

Between the Enhancement of Heritage and Geotourism: Sustainable Approaches for the Regeneration of Geoparks UNESCO

Original

Between the Enhancement of Heritage and Geotourism: Sustainable Approaches for the Regeneration of Geoparks UNESCO / Renzulli, A., Lombardo, L.. - (2024), pp. 705-715. (ReUSO 2024 Documentazione, restauro e rigenerazione sostenibile del patrimonio costruito Bergamo 29-31 Ottobre).

Availability:

This version is available at: 11583/2997567 since: 2025-02-17T16:02:22Z

Publisher:

Publica

Published

DOI:

Terms of use:

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

(Article begins on next page)

PUBLICA



ReUSO 2024

Documentazione, restauro e rigenerazione sostenibile del patrimonio costruito

a cura di
Alessio Cardaci, Francesca Picchio, Antonella Versaci



ISBN: 978-88-99586-454



PUBLICA

ReUSO 2024

Documentazione, restauro e rigenerazione sostenibile del patrimonio costruito

a cura di
Alessio Cardaci, Francesca Picchio, Antonella Versaci

ISBN: 978-88-99586-454

Alessio Cardaci, Francesca Picchio, Antonella Versaci (a cura di)
Reuso 2024: Documentazione, restauro e rigenerazione sostenibile del patrimonio costruito
© PUBLICA, Alghero, 2024
ISBN 978 88 99586 454
Pubblicazione Ottobre 2024

I saggi contenuti in questo volume sono stati sottoposti
a referaggio cieco (*double blind peer review*) da parte di *referee*
facenti parte di un apposito comitato scientifico.

Dipartimento di Ingegneria e Scienze Applicate
Università degli Studi di Bergamo

Dipartimento Ingegneria Civile Architettura DICAr
Università degli Studi di Pavia

Dipartimento di Ingegneria e Architettura
Università degli Studi di Enna "Kore"



PUBLICA
WWW.PUBLICAPRESS.IT



COMITATI

DIREZIONE SCIENTIFICA

Alessio Cardaci – Università degli Studi di Bergamo
Francesca Picchio – Università degli Studi di Pavia
Antonella Versaci – Università degli Studi di Enna 'Kore'

COMITATO D'ONORE

Sergio Cavalieri – Magnifico Rettore Università degli Studi di Bergamo
Elena Carnevali – Sindaco del Comune di Bergamo
Sergio Gandi – Vicesindaco del Comune di Bergamo, delegato alla Cultura e Rapporti con l'Università
Elisabetta Bani – Pro-Rettore Università degli Studi di Bergamo
Giuseppe Franchini – Direttore DISA – Università degli Studi di Bergamo
Andrea Penna – Direttore DICAr – Università degli Studi di Pavia
Francesco Castelli – Direttore DIA – Università degli Studi di Enna "Kore"
Francesca Fatta – Presidente UID – Unione Italiana Disegno
Rossella Salerno – Vicepresidente UID – Unione Italiana Disegno
Fabio Fatiguso – Presidente Ar.Tec. – Società Scientifica di Architettura Tecnica
Renata Picone – Presidente SIRA – Società Italiana per il Restauro dell'Architettura
Maurizio Caperna – Vicepresidente SIRA – Società Italiana per il Restauro dell'Architettura
Elena Svalduz – Presidente AISU – Associazione Italiana di Storia Urbana
Massimiliano Savorra – Vicepresidente AISU – Associazione Italiana di Storia Urbana
Edoardo Currà – Presidente AIPAI – Associazione Italiana per il Patrimonio Archeologico Industriale
Bernardo Naticchia - Presidente ISTeA - Italian Society Science Technology and Engineering of Architecture
Roberta Frigeni – Direttore del Museo delle Storie di Bergamo
Cristiana Iommi – Responsabile Biblioteca Civica Angelo Mai e Archivi storici
Giovanni Carlo Federico Villa – Presidente Ateneo di Scienze Lettere ed Arti
Laura Serra Perani – Vicepresidente Ateneo di Scienze Lettere ed Arti
Maria Mencaroni Zoppetti – Vicepresidente Ateneo di Scienze Lettere ed Arti
Sergio Tosato - Presidente della Fondazione Dalmine
Carolina Lussana - Vice-Presidente della Fondazione Dalmine
Mariangela Carlessi - Presidente della Fondazione 'Giusi Pesenti Calvi'

COMITATO SCIENTIFICO

Andrea Arrighetti – Università degli Studi di Siena
Marcello Balzani – Università degli Studi di Ferrara
Calogero Bellanca – Università degli Studi di Roma 'La Sapienza'
Andrea Belleri – Università degli Studi di Bergamo
Stefano Bertocci – Università degli Studi di Firenze
Daniela Besana – Università degli Studi di Pavia
Matteo Bigongiari – Università degli Studi di Firenze
Vanessa Borges Brasileiro – Universidade Federal de Minas Gerais
Maria Sole Brioschi – Università degli Studi di Bergamo
Susanna Caccia Gherardini – Università degli Studi di Firenze
Alessio Cardaci – Università degli Studi di Bergamo
Santi Cascone – Università degli Studi di Catania
Chiara Circo – Università degli Studi di Catania

Antonio Conte – Università degli Studi della Basilicata
 Valentina Cristini – Universitat Politècnica de València
 Fauzia Farneti – Università degli Studi di Firenze
 Marinella Fossetti – Università degli Studi di Enna ‘Kore’
 Emanuele Garda – Università degli Studi di Bergamo
 Daniela Giretti – Università degli Studi di Bergamo
 Alessandra Ghisalberti – Università degli Studi di Bergamo
 Alessandro Greco – Università degli Studi di Pavia
 Antonella Guida – Università degli Studi della Basilicata
 Mariangela Liuzzo – Università degli Studi di Enna ‘Kore’
 Nora Lombardini – Politecnico di Milano
 Alessandra Marini – Università degli Studi di Bergamo
 Giovanni Minutoli – Università degli Studi di Firenze
 Camilla Mileto – Universitat Politècnica de València
 Giulio Mirabella Roberti – Università degli Studi di Bergamo
 Susana Mora Alonso-Muñoyerro – Universidad Politécnica de Madrid
 Marco Morandotti – Università degli Studi di Pavia
 Maurizio Oddo – Università degli Studi di Enna ‘Kore’
 Luis Palmero Iglesias – Universitat Politècnica de València
 Caterina Palestini – Università degli Studi “G. d’Annunzio” Chieti-Pescara
 Elisabetta Palumbo – Università degli Studi di Bergamo
 Sandro Parrinello – Università degli Studi di Firenze
 Francesca Picchio – Università degli Studi di Pavia
 Davide Prati – Università degli Studi di Bergamo
 Monica Resmini – Università degli Studi di Bergamo
 Marco Ricciarini – Università degli Studi di Pavia
 Paolo Riva – Università degli Studi di Bergamo
 Emanuele Romeo – Politecnico di Torino
 Riccardo Rudiero – Politecnico di Torino
 Giuseppe Ruscica – Università degli Studi di Bergamo
 Massimiliano Savorra – Università degli Studi di Pavia
 Barbara Scala – Università degli Studi di Brescia
 Marco Tanganelli – Università degli Studi di Firenze
 Ilaria Trizio – Istituto per le Tecnologie della Costruzione CNR
 Silvio Van Riel – Università degli Studi di Firenze
 Fernando Vegas López-Manzanares – Universitat Politècnica de València
 Antonella Versaci – Università degli Studi di Enna ‘Kore’
 Maria Rosaria Vitale – Università degli Studi di Catania

SEGRETERIA ORGANIZZATIVA

Pietro Azzola – Università degli Studi di Bergamo
 Sara Brescia – Università degli Studi di Pavia
 Gabriele Daleffe – Università degli Studi di Bergamo
 Anna Dell’Amico – Università degli Studi di Pavia
 Elisabetta Doria – Università degli Studi di Pavia
 Luca Renato Fauzia – Università degli Studi di Enna ‘Kore’
 Francesca Galasso – Università degli Studi di Pavia
 Silvia La Placa – Università degli Studi di Pavia
 Monica Lusoli – Università degli Studi di Firenze
 Giulia Porcheddu – Università degli Studi di Pavia
 Michele Russo – Università degli Studi di Enna ‘Kore’

COMITATO FONDATORE ASSOCIAZIONE ReUSO

Stefano Bertocci – Università degli Studi di Firenze
 Fauzia Farneti – Università degli Studi di Firenze
 Giovanni Minutoli – Università degli Studi di Firenze
 Susana Mora Alonso-Muñoyerro – Universidad Politécnica de Madrid
 Silvio Van Riel – Università degli Studi di Firenze

CON IL SUPPORTO DI



CON IL PATROCINIO DI



SPONSOR





INDICE

- XXI *Introduzione*
- XXV *Conservare il patrimonio in tempo di crisi*
- XXVII *Presentazioni istituzionali*
- XXIX *Elenco degli autori*

SEZIONE 1 - Tecnologie e strumenti al servizio del percorso di conoscenza: letture storico-critiche, documentazione, rappresentazione, valorizzazione del patrimonio costruito e paesaggistico anche mediante il mondo digitale

- 3 Renato Morganti, Laura Ciammitti
Strumenti per il recupero del patrimonio costruito: relazioni tra normativa e manualistica
- 15 Daniele Romagnoli
BIM e GIS 3D per la mappatura del degrado: casi studio a confronto
- 27 Francesca Lembo Fazio
Riuso dell'antico a Roma e nei suoi territori circostanti. Alcuni casi nei possedimenti sotto l'influenza degli Orsini
- 39 Riccardo Rudiero
Across religious wars and resistance: the transnational valorization of Waldensian Valleys
- 49 Sonia Mollica
Il Villaggio del Fanciullo di Marcello D'Olivo: per una valorizzazione del pensiero progettuale
- 61 Valentina Astini, Mariana Bettolli, Pasquale Cucco, Carla Ferreyra
Among the rocks: Rocca gloriosa's castle as a place of knowledge and interpretation
- 73 Federica Pompejano, Sara Mauri, Marta Casanova, Sara Rocco
DBMS and GIS for the knowledge of the Ferrania (post) industrial site (Savona, Italy) within the Land-in-pro research project
- 83 Antonella Salucci, Serena Sanseviero
Integrità dell'immagine dell'abitare collettivo. da 'Prato-Della-Fiera' a primo quartiere social-housing d'Abruzzo
- 95 Marco Bussoli, Giacomo Cardella
Conoscenza della fabbrica e consolidamento: il caso di San Francesco a Ferrara
- 105 Daniele Romagnoli, Marta Lalli
Modelli 3D e progetto di restauro: strumenti e metodi per l'analisi e la risoluzione del testo architettonico
- 117 Cassia De Lian Cui, Edoardo Currà, Antonio Fioravanti, Wei Yan
AI-powered built heritage: enhancing interpretation and recovery processes with generative ai models
- 129 Anna Gallo
Acqua e architettura. Percorsi di conoscenza del patrimonio storico urbano per future strategie di gestione, tutela e valorizzazione nell'ottica della sostenibilità

- 141 Giuseppe Fortunato, Lorenzo Russo, Antonio Agostino Zappani
Verso un modello informativo della facciata della chiesa di San Domenico in Soriano Calabro
- 153 Federica Fiorio, Nicola Parisi
Il ruolo del digitale nella conoscenza e valorizzazione del patrimonio culturale: prospettive multidisciplinari per la costruzione di approccio progettuale integrato
- 163 Giovanni Caffio
Ri-generare i piccoli comuni abruzzesi: un'esplorazione attraverso il disegno a mano libera
- 173 Vincenzo Cirillo, Rosina Iaderosa
Il rilievo integrato e la documentazione digitale per la conoscenza dei borghi storici
- 185 Gennaro Pio Lento, Angelo De Cicco
I Jardines de Alfabia sull'isola di Palma de Mallorca in Spagna. Processi di conoscenza del patrimonio naturale e costruito
- 195 Gianluca Gioioso
Il chiostro della cattedrale dell'Assunzione di Maria Vergine e di San Frutos a Segovia, in Spagna. Conoscenza, rappresentazione, documentazione
- 205 Antonella Salucci, Emanuela Chiavoni
Osservatorio urbano tra disegno, colore e fotografia. Piazza Perin del Vaga al Flaminio, Roma
- 217 Stefano Cecamore, Claudio Mazzanti
Dalle case di terra alle ville suburbane: architettura rurale da tutelare nella Regione Abruzzo
- 229 Stefano Cecamore, Giancarla Eleuterio
Ciudad y patrimonio construido, análisis y valorización de la Arquitectura del Siglo XX en el contexto de conservación y desarrollo urbano. Villa Clemente en Pescara
- 241 Alessio Altadonna, Alessia Chillemi, Giuseppina Salvo, Fabio Todesco
Digitalizzazione del patrimonio edilizio a Massa San Nicola (ME): un caso di studio per una gestione efficiente dei dati e la conservazione
- 253 Domenico Iovane, Margherita Cicala
Documentazione e conoscenza per un re-uso consapevole: la Filanda del Complesso Monumentale del Belvedere di San Leucio
- 265 Fabiana Guerriero, Luigi Corniello
The Temple of Debod in Madrid. Knowledge and representation of monumental architecture in Spain
- 275 Luca Sbrogiò
Livelli di informazione e di sviluppo nella modellazione informativa degli edifici storici (HBIM) per il restauro
- 287 Francesco Trovò, Ilaria Forti
Le Galeazze dell'Arsenale di Venezia tra didattica e opportunità di riuso
- 299 Luigi Corniello
Tecnologie e strumenti per la conoscenza della rete infrastrutturale dei trasporti in Albania
- 309 Alessia Garozzo, Rosario Scaduto
Architetture dismesse. Rappresentazione e valorizzazione
- 321 Caterina Palestini, Stella Lolli, Elena Eramo
Lecture grafiche per la valorizzazione delle memorie tangibili e intangibili di Lama dei Peligni
- 333 Riccardo Florio, Raffaele Catuogno, Teresa Della Corte, Anna Sanseverino, Alessandra Tortoriello, Mario Delli Prisco, Caterina Borrelli
Costruzione di un ecosistema informativo digitale: il caso studio del c.d. Tempio di Venere a Baia
- 345 Alessio Altadonna, Antonino Nastasi
Palinsesti inevitabili: alcune letture e rilievi sulla città di Milazzo
- 357 Carlo Biagini, Andrea Bongini, Daniele D'Errico, Gianmarco Dell'Orca
Exchange Information Requirements (EIR) in BIM Uses for the structural analysis of historic buildings: the case study of Aldobrandeschi Palace in Grosseto
- 369 Raissa Garozzo, Angela Moschella, Cettina Santagati
Tecnologie digitali a supporto del percorso di conoscenza del patrimonio industriale: l'ex-conceria dei fratelli Rizzo ad Acireale
- 381 Silvia La Placa, Elisabetta Doria, Jolanta Sroczynska
Fast survey methodologies for knowledge, analysis, and digital valorization of the built heritage in educational context
- 393 Stefano Bertocci, Federico Cioli, Maria Chiara Forfori
Protocolli sperimentali per la documentazione del patrimonio teatrale. Esperienze di rilievo digitale dei teatri storici fiorentini
- 403 Ilaria Trizio, Francesca Savini, Gianluca Ciuca, Antonio Sandoli, Giovanni Fabbrocino, Adriana Marra
Progettazione integrata in ambiente HBIM del recupero di un'area urbana in stato di abbandono
- 415 Alessio Cardaci, Pietro Azzola, Antonella Versaci
A virtual museum in the Upper Town of Bergamo. Reuse and digitalisation to preserve and enhance the former convent of San Francesco
- 427 Anna M. Gueli, Mariangela Liuzzo, Giuseppe Margani, Giuseppe Stella
Un approccio multidisciplinare per lo studio dell'uso e del riuso degli antichi edifici termali
- 439 Regina Helena Vieira Santos
Architettura Moderna: Clube Paineiras do Morumby
- 451 Giovanni Pancani, Rosa Romani, Maddalena Branchi
I centri minori del Casentino, come laboratorio di rigenerazione sociale, ambientale ed economica delle aree interne
- 463 Matteo Bigongiari
La Cittadella Appiani a Piombino: uno sguardo sul passato per valorizzare gli interventi futuri

475 Gianlorenzo Dellabartola, Anna Dell'Amico
Georeferenziazione e analisi multilivello per la conoscenza e la rappresentazione digitale dell'isola di Madonna del Monte a Venezia

487 Anna Marotta, Giulio Marchettoni
La cittadella di Alessandria, faro di pace in Europa: un progetto del Consiglio d'Europa dalla storia al futuro

**SEZIONE 2 - Restauro, riuso, fruizione, valorizzazione:
teorie, orientamenti e indirizzi metodologici per la conservazione del patrimonio
architettonico, archeologico, paesaggistico e delle componenti materiche e strutturali**

499 Fabio Ambrogio
Il teatro e l'anfiteatro di Magontiacum. Progetti e trasformazioni per la tutela del patrimonio archeologico. Un work in progress

511 Elisabetta Grandis
Nascita e adattamenti del tempio valdese di Genova: da Carlo Gabetti a Giovanni Klaus Koenig

521 Matilde Caravello
La Grotticina di Madama: il rilievo critico di un arredo cinquecentesco all'interno del Giardino di Boboli a Firenze

531 Andrea Savorelli
Il chiostro dell'abbazia di San Mercuriale a Forlì, dal restauro di "innovazione" di Gustavo Giovannoni del 1939 ai restauri conservativi nel nuovo millennio

541 Emanuele Romeo
Alcune considerazioni sul restauro archeologico tra conservazione della memoria e valorizzazione compatibile

551 Maria Parente, Federica Ottoni
Una conoscenza guidata tra geometria, storia e struttura: la conservazione delle strutture in legno in ambiente H-BIM

563 Ilaria Forti, Isabella Friso, Gabriella Liva, Irene Rocca
San Francesco della Vigna a Venezia. Tecniche di rilievo per la valorizzazione e il monitoraggio dei beni architettonici

575 Chiara Atanasi Brilli
Progetto di riqualificazione e restauro del complesso edilizio del mercato coperto di piazza Cavour_ PNNR Missione 5 Rigenerazione Urbana

585 Gabriella Guarisco, Daniela Oreni
La conoscenza per la valorizzazione della foresteria dell'abbazia cistercense di Chiaravalle Milanese

597 Brunella Canonaco
Dalla conoscenza alla conservazione di un patrimonio di archeologia industriale nel Mediterraneo: le Imprese della Cannamele

609 Angela Valentina Campolongo, Federica Castiglione
Analisi per la conoscenza di un opificio molitorio emblematico nella Calabria Citra: il Mulino di Mezzo nella Valle del Fullone.

621 Adriana Trematerra
Strategie di valorizzazione per un turismo religioso sostenibile: il riuso dell'architettura ortodossa balcanica

631 Marta Inama, Cinzia Martino, Alessia Vergari
Advanced technologies for built cultural heritage conservation: palazzo Polo – Freguglia facade

641 Cecilia Antonini Lanari
Restauro e museografia in Italia

649 Calogero Bellanca, Susana Mora Alonso-Muñoyerro
Un ejemplo histórico en España: los Paradores

661 Laura Suvieri, Fabio Bianconi, Marco Filippucci, Andreas Lechner
Typological adaptive reuse of contemporary European commercial derelicts. Studies for the transformations of real estate into multifunctional third spaces

673 Valentina Vacca
Narrating ancient landscapes: infrastructure and archaeological areas

681 Enrica Petrucci, Claudia Vagnozzi
Itinerari di patrimonio alla riscoperta dei manufatti legati all'uso dell'acqua

693 Maria Grazia Ercolino
L'insediamento industriale della Snia-Viscosa a Roma: cento anni di [r]esistenza tra storia, natura e architettura

705 Alessandra Renzulli, Luisa Lombardo
Between the enhancement of heritage and geotourism: sustainable approaches for the re-generation of Geoparks UNESCO

717 Manlio Montuori, Luca Rocchi
La conservazione preventiva nei luoghi custodi della memoria e il monitoraggio degli agenti biodeteriogeni

727 Giovanna Badaloni
Oltre il Muro. Verso Nuovi Scenari di Valorizzazione e Riuso della Cittadella di Ancona

739 Benida Kraja, Fiona Nepravishta, Vjola Ilia
The impact of systematic cataloging on the preservation of cultural heritage for traditional albanian tower house

749 Francesca Albani, Matteo Gambaro
Il patrimonio diffuso come occasione per la città di riscoprire sé stessa. Il caso delle zone "extra moenia" di Monza

761 Calogero Vinci, Gianvito Cacciatore
I balconi in travertino di Alcamo. Analisi e conoscenza per un recupero compatibile

- 773 Fiona Nepravishta
Industrial heritage preservation and adaptive reuse: Kombinat case study
- 785 Anna Laura Petracci
L'auto-recupero nel cantiere di restauro del Palazzo del Podestà al Galluzzo a Firenze: una forma partecipata per il riuso e la valorizzazione del patrimonio culturale
- 797 Elisabetta Caterina Giovannini, Davide Prati, Virna Maria Nannei, Giulio Mirabella Roberti
Interdisciplinarity in architecture: an HBIM data modelling approach for the church of San Tomè in Almenno (BG)
- 809 Anna Trupia
Scenari di riuso e valorizzazione delle rovine archeologiche. Il caso delle Terme Imperiali di Caracalla a Roma
- 821 Marco Ricciarini, Anastasia Cottini, Veronica Braccini
Metodologie di documentazione digitale per la valutazione e il recupero di insediamenti urbani: i casi studio di Camporgiano, Fornovolasco e Villa Basilica (LU)
- 833 Antonella Versaci, Raimon Farré Moretó, Núria Salvadó Aragonès, Luca Renato Fauzia, Michele Russo, Irene Vaccalluzzo
Dalla percezione del genius loci al progetto. Proposte di riuso dell'ex chiesa di Sant'Anna a Piazza Armerina
- 845 Massimiliano Savorra, Francesca Galasso
Digital storytelling and participatory tools. Enhancing and preserving the urban historical memory of the city of Bethlehem
- 857 Sofia Velichanskaia, Nora Lombardini
"Bitter work": the problem of safeguarding policies the Modernist heritage of former Soviet Republics
- 867 Miriam Terzoni, Nora Lombardini
Awareness of context identity for the conservation of cultural heritage
- 877 Monica Resmini
La facciata delle Marmoreas... Doms di Benedetto Ghislandi (detta dell'Arciprete): cronaca di un restauro
- 887 Beatrice Bolandrini, Roberta Grazioli
Affreschi strappati nel monastero di S. Spirito a Bergamo: restauro e rinascita
- 897 Christian Campanella, Michela Tessonni
Le ragioni del progetto (di architettura). Ritrovare Santa Marta
- 909 Clara Verazzo
The modern ruin. some reflections about the monument Gabriele D'Annunzio
- 921 Daniela Oreni, Gianfranco Pertot
La tormentata vicenda della chiesa e dell'ex monastero di San Bernardo in Milano, sede del collegio Calchi Taeggi. Studi e rilievi per la conoscenza, la conservazione e il riuso
- 933 Alessandro Bazzoffia
Peschiera: fortezza veneziana di terraferma tra il Garda e il Mincio

- 941 Fauzia Farneti
Palazzo Pucci a Firenze e il restauro innovativo di Piero Sanpaolesi
- 951 Susanna Caccia Gherardini
Usus sine doctrina. Around a possible theory of micro-restoration

SEZIONE 3 - Mitigazione del rischio sismico, idrogeologico e antropico dei Beni Culturali, architettonici, urbani e ambientali: indirizzi e criticità degli interventi di conservazione finalizzati alla tutela del Patrimonio

- 963 Andrea Donelli
Dissonanze: disegno – rilievo recupero e/o restauro del costruito edilizio
- 975 Guido Romano, Gabriele Bernardini, Enrico Quagliarini, Marco D'Orazio
Flood risk in historic built environments: how do safe human behaviors matter?
- 985 Maria Teresa Cristofaro, Giorgio Caselli, Costanza Stramaccioni, Marco Tanganelli
Studio sperimentale delle prestazioni meccaniche di una malta a base di calce per interventi su edifici monumentali
- 997 Filippo Maria Del Vecchio, Anna Livia Ciuffreda, Agnese Gasparotti, Marco Tanganelli
Approcci integrati per la conoscenza ai fini della valutazione della sicurezza strutturale di edifici scolastici
- 1009 Nebai Osorio Ugalde
Riabilitazione del patrimonio storico per la sostenibilità di Città del Messico
- 1019 Gülru Koca
Evaluation of retrofit interventions in terms of seismic resistance
- 1029 Cesare Tocci, Francesca De Cola
La standardizzazione del rilievo del danno. Meccanismi ricorrenti nei sistemi voltati in occasione del terremoto de L'Aquila del 2009
- 1041 Francesco Monni, Enrico Quagliarini
Confinamento di colonne in muratura di mattoni facciavista con micro-trefoli in acciaio annegati nei giunti di malta: risultati sperimentali
- 1053 Francesco Monni
L'intervento di recupero come risorsa per avviare un processo di conservazione preventiva: il caso del Palazzo Comunale di Corinaldo (Marche, Italia)

SEZIONE 4 - Strategie di intervento sul patrimonio costruito: abitabilità, accessibilità, trasformabilità, adattabilità e resilienza

- 1065 Francesco Spada, Laura Greco
Un contributo alla conoscenza del patrimonio costruito prefabbricato del Sud-Italia. Due interventi degli anni Settanta a Cosenza

- 1077 Pierfrancesco Fiore, Antonio Nesticò, Francesco Pisani, Emanuela D'Andria
Strategies for the sustainable regeneration of small towns: integrated reuse. Model and application to a case study in Campania (Italy)
- 1087 Domenico Amati, Marica Marazia, Sabrina Mellacqua
Il patrimonio ecclesiastico abbandonato: il caso dell'ex convento di Sant'Elia a Trepuzzi. Conoscenza, conservazione, restauro e valorizzazione
- 1099 Cristina Navajas Jaén
El museo Kolumba de Peter Zumthor en Colonia. Una construcción sobre las ruinas de la antigua iglesia gótica
- 1111 Maria Grazia Cianci, Michela Schiaroli
Lo spazio dell'immateriale. La ex fabbrica Mira Lanza, tra permanenze archeologiche e connessioni dello spazio urbano
- 1121 Domenico Chizzoniti, Tommaso Lolli, Amra Salihbegovic
The post-war reconstruction of spaces for worship.three project proposals in Mosul
- 1133 Michele La Noce, Grazia Massimino, Gaetano Sciuto
Il recupero dell'architettura rurale. Il caso studio della masseria Maucini
- 1143 Laura Magri
Efficientamento energetico e valorizzazione dell'architettura residenziale del secondo Novecento. Sfide, ricadute e potenzialità degli incentivi fiscali
- 1151 Rolando Pizzoli, Paola Bassani, Giuliana Cardani
The preservation of cultural heritage through the national recovery and resilience plan: opportunities and criticalities
- 1161 Fausta Fiorillo, Riccardo Mirri, Giuliana Cardani
Back to court: a reuse perspective to preserve identity and memory of Palazzo Visconti Nuovo (Brignano Gera d'Adda - BG)
- 1173 Federica Ribera, Antonello Pagliuca, Pier Pasquale Trausi, Giulia Neri, Roberto Facendola
Conoscenza e recupero della Palazzina di Comando dell'Idroscalo di Taranto di Armando Brasini
- 1183 Santi Maria Cascone, Lucrezia Longhitano, Salvatore Polverino, Giuliana Sciacca
Conoscenza, recupero e riutilizzo. Il caso genovese del Tabarca
- 1195 Giorgia Ranieri
Patrimonio architettonico VS. speculazione edilizia: la masseria Solito a Taranto
- 1205 Giorgia Strano, Francesca Castagneto
Ripensare i nuovi luoghi della cultura: strategie ibride di recupero e riuso culturale. Il progetto di rigenerazione urbana degli Ex Magazzini della Stazione Ferroviaria di Noto
- 1217 Vincenzo Sapienza, Angelo Monteleone
Digital building technologies for the architectural sustainable modules, in fragile context. Application in the fragile context of Aeolian islands
- 1229 Daniela Besana, Carmine Isi, Marco Morandotti
Strumenti di valutazione per la lettura del grado di reversibilità del patrimonio costruito
- 1241 Rebecca Moroni, Cinzia Maria Luisa Talamo, Oscar Eugenio Bellini
Il riuso a scopi sociali dei beni confiscati alla criminalità organizzata: il caso di regione Lombardia
- 1253 Valentina Spagnoli, Maria Vittoria Arnetoli, Sandra Carlini
La residenzialità studentesca come strumento di rigenerazione del patrimonio storico e moderno dismesso
- 1263 Salvatore Di Maggio, Calogero Di Maggio, Rossella Corrao, Calogero Vinci
Volte realine. Interventi di recupero e manutenzione
- 1273 Gianni Di Giovanni
Una metodologia operativa per il recupero tecnologico degli aggregati edilizi: verso un modello di interoperabilità
- 1283 Attilio Ferraro, Emanuela D'Andria, Pierfrancesco Fiore
Riuso adattivo e flessibilità architettonica: un modello partecipato e sostenibile per la trasformazione del Complesso "Lanzani" in Barlassina (MB), Italia
- 1295 Vjola Ilia, Florian Nepravishta, Benida Kraja
Restoration and revitalisation of Korça and Gjirokastra bazaars in Albania
- 1307 Giuseppe Canestrino, Roberta Lucente
Dialoghi compositivi con le fortificazioni. Una mappatura (2009 -2024) per la codifica di possibili azioni progettuali sulle fortezze "alla moderna"
- 1319 Alessandro Greco, Marco Morandotti, Daniela Besana
Strategie e approcci sostenibili per l'edilizia universitaria: la rigenerazione dell'area degli "Istituti Scientifici" in Pavia
- 1331 Alberto Anello, Angelo Ganazzoli, Luigi Savio Margagliotta
Il borgo rurale nella contemporaneità: progetti per la valorizzazione
- 1343 Antonino Margagliotta, Paolo De Marco, Emanuele Richiusa
Il patrimonio e la città. Un'occasione di riuso adattivo
- 1355 Teresa Casale, Emilia Garda, Valentina Porta
L'educazione alla legalità. Il caso dei beni confiscati alle mafie
- 1367 Luca Zecchin
Architettura interrotta. Paesaggio interspeciale
- 1379 Simonetta Acacia
Uso e riuso delle ville genovesi tra trasformazioni urbane e tutela
- 1391 Emanuele Garda, Marta Rodeschini
Strumenti di partenariato speciale e processi di rigenerazione del patrimonio pubblico: l'esperienza del Monastero del Carmine a Bergamo
- 1403 Pedro Murilo Freitas, Cristina Tasso, Ana Marques, João Ling, Teresa Cunha Ferreira
Training Experiences on Contemporary Architectural Heritage through heuristic activities: values-based reuse designs for the Escuelas Profesionales San José, Valencia, Spain

- 1415 Maurizio Oddo, Alessandro Barracco
Architettura, Storia e Contemporaneità. Innovazione tecnologica versus Restauro del Moderno
- 1427 Regina Helena Vieira Santos, Leticia Falasqui Tachinardi Rocha
Solar da Marquesa de Santos, del XVIII secolo, il suo reuso
- 1437 Michelle Gualdi, Andrea Belleri, Elisabetta Palumbo
Riuso di pannelli in acciaio formato a freddo per la riqualificazione integrata di edifici esistenti e per nuove costruzioni
- 1447 Pablo Alejandro Cruz Franco, Elena Gómez Bernal, María Pérez Sendín, Adela Rueda Márquez de la Plata
Nuevas fronteras en la conservación del patrimonio: integración de NERF en la restauración de monumentos arquitectónicos y control de obra.
- 1457 Pablo Alejandro Cruz Franco, Diego Gaspar Rodríguez, Elena Gómez Bernal, María Pérez Sendín, Adela Rueda Márquez de la Plata
DIGIMAP: diseño y gestión eficiente de gemelos digitales mediante sistemas de información: bases de datos geospaciales para la preservación del patrimonio arquitectónico
- 1469 Giorgio Ghelfi
Trattamenti conservativi per la pietra. Il caso della Porta de las Granadas dell'Alhambra
- 1479 Eugenio Vassallo, Bogumil Filipczuk, Giuseppe Nucara, Riccardo Sonzogni, Virginio Brocajoli, Carlo Pavan, Alessio Leondini, Paolo Sette
Dal Restauro del Grand Hotel di San Pellegrino Terme spunti e riflessioni su questioni di metodo e scelte operative

SEZIONE 5 - Strategie di intervento per la gestione, la rivitalizzazione e la rigenerazione delle città, dei centri storici e delle aree periferiche: pianificazione, strategie e progetti di intervento sul costruito urbano, sul territorio e sul paesaggio

- 1489 Pablo Altaba Tena, Juan A. García-Esparza, Anna Valentín
Assembling cultural and natural values in vernacular landscapes: an experimental analysis
- 1499 Samia Chergui
Using building archaeology for a more careful and efficient restoration of architectural heritage in ottoman Algiers
- 1511 Alessandra Palma
Ri-costruire con la vegetazione. Kamarina (Ragusa) e la percezione del tempo
- 1523 Laura Lucarelli, Arturo Gallozzi, Marcello Zordan, Michela Cigola
Conservazione e recupero dei centri storici minori: il caso di Atina nel Lazio Meridionale
- 1535 Laura Lucarelli, Arturo Gallozzi, Michela Cigola, Marcello Zordan
Castelli e architetture difensive nei centri minori italiani. Il caso studio della Valle di Comino
- 1547 Ivana Passamani, Olivia Longo, Virginia Sgobba, Davide Sigurtà
Il paesaggio dentro l'architettura. Microarchitetture per una nuova mobilità sostenibile e resiliente

- 1559 Barbara Scala
Oltre il mutuo aiuto: il valore del credere nelle risorse locali per la rivitalizzazione del territorio e del paesaggio dell'alta Valle Trompia
- 1571 Alessandra Vazzoler, Olivia Longo, Davide Sigurtà
Progetto di valorizzazione architettonica e urbana delle "Ex Trafilerie" a Nave (BS)
- 1583 Francesca Bilotta, Francesco Garofalo
Fabbriche rurali nella Piana di Sibari: l'esempio di masseria Torre della Chiesa
- 1593 Maria Paola Gatti, Giorgio Cacciaguerra
To regenerate the small villages of the Terragnolo Valley through responsible and sustainable tourism
- 1603 Claudia Battaino, Maria Paola Gatti, Andrea Zaniboni
The Arco landscape factory: conservation, valorisation and use of the rural heritage
- 1613 Cristian Tolù, Stefania Mornati, Ilaria Giannetti
Valorizzare il patrimonio della prefabbricazione leggera in Italia: una piattaforma digitale a supporto della "decostruzione selettiva"
- 1623 Mariangela Carlessi, Fabrizio Bonomi, Sergio Valetti
The 'Belvedere' Compendium in Alzano Lombardo. Themes and strategies for managing a multifaceted and complex heritage
- 1635 Emanuele Giaccari, Paolo Giannandrea, Marianna Calia, Mariangela Piumini, Emanuel Quarto
Il patrimonio immobiliare abbandonato di Alianello in Basilicata. Analisi e proposte per il riuso
- 1649 Lia Ferrari, Massimo Cotti
Architetture storiche rurali: una proposta di valorizzazione per il "Casello" della Commenda Gerosolimitana in Calerno
- 1661 Giulia Luciani
Patrimonio in azione. Mobilizzare il passato nella rigenerazione ecologica delle città europee
- 1673 Corrado Scudellaro
I fattori di rischio antropico sul patrimonio in terra lionese: cause, sintomi e prospettive
- 1683 Mariangela Carlessi, Alessandra Kluzer
Oltre ogni ragionevole dubbio. Accogliere l'attitudine dei luoghi come trait-d'union tra conoscenza e progetto funzionale
- 1693 Ornella Zerlenga, Vincenzo Cirillo, Riccardo Miele
In-accessibilità. Santa Maria della Sanità in Napoli fra best-practices e spazi inesplorati
- 1703 Amra Salihbegović
Military brownfields. From assessment to design strategy for the Sarajevo University Campus
- 1713 Giulia Formato
I silos granari. Difficoltà e opportunità per il riuso a confronto

- 1725 Elena Zanazzi, Luca Leoni
Chiese emiliane e storia sismica recente: un'indagine sull'(in)efficacia degli interventi pregressi
- 1737 Altea Panebianco, Barbara Caselli
Piattaforme digitali per le aree interne. Il caso studio di Stigliano
- 1749 Lorna Dragonetti, Cecilia Mazzoli, Anna Chiara Benedetti, Annarita Ferrante
Riqualificazione energetica del patrimonio edilizio scolastico recente: metodo S.C.O.R.E.S. per la valutazione degli impatti delle strategie sostenibili di intervento
- 1761 Stefano Cecamore
Earthquakes and endless reconstructions. Irpinia 1980, from Lioni to Cairano towards adequate protection and conservation of the historic centres
- 1773 Stefano Cecamore, Arianna Petraccia
La chiesa dei SS. Marciano e Nicandro, terremoti, trasformabilità e adattabilità del patrimonio culturale aquilano
- 1785 Stefano Cecamore
Una comunità per la conservazione e valorizzazione della Piana del Cavaliere. La tutela del patrimonio e la chiesa di San Giorgio Martire a Pereto (AQ)
- 1795 Ilva Hoxhaj
Valona tra suolo e acqua: riconnettere il tessuto urbano attraverso il progetto del waterfront
- 1805 Francesco Paolo R. Marino
Ventilated rainscreen, new materials and modern construction techniques in the renovation and recovery of a historic heritage building
- 1817 Gianluca D'Agostino
Il patrimonio architettonico di Shahjahanabad: un destino incerto per le haveli della città vecchia di Delhi tra abbandono, heritage hotels e centri culturali
- 1825 Esther Almarcha Núñez-Herrador, Rafael Villena Espinosa, José Manuel López Torán
Patrimonio monumental y turismo en la España Franquista
- David Ordóñez-Castañón, Teresa Cunha Ferreira, Poliana Marques da Silva
1835 *Continuity and creation: adaptive reuse of a manor house in Esposende as Municipal Library by Bernardo Ferrão (1979-1992), Portugal*
- 1847 Carlo Atzeni, Stefano Cadoni, Massimo Faiferri, Stefano Mais, Silvia Mocci, Marco Moro, Fabrizio Pusceddu
Scientific infrastructure and landscape. First developments of the "Laboratory of architecture and territory" of the etic project
- 1857 Marco Galimberti, Mauro Casartelli
Aree industriali dismesse: fragilità delle strategie di intervento per il comparto sud della Ticosa di Como (1982-2024)
- 1867 Elena Cantatore, Vincenzo Ambrosio, Margherita Lasorella, Fabio Fatiguso
The systematization of technical information about architectural heritage in historic district by Citygml-Based Models. Preliminary activities towards digital recovery plans
- 1879 Francesca Privitera, Emiliano Romagnoli
Contemporary Models of Co-living for 'the three human ages': strategie di intervento per una rigenerazione urbana e sociale del quartiere del Soccorso a Prato
- 1891 Caio Felipe Gomes Violin, Renata Baesso Pereira
The reuse Project of Fazenda Mato Dentro in the city of Campinas-SP (Brazil): From a manor house to a Peace Museum
- 1899 Albina Sciotti, Ippolita Mecca
Il riuso degli edifici storici dismessi: il caso delle carceri
- 1911 Alberto Cervesato
Borghi urbani. Sguardi progettuali per il riuso
- 1923 Francesca Picchio, Marianna Calia, Silvia La Placa, Rossella Laera
Strategie di documentazione integrata e di rilievo speditivo per la valorizzazione dei contesti fragili
- 1935 Sara Brescia, Giulia Porcheddu, Francesca Picchio
Strategie di rappresentazione di uno scavo archeologico
- 1947 Chiara Marchionni
Strategies for the regeneration and revitalisation of historic port areas: the case of the "ca-liscendi" of the port of Giulianova (TE)
- 1959 Silvia Meschini, Lavinia Chiara Tagliabue, Stefano Rinaldi, Giovanni Miri, Andrea Bracciali, Roberto Nai, Rosa Meo, Giuseppe Di Giuda
Blockchain-Driven Transparency: Revolutionizing Construction Tenders with Smart Contracts and Sustainable Waste Management
- 1971 Luca Guardigli, Annarita Ferrante, Sara Lanzoni, Carlo Costantino, Lei Sun
Exploring the potential of wood for urban densification: a case study of sustainable architectural design education
- 1983 Chiara Marchionni, Eleonora Laurini, Marianna Rotilio, Gianni Di Giovanni
La rigenerazione urbana sostenibile per le città resilienti. Il caso di studio del complesso sportivo di "Centi Colella" dell'Aquila
- 1995 Elena Paudice
La memoria dei territori della produzione e la forma del paesaggio. Tutelare l'abitare attraverso il recupero della storia dei luoghi
- 2007 Martina Porcu
Il ruolo delle grandi fabbriche dismesse nei processi di riqualificazione e rigenerazione urbana
- 2019 Ana Velosa, Hugo Rodrigues, Paulo Silva
Intervention in historic villages: conservation, rehabilitation and sustainability



SEZIONE 2

Restauro, riuso, fruizione, valorizzazione:

teorie, orientamenti e indirizzi metodologici per la conservazione del patrimonio architettonico, archeologico, paesaggistico e delle componenti materiche e strutturali

Alessio Cardaci, Francesca Picchio, Antonella Versaci (a cura di)

**Reuso 2024: Documentazione, restauro e
rigenerazione sostenibile del patrimonio costruito**

© PUBLICA, Alghero, 2024

ISBN 978 88 99586 454

Pubblicazione Ottobre 2024



**TRA VALORIZZAZIONE DEL PATRIMONIO E
 GEOTURISMO: APPROCCI SOSTENIBILI PER LA
 RIGENERAZIONE DEI GEOPARKS UNESCO**

**BETWEEN THE ENHANCEMENT OF HERITAGE AND
 GEOTOURISM: SUSTAINABLE APPROACHES FOR THE
 REGENERATION OF GEOPARKS UNESCO**

Alessandra Renzulli - Department of Structural, Geotechnical and Building Engineering, Politecnico di Torino, Turin, Italy, e-mail: alessandra.renzulli@polito.it

Luisa Lombardo - Department of Architecture, University of Palermo, Palermo, Italy, e-mail: luisa.lombardo01@unipa.it

Abstract: The research stems from the desire to understand the importance of natural and cultural heritage within the processes of enhancing and regenerating a territory, highlighting how sustainable tourism can serve as a catalyst for designing, planning, and defining intervention strategies aimed at local development. Within UNESCO heritage sites, these territorial policies are highly focused on, particularly in Geoparks. Arising from grassroots management needs, the heritage of Geoparks is not strictly associated with geological heritage but is valued according to its relationships with natural, cultural, and intangible heritage. To identify the most virtuous and effective management strategies related to tourism, an initial analysis was conducted on European UNESCO Geoparks. Five Geoparks were selected, followed by a comparative assessment with quantitative evaluations of the results obtained. The same approach was applied to understand the dynamics of Geoparks in Italy, specifically analyzing the Madonie Geopark in Sicily and the Sesia Val Grande Park in Piedmont. In comparing them with European countries, the latent potential of Italy's rural built heritage emerged. The discovery of residual quality elements could lead to the implementation of the action plan through the recovery of these architectures for tourism purposes.

Keywords: UNESCO Global Geopark, Tourism, Territorial Management Strategies, Rural Built Heritage, Sustainable Development.

1. Introduction

In a note produced for its roundtable discussion on “Regional Policy and Tourism” the Organization for Economic Co-operation and Development (OECD) highlighted the clear link between tourism and regional development. Tourism, identified as one of the world's major service and growth industries, presents several challenges for economic development and job creation at the national, regional, and local levels [1]. These challenges include supporting tourism as an instrument for territorial development with strategies for sustainable conservation, creating new forms of marketing linked to quality standards for a global market, encouraging new regions to become competitive tourist destinations, revitalizing slowing tourist areas [2], fostering cooperation between regions, and raising awareness of the social impacts of tourism. Since this document was produced in 1999, the European Geoparks Network (EGN), initiated in 2000, has addressed these challenges. European Geoparks, members of a network, actively promote tourism as a driver for economic development and job creation. The research focus is on UNESCO Global Geoparks (UGGp), areas of significant scientific, tourist, and educational importance, de-

financed by sustainable area development strategies [3] benefiting from geotourism and geo-conservation. These territories were chosen not only for their valuable geological heritage but also for their fundamental role in promoting knowledge of natural, cultural, and intangible heritage. The transmission of this heritage occurs through strategies and actions aimed at sustainable development, promoting shared understanding of territorial values. By appreciating and enhancing local heritage, recognition as Geoparks stimulates communities to actively engage in the responsible management of natural resources and the creation of sustainable economic and social opportunities. The acquisition of the UNESCO title through a grassroots approach has allowed the interpretation and enhancement of the landscape system to begin on a local scale before integrating internationally. This is evident in the need to aggregate multiple landscapes or sites with common geological characteristics and future objectives, as well as in the relationships established between associations, local and territorial entities, and the community itself. Therefore, these relationships are crucial for raising awareness about territorial care and educating both locals and visitors [4]. Geoparks have developed innovative geotourism products such as time walks, field excursions, and local cultural experiences, combining leisure with education. Over the past decade, Geoparks have advanced holistic nature experiences, promoting geotourism for sustainable development. This special interest tourism, now a global phenomenon, uses unique landscape features to attract visitors, combining adventure with educational insights into geological processes. Through educational initiatives and programs, Geoparks strengthen the bond between humans and nature, raising awareness of the importance of geodiversity heritage and encouraging responsible natural resource management practices while promoting sustainable tourism. Tourism itself becomes a key to revitalization, driving the implementation of local development strategies, transmitting the human-nature connection, and serving as a vehicle for valuing natural-cultural, tangible-intangible heritage. Consequently, the investigation identified exemplary UNESCO Geoparks where territorial regeneration has been most effectively achieved through sustainable tourism.

2. Applied methodology

The analysis follows a multi-scale approach based on three levels: global, European, and Italian. The first level consists of a preliminary survey aimed at identifying the 213 UNESCO Global Geoparks [5]. The second level involved narrowing the scope of the investigation to European boundaries and was divided into four main phases: ‘selection of territories’, ‘classification by geomorphological characteristics’, ‘definition and analysis of the prevailing macro categories’, and ‘selection of case studies’. The ‘selection of territories’ phase included an initial narrowing at the European level, identifying 108 UNESCO Global Geoparks out of the 213 worldwide. Among these, five have transnational boundaries: Karawanken/Karavanke UNESCO Global Geopark between Austria and Slovenia, Schelde Delta UNESCO Global Geopark between Belgium and the Netherlands, Muskauer Faltenbogen/Łuk Mużakowa UNESCO Global Geopark between Germany and Poland, Novohrad-Nógrád UNESCO Global Geopark between Hungary and Slovakia, and Cuilcagh Lakelands UNESCO Global Geopark between Ireland and the UK. After this analysis, the ‘classification by geomorphological characteristics’ phase began, where the territories were divided according to different geomorphological natures into three general macro categories: rural, mountainous, and volcanic. The survey revealed that these categories sometimes appear in combination: rural and volcanic, mountainous and rural, and rural, mountainous, and volcanic. Considering all six macro categories, the ‘definition and analysis of the prevailing macro categories’ phase aimed to understand the percentages of territories associated with each. For greater material availability and ease of analysis, only the primary macro category of each territory was considered, and the category of transnational geoparks was excluded, as they span multiple nations with different regulatory regimes. Finally, the ‘selection of case studies’ phase was conducted on the overall total to identify which territories have implemented the most efficient policies regarding sustainable tourism as a strategy for regeneration/revitalization. The choice fell on five UNESCO Global Geoparks: Geopark Cabo de Gata in Spain, Geopark Vulkaneifel in Germany, Geopark Northwest Highlands in Scotland, Geopark Famenne-Ardenne in Belgium, and Geopark Luberon, Parc Naturel Régional in France.

The third and final level concerned the Italian context to understand whether regeneration policies related to tourism have been as strategic in Italy as abroad. Following the previous methodology, four main phases were defined. The ‘selection of territories’ phase included an initial narrowing at the national

level, identifying 11 UNESCO Global Geoparks out of the 108 in Europe. After this analysis, the second phase of ‘classification by geomorphological characteristics’ began, where the territories were divided according to different geomorphological natures into three general macro categories (rural, mountainous, and volcanic) and their combined forms. In the third phase, for greater material availability and ease of analysis, only the primary macro category of each territory was considered, and the volcanic and mountainous, rural and volcanic categories were excluded as they were absent among the identified territories. Finally, for the ‘selection of case studies’, the choice fell on two UNESCO Global Geoparks (UNESCO Global Geopark Madonie in Sicily and UNESCO Global Geopark Sesia Val Grande in Piedmont) located in different regions positioned oppositely for greater differentiation. Following the identification of the seven case studies (five European and two Italian), the UNESCO Global Geoparks were first analyzed individually, and then a comparison was structured based on five interpretative categories defined by the authors: implementation of digital tourism promotion and enhancement tools, creation of tourist itineraries, marketing projects and events, functional building, structural or infrastructural works, and installations on cultural, landscape, and natural sites. The aim was to identify the intervention approaches and effective strategies promoted in the UNESCO Global Geoparks for the regeneration/revitalization of the sites. The parameters were defined on a common basis for all sites and obtained by analyzing the strengths and weaknesses that a park might have concerning the strategies adopted for regeneration. Numerical values were assigned for the evaluation on a scale from 0 to 5: 1 poor, 2 moderately poor, 3 average, 4 good, 5 excellent. Additionally, development strategies, solutions adopted, and results obtained in the post-designation period were identified. The focus was particularly on the theme of tourism, analyzing the impact of visitors, the most used types of tourism, the activities and projects that led to the configuration of itineraries and tourist-informative and technological facilities, and the recovery interventions on built structures that led to the overall enhancement of the Geopark. The intention was to understand how the Geopark relates to the theme of tourism and what solutions were implemented in different territorial contexts.

3. On the global scale

The first level of analysis was conducted on the presence of UNESCO Geoparks across the 7 continents. The quantitative investigation enabled the identification, in numerical terms, of both the nations involved and the various sites designated within them. Out of the total 48 nations and 213 worldwide sites, the highest percentage is found in Europe [6], comprising 27 nations and 108 sites. Following Europe is Asia with 10 involved nations and 84 sites, South America with 7 involved nations and 13 sites, Africa with 2 involved nations and 2 sites, North America with 1 involved nation and 5 sites, and Oceania with 1 involved nation and 1 site, concluding with Antarctica, which does not present any sites. For Russia and Turkey, in assigning sites, their locations were identified as both nations have presence in both the European and Asian territories. Further attention was directed towards Europe due to the presence of 5 transnational geoparks: the Karawanken / Karavanke UNESCO Global Geopark located between Austria and Slovenia, the Schelde Delta UNESCO Global Geopark between Belgium and the Netherlands, the Muskauer Faltenbogen / Łuk Mużakowa UNESCO Global Geopark between Germany and Poland, the Novohrad-Nógrád UNESCO Global Geopark between Hungary and Slovakia, and the Cuilcagh Lakelands UNESCO Global Geopark between Ireland and the United Kingdom of Great Britain and Northern Ireland. For counting purposes, the sites were considered as part of the total for each nation, but in the final count, they were treated as a single geopark. Therefore, 5 sites were subtracted from the calculated total of 113 European sites. An asterisk ‘*’ denotes this type (tab. 1).

4. On the European scale

Following the identification of the 213 sites related to the world heritage, with data updated to 2024, the analysis focused on the 108 European sites. [6] An initial selection was made on the overall total to understand which territories, in the post-nomination period, have implemented more effective intervention approaches, strategies, and policies concerning sustainable tourism for rejuvenation/revitalization. Given their close ties to natural and geomorphological heritage, it was necessary to begin the investigation by identifying the site in relation to one of the macro-categories it belongs to: rural, mountainous, and volcanic. However, since some Geoparks fall into an associated form among the different categories,

three additional macro-categories were initially distinguished: mixed rural and volcanic, mixed mountainous and rural, mixed rural, mountainous, and volcanic. The 108 territories are predominantly rural Geoparks with 50 territories, followed by mountainous ones with 33 territories, volcanic ones with 4 territories, mixed rural and volcanic ones with 4 territories, mixed mountainous and rural ones with 14 territories, and mixed rural, mountainous, and volcanic ones with 3 territories. However, each territory also, in its own definition, highlights the prevalence of one macro-category over the others. The coexistence of different categories underscores the awareness of the plurality and diversity of the parts of the territory with different morphologies and landscape nature. Still, for the sake of facilitating the analysis and due to greater availability of material, only the prevailing macro-categories for each territory were

UNESCO Geoparks	Europe	North America	South America	Africa	Asia	Oceania	Antarctica
47 sites					China		
17 sites	Spain						
11 sites	Italy						
10 sites					Indonesia - Japan		
9 sites	United Kingdom and Northern Ireland* - Greece - France						
8 sites	Germany*						
6 sites	Portugal		Brazil				
5 sites	Finland	Canada			Republic of Korea		
4 sites	Norway						
3 sites	Ireland* - Hungary* - Denmark - Croatia - Austria* - Poland				Vietnam		
2 sites	Belgium* - Iceland - Netherlands - Romania - Slovenia*		Mexico		Malaysia - Thailand		
1 site	Cyprus - Czechia - Luxembourg - Serbia - Slovakia* - Sweden - Russian Federation		Chile - Ecuador - Nicaragua - Peru - Uruguay	Tanzania - Morocco	Türkiye - Philippines	New Zealand	
Total	27 nations 108 sites*	1 nation 5 sites	7 nations 13 sites	2 nations 2 sites	10 nations 84 sites	1 nation 1 site	0 nation and site

*The asterisk accounts for the 5 transnational geoparks, calculated in the table as two separate sites located in different countries but considered as a single site for the purpose of overall calculation.

Tab. 1 - Quantitative analysis of UNESCO Geoparks across seven continents.

considered in the selection of case studies (fig. 1). Additionally, transnational Geoparks were excluded from the selection, as they involve multiple nations with different regulatory regimes. The case studies selected for a more in-depth investigation based on the parameters identified previously are: the Cabo de Gata Geopark in Spain, belonging to the rural macro-category; the Vulkaneifel Geopark in Germany, falling under the rural and volcanic macro-category; the Northwest Highlands Geopark in Scotland, categorized as mountainous; the Famenne-Ardenne Geopark in Belgium, pertaining to the rural macro-category; and the Luberon Parc Naturel Regional Geopark in France, classified as mountainous. Therefore, the selected territories consist of 2 predominantly rural, 2 predominantly mountainous, and 1 predominantly volcanic, for better differentiation and case analysis. The analysis proceeded with a focus on the 5 individual sites, evaluating them according to some common parameters defined by the authors and obtained by analyzing the strengths and weaknesses that a park could have regarding the strategies adopted for regeneration. The identified parameters are 5: Development of digital tourism enhancement and promotion tools, Development of tourist routes, Marketing projects and events, Works of architectural, structural, or functional plant nature, Arrangements on cultural, landscape, and naturalistic sites. For each parameter, a value ranging from 0 to 5 was assigned, where 0 is considered as not evaluable, assigned when the geopark does not have sufficient data for adequate evaluation; 1 as poor, when the geopark shows serious deficiencies in management, heritage enhancement, and sustainable tourism strategies; 2 as moderately poor, when the geopark has implemented some initiatives but still has significant gaps in various management and enhancement aspects; 3 as average, the geopark demonstrates acceptable management and enhancement, with good results in some areas but with room for improvement; 4 as good, where the Geopark excels in many areas of management and heritage enhancement, showing an effective implementation of sustainable tourism strategies. 5 as excellent, when the Geopark represents a model of excellence in management, heritage enhancement, and adoption of sustainable tourism practices, achieving high-level results in all evaluated sectors. The aim was to lay the groundwork for a common qualitative comparative analysis, so that effective practices for regeneration/revitalization of territories could be objectively identified, to assess the contribution that sustainable tourism has made to the sites, and how essential the involvement and benefits for local communities have been. For each Geopark, a brief initial description of the site, activities, and promotion strategies implemented in favor of tourism, impacts on the territory, and finally, a tabulated summary of the qualitative analysis with final scores, and the results obtained following the implementation of management policies applied and improvements to be made are reported. At the end of these examinations, a general conclusion and a comparative analysis of the overall results obtained are provided.

4.1 European case studies

Geoparks represent a model of integrated management of natural and cultural heritage, aimed at promoting sustainable tourism and stimulating local economic development. Below, we will analyze five geoparks, highlighting their main characteristics, criteria of attractiveness, available services, associations promoting geotourism, virtuous activities, and implemented technological solutions.

The Geopark Cabo de Gata is in Andalusia, in southeastern Spain. Characterized by a unique landscape that combines pristine beaches, towering cliffs, and volcanic formations dating back 15 million years, the park offers a wide range of ecosystems, including wetlands, dunes, salt flats, and marine bottoms teeming with life. The main attractions include volcanic geological formations such as calderas, craters, and lava flows, as well as the park's unique biodiversity. The hiking trails (17 in total) allow exploration of various rural and coastal landscapes. The park offers 59 tourist activities, including guided tours, water sports, and educational workshops. There are also seven information points for visitors. Numerous local associations and tourism organizations collaborate to promote geotourism and environmental sustainability. Virtuous activities include educational programs on geology, biodiversity, and environmental sustainability. Implemented technologies include apps for guided routes and tools for astronomical observation, given the reduced light pollution. The local community is actively involved in conservation initiatives and park management, contributing to its tourism promotion and sustainable economic development [7, 8]. The Geopark Vulkaneifel in southwestern Germany is renowned for its unique volcanic landscape, featuring water-filled volcanic craters (maars), volcanic hills, and lava flows. This rich geological area also supports diverse flora and fauna in its forests, meadows, and wetlands. To

promote eco-friendly tourism, the park offers a range of outdoor activities, including extensive hiking and cycling trails. It also emphasizes environmental education through programs for schools and groups, aimed at fostering an appreciation for geology and ecology. Visitor centers and the Geo Museum provide educational resources and insights into the region’s volcanic history. The park also includes cultural sites like ancient churches and monasteries, enriching the visitor experience. Overall, Geopark Vulkaneifel combines natural beauty, educational initiatives, and cultural heritage to attract tourists and support local community development sustainably. The Geopark Northwest Highlands is located in the northern region of Scotland. It is known for its spectacular landscapes, including mountains, rugged coastlines, crystal-clear lakes, and glacial valleys, and for rocks dating back over 3 billion years. The main attractions are the mountainous and coastal landscapes, the biodiversity with rare species such as the golden eagle, and the hiking trails that span over 1,500 km of terrain. The park offers a wide range of outdoor activities, such as trekking, cycling, kayaking, fishing, and birdwatching. Astronomical observation sessions are another attraction, thanks to the reduced light pollution. Numerous local organizations support geotourism and the conservation of the region’s cultural and natural heritage. Activities include environmental and geological education, guided tours to archaeological sites, and the promotion of sustainable tourism. Technologies such as hiker apps and interactive maps enhance the visitor experience. The local community actively participates in promoting cultural traditions and organizing events to highlight the park’s heritage [9, 10].

The Geopark Famenne-Ardenne is in the Ardennes region, in southern Belgium, and is famous for its hilly landscapes, river valleys, and limestone caves with stalactites and stalagmites. The main attractions are the limestone caves, historic castles, and local gastronomic products such as cheeses, craft beers, and traditional dishes. The park offers guided tours of the caves and castles, cycling routes, cultural and gastronomic festivals, and glamping activities for a luxury camping experience. Various local associations and tourism entities promote geotourism and the cultural authenticity of the region. Virtuous activities include cultural festivals, gastronomic events, and educational programs on natural and cultural heritage. Technological solutions include interactive guides and tools for virtual visits to the caves. The community is strongly involved in promoting and preserving local traditions, contributing to the sustainable economic development of the park [11, 12].

The Geopark Northwest Highlands is located in the northern region of Scotland. It is known for its spectacular landscapes, including mountains, rugged coastlines, crystal-clear lakes, and glacial valleys, and for rocks dating back over 3 billion years [19,20]. The main attractions are the mountainous and coastal landscapes, the biodiversity with rare species such as the golden eagle, and the hiking trails that span over 1,500 km of terrain. The park offers a wide range of outdoor activities, such as trekking, cycling, kayaking, fishing, and birdwatching. Astronomical observation sessions are another attraction, thanks to the reduced light pollution. Numerous local organizations support geotourism and the conservation of the region’s cultural and natural heritage. Activities include environmental and geological education, guided tours to archaeological sites, and the promotion of sustainable tourism. Technologies such as hiker apps and interactive maps enhance the visitor experience. The local community actively participates in promoting cultural traditions and organizing events to highlight the park’s heritage [13, 14].

The Luberon Regional Natural Park, located in Provence, southeastern France, is characterized by hills covered with forests, vineyards, lavender fields, and picturesque medieval villages. The main attractions are the natural landscapes, medieval villages, castles, and Provençal cuisine with high-quality local products. The park offers a network of hiking and cycling trails, food and wine tastings, guided tours of historical sites, and cultural activities in the medieval villages. Numerous associations and local entities collaborate to promote geotourism and environmental sustainability. Virtuous activities include promoting local cuisine, cultural events, and educational programs on sustainability. Implemented technologies include apps for hiking trails and digital guides for visitors. The local community is actively involved in park management, promoting the conservation of cultural and natural heritage and the sustainable development of the territory [15, 16].

The table 2 shows that the values attributed to each individual park are extremely high. Various common strategies have been undertaken from a naturalistic perspective, such as the expansion and/or implementation of hiking and cycling trails, the possibility of observing flora, fauna, and stars. However, particular importance has been given to the cultural heritage, not only in terms of local culture but also in terms

of the built environment associated with it. The analysis of the case studies has shown how local architectures are presented to visitors sometimes through guided tours, sometimes through the establishment of museums. Although less varied than the natural heritage, this built heritage includes both ruins and new constructions designed to immerse the tourist in a complete experiential process within the territory. Although these territories are already highly valued, where innovations aimed at improving territorial management, sustainability, and environmental education through tourism are diverse, it is necessary to continue proposing effective strategies for enhancing natural and cultural heritage. This is possible only through a correct understanding of the potential and remaining quality elements of a territory, as demonstrated in the five case studies. The strategies implemented through the promotion of low-impact tourist activities (trekking, birdwatching, and guided tours) can lead to the creation of new ecological transport networks, guaranteed by the implementation of electric buses to reduce the environmental impact generated by visitors. Additionally, conservation and research programs aimed at expanding knowledge of biodiversity can be planned. The preservation of nature and its morphological components is the focus of numerous enhancement strategies and can be pursued through the promotion of projects for the protection of endemic species and critical habitats, including monitoring and scientific studies, as well as ecological restoration initiatives, which involve the recovery of degraded ecosystems through the planting of native species and the removal of invasive species.

It is essential that this environmental education continues to support the ongoing development of new educational centers aimed at raising public awareness of the importance of geodiversity and the conservation of the natural environment. A common outcome is the establishment of educational programs for schools and communities, which involve collaboration between educational institutions and local communities to offer educational programs and workshops on the environment. The involvement of the local community has also allowed for the management of the park through participatory projects and public consultations, as well as increasing sustainable economic development through the promotion of local entrepreneurial initiatives with a focus on complete sustainability.

In line with current issues related to climate change and the Sustainable Development Goals of the 2030

UNESCO Geoparks	Development of tools for enhancement and digital tourism promotion	Creation of tourist itineraries	Marketing projects and events	Construction of functional architectural, structural, or facility works	Outfits on cultural, landscape, and naturalistic sites	Total
Cabo de Gata	4	5	4	4	5	22
Vulkaneifel	4	5	5	5	5	24
Famenne - Ardenne	4	5	5	3	5	22
Geopark Northwest Highlands	4	4	4	3	4	19
Luberon Parc Naturel Regional	4	5	4	4	5	22

Tab. 2 - Qualitative assessment of the regeneration strategies implemented in the five case study.



Fig. 1 - 1 –Spain, 2 – Germany, 3 – Scotland, 4 – Belgium, 5 – France, 6 & 7- Italy (Piedmont & Sicily).

Agenda, new territorial policies aim to develop new strategies to increase the resilience of ecosystems and local communities, particularly concerning measures to reduce the park’s carbon emissions through energy efficiency and the use of renewable energy. In this regard, new support tools are necessary for environmental monitoring, such as drones and sensors that monitor the health of ecosystems and instantly detect any threats, as well as providing visitors with an easy-to-read tool, such as smartphone applications and online platforms. These tools can offer information on how to navigate within the park, promote hiking trails, and raise awareness of the importance of conservation and preservation of heritage.

4.2. A focus on Italian cases studies

The “Parco delle Madonie”, situated in the heart of central Sicily approximately 70 km from Palermo, represents a protected area of natural interest. Established in 1989, this park extends over an area of over 39,000 hectares, characterized by a varied composition of mountains, forests, rivers, and lakes. Among its main attractions stand out Monte Carbonara, the highest peak of the Madonie at 1,979 meters above sea level and secular beeches forest that hosts a rich biodiversity of flora and fauna. Not to be overlooked are also the medieval villages of Geraci Siculo, Petralia Soprana, and Castelbuono, rich in history and charm among the other 18 villages. This park offers a wide range of activities for visitors eager to explore nature and immerse themselves in local culture. Among the available options are hiking along a network of well-marked trails, trekking on more challenging routes leading to the highest peaks, and mountain biking through dirt trails winding through forests and mountains. Nature lovers will have the opportunity to practice speleology in the numerous caves and grottoes present in the park, as well as to engage in birdwatching to admire the diverse avifauna that inhabits it. For those who prefer more relaxing activities, horseback riding excursions along the park’s trails are available, allowing them to appreciate the beauty of the surrounding landscapes. Not only does the Park offer an immersive experience in nature, but it is also renowned for its rich culinary tradition. The local cuisine offers a wide range of typical products, including ricotta, pecorino cheese, honey, and olive oil, which will delight even the most discerning palates. [17, 18]

Turning to the Geopark UNESCO Sesia Val Grande, located in northern Piedmont between the provinces of Vercelli and Biella, another wonder of Italian nature is discovered. Founded in 2022, this geopark extends over a vast area of over 78,000 hectares, characterized by a variety of landscapes including mountains, rivers, lakes, and forests. Among the main attractions of the Geopark UNESCO Sesia Val Grande are the majestic Monte Rosa, the second highest mountain in the Alps, and the Parco Nazionale della Val Grande, the first Italian national park. Furthermore, the park hosts the Riserva Naturale Speciale del Monte Mars, a protected area that preserves a rich biodiversity of flora and fauna, and the picturesque Lago Maggiore with its islands and breathtaking landscapes. Not to be missed are also the Sacro Monte di Oropa, an important Marian sanctuary located on a hill, and the medieval village of Varallo Sesia, with its well-preserved historic center. Like the Parco delle Madonie, the Geopark UNESCO Sesia Val Grande offers a wide range of activities for visitors. Among these are hiking along panoramic trails, trekking on more challenging routes, and mountain biking through forests and mountains. Nature lovers can explore the caves and grottoes of the park, indulge in birdwatching to observe the numerous species of birds present, and enjoy skiing on the slopes during the winter season. Additionally, it will be possible to practice rafting and canoeing along the rivers that traverse the geopark’s territory. These

two splendid parks offer visitors a unique opportunity to immerse themselves in nature and discover the cultural and landscape richness of Italy. [19, 20] From the results of the conducted analysis in tab. 3, following the previous methodology applied for the other parks it emerges that the two geoparks in Italy have obtained significantly lower scores compared to the case studies located in Europe. This allowed to identify the potential areas that could be enhanced and to outline possible approaches.

The comparison revealed that built heritage has not received particular attention, when, instead, it is a component that absolutely favors these parks over the others considered. In the case of the Madonie Park, villages and rural architectures are abandoned, while for the Sesia Val Grande, reference is made to the rich built heritage linked to the Walser culture, still preserved; significant opportunities for the recovery and enhancement of villages and communities together. These medieval villages hold rich historical and cultural heritage, which can be leveraged for tourism development by promoting their historic architecture, traditional crafts, and local traditions. Sustainable tourism practices prioritizing environmental conservation and community engagement can benefit local communities, collaborating also with entities and promote the development of eco-friendly tourism initiatives, including responsible outdoor activities and agritourism ventures showcasing slow food and hospitality. Community-based tourism initiatives can empower residents to actively participate and give work. Through cooperative networks, villagers can become ambassadors for their communities, sharing their knowledge and traditions with visitors while preserving their way of life and building stock. By harnessing the strengths of villages and communities, these parks can create sustainable development pathways that enhance both cultural and natural assets, thriving as vibrant hubs of heritage tourism while safeguarding resources for future generations.

UNESCO Geoparks	Development of tools for enhancement and digital tourism promotion	Creation of tourist itineraries	Marketing projects and events	Construction of functional architectural, structural, or facility works	Outfits on cultural, landscape, and naturalistic sites	Total
Madonie	2	3	2	1	2	10
Sesia Val Grande	2	2	2	1	2	9

Tab. 3 - Qualitative assessment of the regeneration strategies implemented in Italian case study.

5. Conclusion

In the comparison among the whole case studies, it has emerged that all Geoparks share the UNESCO designation, along with a geological, natural, and cultural component closely linked to the local community and the territory it pertains to. However, it is particularly evident that in Italian cases, there is also a strong connection with the entire built heritage, which is currently not fully exploited. It is believed that regeneration/revaluation strategies should pay greater attention to this type of heritage, to integrate the shortcomings identified in the comparison.

Tourism could provide valuable insights for identifying new projects: while other European parks, with their significant heritage mainly linked to geological and natural features, are able to implement effective management strategies that foster growth and provide employment, thus enhancing their international attractiveness, the Italian cases, under the same criteria, do not demonstrate a complete recognition and subsequent valorization of the existing heritage. The built heritage could be reconsidered as an additional quality element, through the attribution of new functions related to tourism. In this way, it would be possible to enhance the hospitality of the territory, which is already open to this type of issues (as in the

case of European parks). The aim of the research is to highlight these latent potentials in order to bring them to light and gain recognition from the local community and associations operating in the same territory, so that, through a grassroots approach, interventions can be made to improve their attractiveness, as seen in the case of UNESCO recognition. The use of these local resources could involve the recovery of local architectures that are currently in an advanced state of degradation/abandonment: ranging from villages to rural architectures.

The idea would be to use these assets to promote the growth of tourist services on par with other parks. The issue of hospitality is crucial in the Italian case, as the territories are unable to meet the demand compared to the required supply (unlike what happens in Europe). By integrating these considerations, the guidelines for the recovery and enhancement of parks can be further enriched, ensuring greater involvement of local communities, more effective use of available resources, and sustainable tourism growth respecting the environment and cultural traditions.

Bibliography

- [1] Molinelli G, Benvenuti M, Di Benedetto G. UNESCO Global Geoparks: A Powerful Tool for Sustainable Development and Geotourism Promotion. *Sustainability* 2023;15 (1):1-18.
- [2] Newsome D, Dowling R. *Handbook of Geotourism*. Massachusetts: Edward Elgar Publishing, 2020.
- [3] Németh K, Rashad MHM. Challenges of Geoconservation and Geotourism in a Changing Environment. In: Eder W, Bobrowsky PT, Martínez-Frías J, editors. *Geoheritage, Geoparks and Geotourism. Conservation and Management Series*. Springer Publishing: 2023.
- [4] Dowling RK, Newsome D. *Geotourism*. Elsevier, 2005.
- [5] UNESCO, UNESCO Global Geoparks: Guidelines and Criteria for Designation. Last consultation 07/06.2024. <https://www.unesco.org/en/igpp/geoparks/proposals>
- [6] UNESCO. Geoparks. UNESCO. Last consultation 07/06.2024. <https://www.unesco.org/en/igpp/geoparks?hub=67817>
- [7] Pérez-Calderón E, Prieto-Ballester JM, Miguel-Barrado V. Perceived Rural Development in UNESCO Global Geoparks in Spain. In *Land* 2022;11(7):1086. DOI: 10.3390/land11071086
- [8] Gómez-García D, Martín-Bueso M. The Role of Geoparks in Promoting Local Culture and Heritage: A Case Study of Cabo de Gata Geopark, Spain. *Journal of Heritage Tourism* 2022;17(6):854-872.
- [9] Höck J, Behr U. The Vulkaneifel Geopark, Germany: A Model for Geoconservation and Sustainable Tourism Development. *Geoheritage* 2015;7(2):145-154.
- [10] Döring M, Frevert T. The Economic Impact of Geotourism in the Vulkaneifel Geopark, Germany. *Tourism Economics* 2015;21(4):785-800.
- [11] Tsien HH, Sun Q. The Famenne-Ardenne Geopark: A geotourism destination with a global perspective. *Tourism Geographies* 2018;20(3):432-449.
- [12] Bernier H, Boulvain D. The Famenne-Ardenne Geopark: A geological and cultural heritage asset in Belgium. *Géochronique* 2018;146:4-11.
- [13] Barbier F, Bertrand J. Le Luberon: Un espace naturel et culturel à valoriser. *Revue des Régions Européennes* 2004;314:101-112.
- [14] Clark MS. The geomorphology of the North West Highlands Geopark. *Scottish Geographical Magazine* 2004;120(4):213-225.
- [15] Milne C. The North West Highlands Geopark: A visitor attraction with a difference. *Tourism Management* 2004;25(3):307-318.
- [16] Clauzon G, Métral J. Le Géoparc du Luberon: Un outil de développement durable. *Développement durable et territoires* 2004;2:127-138.
- [17] Cacciatore G, Di Vincenzo G. The Madonie Mountains Geopark (Sicily, Italy): A geotourism case study. *Journal of Sustainable Tourism* 2012;20:115-135.
- [18] Anselmo V. *Madonie a piedi: 24 itinerari escursionistici nelle «Alpi di Sicilia»*. Youcanprint Editor, 2016.
- [19] Guerini M, Mantovani A, Khoso RB, Viani C, Giardino M. Geodiversity and Geoheritage data from Alagna Valsesia, Sesia Val Grande UGGp (NW-Italy). *Zenodo* 2024;19. DOI: 10.5281/zenodo.10636049

- [20] Guerini M, Khoso RB, Negri A, Mantovani A, Storta E. Integrating Cultural Sites into the Sesia Val Grande UNESCO Global Geopark (North-West Italy): Methodologies for Monitoring and Enhancing Cultural Heritage. *Heritage* 2023;6(9):6132-6152. DOI: 10.3390/heritage6090322