

MECHANICAL ENGINEERING | PHYSICS |
PRESERVATION OF THE ARCHITECTURAL
HERITAGE | STRUCTURAL, SEISMIC
AND GEOTECHNICAL ENGINEERING |
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POLICY | AEROSPACE ENGINEERING |
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DESIGN | BIOENGINEERING | DATA ANALYTICS
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| MATERIALS ENGINEERING | MATHEMATICAL
MODELS AND METHODS IN ENGINEERING



Chair:
Prof.
Mariacristina Giambruno

DOCTORAL PROGRAM IN PRESERVATION OF THE ARCHITECTURAL HERITAGE

The Doctorate Course in “Preservation of the Architectural Heritage” was first held at Milan-based Politecnico back in 1983.

The PhD program focuses its attention to some currently crucial themes for the preservation, conservation, management and valorization of Architectural Heritage.

Starting from the fundamental topics of knowledge, preservation, design and intervention, the PhD program takes care of the most important and urgent problems affecting the built Heritage and Cultural Landscapes: the fragility and the abandonment of historic marginal areas; the climate change and its effects on the built environment; the improper pressure of mass tourism on our historic settlements and sites of cultural interest, the needs for a wider social involvement in the field also through appropriate ICT mediums, the management and the use of architectural Heritage.

The conservation of Architectural Heritage is, in fact, a strategic field as well as one of the main important resources for worldwide economy and for a sustainable future in different areas of the world.

The team of professors, promoting and participating in the debate about these matters on a national and international scale, will thus deal with a broad range of issues requiring strong and real multi-disciplinary approach.

In addition to the professors of architectural restoration, history of architecture and structural strengthening of the Politecnico di Milano, the Faculty Board includes representatives from other well-known universities and research institutes (Università IUAV, Venezia; Università di Genova; Università degli Studi di Bergamo; ISPC-CNR, ISAC-CNR); they collaborate actively in the teaching and research activities.

The ultimate purpose of the Faculty Board not only resides in broadening the experiences that the PhD candidates acquire over the first three years of the course, where they have the opportunity to interact with scholars from different backgrounds; it chiefly aims at providing the PhD candidates with a unique training experience in the Italian panorama, so far unparalleled also in domains other than the preservation and restoration of the cultural heritage. Such context investigates the synergies and responses to the modern themes of cultural heritage protection.

The PhD programme is meant as the place where theorization, methodology, investigation into the most significant chapters of the protection of historic architectural and cultural heritage are connected to complex, challenging operating research themes, on-site and lab experimentation of analytical and diagnostic stages.

The relationship with Italian Ministero per i beni e le attività culturali e il turismo - Mibact has been definitely fruitful, especially when we consider that many among the best PhDs in Preservation of Architectural Heritage have been hired as officers and executives to the above ministry; recently (February 2018) twelve PhD from the PAH Programme won the competitive exam to become officers in the Ministry of Cultural Heritage

Teaching aims

The Faculty Board organization allows to investigate and share extremely relevant, up-to-date topics that, architectural heritage being the high spot of research, describe the complex domain of preservation, a strategic field and, at the same time, one of the chief resources of the Italian economy and future.

Being a mix of differentiated research, experimentation and operating methods, the PhD programme provides the candidate with a rich and very interesting experience. The on-going contact with the breakthroughs from studies and research carried out in Italian and international contexts and the will to promote joint projects are fostered through expanding the network of relations the university entertain with other universities and research centres in different geographic areas of the world. In this regard, over the past 5 years the PhD programme in Preservation of the Architectural Heritage has been committed to promoting and coordinating inter-doctoral courses contributed by foreign professors from different European countries.

Coursework

The PhD Programmes and the PhD School activate teaching forms of different kind and credit value, including courses, seminars, project workshops, laboratories. Teaching activities both cover the basic research issues (problems, theories, methods), which represent the founding element of the PhD

programme and clearly identify its cultural position, and deepening in a specialist way some research issues connected with the problems developed in the theses.

Within this plan, different experiences are organized in order to get PhD candidates in touch with study and research developed in Italian and International context.

Visits to important restoration site are organized, such as the ones to the area in the central part of Italy damaged by the earthquakes (Amatrice Accumoli, etc.); to the Procuratie, Rialto Bridge and the Palazzo Vendramin Calergi in Venice; to the Colosseo in Rome under intervention of maintenance (with ISCR, formerly Istituto Centrale del Restauro), to the Sanctuary of Vicoforte (in collaboration with Politecnico di Torino); to the underwater archaeological site in Baia (Napoli) in relation to the ISCR project “Restoring Unerwater”. Three workshops organized as interdoctoral program in Sulmona, in Nicosia (Cyprus) and in Elbasan (Albania) allowed students to gain experience in national and international contexts with highly topical issues.

The second and the third years are aimed at personal study and research for the PhD thesis.

The activities undertaken during the second and third year also include attendance of workshops, seminars, international meetings related to individual research, with great attention to conferences wherein PhD candidates present the results, even partial, of their research theses.

Research organization and topics

Educational activities are related to research either under way or at an early stage of development, some of which addresses major monumental structures and some of the most renowned sites of the world. This aspect increases the technical characteristics and will make PhD immediately competitive at the European level.

To the aim of their thesis research, PhD candidates have the opportunity to rely on facilities and laboratories, both inside and outside the University, the breadth and width of which provides them with a crucial support to the aim of acquiring “competence for highly qualified research activities” in the domain of cultural heritage protection.

In this connection, the PhD programme deems to carry on the long - standing collaboration with the ISPC CNR (the Institute for the Preservation and Enhancement of Cultural Heritage) and new collaboration with ISAC-CNR regarding climate change and Heritage.

As for the thesis research, candidates thus have the opportunity to address and investigate in-depth the wide-ranging themes connected to heritage knowledge and preservation broadly meant, such as advanced methods of investigation.

The multi-disciplinary nature of the doctoral courses, encouraged in the framework of the PhD programme since its establishment, equally values the fundamental contribution of historical research and its methods; at the same time it features innovative, pioneering themes: impacts of climate change on architectural heritage and cultural landscapes; Inner Areas: census, conservation and re-use of Architectural Heritage; strategic approaches for the preservation; social involvement and Communities engagement in the protection and management of their Heritage; Impact of mass tourism on architectural heritage and cultural landscapes; cultural and sustainable tourism policies and practices; Architectural Heritage at risk in seismic or in conflict areas; Architectural Heritage and Cultural Landscapes in Countries in transition; Cultural Heritage and Economic Evaluation.

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EVALUATION OF CULTURAL POLICIES IN TERRITORIAL DEVELOPMENT: A POLICY ANALYTICS PERSPECTIVE

Federica Cadamuro Morgante – Supervisor: Prof. Alessandra Oppio

Co-Supervisors: Prof. Ugo Fratesi, Prof. Stefano Della Torre

The context and the project. This interdisciplinary research intends to contribute to evaluation studies for Italian and European cultural (public) policies, which today are increasingly involved in strategic logics of territorial development and especially for non-urban areas. In this context, the research orientation stems from the observation of a growing focus on integrated and 'democratic' policy evaluation approaches also in the cultural field. Specifically, the integrated assessment for cultural policies involved in territorial development seeks to grasp the contribution of a cultural policy defined by a *unicum* of culture-territory elements capable of becoming levers of socio-economic-cultural-environmental development; a *unicum* that the thesis proposes to identify with the 'Cultural Landscape' (ref. 2000 European Convention) of a place. Moreover, the evaluation of policies, not only cultural ones, must nowadays come to terms with the need for strategic choices to respect legitimacy, accountability and transparency concerning complex, participative contexts characterised by fast and huge information and data flows. In the search for an evaluation approach that would meet the need to capture value-based

and not just data-based aspects (such as the popular evidence-based approach), the recent constructivist framework of Policy Analytics ("PA") appeared coherent to apply the goal of evaluation in the service of cultural policies associated with territorial development. However, PA has never been applied to cultural concepts. Hence, the ultimate aim of the research was expressed by the initial research question: "How to integrate Policy Analytics approach into evaluation process of the territorial policies that rely on Cultural Landscape as a key strategic factor?". The research, therefore, proposed adapting the founding principles of PA to a framework for assessing the contribution of cultural policies in territorial development and building an integrated measurement tool that would respect the new framework. Thus, the methodological procedure followed three steps:

- i) Literature reconnaissance for the fundamental concepts to be integrated into the framework;
- ii) Theoretical and technical construction of the framework and the integrated tool according to PA approach;
- iii) Contextualisation of the integrated tool to an

observational case and pre-test to assess its theoretical robustness.

The methodology followed proposed to investigate the contribution of cultural policies to the Relational Value arising from the Cultural Landscape of a territory. The idea was inspired by the tendency of the Italian and European territorial development policies observed (e.g. Leader, SNAI) towards strengthening the territory-collectivity relationship for the re-appropriation of spaces, identities and economical propulsion dynamics. Particularly, the Relational Value stands as a critical concept or "form" investigated by the constructed framework, capable of uniting the evaluation of the individual cultural asset and the values recognised to it by local stakeholders with its necessary dialogue and contribution with the territorial dynamics studied and evaluated on a large scale as the territorial capital.

Results and further research.

The integrated measurement tool presented in this research as the output is a composite index, the "Relational Value Index" and, following the PA framework adapted to for cultural policy evaluation, investigates in a multidimensional way the

contribution of cultural policy as well as its capacity to favour the creation or strengthening of the Relational Value of the Cultural Landscape. In particular, the index investigates three dimensions of people's attitudes towards Cultural Value: the individual dimension of the relationship with the Cultural Landscape ("Individual Vision"), the collective and inclusive dimension of sharing cultural values through the Landscape ("Inclusive Vision"), and the ability to grasp the Cultural Landscape as a single system and thus to reason on a complex scale in solving problems ("System Thinking"). The same index is then re-proposed concerning three different profiles of actors as end-users, stakeholders and experts. The necessary quantitative and qualitative data would be collected employing ad hoc individual questionnaires/interviews and, then, appropriately aggregated according to an additive logic to verify the contribution of each variable in the variation of the complex phenomenon. The Relational Value Index, then was adapted and discussed with a

panel of experts involved in the Italian case study Valli Resilienti, implemented by Fondazione Cariplo in the mountainous areas of Brescia Province (Val Trompia and Val Sabbia) between 2016 and 2020. With respect to the outputs obtained and the pre-test of the index architecture submitted to the panel of experts of Valli Resilienti, the following considerations are highlighted:

- *Integrated evaluation.* A framework or "formal model", in the shape of an integrated tool or procedural rigor, can help to combine data and value or qualitative and quantitative aspects according to a 'mixed' evaluation logic.
- *The constructivist role of the composite index.* The index responded well to the principles of PA and those of constructivist approaches according to which the effects of policies to be sought are not only expected but also unexpected, the evaluation itself must have a cognitive and not instrumental role and, participatory practices are demanded for the index

construction.

- *Models of relational system policies.* Regardless the Valli Resilienti experts' appreciation, the Relational Value can become an innovative key in the way of looking at valorisation, conservation and evaluation together inside a system policy that would like to trigger a positive impulse through cultural leverage.

- *Output limits.* Two limits must be emphasised: the need to practically apply the composite index (so that risks or problems in data collection can be identified) and the pioneering profile of the research itself.

The considerations and limits described above also open the way for future research developments and the application of the index on a new case study with data collection to test its "flexibility" to different contexts and scales of intervention. Furthermore, the PA framework could be adapted for evaluation purposes and as a decision-support approach in policy design. More in general, this research would like to stimulate new experimentations with PA in the cultural field and further reflections on the Relational Value of Cultural Heritage for territorial development from a policy perspective. Not least, the research supports cross-fertilisation between scientific fields as means to build cultural policies that can adapt well to the specificities of a territory and grasp the key factors for a sound and long-term development that starts from those who inhabit and live in that territory.

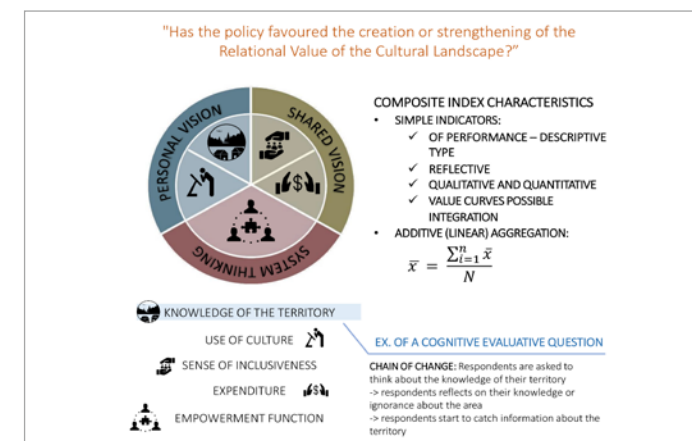


Fig.1 - The Relational Value Index architecture

GOVERNING RURAL LANDSCAPES FRAGILITIES: COMMUNITY AND HERITAGE-BASED DYNAMIC CONSERVATION IN THE ANDEAN CORDILLERA

Andrea L'Erario – Supervisor: Prof. Maurizio Boriani

Preserving rural landscapes stands out as one of the most pressing human challenges in contemporary times, holding paramount importance for global food security and the sustenance of agroecosystems while serving as a conduit for the transmission of ecological knowledge providing ecosystem services. The escalating impacts of climate change and ongoing socioeconomic shifts increasingly underscore the vulnerabilities inherent in the expansive global rural landscape heritage. The marginalization, encompassing cultural, social, environmental, and economic dimensions, alongside the abandonment of rural territories where the implementation of conventional agro-industrial models proves unattainable, serve as harbingers of more severe consequences, including heightened hydrogeological disruptions. In the “developed” regions such as Europe, these phenomena have unfolded over decades, often resulting in the relegation of heritage to a state of dormancy. Conversely, in many developing countries, these processes are of more recent origin, yet their repercussions manifest with alarming rapidity, accentuating the urgent imperative for interventions aimed at

safeguarding this intertwined human and ecological heritage within the overarching framework of the global agroecological transition. Notwithstanding the multifaceted challenges delineated above, it is widely recognized that a substantial reservoir of the world's biocultural diversity persists in rural marginal areas, distinguished by their rich tapestry of landscapes, agrobiodiversity, ancestral wisdom, and cultural practices, which are sustained by the enduring ethos of family farming management models. Across recent decades, numerous developing countries have borne witness to a burgeoning civic and political consciousness concerning these issues. Latin America stands out as a significant geo-cultural nexus on the global stage, witnessing the emergence of a plethora of initiatives geared towards the active preservation of rural heritage, spearheaded by a diverse array of stakeholders ranging from NGOs and grassroots communities to national governments. In particular, the Andean area represents a geo-cultural context of global importance, still preserving highly differentiated rural landscapes. Heritage includes agricultural terraces

dating to pre-Inca times, agroforestry systems, water management systems (*waru-waru*, *suqakollos*), highland wetlands utilized as pastures (*humedales*, *bofedales*). Many of these initiatives, albeit largely uncharted within the existing scholarly discourse, endeavor to grapple with the far-reaching ramifications stemming from the decay of marginal rural territories. They embody a trajectory marked by a progressive expansion of goals, evolving from the in-situ conservation of agrobiodiversity towards the systemic safeguarding of historical landscapes and



Fig. 1 - Over 5,000 years, the Andean farmers have dynamically conserved native agrobiodiversity and ancestral ecological knowledge. The diversity of rural landscapes, agroecological practices, crops, and cultures resulting from these millennia-old processes still characterizes an immense fragile bio-cultural heritage to preserve (photo: FAO/ Jeremy Comejo).

agro-eco-cultural practices, with an emphasis on fostering the key-role of communities as heritage custodians and landscape stewards. This research endeavors to delve into a select cohort of projects operating within this sphere – from the Peruvian *Zonas de Agrobiodiversidad* to the Chilean *Red de SIPAN* project fostering the international FAO-GIAHS approach (*Globally Important Agricultural Heritage Systems*) towards dynamic and active conservation of rural landscapes –, casting a spotlight on their systemic methodologies and pioneering innovations in multilevel and multistakeholder governance frameworks. By subjecting these projects to meticulous scrutiny, the overarching aim is to distill



Fig. 2 - Sondondo Valley, Peru. Daily landscape care of agricultural terraces by native communities still promotes the intergenerational oral transmission of ancient knowledge (photo: Peruvian Ministry of Culture).

invaluable insights and discern replicable factors that can inform and catalyze concerted efforts aimed at the preservation of rural landscape systems on a global scale. The preservation of historical rural landscapes represents a timeless commitment to nurturing the intricate tapestry of human existence intertwined with the natural world. At its core, this endeavor transcends the boundaries of mere conservation; it embodies a profound acknowledgment of the symbiotic relationship between humanity and the environment, rooted in millennia of shared history and collective wisdom. As stewards of this heritage, we are tasked with the responsibility of safeguarding the legacy bequeathed to us by our forebears

while charting a course towards a more sustainable and harmonious future for generations yet unborn. It is a calling that beckons us to action, compelling us to rise above the exigencies of the present and embrace the enduring legacy of stewardship that defines our shared humanity. In a world beset by myriad challenges, from the specter of climate change to the specter of social unrest, the preservation of historical rural systems stands as a beacon of hope towards a global sustainability. In the preservation of ancestral rural systems lies the enduring legacy of a world where humanity and nature coexist in harmony for millennia, bound together by the unbreakable bonds of landscape heritage stewardship.



Fig. 3 - Left: Community-based activities for cleaning channels, *limpia de acequia*, of highland wetlands: the human-nature systemic interrelationship characterizing the landscape care of the Andean *bofedales* still ensures the dynamic conservation of these places with a view to sustainability. Right: Training on dry-stone wall conservation led by local experts from rural communities (photo: Red de SIPAN, Chile, 2022-2023).

FACHWERK ARCHITECTURE FROM POMERANIA TO POMERODE, BRAZIL: ORIGINS AND HISTORICAL VICISSITUDES, 1860s-2020s

Marco Antonio Minozzo Gabriel - Supervisor: Prof. Carolina Di Biase

This research analyzes the transformations of rural residential architecture associated with the *Fachwerk* technique in Pomerode, Brazil, between 1860 and the 2020s. The research investigates the transposition of the “wide front house” housing typology from Pomerania to the Germanic colonies of Santa Catarina and the Pomeranian immigrants’ role in establishing the *Fachwerk* cycle in the State, where the consolidation, transformations, and adaptations of typology and technique from the apogee to the decadence of the cycle in the 1950s are assessed. Finally, it investigates the results of the patrimonialization and touristification processes established from the 1970s onwards. The immigration of Germanic populations in the 19th century brought customs associated with the *Fachwerk* technique to Brazil. *Fachwerk*, known as *enxaimel* in Portuguese, is a traditional building system composed of an interlocked timber structure. The concentration of Germans in three states - Espírito Santo, Rio Grande do Sul, and Santa Catarina - characterized this distinct architectural production. Nevertheless, it is in the Itajaí Valley, Santa Catarina, and

adjacencies that its highest expression occurred. From tiny houses to substantial commercial structures, *Fachwerk* was used by German Immigrants and their descendants in rural areas from the 1830s to the 1950s. While early *Fachwerk* constructions from the 1830s were registered in the São Pedro do Alcântara colony (the first German colonization attempt in Santa Catarina), it is the founding of the Colonies Dona Francisca (today's Joinville) and Blumenau in 1850 that propelled it. In the city of Pomerode, the physical dimension of this heritage is more evident. Its history, started by the great flux of Pomeranian immigrants who, between 1860 and 1880, left their homeland to settle in the Blumenau Colony - founded in 1850 and idealized by Dr. Hermann Blumenau to shelter German immigrants - is revealed through its extensive set of architecture made with the *Fachwerk* technique. The city's *Fachwerk* ensemble, comprised of 232 remaining buildings today, is inserted within a vast area of the relevance of the technique in the State. The investigation of the transformations suffered by this architectural typology between its formation period in Pomerania and its acclimatization and adaptation in Pomerode

part from the central hypothesis of the thesis that there is a clear connection between the wide front house model and the early *Fachwerk* developments in Santa Catarina. Based on economic precepts, this architecture supposedly relied on the technique to reconcile construction methods and typology, following customs associated decades before during the Frederician colonization period in Pomerania. Its popularization is linked to its communitarian production form, in which the settlers were directly involved in building the houses, a custom that was repeated in Brazil and facilitated the introduction of the typology and technique in the Santa Catarina State Germanic colonies. The result of the typological evolution of this residence model in Pomerania in the middle of the 19th century confirms that the constructive custom of the immigration period (the 1850s-1880s) is compatible with that executed in the first decades of colonization in Blumenau, Joinville, and Pomerode, and was adapted to the new reality of the settlers. The methodology of this research was based on the confrontation between the extensive review of the Brazilian, German, and Polish

bibliographies - never before examined together - and is added by the comparative analysis between architectural inventories carried out on multiple occasions in Santa Catarina, Brazil, and Poland, and further verifications in comparison with the process of immigration and transposition of the wide front model and the *Fachwerk* technique by Pomeranian immigrants in the United States. Added to this analysis is a vast collection of archival materials, many originals, collected in Brazil, Germany, and Poland during the field research carried out between 2020 and 2021 and in the United States by digital means. The first chapter of this dissertation investigates the first movements around the patrimonialization of the remaining architecture and the relevance of Pomerode to its great preserved ensemble. In particular, the question of origin is worked out to explore several inventories and research works about the origin of the *Fachwerk* architecture in *Vale do Itajaí*, trying to understand how the research results were formed. In particular, the contradiction between Weimer and Baumann was explored to verify the validity of the German researchers’ suggestions of the probable Pomeranian origin of the model adopted in the region. Once adopted as a hypothesis, the chapter explores the feasibility of this research, delving into the possibilities of constructing an investigation of transposing the *Fachwerk* model and technique in the region between Pomerania and Pomerode. The second

chapter draws parallels between the colonization movement in Santa Catarina, the formation of the Blumenau colony and *Rio do Testa* and German Immigration to Brazil, and the changes in Pomerania’s rural environment from the 16th century to the 19th century. It then explores the period of the Frederician Colonization and its likely impact on the formation and popularization of the wide front model from the late eighteenth century. Finally, it proceeds to investigate how this model was applied during the 19th century in the territory relevant to the research and how it was transformed until immigration to Brazil. Chapter three uses the inventories on *Fachwerk* architecture in Pomerania and Pomerode to understand how the possible transposition of the wide front model occurred in the *Vale do Itajaí* territory, using the older specimens primarily to understand immediate material transformations and adaptations to the environment, as well as inquiring about the content of the characteristics that were maintained. This chapter also explores the possible conditioning factors that influenced the immigrant community's proliferation of the building custom, including social and economic factors that allowed for its large-scale adoption. Finally, the chapter explores those notably particular elements specifically linked to regions of Pomeranian dominance. Chapter Four addresses the period of maturation and transformations between the heyday of *Fachwerk*

architecture and its decline in Pomerode. It explores how economic and environmental changes transformed the morphological aspects of this architecture, including its functional transformations. The weight of the economic transformations of the *Vale do Itajaí*, mainly the industrialization of Blumenau, is contrasted with the resilience of the cycle in the rural region of Pomerode to understand the cultural factors that allowed the maintenance of the custom in the rural regions. It also examines and investigates the transformations that occurred between the decadence of the *Fachwerk* cycle and the patrimonialization, trying to understand how socio-political factors resulted at the end of the *Fachwerk* cycle in *Vale do Itajaí* and, at the same time, were determinant for the creation of an early patrimonial conscience related to it. Finally, chapter Five explores the results of these multiple mechanisms and actions of “valorization” bestowed upon Pomerode’s ensemble while evaluating how the perceived lack of proper historiography, now redeveloped, affected the core of such arrangements. It explores the precepts and the result of conservation projects and examines the impact of tourist development on the fabric of historic buildings while also bringing light to the overall impact of ensemble preservation schemes.

DOMINICAN ORDER ARCHITECTURE IN NEW SPAIN: KNOWLEDGE, INFLUENCES, AND EXPERIENCES IN THE PROVINCE OF ST. JAMES OF MEXICO (16TH CENTURY)

Raúl A. Musiate Arellano – Supervisor: Prof. Alberto Grimoldi

This research aims to explore the influences, knowledge, and experiences that shaped an extensive network of conventual ensembles within a relatively short period in a territory initially unfamiliar to evangelizers. It examines how Dominican friars, pioneers in the evangelization of central and southern New Spain, led the establishment of this vast array of convents, showcasing the extrapolation, adaptation, and mediation of knowledge. The Spanish colonization entailed the conversion of the indigenous population, necessitating the creation of a vast network of strategically positioned convents across a territory larger than the European confines of the Spanish Empire. Initially provisional, these convents evolved into remarkable complexes, displaying adaptability, erudition, and humanistic culture. The Dominicans arrived in New Spain in 1526, officially establishing the Province of St. James of Mexico of the Order of Preachers in 1532. They swiftly expanded from the capital of the Kingdom of Mexico to the southernmost reaches of the territory, including what is now the State of Oaxaca, and continued their foundations in Chiapas, Guatemala, and Central America, where they founded additional Provinces.

The uniqueness of the territory where they established St. James Province lies in its geographical and cultural conditions, with a predominant indigenous population. The notable buildings constructed by the Dominicans reflect their significant role and positive relationships established with the preexisting indigenous societies, shaping a new social order. The conventual complexes integrated a mixture of practical and theoretical knowledge, institutional guidelines, European monastic architectural models, and insights from local experiences and regulations since the early years of the Province of the Order of Preachers' establishment in central-southern New Spain. Particularly notable is the process of transfer, mediation, and adaptation that Dominican architecture underwent, influenced by various factors, including indigenous methods of worship and construction organization prevalent in the local pre-Hispanic context. The research addresses several research questions, such as the adherence of this architecture to Spanish 16th-century religious architectural canons, the influence of institutional models and prescriptions on the architecture of the Order,

the degree of involvement of Dominican friars among patrons, architects, and construction supervisors, the circulation of Renaissance technical literature in the study area, and the realization of the most significant Dominican convent throughout the 16th century. This study delves into the influences, knowledge, and experiences that shaped an extensive network of conventual ensembles in 16th-century New Spain, exploring how Dominican friars spearheaded this architectural endeavor. The study examines the adaptation, mediation, and synthesis of knowledge and architectural forms in the context of evangelization and Spanish Empire expansion. It raises questions about adherence to European architectural canons, the roles of Dominican friars, the circulation of Renaissance technical literature, and the realization of significant Dominican constructions. The thesis comprises five chapters: The Order of Preachers in New Spain, which provides background on the establishment and governance of the Dominican Order in New Spain, contextualizing its role in evangelization. Construction in the Province of St. James of Mexico, exploring the evolution

of Dominican architecture, considering influences from institutional prescriptions, European models, and local circumstances. The chapter regarding builders of the Province of St. James of Mexico investigates the roles and involvement of Dominican friars and other artisans in construction projects, examining archival sources and chronicles to illuminate their contributions. The fourth Chapter is dedicated to Books and Knowledge of Architecture in the Dominican Context, exploring the circulation of architectural treatises and their impact on Dominican architecture, tracing connections

between Spain and New Spain. Construction, Experience, and Adaptation: This chapter analyzes a specific case study, St. Dominic's Imperial Convent in Mexico City, highlighting challenges, innovations, and socioeconomic factors influencing its construction through known and unpublished archival sources. Through these chapters, the research sheds light on the complex interplay of factors shaping Dominican conventual architecture in 16th-century New Spain, contributing to our understanding of Spanish and Mexican architectural history.

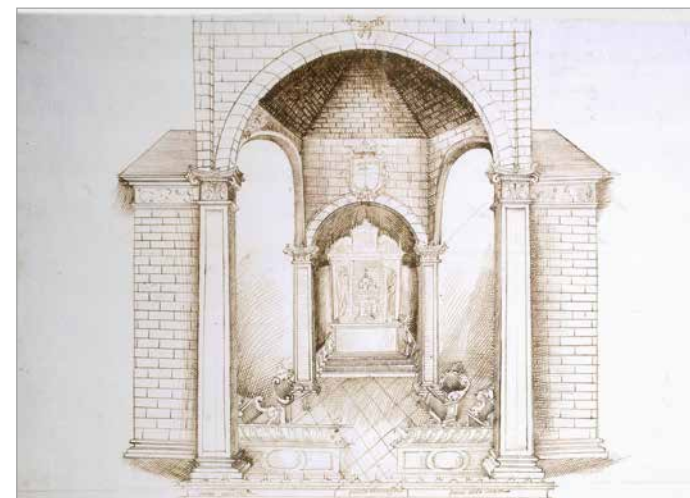


Fig. 1 – View depicting the presbyteral area of St. Dominic's Conventual Temple in Mexico City. "Forma de la Capilla Mayor de la Yglesia Real de S[ant]o Domingo de México", 1590.

A STRATEGIC SOCIAL VALUE-BASED APPROACH TO SUPPORT BUILT HERITAGE CONSERVATION IN INNER AREAS: THE CASE OF TAMMARO-TITERNO

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The PhD thesis, conceived within the DASTU Department's Territorial Fragilities project, deals with two specific and crucial dimensions of the territorial fragility phenomenon in Italy. On the one hand, it focuses on architectural heritage, whose fragility stems from its peculiar physical features and system of values menaced by a growing tendency to insensitive and unconscious transformation processes. On the other hand, it deals with the inner areas' territorial dimension, the focus of the National Strategy for Inner Areas (SNAI) since 2014, where the last decades' urban-centered leading planning approaches have triggered a marginalization process with a consequent steady demographic shrinking phenomenon. The interaction between these territorial fragility elements, indeed, charges architectural heritage conservation with additional meanings and objectives by opening to its possible contribution to addressing abandonment dynamics and strengthening relationships between people and places. Conceiving architectural heritage conservation interventions within a strategic design open to local development and social needs becomes crucial in these

territorial contexts. Based on these premises, thus, the research reflects on the possibility of contrasting the ongoing marginalization process in inner areas by focusing on the role of architectural heritage within the frame of the NSIA public policy. More in detail, it aims at reconnecting and relocating conservation projects oriented to built heritage assets' reuse, whose coherence with local needs and development potentials is usually left to designers' intuition and sensitivity, in the NSIA policy planning process by providing a strategic frame in which these projects can be conceived. Such a lack of a strategic vision toward heritage conservation is a common flaw in territorial planning tools at different levels, which seem unable to capture the inputs from a consolidated and vibrant theoretical scientific debate in the conservation domain. In the policy context of the SNAI, which formally recognizes architectural heritage's role in the inner areas' relaunch, the opportunity of such a strategic frame toward built heritage conservation also stems from the need to manage and integrate a national policy perspective with a local, territorial dimension of this policy's return. Furthermore,

in light of the relevance of the society-places relationship in addressing territorial fragility issues, the research work is also geared toward understanding the opportunities and spaces of local communities' involvement in supporting the construction of built heritage conservation strategies in inner areas. According to the outlined objectives, thus, the research work attempts to trace a decision-making process, opened to local communities' involvement, to support built heritage conservation from a strategic perspective with a specific focus on its scattered dimension. To this aim, the strategic process construction rests on an interdisciplinary approach, which feeds on the theoretical contributions developed within the scientific conservation debate, while finding crucial support in the methodological opportunities deriving from the economic evaluation field. It is worth underlining that, moving on this strategic and pre-feasibility level, the evaluation must be conceived from a 'constructive' perspective. It can serve as a tool for constructing a shared social meaning, guiding, and orienting strategic transformations toward heritage

conservation, and facilitating stakeholder relationships. In this sense, evaluation cannot be seen as a 'supporting calculus' tool behind decisions but as a dialogic/communicative process, which evolves through different steps and accompanies the whole decision process. This integration attempt between the conservation and evaluation disciplines' contributions informs the development of the whole research work. More in detail, after clarifying its reference terms, the research delves into defining an integrated methodological framework, named THEMA (Tool for Heritage Enhancement in Marginal Areas) tool that, feeding on the methodological opportunities deriving from the economic evaluation field, can support place-based decision-making processes, inspired to the action-research approach, toward defining conservation strategies for built heritage in *inner areas*. Such a framework is tested through the interaction with a case study, represented by Tammaro-Titerno *inner area* and its local community. In this sense, moving on a strategic and pre-feasibility level, the THEMA tool implementation to support built heritage conservation in Tammaro-Titerno's *inner area* deals with the first three phases of the outlined decision process inspired by the action research:

- *The Co-definition of the problem phases* that, starting from the core objectives of the Tammaro-Titerno "Area Strategy" aims to select a pilot cluster of Tammaro-Titerno municipalities more 'prone' to undergo

heritage-based development processes, thus considering them as the focus for the following decision tasks;

- *The Co-generation of relevant knowledge phase*, concerning the municipalities belonging to the identified cluster, which is geared toward recognizing heritage assets' significance by integrating a history-based knowledge approach with the local community's perspective. More in detail, on the local knowledge side, the research investigates built heritage assets' social value as recognized by local communities.
- *The Co-learning and co-design of actions phase*, focusing on co-defining reuse strategies for built heritage assets and providing a comprehensive feasibility judgment about them, which can be taken as the link between the strategic planning process and conservation projects.

The interaction with the Tammaro-Titerno case study allows for better reflection on the possible contribution of this thesis work with a strong process-oriented perspective. This contribution can be first read from an operative perspective in providing methodological support to define and implement heritage-sensitive and place-based conservation strategies within a public policy frame. Concerning the possible contribution to the scientific debate in the architectural heritage conservation field, instead, the research provides an additional and critical perspective

to the recent debate about built heritage's future in small towns and *inner areas*. In this sense, the research embraces a specific perspective toward architectural heritage conservation that, far from considering it as a merely technical and functional subject, recognizes its role as a complex cultural challenge dealing with social justice. Because of this theoretical positioning, it works toward putting conservation theoretical positions in dialogue with other disciplinary domains (social sciences and economic evaluation), thus conveying them into a scientifically sound and heritage-sensitive planning discourse. Of course, it also brings along some limits in its providing contributions both to the NSIA implementation and the scientific conservation debate related to: the adoption of a shared language toward integrating and conciliating different scientific fields' cultural perspectives; the full investigation of local communities' involvement opportunities; the compatibility between the research's theoretical and methodological complexity and a public policy's implementation time and resources. These limits must be considered as starting points for the future improvements of this research work that, while embracing a shift in perspective toward conservation in *inner areas* and providing preliminary answers to manage this topic's complexity, opens multiple new research frontiers to be crossed and investigated.

PLANT-DERIVED COLORANTS AS CULTURAL HERITAGE: BETWEEN HISTORY OF TECHNIQUES, APPLICATIONS ON ANCIENT ARCHITECTURAL SURFACES, AND PROSPECTS IN PRESENT-DAY PRODUCTIONS

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Dye plants have been extensively used since ancient times as sources of vegetal colorants for dyeing, painting, cosmetics and pharmaceuticals. Replaced in the late 19th century by synthetic substances, these colorants have recently witnessed a revival in Europe in the wake of the growing interest towards sustainable and low environmental impact productions. In the Italian context, however, most recent initiatives for the reintroduction of vegetal colorants were not able to match their integration in production processes with an adequate background of historical and scientific knowledge: consequently, most of these initiatives remained anchored in an amateur dimension, which often led to failure.

This research wishes to build up a background of knowledge on plant-derived colorants by highlighting their prominent cultural dimension and multidisciplinary nature, and to explain how, grounding their reintroduction on these features, these colouring substances have the potential of becoming a resource – a “cultural tool” – that can support territorial enhancement. To this aim, the research is made up by three essays; each of them, with dedicated methods, tools,

and disciplines, gives insight into a specific kind of cultural heritage bound to vegetal colorants: 1. Their history of ancient techniques and technologies, studied by means of the technical literature of the Modern Age; 2. Their uses in built heritage, examined through an analytical investigation on their painting applications on ancient architectural surfaces; 3. Present-day productions, intended as elements of material culture and expressions of an intangible heritage. Throughout the thesis, the case of woad (*Isatis tinctoria*, the “European indigo” plant) and its blue indigoid colour has been examined as a relevant example among dye plants to get insight into these topics. The historical research has brought to light that, on the contrary of what is often assumed, woad had not disappeared in Italy by the 18th and early 19th centuries. Instead, it was still cultivated, processed, and used in dyeing in several parts of the country, and had a more extensive diffusion than what is usually thought. Woad could be processed in different ways, and its extraction and dyeing techniques in this period had some points in common with those of *Indigofera tinctoria*, the “rival” foreign indigo plant.

Furthermore, the dyeing processes with woad could result in by-products – especially a scum, called the “flower” of woad – that could be used to make a pigment for painting: the plausible remnants of plant tissues in such by-products provides interesting starting points for future studies. The analytical investigation targeted painting layers of ancient wooden ceilings in Cremona (Lombardy), a city that turned out to have been bound to woad cultivation and production in the past, but had never been properly searched out in regard to indigoid colorants before. An indigoid blue was detected on three 15th-century ceilings, and was attributed to woad because of the extensive local availability of the colorant in this period. This result, compared with other findings of indigoid blues on coeval wooden ceilings of the Mediterranean arc, shows that indigoid pigments were used in built heritage in those places that had an active economy bound to woad. Concurrently, the finding of traces of plant tissues inside some indigoid painting layers seems attributable to woad’s processing techniques, and could become a new feature by means of which indigoid blues could be studied.

Finally, the examination of current woad productions in Italy confirms that today’s reintroduction initiatives have been mostly naïve, lacked a thorough support of research, and had an insufficient knowledge of historical processes, current optimization possibilities, and of the bond with a territory’s history. Concurrently, it showed that dye plants’ cultural significance does not primarily lie in an agricultural connotation, but rather in their transformation processes and their uses. It therefore appears necessary to rebuild the “culture of transformations” of vegetal colorants, in order to set up a complete and effective production chain of woad. In conclusion, the research showed that a culture of woad existed, and could be declined in different ways and different fields. This work represents a first step within a fragmentary framework, and allows to find some cornerstones, from which a work programme can be set up. This programme can involve a plurality of people, competences, and disciplines, that engage the territory on multiple levels: in this sense, vegetal colorants can be a multifunctional “cultural tool”, that can also contribute to territorial enhancement.

PRACTICES OF REUSE OF THE ARCHITECTURAL HERITAGE IN INNER AREAS. EXPERIENCES SUPPORTING CONSERVATION AS A RESOURCE FOR LOCAL DEVELOPMENT

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The primary objective of this research was to investigate the role of conservation and reuse of architectural heritage within broader processes of regeneration of the territory and local development, in areas identified as "inner" by the National strategy for inner areas (Snai), which are marginalized and disadvantaged mainly from the point of view of access to essential services. The final aim of this study is to understand if and how the conservation and reuse of the architectural heritage can become a stimulus for a relaunch that is not limited to the single building but extends, in a broader sense, to the community that uses it and to its territory. Specifically, the thesis aims at constructing a device that can support local municipalities and stakeholder and that can help direct policies and programs in order to take into consideration the protection and enhancement of the architectural heritage with a view to real public use. The research, in fact, is aimed at supporting not only other scholars, but also the various actors who at different scales are involved in these practices, in order to clarify how it is essential to act on the reuse of built heritage and,

above all, under what conditions this approach can be adequate in relation to the protection of assets and effective within local development strategies. Through an ex-post analysis of cases already carried out, the various elements that allow an initiative to be activated, to continue to take place or, on the contrary, to end in failure have been collected and investigated. Different types of practices were analysed, not only in terms of methods of approach, quality of the intervention, impact on the built environment, but also in terms of effects on use, management, and therefore the indirect impact on the community and on the territory. Based on the data collected through the



Fig. 1 - Gangi, Palermo. Inner Area Madonie (photo C. Valiante 2021).

study of the bibliography, onsite inspections and interviews, a census of conservation and reuse practices located throughout the national territory was carried out, not with the aim of identifying all the initiatives that has been promoted in Italy, but to trace a framework as representative as possible of the dynamics underway. The GIS platform accessible online collects a large number of experiences that have already been implemented, which any potential promoter can look to in order to implement their own strategy. Finally, some interpretative keys were defined for the pre-evaluation and orientation of heritage reuse practices to support local

development processes and, specifically, elements were identified aimed at recognizing the ex-ante conditions of feasibility and effectiveness of possible reuse and local development strategies. The interpretative keys represent a "usable", agile and expeditious type of tool, once again in support of the stakeholders who, at various extent, deal with reuse practices. The research, in general, made it possible to confirm how much reuse is compatible with the expansion and provision of essential services, however, it was also noted how much the outcome of the numerous initiatives activated was negative on the built heritage, in the total absence of guidelines or monitoring tools at the central level, nor at the local level. The tools proposed here, operationally usable by potential promoters of reuse practices aimed at local development, represent a starting point for further developments and experiments aimed at outlining methodologies to guide or assist these processes in an aware way, also from the point of view of the protection of built heritage. In this sense, we intend to offer support to those actors who promote policies for the recovery and

reuse of heritage at the local level (i.e. public administrations, but also local private or third sector

actors), those who deal with the design of policies and strategies at national level



Fig. 2 - Census of reuse practices in the Italian inner areas (author's elaboration).



Fig. 3 - Aggregation centre in Giove, Trani. Inner Area Sud-Ovest Orvietano (photo C. Valiante 2021).