Pierfrancesco, 1790
Fornasari, Alberto, 868
Foti, Giandomenico, 66
Fotia, Antonino, 2024, 2268
Fragomeni, Paolo, 289
Francini, Carlo, 2587
Franco, Massimo, 1102
Fratini, Fabiola, 2680

Fregonara, Elena, 1610
Freni, Giulia, 154
Fugger, Rebecca, 2183

G

Gabaglio, Rossana, 570
Gabbalo, Marika, 957
Gabrielli, Laura, 1018
Galassi, Stefano, 2233
Garnero, Gabriele, 2556
Gattuso, Domenico, 1596, 2012
Gerundo, Roberto, 2833
Ghasemi, Masoud, 2628
Ghomeshi, Mohsen, 2638
Giacobbe, Savino, 1956
Giannattasio, Orlando, 1319
Giannopoulou, Maria, 1546, 1557
Giglio, Francesca, 2778
Gilardi, Giovanni, 1937
Giordano, Carla, 1328
Giorgi, Serena, 1879
Giorno, Claudia, 1197
Giovanniello, Monica Anna, 1140
Gissara, Marco, 483
Giuffrida, Salvatore, 211
Giunta, Marinella, 346, 356
Goetzl, Gregor, 1699
Gómez, Elena Merino, 1366
Gotta, Alessia, 201
Grasso, Mariolina, 764, 786, 2587
Graziuso, Gabriella, 1328
Grillo, Evelyn, 2778
Grimaldi, Michele, 1328, 2833
Grion, Valentina, 858
Grisafi, A. Julia, 221
Guarini, Maria Rosaria, 1567, 1578
Guarino, Francesco, 1830, 1850

H

Hajto, Marek, 1699
Haki, Maha, 75
Hama Radha, Chro Ali, 387, 396
Hamza Yassin, Reema, 2505
Hartog, Niels, 1699
Hayes-Stevenson, Lucy, 664
Hisham Taher Al-Jarah, Sivan, 387, 396

I

Iacovino, Angela, 1166
Iaffaldano, Nicolaia, 2313
Ibba, Monica, 257
Iervolino, Iunio, 2248
Igbareyeh, Jihad, 1683

Imbesi, Paola N., 2790
Iovane, Giacomo, 2597
Iovino, Giorgia, 1218

J

Javanmard, Zinat, 1631
Jones, Zachary M., 2526

K

Kahachi, Hussaen A., 1048
Kourtit, Karima, 904

L

La Mantia, Simona Rosaria, 1850
La Rocca, Ludovica, 501
La Via, Giovanni, 1384
Laface, Valentina Lucia Astrid, 1664
Laganà, Filippo, 334
Lami, Isabella M., 1465, 1476, 1771
Lanorte, Antonio, 2163
Lasaponara, Rosa, 2122, 2132
Lavagna, Monica, 1621, 1860, 1879
Laven, Daniel, 234
Lazzarini, Luca, 531
Lee-Niinioja, Hee Sook, 2371
Lelo, Arda, 471
Leonardi, Giovanni, 346, 356, 363, 377
Lino, Barbara, 191
Llewellyn, Rick, 2000
lo Presti, Anna, 2301
Locurcio, Marco, 664
Loddo, Olimpia G., 1065
Lois-González, Rubén C., 268
Lombardi, Patrizia, 935
Longo, Sonia, 1830, 1850
Loperte, Guido, 2132
Lopez, Lucrezia, 406
López-Maciel, Max, 1916, 2000
López-Rodríguez, Ramón, 1536
Lorè, Immacolata, 278, 289, 313
Lorini, Giuseppe, 1065
Losco, Salvatore, 622, 1956
Lucanto, Domenico, 1870
Lumia, Giovanni, 2153
Luongo, Angelo S., 363
Lykostratis, Konstantinos, 1546, 1557

M

Macchiaroli, Maria, 1319, 1337, 1347
Magarò, Antonio, 786
Maggetti, Damodar, 1937
Magos, Raymundo, 2233
Mahdavinjad, Mohammadjavad, 2638

Malacrino, Carmelo, 301
Malerba, Alessandro, 1671
Mancuso, Pierluigi, 66
Mandrone, Giuseppe, 1699
Mangialardi, Giovanna, 1526
Mangiameli, Michele, 1122
Marchetti, Federica, 1496
Mareggi, Marco, 603
Mariano, Carmela, 2692
Marino, Concettina, 1804, 1818
Marino, Daniele, 2035
Marino, Giorgia, 795
Marino, Marsia, 2692
Marra, Alessandra, 2833
Marra, Antonino Maria, 2223
Marranzini, Dante, 2597
Martínez Yáñez, Celia, 2361
Marzullo, Rossella, 2701
Maselli, Gabriella, 702, 1209, 1355
Masini, Nicola, 2122
Massaro, Stefania, 840
Massimo, Domenico Enrico, 713, 725
Matos, Fábio, 1916, 2000
Mecca, Beatrice, 1465
Mecca, Umberto, 201
Mehan, Asma, 2607
Meijerborg, Matilda, 234
Mendes, Rúben, 1916, 2000
Mendonça, Rita, 1916, 2000
Mérida Rodríguez, Matías, 1671
Merlino, Angelo, 2093
Messina, Davide, 2258
Messina, Gaetano, 2153
Miceli, Elena, 1130
Micelli, Ezio, 461, 501
Micelli, Francesco, 2203
Minniti, Salvatore, 2045
Mistretta, Marina, 1850
Modafferi, Maurizio, 2045
Modica, Giuseppe, 2093, 2153
Molari, Matilde, 1905
Monaca, Mariangela, 2404, 2417, 2470
Monardo, Bruno, 1110
Mondini, Giulio, 2545, 2556
Montillo, Francesco, 483
Moraci, Francesca, 988
Morano, Pierluigi, 655, 1567, 1578
Morisson, Arnault, 914
Mormino, Mauro, 2470
Motta, Paolo, 2335
Muccio, Eugenio, 1505, 1990
Mura, Fernanda Della, 1505
Murgante, Beniamino, 2104, 2146, 2163

Musarella, Carmelo Maria, [1664](#), [1683](#)
 Musolino, Giuseppe, [324](#)
 Musolino, Mariangela, [713](#), [725](#)
 Mussumeci, Giuseppe, [1122](#)

N

Naddeo, Vincenzo, [1188](#)
 Naom Abbawi, Rawaa Fawzi, [2505](#)
 Napoli, Grazia, [1273](#)
 Narciso, Alessandra, [1437](#)
 Nasca, Ludovica, [211](#)
 Naselli, Fabio, [580](#)
 Nava, Consuelo, [1631](#), [1889](#)
 Nesticò, Antonio, [1188](#), [1209](#), [1243](#), [1293](#), [1355](#),
[1790](#)
 Neves, Marco, [2093](#)
 Nicotera, Tiziana, [2301](#)
 Nijkamp, Peter, [904](#)
 Nolè, Gabriele, [2104](#), [2163](#)
 Nucara, Antonino Francesco, [1804](#), [1818](#)

O

Olcuire, Serena, [483](#)
 Olivari, Carlotta, [173](#)
 Oliveto, Francesco, [2268](#)
 Oppio, Alessandra, [1947](#)
 Ostanel, Elena, [461](#)
 Oteri, Annunziata Maria, [16](#)
 Otero-Varela, Alejandro, [946](#)
 Ou, Yapeng, [86](#)

P

Pacchi, Carolina, [1059](#)
 Pacifico, Adriana, [2248](#)
 Palamara, Rocco, [356](#)
 Palermo, Nunzio Bruno, [2737](#)
 Panzera, Maria Francesca, [1804](#), [1818](#)
 Pappalardo, Maria Laura, [1229](#)
 Paris, Mario, [1425](#)
 Pasquali, Margherita, [173](#)
 Passalacqua, Francesca, [2460](#)
 Pastore, Lavinia, [432](#), [471](#)
 Patti, Miriam, [1664](#)
 Paül, Valerià, [946](#)
 Pawłowska-Mainville, Agnieszka, [2383](#)
 Pazos-Otón, Miguel, [406](#)
 Pecorino, Biagio, [1400](#)
 Pellicanò, Domenica Savia, [1596](#), [2012](#)
 Perla, Loredana, [878](#)
 Pezzoli, Alessandro, [2545](#)
 Pietra, Caterina, [1072](#)
 Pietrafesa, Matilde, [1804](#), [1818](#)
 Pigliautile, Ilaria, [2800](#)

Piñar Fuentes, José Carlos, [1683](#)
 Piñeira-Mantiñán, María José, [1536](#)
 Piñeiro-Antelo, María de los Ángeles, [406](#)
 Pinti, Lidia, [1977](#)
 Pinto, Maria Cristina, [1742](#)
 Pinto-Gomes, Carlos, [1692](#)
 Pittau, Fabrizio, [2223](#)
 Pizzi, Marco, [735](#)
 Poli, Giuliano, [1990](#)
 Poli, Irene, [2790](#)
 Poli, Nicola, [1721](#)
 Pontrandolfi, Piergiuseppe, [2112](#)
 Porqueddu, Elena, [1028](#)
 Pourahmadi, Behnam, [2628](#)
 Pourzargar, Mohamadreza, [2638](#)
 Praticò, Filippo Giammaria, [334](#), [2289](#)
 Praticò, Salvatore, [2093](#), [2153](#)
 Previtali, Mattia, [2535](#)
 Pucinotti, Raffaele, [2268](#), [2278](#)
 Pugliese, Dora, [2223](#)
 Pultrone, Gabriella, [2717](#)
 Puntorieri, Pierfabrizio, [66](#)

Q

Quaglino, Virginio, [2173](#)
 Quaglio, Caterina, [1476](#)
 Quagliolo, Carlotta, [2545](#)
 Quinto-Canas, Ricardo, [1664](#), [1683](#)

R

Raffaghelli, Juliana Elisa, [858](#)
 Ranieri, Rossana, [655](#), [664](#), [690](#), [1567](#)
 Raposo, Mauro, [1692](#)
 Ravagnan, Chiara, [1110](#)
 Rebaudengo, Manuela, [182](#), [201](#)
 Rebecchi, Andrea, [1966](#)
 Recupero, Antonino, [2258](#)
 Rennemo, Øystein, [246](#)
 Repaci, Pasquale, [2035](#)
 Righettini, Maria Stella, [257](#), [1780](#)
 Rincione, Roberta, [1850](#)
 Rindone, Corrado, [324](#)
 Ripamonti, Francesca, [512](#)
 Robasto, Daniela, [849](#)
 Robba, Michela, [1830](#)
 Roebeling, Peter, [1916](#), [2000](#)
 Rolando, Diana, [182](#)
 Romano, Marco, [2822](#)
 Romano, Rosa, [2223](#)
 Roncoroni, Fabio, [2535](#)
 Rossi, Mansueto, [1830](#)
 Rossitti, Marco, [26](#), [1587](#), [1926](#)
 Rotondo, Federica, [1771](#)

Ruggeri, Aurora Greta, 1018
 Ruiz, Jordi Serramia, 1658
 Russo, Federica, 1209, 1293

S

Sabatini, Francesca, 94
 Saiu, Valeria, 979
 Salvo, Francesca, 211
 Sammarro, Maria, 887
 Sandström, Fanny, 234
 Sansotta, Sara, 2778
 Santamato, Vito Roberto, 2313
 Santana Tovar, Daniela, 935
 Santarsiero, Valentina, 2104, 2163
 Santopietro, Luigi, 2146
 Santucci, Luca, 2347
 Santus, Kevin, 1621
 Savrami, Maria, 2438
 Scaffidi, Federica, 494
 Scarinci, Alessia, 868
 Scarpa, Massimiliano, 1018
 Schepis, Francesca, 146
 Scorza, Francesco, 2104, 2146
 Scuderi, Alessandro, 1384, 1400
 Selvaggi, Roberta, 1384
 Serbatì, Anna, 858
 Sh. Al-Hinkawi, Wahda, 2496
 Sica, Carmela, 924
 Sica, Francesco, 1567, 1578
 Siclari, Antonino, 2035
 Simoncini, Stefano, 483
 Simonetti, Silvia, 2045
 Sinicropi, Antonino, 612
 Sirchia, Antonino, 1916
 Skoglund, Wilhelm, 246
 Somma, Piera, 1188
 Somoza-Medina, Xosé, 268
 Sortino Barrionuevo, Juan Francisco, 1671
 Spadafina, Giulia, 1526
 Spampinato, Giovanni, 1664
 Spatari, Giovanna, 313
 Speciale, Salvatore, 2428
 Spinnato, Piersaverio, 1916
 Stagno, Elvira, 549
 Stefano, Davide, 1082, 1262
 Stipo, Gianfranco, 2223, 2233
 Strøm-Andersen, Nhat, 1448
 Sturiale, Luisa, 1384, 1400
 Sturniolo, Adila, 2065
 Sulfaro, Nino, 2659
 Surace, Giuseppina Maria Patrizia, 896
 Suraci, Federica, 1804
 Szulecka, Julia, 1448

T

Taccone, Antonio, 541, 612
 Tagliafiero, Bonaventura, 1284
 Tajani, Francesco, 655, 664, 1567, 1578
 Tanganelli, Marco, 2213
 Tiganea, Oana Cristina, 37
 Timpanaro, Giuseppe, 1384, 1400
 Todella, Elena, 1465, 1476
 Todesco, Fabio, 2449
 Todesco, Ruggero, 164
 Tommasi, Luca, 1937
 Torabi Moghadam, Sara, 935
 Torrieri, Francesca, 1587, 1926
 Tortia, Ermanno C., 1176
 Tramontana, Carmela, 2404, 2417
 Tricarico, Luca, 432, 471
 Tripodi, Raimondo, 2093
 Troisi, Roberta, 1140, 1252
 Trovato, Maria Rosa, 211
 Tufina, Klaudia, 580
 Tumminia, Giovanni, 1830
 Türk, Umut, 904
 Turner, Clara, 914

U

Ugolini, Michele, 603

V

Vacha, Damiano, 1699
 Valanzano, Luigi, 1243, 1303
 Valente, Iliaria, 1621
 Valente, Renata, 1956
 Valiante, Caterina, 16
 Vaňová, Anna, 2617
 Vardon, Philip J., 1699
 Varvaro, Stefania, 522
 Venco, Elisabetta Maria, 1072
 Ventura, Claudia, 301
 Verardi, Ferdinando, 2727
 Vergerio, Giulia, 1752
 Verre, Salvatore, 2192, 2203
 Viazzo, Sara, 968, 1752
 Viccione, Giacomo, 1284
 Viglianisi, Angela, 313, 2325
 Vigotti, Francesca, 37
 Villella, Francesco, 1966
 Vinci, Viviana, 815
 Virassamy, Catherine, 2393
 Vitálišová, Katarína, 2617
 Vitetta, Antonino, 324
 Vitiello, Veronica, 2597

Votano, A., [1818](#)

Voynov, Nasko Stefanov, [1966](#)

W

Wahhab Ajeena, Dimah, [2485](#)

Wahlstrom, Mia, [904](#)

Z

Zanjani, Nastaran Esmailpour, [1072](#)

Zappia, Eliana, [2289](#)

Zema, Demetrio Antonio, [47](#), [56](#)

Zerbinatti, Marco, [2648](#)