



Chair:  
**Prof. Carolina Di Biase**

## DOCTORAL PROGRAM IN PRESERVATION OF ARCHITECTURAL HERITAGE

Interventions on the built environment and more generally on buildings of the past, including the recent past, and their management call for fine-tuned knowledge and organization skills in all the related areas, from planning to maintenance. Special and separate attention is paid, on one hand, to older and historical buildings and structures, on the other to contemporary architecture, in both cases in constant contact with developments in studies elsewhere in others countries.

Regarding the method, the most significant contribution of the PhD program is the ability to acquire both the learning derived from specialized knowledge, both the fundamentals of knowledge that allow to dialogue with different disciplinary matters and often complementary.

The sequence of courses and activities are designed to form a researcher and an operator that can work with high-quality in preservation activities, maintenance and management of building heritage.

### Teaching aims

Knowledge is an essential step towards protecting and preserving the built environment, and particularly in the case of the “conservation of the architectural heritage”, it is essential to understand complex aspects of its creation, transformation, present conditions, and consider the richness of its meanings and evidences.

In fact a building or a structure cannot be explained by the technical instruments of architecture alone: its documentary dimension lies in its material substance, in the meanings that built heritage has been assuming over time for different societies and that should be evaluated when news condition and significances of buildings and sites are to be defined.

Familiarity with the built environment is necessarily aided by historical research and every other kind of useful contribution as well as, obviously, that by experimental science. As far as knowledge and intervention on the built heritage are concerned, the human sciences and historical disciplines are indissolubly linked with the relevant applied sciences. For there can be no “truthful”, exhaustive diagnosis of old buildings that fails to consider the dimension of time, and the reconstruction of past usages and transformations. Conservation of built environment founds in the interdisciplinary knowledge as well as on people able to solve the questions by means of the contribution of different kind of subjects and studies.



1. An ‘enfilade’ of radiators hidden by seats at the Alte Pinakothek, Munich, in a 1926 picture

### Coursework

The PhD is intended to offer a broad range of courses which combine theory and practice to stimulate advances in multidisciplinary research. The PhD career, held in three years, involves the acquisition of a total of 180 credits.

30 credits are concentrated in the first year and are divided as follow: 25 (minimum) offered by PhD courses organized by the PhD program in Preservation of the architectural heritage, and 5 credits offered by the PhD School. The remaining credits are aimed to personal study and research for the preparation of the PhD thesis.

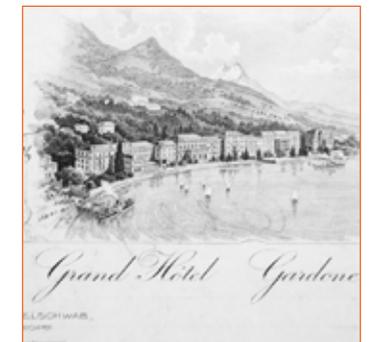
In addition to compulsory courses, for each PhD candidate is organized a specific path-study that will include the attendance at other teaching activities. PhD candidates may attend courses offered by the School for Specialists in Architectural Heritage and Landscapes (*Scuola di Specializzazione in Beni Architettonici e del Paesaggio - SSBAP*), both in order to add more specific knowledge to those acquired in the courses of Master degree, and in relation to different topics of the thesis.

In support of research carried out for their thesis, students will benefit from several laboratories both in the University, and outside: among them, the Analysis and Diagnostic Evaluation of Buildings Laboratory (DiAP), the Diagnostic, monitoring and investigation of building materials Laboratory (DICA), the Laboratories of ICVBC – CNR Unità di Milano “Gino Bozza” and of the Institute of atmospheric sciences and climate (CNR Isac Padova). Among the activities undertaken during the second and third year there are also included the attendance to workshops, seminars and national and international conference related to individual research, with particular attention to the conferences in which PhD candidates will present the results, even partial, of their research thesis.

The PhD courses are organized in a variable number of lectures (one semester) and are complemented by study visits and seminar activities. The seminars are organized by the responsible professors – which provide information and basic bibliography- and have a systematic presence of lecturers from other Italian or foreign Universities in order to allow PhD candidates to get informed about the research in the different aspects and contexts. The lectures by foreign professors



2. The decay of the Chilean architectural heritage. Palacio Pereira, Santiago de Chile (Photograph taken by Maria Victoria de los Angeles Correa Baeriswyl)



3. Drawing of the Grand Hotel Gardone Riviera in a letterhead of the 1904. It is possible to notice that the Grand Hotel, had already ‘conquered’ a big part of the lake shore of the village.

(Source: Historical Archive of Gardone Riviera, y. 1904, letter from Karl Lüzelschwab – owner of the Grand Hotel - to the Municipality of Gardone Riviera, Gardone Riviera, Maj 27, 1904)



4. Overview of Palazzo Chiericati from Matteotti square, Vajenti, ante 1960 (© CISA “Andrea Palladio”)

will be held in English. In the case of lessons held in a language different from English, the PhD course will organize a simultaneous translation into English language.

- *Diagnosis and rehabilitation of heritage building under static and dynamic conditions* of structures and materials deals with analytical and experimental methods for testing the efficiency of structures, including those at particular risk. It includes study and calibration of non-destructive investigative techniques for structural diagnosis, as well as theoretical and experimental study of appropriate non-invasive techniques, amongst them compliance with safety standards for buildings in seismic areas.
- *The Culture and experiences of heritage preservation* is approached as part of the history of culture getting to contemporary events; as history of the change of the ways of thinking about preservation and its frontiers and change in the expression of different cultural and institutional aspects. Preservation is also considered as history of criteria and types of design and interventions that vary in time, up to the introduction of new intervention techniques, materials and forms between XIXth and XXth Century.
- *Construction history* explores the issues of recognizing buildings as a historic source, interpreting how events unfolded at building sites and how production was organized, and showing how construction techniques of the past evolved thanks to the technical know-how of architects and builders, on one hand, and the methods of archaeological stratigraphy, also in elevation, on the other. In parallel students conduct workshop analyses and learn to interpret their findings.
- *Historical research methodology* aims to outline, through a selection of case-studies, the methodological and research aspects undertaken by researchers connected with different historical disciplines, with bibliographical readings in relation to the cultural interpretations that have influenced the site transformation during the time.

#### Research organization and topics

One of the distinctive features of the PhD course is that it explores issues as yet seldom addressed in the sector of conservation, as a means of developing new contributions to scientific output.

Particularly there are analysis of materials of contemporary buildings and their decay, the research of intervention techniques respecting the cultural heritage; the topic could be extended, starting from monumental building, to the wider field of common ones; the heating and plumbing systems of historic buildings, “building physics” (already studied in Germany and France) and the consequent documenting of innovative installations in old buildings with the parallel study of old installations in individual buildings and at urban level.

Experimental and workshop activities about famous buildings or less known are carried out in the Laboratories that collaborates with PhD Doctoral program. Innovative studies are being conducted in this sector, thanks to new research tools: the particular subjects of interest are historic mortars, old concrete, new mortars for masonry restoring. The objective is to find out how they were produced in the past, something little is yet known about, and current possibilities for re-introducing their use, or to research suitable and compatible materials and techniques of interventions.

Other more usual subjects of research and specialized teaching are the economic aspects of conservation, legislation to cultural heritage, archaeological sites and landscape conservation, museology and museography. The PhD program fosters contacts with government institutions – starting from the Ministry for Cultural Heritage, in its central and regional offices – and with organizations operating across the country in the sector of preservation. Within this framework several bodies have financed scholarships. Graduates of the PhD program have often found employment in public sector conservation institution at progressively higher levels, as well as in professional practice and in the business world, in specific specialized fields..

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## THE TRANSFORMATIONS OF A LANDSCAPE AND ITS TOURISTIC 'CONSTRUCTION'. THE REDEFINED NORTH-WEST SHORE LANDSCAPE OF GARDA LAKE (1880 – 1940)

Monica Aresi - Supervisor: Ornella Selvafolta

This research approaches the landscape, infrastructural and architectural transformations on the north-west shore of Garda Lake at the end of 19<sup>th</sup> and beginning of 20<sup>th</sup> Century and their connection with that moment's touristic flourish of the area. More precisely, the lake shore section between Salò and Riva del Garda during the 1880s and 1930s presented substantial touristic developments manifested in original and significant territorial interventions with important regional impact for the years to come. This impact was visible at urban and landscape levels as well as on the local economy. The studied period of time is characterized by another important phenomenon which is the passage from the 'foundation' of the touristic health resorts addressed to a 'foreign élite' to the spread of custom tourism as a vector of territorial modernization. Thus, the formation of a touristic *Gardesan* landscape is investigated from different scales and point of view (from architectural objects towards the infrastructural realizations), using different sources and passing through different emblematic themes.

The main purpose of this research is that to understand the conditions and motivations that made possible the creation

of such a 'touristic landscape' within its geopolitical and socio-cultural context and economic territorial influences. The intention of this research is that to capture the complex historical identity of the analyzed case studies contributing to present day awareness of such a heritage.

A particular attention of the research is directed towards the interlinked connections between the local sources' enhancement strategies - launched by institutional and private actors - and the results noticeable in the landscape transformations. Such transformations are visible in the coastal infrastructural network (sailing docks, tramway lines, roadway routes, etc.) which contributed also to the area's connection with the rest of Europe; in the big Grand Hotels' 'net' together with their parks and gardens, and the rest of the hosting facilities.

The thesis structure, in base of the information derived from the archival investigation and various bibliographical sources, is determined by the main research thematic approached, ordered simultaneous in a chronological way.

The first part is focused on the narrative landscape descriptions that targeted the northern Italian lakes, more specific Garda Lake area, from the classical period to the 20<sup>th</sup> Century

literature when the joggling between mythical and realistic descriptions influenced the further-on landscape perception and transformation.

This section analysis the travel descriptions around the Garda Lake done by Italian and foreign authors as well as touristic associations, with the purpose to understand how the landscape transformation was perceived and conveyed on different periods and by different promoters. Thus, it emerged a variety of 'territorial readings' which reflects the cultural context that originated them: the guidebooks written by the German physicians were characterized by a 'scientific' approach, while the international guidebooks were mentioning the services and the facilities of the Garda region and the local writers contributed with their travel descriptions. All publications had a 'propagandistic' aim of this area and contributed to the dispersion of a particular way of understanding and discerning the touristic landscape. Thus, while the German physicians gave priority to the benefits of the winter health resorts from Garda Lake through detailed comparisons of air temperature, list of botanic Mediterranean species and so on, the local writers surprised in their writings the landscape transformations

of the place during time. From all this particular literature, a special attention during the research was given to the *Touring Club Italiano's* role and its consideration towards 'avant-gard' touristic themes.

The second part of the thesis is focused on the infrastructural system developed during the studied period of time within the re-organization process of the *Gardesan* network. Analyzing the infrastructural development was possible to delineate first which traffic directions were 'promoted' (mainly from North), and second the connection between the development of the communication system and the touristic development of the area, a fact not directly emerged from the publication edited until now. A particular event taken into account and detailed during this research is the construction of the west *Gardesan* route. This route, at that moment believed to be necessary for the economic future of the area, is an interesting example with an aesthetic cultural impact on the area, becoming a touristic attraction by itself. Some final notes are dedicated to the 'destiny' of the cited infrastructures, in the idea to underline their actual status as abandoned or under evaluated landscape features of the area at the present time.

Another substantial section of



1. View of the Gardone shore at the beginning of the touristic phenomenon. The characteristic constructions and lemon groves tower the landscape.



2. View of the Gardone shore after the first period of the touristic development. Here are visible the big Grand Hotels, the spread of new constructions and the new lakeside

the thesis closely observes the *Gardesan* touristic places briefly before and after the First World War from cultural tendencies and references point of view. This part takes into consideration the economical, social, cultural and geopolitical context where the territorial transformations took place, indentifying the main actors, the construction activities from a qualitative as well as quantitative point of view and their consequences on the landscape.

While general trends regarding the territorial changes were underlined so far, the last part of the thesis is focused on the particular case of the village Gardone Riviera. This case study was chosen due to its accomplishments regarding the specific touristic facilities and in particular the structures

of the Grand Hotels. Thus, is realized a reflection upon the construction of such buildings and their impact in the urban development and transformation at the moment of their construction as in the after war changing events.

The final considerations are directed on one hand towards the main issues with which this vast and heterogeneous heritage deals in present day and on the other hand towards the available tools in matter of awareness, conservation, management and enhancement. The interpretative approach of this research aims to the establishments of a 'conscious' conservation and enhancement policies of the cultural and historical heritage.

## ARCHITECTURAL HERITAGE PROTECTION SYSTEM IN CHILE: SUSTAINABILITY AND OPPORTUNITY FOR THE FUTURE OF THE PAST

María Victoria de los Ángeles Correa Baeriswyl - Supervisor: Amedeo Bellini

The lack of attention toward architectural heritage in Chilean cities is nowadays debate argument in the local society. During recent years, numerous experts have established the urgent necessity of improving the actual legislation. The actual protection system for conserving architectural heritage presents huge problems that allowed the decay, neglect and demolition of an important part of the architectural preexistences in local cities. The year 2000, the amount of protected buildings in the whole country reached around 500 goods. This number could explain, at least in part, the low impact that the protection of architectural heritage has in the local context, mainly when an accelerated process of urban modernization takes place, as the one that happened in Chile in the last decades. Several fabrics of notable interest were not protected in time because of the restricted criteria in the selection of buildings to safeguard. The future conservation of protected buildings was not ensured because of the centralized heritage institution and the lack of coordination between actors and existing instruments. Nowadays, Chile does not have a strong public policy regarding architectural conservation: the Chilean State still does not have a Ministry of Cultural Heritage.

The consequences of this weak regulation are visible. The fast urban development in the recent years generated a process that can be defined as 'amnesic', that did not considered existing constructed memory in local cities. Urban speculation has endangered until now a huge amount of historical buildings. A process without reflection is going on, erasing and reconstructing, modifying and reinterpreting the local architectural heritage, vulnerable in terms of legislation, and economics and material aspects. Historically, urban planning in Chile was developed independently from the protection of heritage. Architectural heritage in local cities is usually considered as an 'obstacle for the progress', instead of a 'resource' or an 'opportunity'. This thesis proposes that this heritage - today decayed, being demolished or neglected - can become a resource, and part of a virtuous system. The research has considered actual and historical legislation, safeguarding mechanisms, institutions involved, maintenance programs, and ways of economical management. Knowing the limitations of a theoretical research made by an architect, the idea was to establish possible ways of improving the

current situation in the field. The objective of this work was not a legislative proposal, because of the technical skills required. The thesis was organized in three parts: Part I "*History of the protection of the architectural heritage in Chile*", Part II "*Analysis of the architectural heritage protection system in Chile*", and Part III "*Proposal for the improvement of the architectural heritage protection system in Chile*". The research results can explain the concept that gave form to the architectural heritage protection system in the local context, understanding its motivations and lack of evolution. The system was established in 1925, based on a concept of 'artistic value' and of 'historical documentation', related to the political, social and cultural environment of that period. This system has been only scarcely modified during the last century, and this situation could explain some of the problems it is suffering in the contemporary context. The research delivers an overview of the historical and cultural situation that maintained until the present time the 'concept of value', which distinguishes between which architectures are to be kept and which are not to in local cities, even if they are located in historical centers of if they have centuries of history.

One of the most complicated challenges for a system improvement will be to re-insert protected architecture into their material and immaterial context. It was confirmed that the actual legislation works isolating these goods from their urban, social and economical context. It was detected that only weak connections exist between safeguarding heritage and urban planning, and they should be improved and strengthened. The results were organized into five points that the system for protecting architectural heritage could follow: 1. *Heritage protection system organization*, 2. *Legislation and safeguarding*, 3. *Management of protected buildings*, 4. *Participation of the heritage protection system in urban decisions*, and 5. *Education and cultural diffusion of safeguarded architecture*. A sample project in the city of Valparaíso, has shown that a practical application of these principles is possible. This was an urban decaying area in the surroundings of the "Florida" public elevator. This case demonstrated that the actual instruments for protecting heritage are not enough to guarantee future conservation. The current system is not oriented toward the future management of protected buildings. Local regulations are selective, and leave without

safeguard some interesting buildings that could become 'valuable' in a later historical moment. In fact, the chosen urban area is characterized by the absence of 'monumentality'. The case study was analyzed considering material and immaterial aspects of the district: residents, existing set of urban rules, urban fabric, the elevator and the network of urban spaces of the area. The absence of future planning of this area was taken as an opportunity for generating a project, through a general and a specific plan. The idea was to guarantee the architectural conservation, but at the same time to allow the necessary transformation of the place, based on functional requirements, but always respecting the preexistence. The criteria for the plan were material and immaterial conservation, and a revitalizing strategy that considered the maintenance of the actual residents, but including the arrival of new and compatible inhabitants. The cultural and political Chilean ambient is nowadays going toward a possible improvement of the current legislation on conservation. The population and the political class are showing the first signs of sensibility in this matter. The theoretical debate is going on, the citizens react



1. Historical Center of Santiago de Chile, 2012. Photograph taken by the author

and the current law is being criticized. Meanwhile, the urban development of local cities does not stop. Modifying a law for protecting architectural heritage is a slow and difficult work. Because of the topic's relevance, this thesis wanted to contribute to the actual debate. This thesis has shown a possible way, and some of the problems that the system must necessarily consider in order to evolve with positive results. The research concluded that, however, a change should not be focused only on the national monuments law. A change should consider other factors and disciplines, such as economics, urban planning, training of technicians, sociology and local population, in order to prevent urban speculation to continue to guide the development of local cities.

## STUDIES FOR THE CONSTRUCTION OF A BRICK MEASURE-CHRONOLOGICAL CURVE IN BERGAMO

Silvia Gaggioli - Supervisor: Amedeo Bellini

Attention to architecture's construction material emerged in Italy in the seventies of the 20th century; it developed a radical change of approach to the build environment, performed the execution of a stratigraphic relief of buildings and assumed planning groups with interdisciplinary knowledge. This formulated the need to investigate from different viewpoints that large archive of information formed by the historic architecture in its entirety. The adoption of this kind of approach has made it possible to clarify, in a more structured way, the peculiarities of Bergamo's economy in connection with brick production in local economy. Studying the build environment, as well as creating opportunities for contact between disciplines, enable an enrichment of the social and economic history in different sectors: the history of production, the history of infrastructures, the history of labour. The masonries are the product of a number of factors: historical, economical, technical and cultural. Regarding brick walls in particular, the most important aspect, under stratigraphic profile, lies in the fact that the brick is a whole object with its own; surface and shape are defined before been joined and layered for construction of the wall. The stratigraphic interpretation of brick surfaces, seemingly simple, is actually very complex.

The stratigraphic analysis and reading of the documents are closely interconnected and only a detailed examination can lead to historical clarity in a different and more complete way. It is impossible to establish a general policy approach to historical buildings since each region is characterized by socio-economical and cultural diversity, having their construction traditions often imposed by materials available, in relation to the terrain, climate, skill of the workforce, ethnic origin, demographic, geographic, political and economical conditions that affects each one. A measurement, that may appear to be purely a mechanical aspect using mathematical formula and statistical analyses, is in reality far more informative in the provision of general principles. Chronological analysis considers many factors, one of them is the size of the brick; this gives rise to a series of relationships within a historical, economic, social context, manufacturing world. The interaction of different disciplines and trades, seemingly apart and distant at first, implies a way of making history in the etymological sense: doing research in the broadest and deepest way.

Many informations can be drawn from through examination of bricks surfaces: the chronology of individual elements, historical date on their production and trade,

way of building local culture in general and social, economical and political aspects of an area. The aim of the research is to date part of historic buildings in accordance with the dimension of the bricks constituting the masonry structure. Mensiocronologia is a way of studying based on the possibility of identifying recurrent relations between dimensional variations of the construction materials used (stones or bricks) and their time of forming or realization; it is a non-destructive method which deals with many direct and indirect methods of analysis of historical buildings. Some of the most significant applications of measure chronological method have been analyzed in order to provide an overview of the current state of research. Bricks production has always been based on normalized size criteria; that kind of normalization could not have a wide diffusional area. There is no doubt that the measure chronological curve, to be applicable and reliable, should be limited to a particular territorial area having limited size and which has been subject to the same geographical, political, economical and social conditions. Specialist literature and treatises allowed to relate the process of production of the bricks to the study of variations in the size of bricks attributable partly to random phenomena and partly to phenomena driven by human will.

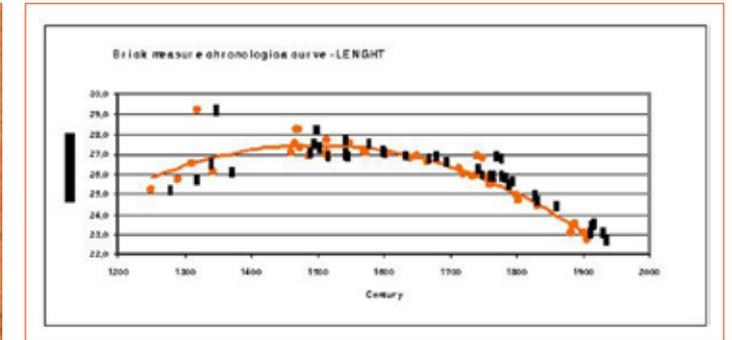
Bibliographic research, research of archival documents, supply contracts and sources of municipal law were the starting point for knowing: the location of the most important deposits of clay and of brickkilns, place-name "kiln", the quality of the clay used in the manufacture of bricks, the types of brickkiln, their ability, the



1. Measure of brick thickness by calibre

traditional production process and their location in Bergamo. Awareness of fragmentation and discontinuity of the sources analyzed; reading the documents examined has character example but theoretically could not stop ever. Also in Bergamo occurred the existence of a free market of bricks that public authority sought to regulate. The name "kiln" is widespread in low plain of Bergamo and along the foothills. The choice of location of brickkiln was linked to several factors: the proximity of deposits of clay, the available of wood to fire, the proximity of the building site, the presence of important routes that could reduce transport costs and kiln's management costs. The operational methodology has been developed starting from the experience of the laboratory of Archeometria of ISCUM (Institute of History of material culture). That study will

also be an opportunity to develop a methodology of investigation articulated in operations of relief measures (fig. 1), of transposition of data in the various tabs, of methods of processing and representation data collected. In this study is proposed an embossed card as do not exist one recognized at disciplinary level.



2. Brick measure chronological curve: Lenght

Buildings already dated from archival documents and written sources have been analyzed; buildings from different ages have been deliberately analyzed (the study has been carried out considering a range of time going from the XIII to XIX century) trying to cover as much as possible of the municipalities belonging to the province of Bergamo; in these buildings has been possible to access with non-destructive measuring methods of bricks. The method adopted is divided into different phases: historical research, stratigraphic analysis, construction of the curve. The purpose of this mensiocronologic study is the determination of the existence or not of a significant trend in dimensional variations of brick. The assessment of a continues and examinable trend represents a perspective of research for the deepening and development of the application of mensiocronologic method to

architecture of Bergamo. In drawn up charts is evident that for the oldest periods the deviation is average greater; with the passage of centuries this deviation has become progressively less; this effect can be put in relation with the changing technologies used in firing bricks.

## HISTORICAL CLIMATES AND CONSERVATION ENVIRONMENTS

### Historical perspectives on climate control strategies within museums and heritage buildings

Andrea Luciani - Supervisor: Alberto Grimoldi

The subject of the research is the development of climate control strategies in conservation environments, focusing on the issues involved in indoor climate analysis and control within historic buildings.

The installation of climate control systems in conservation environments within historic buildings, to provide human comfort and good conservation conditions, is a complicate task which has relevant consequences on the preservation of cultural heritage and is generally characterised by several problems and conflicting needs.

First of all, suitable hygrothermal conditions should be provided for the preservation of artworks and collections, especially if characterised by the presence of hygroscopic materials: the question on which are the best conditions for the preservation of collections has been discussed for centuries, sometimes giving rise to harsh discussions. On the other hand, the introduction of modern climate control devices in heritage buildings can lead to serious consequences on building preservation. This issue became evident with the progressive tightening of suggested ranges of temperature and relative humidity, which has favoured the spread of modern air conditioning in museums.

Other questions are related to the conflict between the hygrothermal needs of artworks and those of people, which do not always coincide, and, recently, to the growing need for sustainable buildings, both in the sense of a higher energy efficiency and in the sense of a reduction of operating costs. These issues are critically reviewed in the thesis through the adoption of a historical methodology, developed from a reflection on the concept of historical climate. This is intended in a double meaning: not only as the climatic conditions to which today an object has become acclimatised, as indicated in the EN 15757:2010 standard, but also as the study of the climate control strategies adopted in the past in conservation environments. That means to analyse how climate control systems and hygrothermal standards for conservation developed in the past and, at the same time, to improve our knowledge on indoor environments within historic buildings by coupling historical research on climate control systems with indoor climate analyses.

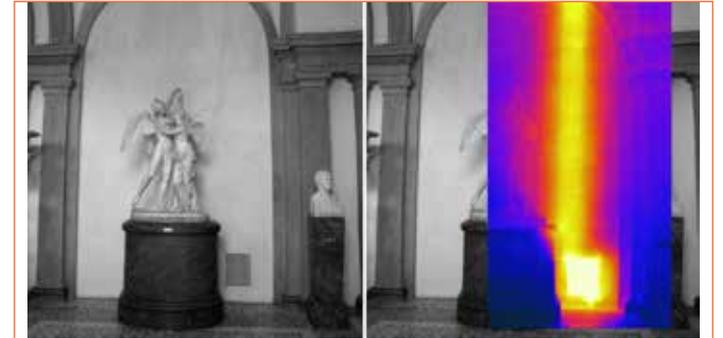
The double use of the concept of historical climate is reflected in the division of the thesis into two parts. In the first one, the historical

development of climate control strategies for conservation is examined. The focus is on the museum environment, since in this context the influence of hygrothermal parameters on artwork preservation started to be observed and was extensively studied until our days. Central heating was introduced in museums in 19<sup>th</sup> century to provide human comfort but its damaging effects on artworks were soon noticed. These observations contributed to the development, at the beginning of twentieth century, of specific scientific research. Thanks to these studies the decisive role of relative humidity for the preservation of hygroscopic materials started to be understood. In the 1930s, multidisciplinary and collaborative research on the museum environment was carried out by conservators, art historians, architects, engineers and scientists, leading to remarkable innovations in museum design and conservation practices. Many innovative and interesting climate control installations from this period are presented and described. During the Second World War, the tragic need for protecting museum collections in repositories gave to conservators and heritage professionals, especially in United Kingdom,



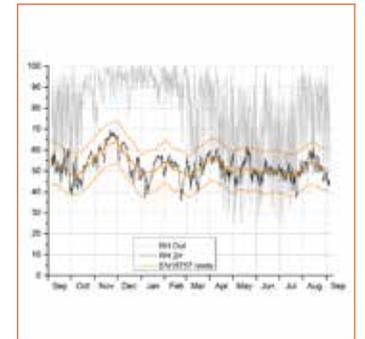
1. Monitoring of the environmental conditions inside war-time repositories of the National Gallery at Manod quarry

the opportunity for testing the beneficial effect of a careful control of the indoor climate: looking in retrospect we can claim that those experiences were a crucial event for the following development of climate-related conservation strategies since in the post-war period they resulted in the spread in museums of strict environmental standards and, as a consequence, of air conditioning. The problems that may be caused by this approach, especially in historic buildings, have been described above. The recent debate on conservation standards has questioned the traditional museum climate and more relaxed specifications have been suggested. The second part of the thesis will deal with the application of a historical approach to the



2. Thermal image of the old air heating system in Villa Reale, Milan

climate analysis and monitoring of two case studies, one in Italy and one in Sweden. In Villa Reale, in Milan, the influence of an historic air heating system on the indoor climate was assessed, while in Skokloster Castle, located north of Stockholm, a procedure to evaluate the influence of air exchange on a passively controlled environment was developed. The aim is to show that some peculiar features and environmental mechanisms of historic buildings can be more effectively analysed and assessed if climate monitoring is coupled with tools derived by building conservation practice. A careful analysis of the existing environmental conditions and of the complex hygrothermal behaviour of an historic building makes clear that the exploitation



Yearly graph of relative humidity in an unheated room in Skokloster Castle, Sweden, compared with outdoor values and with EN15757:2010 target ranges

of its own features is often the best strategy to obtain good conservation conditions with minimal interventions. Positive results obtained by the application of the concept of historic climate to historic buildings are finally discussed and presented.

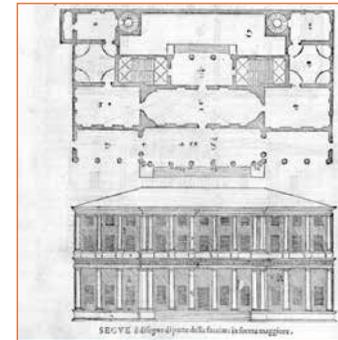
## PALLADIAN TRANSLATIONS. THE RESTORATIONS ON ANDREA PALLADIO'S BUILDINGS BETWEEN 19<sup>TH</sup> AND 20<sup>TH</sup> CENTURIES IN VICENZA

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The aim of this thesis is to delineate a history of Palladian restorations during the 19<sup>th</sup> and 20<sup>th</sup> Centuries. In this regard, Vicenza has been used as a focal point of observation, both because it is the nucleus of Palladio's professional success, and because its *genius loci* has been progressively identified with the 16<sup>th</sup> Century architect. In particular, this study is focused on understanding if and how the different 'ideal images' of Palladio - produced over the time by a rich critical *corpus* - had influenced the work done on his constructions. In fact, from the 18<sup>th</sup> Century, the buildings represented in the *Quattro Libri dell'Architettura* were considered as irrefutable evidence of Palladio's original ideas, instead of his own later re-elaborations; the restorations were consequently often indifferent to the historical values of the buildings and attempted to reconfigure the models shown in the Treatise. The research is divided in four parts: The Unification of Italy; During Eclecticism; The Beginning of the 20<sup>th</sup> Century; and Post-Second World War. For each period, one or more restorations have been considered, whether enacted or simply hypothesised. In each case, information from archives and bibliographies have been compared to the data directly

deduced from the construction itself; the subsequent analysis has been contextualised according to the historical interpretations of the architect at that moment in time, the general debate in the field of the restoration and Palladio's role in Vicenza. Palazzo Chiericati is the first example presented; the study of the three phases - the Palladian construction, the 17<sup>th</sup> Century completion and the mid-19<sup>th</sup> Century restoration - has provided insight into how the formal and technological peculiarities of this building were interpreted over time, depending on different cultural coordinates and on the readings of the *Quattro Libri*. At the end of the 19<sup>th</sup> Century, when the newborn Italy was looking for its own representative style, the neoclassical hegemony of Palladian language started to be in crisis. The debate concerning the restoration of the Loggia del Capitaniato is especially significant. It reflects both the new sensitivity towards the different expressions of the past and a more advanced philology concerning Italian heritage. The sole existing source was the unfinished building itself, since the Loggia had not been included in the Treatise. Nevertheless, the prevailing academic approach aimed to

reconfigure a symmetrical and idealized aspect that never really existed. The Loggia has also been analysed at an urban scale, within a more general process of 'Palladianisation', which regards the entire Piazza dei Signori in the 19<sup>th</sup> and 20<sup>th</sup> Centuries. The various projects about the completion of this monument culminated during the Italian fascism and they reflected different interpretations of themes, such as the definition of authenticity applied to this Palladian fragment, or the relationship between the Loggia and its environment. These topics were destined to characterise also the post-Second World War period, when the existing theories could not be applied to the wide damages caused by the bombs. This moment of methodological transition is clearly exemplified by the "restorations of re-composition" of Palazzo Valmarana, Palazzo Civina, and Arco delle Scalette. In general, after 1945 the voids left by the war often became unforeseen occasions to 're-evaluate' the monuments; according to this perspective, three new steps were added at the base of the Basilica in Vicenza, representing the physical transposition of that neo-idealistic interpretation of Palladio, which had its



1. The ground floor plan and the main façade of Palazzo Chiericati from I *Quattro Libri dell'Architettura*



2. Overview of Palazzo Chiericati from Matteotti square



3. Overview of the coffering of Palazzo Chiericati's Doric loggia during the restoration in 1964 (© CISA "Andrea Palladio")

milestone in the Roberto Pane's monograph. In spite of their acknowledged later origin, the *Quattro Libri* continued to bear witness to the result that a critical restoration should seek, thus going beyond the historical features of the building.

The relationship between Palladian historiography and restorations became even more closely tied after the establishment of the "Centro Internazionale di Studi di Architettura Andrea Palladio". This topic is discussed in the last part of the thesis; the works completed on Palazzo Valmarana and Palazzo Chiericati in the 1960s demonstrate how the philological principles reaffirmed in the Venice Charter of 1964 were assimilated in the case of Palladian heritage. The restorations did not preserve all

the historical stratification but often consisted in operations of completion of the 16<sup>th</sup> Century part and of correction of the 19<sup>th</sup> century transformations, attempting to re-establish a supposed original state. The difficult dialogue between formal and historic values kept characterising the interventions on Palladio's buildings, but from 1970 onwards, different sensitivities towards the complexity of constructions appeared. With the enlargement of the historical interests to the material culture, the building site started to become an occasion for investigation; this determined a gradual improvement in the preliminary knowledge to restoration works and a progressive attention to the conservative instances. The study undertaken attempts to identify the broadest points

of reference, within which to consider the various cases of intervention. In general, the different fates of Palladian buildings reflect wider tendencies within the history of restoration. Style, historical research, philology and neo-idealism characterised different phases with specific theoretical references, but in the routine approaches they all sought to reinstate an ancient splendour of the building, interpreting the physical traces as something able to be reproduced. Rather than just returning to Palladio, restorations were often transformed into possibilities that went beyond Palladio, where the *Quattro Libri* and, in general, the confidence on the rich critical apparatus concerning the architect had only apparently averted the risk of producing a fake.

## PRODUCTION AND USE OF PLASTER ON BUILDINGS ALONG “VENA DEL GESSO” IN ROMAGNA

Historical sources and material presences in the landscape.  
“A landscape of work”

Francesca Tomba - Supervisor: Amedeo Bellini

The “Vena del Gesso” of Romagna is one of the most important geological formation in Italy, which extended between the provinces of Bologna and Ravenna. The research studies how and how much it has been a resource able to give rise to production systems and local building construction characters, which participated in the construction of the landscape. The research shows that the vein should not be considered and protected only for its “geological - environmental” aspect, already well known, but also for the role it has played in the economic development of that area. This development has generated changes in the area that became signs that make up the landscape.

Originally it was used as a shelter, then, from the Roman era, the plaster was used as a material for building blocks, cooked and used as a binder and as a fertilizer for soils. Initially the size of exploitation and use was linked to daily needs and chalk was drawn/pulled out with sticks and wedges and cooked in rudimentary furnaces. In 19th century the first kilns and mills were created, and develops an industrial processing and marketing. Small local economies and specific occupations related to the processing and transport of plaster started.

An important aspect that concerns the whole country is the use of gypsum as a building material for rural housing. The possibility to find it easily and with little cost made chalk become the preferred material for these buildings. This created a close relationship between man, nature and economy, which led to the genesis of the landscape, with signs that exist today: the remains of quarries, industrial areas, paths and artifacts made of gypsum blocks as the remains of fortresses, castles and country houses. It was found that there are forms of protection and enhancement for the remains of fortresses and castles, while there aren't for items made in gypsum blocks.

The massive use of this material in blocks for walls was found in a very limited area close to the Vena. For rural housing, the material was extracted from small quarries specifically and temporarily open in the vicinity of the building to be erected without the help of skilled workers. They were the same farmers who built the house. The creation of very irregular masonry and mortars cooked at low temperatures, as literature sources show, can be attributed to this practice.

In addition in the area there are six Statements of “Notevole Interesse Pubblico”, issued

between 1968 and 1985 and the analysis of the texts of the decrees showed a lot of attention to the protection of visual, geological and natural aspects, but there is no attention for the preservation of the material consistency of what characterized the landscape. The research focused on the analysis of the evidence of the use of gypsum as a building material, that in the area is possible mainly through the remains of artifacts of rural buildings. This aspect has been deepened with a reconnaissance of about fifty artifacts on the territory, for which it was detected a lack of attention by legislation and there are no particular studies. Many of them are in a state of ruin, instead we should act in the protection of these artifacts through their physical preservation.

The European Landscape Convention states that the landscape is a part of territory whose character is the result of the action of natural and / or human interactions and it concerns the entire territory, with the aim of promoting the protection. But the preservation of the landscape is the protection of the signs that make an area that landscape. Therefore, to protect a landscape we must protect signs that connote it, first of all preserving them.



1. The Monte Tondo quarry today

The landscape is the transformation of the man / nature relation over time in a continuous process. Preserving the signs of these changes does not mean denying other changes, but ruling them. For the conservation of the landscape of Vena we must preserve elements that characterize it and therefore houses in plaster, which are cultural assets. For this purpose there are two important aspects to consider: the possible uses of these assets, and the characters of the intervention on them. Concerning the first aspect it's necessary to make the cultural asset enter in the new socio-economic dynamics, with techniques that give priority to the stratification of the signs, rather than removing them. In addition to “second home” use, we should find uses related to tourism or food, which do not involve a fixed stay of



2. The “Vena del Gesso” in Romagna

people, which could lead to less changes.

We can not prevent the deterioration caused by natural phenomena or by the action of time, but you can reduce man deterioration through the definition of intervention procedures. It is necessary to identify a way of cognitive and architectural activities, the designer will face for the development of an intervention that pursues conservation. The survey of artifacts showed that the main problems are structural. There are some interventions that would be worth to be highlighted in procedural rules.