Programming the Stone Conservation Process - Learning from Ghesc Village/Italy

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ABSTRACT

The sustainable conservation of stone structures represents a complex challenge that necessitates the intelligent integration of both contemporary and traditional methodologies. The processes and strategies employed in the conservation and restoration of stone structures, as well as the roles and perspectives of various organizations involved in these efforts, are of critical importance for the effective execution and completion of projects, in addition to ensuring successful preservation. This thesis examines programming stone conservation through organizational and practical aspects of stone conservation in a case from Italy and establishes possible tools and practices in TRNC. It focuses on the restoration and conservation methods used, as well as the contributions made by different organizations and communities involved in the project.

Through a comparative analysis of the conservation and restoration methods used in the Ghesc workshop and those applied to historic stone buildings within the TRNC, the thesis provides a critical examination of the necessary considerations for the implementation of various approaches and offers recommendations. In this context, the thesis emphasizes the importance of harmonizing modern and traditional approaches for the effective conservation of stone structures.

Keywords: programming, stone conservation, Italy, TRNC

ÖZ

Taş yapıların sürdürülebilir korunması hem çağdaş hem de geleneksel metodolojilerin akıllıca bütünleştirilmesini gerektiren karmaşık bir zorluğu temsil eder. Taş yapıların korunması ve restorasyonunda kullanılan süreçler ve stratejiler ile bu çabalara dahil olan çeşitli kuruluşların rolleri ve bakış açıları, başarılı bir koruma sağlamanın yanı sıra projelerin etkili bir şekilde yürütülmesi ve tamamlanması için kritik öneme sahiptir. Bu tez, İtalya'dan bir vaka örneğinin taş korunmasının organizasyonel ve pratik programlanma aşamalarını inceler ve KKTC'de olası araçları ve uygulamaları belirler. Kullanılan restorasyon ve koruma yöntemlerine ve projeye dahil olan farklı kuruluşlar ve topluluklar tarafından yapılan katkılara odaklanır.

Bu araştırma, zengin tarihi mirası ve kültürel önemiyle bilinen Kuzey Kıbrıs Türk Cumhuriyeti'ndeki yerel taş koruma ve restorasyon uygulamalarının potansiyel etkisini incelemektedir. Çalışma, Ghesc atölye çalışmasında kullanılan koruma ve restorasyon yöntemleri ile KKTC'deki yerel taş binalara uygulanan yöntemlerin karşılaştırmalı analizi yoluyla, çeşitli yaklaşımların uygulanması için gerekli hususların eleştirel bir incelemesini ve önerilerini sunar. Bu bağlamda, tez, taş yapıların etkin bir şekilde korunması için modern ve geleneksel yaklaşımların uyumlaştırılmasının önemini vurgulamaktadır.

Anahtar Kelimeler: programlama, taş konservasyonu, İtalya, KKTC

DEDICATION

To Meral, Seba and Kemal

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LIST OF ABBREVIATIONS

ANCSA	The National Association of Italian Cities and Sites
FoRTI	Formazione Recupero Radizione Innovazione
GCI	Getty Conservation Institute
ICOMOS	International Council on Monuments and Sites
MiBACT	Ministero dei Beni e delle Attività Culturali e del Turismo
NTMCAC	Nicosia Turkish Municipality Culture and Art Center
TCHH	Technical Committee of Cultural Heritage
TRNC	Turkish Republic of Northern Cyprus
UNDP	United Nations Development Program
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNOPS	United Nations Project Services

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Chapter 1

INTRODUCTION

Numerous cultures have favored stone throughout history because of its durability, malleability, and aesthetic allure. However, with time, it is susceptible to substantial harm as a result of both natural and anthropogenic factors. Hence, the conservation of stone edifices holds significant significance in transmitting cultural legacy to subsequent generations (Zakar & Eyüpgiller, 2015). It is necessary to identify, weld, and restore the stone materials used in antique buildings with specialized understanding. Analyzing the building materials and techniques employed in ancient structures, conducting the examinations of stone samples, and acquiring comprehensive knowledge about the treated stone type are crucial for restoration and preservation (Doehne et al., 2010). This emphasizes the necessity for applications to have the combined knowledge and skills of a team of professionals with experience in working with stone, ideally under the guidance of a stone consultant.

The imperative to save historical sites and cultural treasures has resulted in the growth of the stone conservation sector. In order to ensure the preservation of historical and cultural ties, it is imperative to save stone structures and artifacts for the benefit of future generations. Weather conditions, natural disasters, pollution, and human activities have caused significant damage to numerous buildings and structures worldwide. Therefore, it is imperative to conserve them in order to prevent further deterioration. (Rives et al., 2006). Hence, it is imperative to implement efficient

conservation strategies in order to safeguard these significant cultural assets for the benefit of future generations.

It is accurate to state that planning and programming play a crucial role in effectively conveying cultural values and treasures, much like in the field of building. It is evident that each step of the conservation process for these valuable artifacts, which we intend to transmit to future generations with minimal harm, must be executed with utmost precision. The parameters of these processes are contingent upon several elements, similar to those found in architectural programming. Given the distinction between cultural heritage programming and architectural programming, it would be beneficial to incorporate an examination and record of the historical transformations that these buildings have undergone into the planning and programming process (Duerk, 1993). This is particularly important considering that these cultural heritages have existed since ancient times. The preservation of historical buildings can be achieved by meticulous planning, the appropriate selection of techniques, and the attainment of social approval. This procedure is highly significant in terms of transmitting and safeguarding historical and cultural heritage for future generations.

In order to formulate efficient conservation plans, it is imperative to safeguard the historic buildings' cultural, historical, and architectural authenticity. Various international agreements, proposals, institutions, organizations, non-governmental organizations (NGOs), state bodies, and local communities establish frameworks for approaches to heritage conservation. The thoughts and contributions of these organizations, along with their financial assistance, are invaluable assets that should always be present to provide numerous advantages in preserving cultural identity and historical significance (Labadi vd., 2021). Conservation methods, advice, and support

not only safeguard historic buildings and art forms, but also play a role in rejuvenating local economies, generating employment opportunities, reducing poverty, and fostering economic expansion. These activities foster strong social connections within the community and enhance overall welfare. Furthermore, conservation strategies are intricately connected to sustainability objectives and guarantee the safeguarding of cultural assets for future generations (The Congress & Council of Europe, 2021).

The cultural and architectural heritage of the Mediterranean region, which spans many centuries, has had a significant impact on the development of stone building materials. The diverse assortment of stones found in the area is a consequence of distinct geological circumstances and has been widely employed in construction over time (Hannibal et al., 2020). The Mediterranean region has served as a hub for significant commerce, cultural, and religious exchanges, resulting in the abundance of stone monuments, medieval cities, and ancient buildings in the area. Cyprus, an island in the Mediterranean region, has been home to many civilizations for ages. These civilizations have left distinct marks on the island's history and identity, which can be seen in its historical buildings (Hoskara & Doratli, 2007). Stone is extensively utilized in Cyprus architecture due to its abundant availability, durability, and capacity to withstand earthquakes. It is employed in the construction of everyday objects as well as grand monumental constructions. Nevertheless, the impact of contemporary influences and advancements has jeopardized the endurance of conventional architecture, resulting in a decrease in endeavors to safeguard cultural heritage (Dincyurek & Olgac Turker, 2007). The conservation issues strengthened encompass deficient legal rules, low financial resources, and a dearth of interest in cultural assets. To tackle these problems, it is necessary to implement comprehensive prevention

measures that encompass activities like documentation, research, suitable treatments, and community education. The degradation of old stone structures, exacerbated by negligence and environmental causes, underscores the imperative for concerted conservation endeavors and governmental backing to safeguard the cultural and historical legacy of TRNC (Ozay, 2005).

Similar to the island of Cyprus, Italy, which is also located in the Mediterranean Region, has achieved great success worldwide in stone conservation and restoration work. One of the main reasons for this success is the importance the country attaches to the preservation of its rich historical heritage. In Italy, advanced techniques and scientific approaches are used to preserve the centuries-old artistic, architectural, and cultural heritage (Doehne & Price, 2011). In addition, prestigious academic institutions and specialized restoration centers in Italy train the most competent professionals in the field. In addition, the legal and financial support provided by the Italian government and local authorities for work in this field contributes to the country's pioneering in the field of stone conservation and restoration. These elements come together to make Italy a leading country in stone conservation and restoration (Agnoletti, 2012).

The conservation of stone structures is a multifaceted problem that necessitates a thorough strategy, and the numerous natural and anthropogenic obstacles encountered in this endeavor are readily apparent. These approaches encompass acknowledging the cultural importance of structures, recording them, examining the reasons for decay, and implementing suitable conservation techniques. To address the above challenges, it is necessary to combine classic and novel conservation approaches and strategies so to implement them in an integrated manner. Additionally, it is crucial to acknowledge

the significance of research and development studies and use them in practical ways (Ahunbay, 2009).

1.1 Background and Context of the Study

The establishment of stone conservation principles and techniques has been crucial since the mid-19th century, when there was a lack of scientific oversight resulting in flawed methods for preserving stone structures and monuments (Doehne & Ferguson, 2010). At the same time, the creation of the first governmental institutions and legislative frameworks for preserving heritage was a significant turning point, accompanied by a growing focus on selecting the right stone materials for architectural projects (Gomez-Heras & McCabe, 2015). The area of stone conservation and restoration has evolved significantly throughout time, with the implementation and investigation of many procedures and techniques to enhance precision, quality, suitability, and sustainability.

Despite the global prevalence of these approaches, there are regional variations that result in visible gaps or shortcomings in the way they are implemented. In such a context, Italy as a Mediterranean country, is notable for its conservation and restoration procedures, showcasing its impressive capacity to safeguard its historical heritage from ancient times to the present. The success of Italy can be due to the joint endeavors of government entities, NGOs, and citizens to save cultural landmarks, supported by a profound recognition of their intrinsic worth and legal responsibilities. The conservation environment in Italy is considerably enhanced by the presence of non-governmental organizations (NGOs), institutes, and associations. While these entities make valuable contributions to Italy's cultural heritage and public participation initiatives through their autonomous projects, the same tendency for conservation is

not shown sufficiently in the case of TRNC, which shares historical and climatic parallels with other Mediterranean regions, and this causes difficulties in the process of conserving varieties of historic structures.

1.2 Aim of the Thesis

This study investigates Italy's notable success in stone conservation and restoration, as evidenced by its exemplary works and contributions. Also, it seeks to understand the reasons for Italy's superior performance in this field by examining the methodologies and approaches adopted by the dedicated institutions and organizations involved. Through identifying and addressing observed discrepancies, this study aims to offer recommendations for the TRNC, with the goal of better safeguarding and proper treatment of its existing stone architecture in conservation and history. To gain a more in-depth understanding of these differences, the researcher participated in the Ghesc Village Project in Italy, an annual workshop hosted by the Canova Association and open to students and practitioners worldwide. This experience provided the opportunity to engage with professionals involved in conservation and restoration, enabling the researcher to discuss issues and deficiencies specific to TRNC from a more expert perspective.

The research entails a detailed examination of the work conducted by the Canova Association in restoring Ghesc Village in northern Italy. The project, which brings together volunteers—predominantly students specializing in this field—from around the globe, focuses on restoring and repurposing the village. The workshop-based educational approach, including its phases, mentality, and mission, presents a valuable model that can be adapted to the architectural heritage of TRNC. It can guide the

identification and rectification of shortcomings and misguided directions in ongoing preservation and restoration projects on the island.

The principal objective of this thesis is to give and highlight some conservation and restoration techniques and methods for TRNC, based on the workshop methodology implemented in Ghesc Village, Italy. Based on the facts and observations gathered, the study will provide recommendations that will not only respect and improve the TRNC cultural legacy and history in its architecture's stone conservation but also offer a fresh viewpoint to current literature and practices.

1.3 Statement of The Problem

The primary focus of this thesis is to investigate the differences in stone conservation and restoration practices between Italy and TRNC, both Mediterranean regions exhibiting certain architectural similarities. This research aims to discern the factors underlying these differences and to identify the consequent variations and shortcomings in practical application.

Italy's notable achievement in the conservation and restoration of stone is made apparent by its outstanding works and important advances in the literature and applications (Boriani & Cazzani, 2006). This study seeks to analyze the reasons for Italy's superior performance in this field and to adopt its effective strategies, understanding the approaches of the dedicated institutions and organizations involved in the practice. The main problem is pointed towards how to utilize this knowledge to address identified gaps and formulate recommendations and enhancement measures for the stone architecture of TRNC, ultimately aiming to improve the preservation of its existing heritage and history in the domain of stone architecture especially.

1.4 Research Questions and Objectives

The research is organized to give an insight into how TRNC stone conservation and restoration practices in stone buildings compare with those in Italy in terms of techniques, methodologies, and outcomes. So, the research questions are as follows:

- How to conduct a comparative analysis of the stone conservation and restoration practices in TRNC and Italy, highlighting the differences and similarities in techniques, methodologies, and outcomes. This will help identify areas where TRNC can improve by adopting successful strategies from Italy.
- Investigate the key factors contributing to Italy's success in stone conservation and restoration.
- Identifying and analyzing the factors that contribute to Italy's exemplary performance in stone conservation and restoration. This includes examining the roles of governmental bodies, non-governmental organizations, educational institutions, and cultural awareness in shaping Italy's conservation landscape.
- Examine how the workshop approach used at Ghesc Village might be modified for implementation in TRNC to improve the stone conservation in heritage building efforts.
- Investigating the methodologies, approaches, and educational strategies used in the Ghesc Village workshop. The aim is to evaluate how these can be adapted and applied in TRNC to enhance its stone conservation in heritage building efforts.

1.5 Limitation of the Thesis

The data of this study were obtained from a general literature review, including scientific articles, theses, and other academic studies on stone conservation and

restoration, as well as books and architectural data. Furthermore, the research integrates the author's experiences and observations from his participation in a workshop (as mentioned before) so to convey this material in an academic manner. In this case study, the practical elements of a 10-day program with experiential learning that was arranged by a volunteer organization are examined. This study investigates the methods learned at the workshop, the organization's overarching goal, and the operational procedures.

The three 10-day workshops began in early July of 2023 and took place in the Ghesc Village, near Domodossola in northern Italy, at the foot of the Alps. Owing to limitations on stay length and private matters, the researcher took part in only one of the workshops in the final ten days of the study and spent the remaining time in the observations in order to wrap up the investigation. Another limitation is a lack of local organizations and associations dedicated to conserving the stone structures in the TRNC.

The objective comparison of the data collected is facilitated by restricting the investigation to these two comparable case study areas only. However, this offers a more comprehensive viewpoint on the body of knowledge already available in the field of stone conservation and restoration. Additionally, it will allow independent institutions and organizations a constructive path to take on a more productive role in this area.

1.6 Methodology

In addition to a comprehensive review of literature, data for this study were obtained from the author’s personal experiences in a workshop with a practical application

focus. The training was conducted through three 10-day sessions in the summer of 2023, held at Ghesc Village in Northern Italy. The daily notes from the 10-day workshop, a comprehensive logbook kept during the event, and technical reports from Politecnico di Torino University—which was heavily involved in the workshop—are all included in this research.

Figure 1: Photo collage from Ghesc Project, photo by author, 2023, Italy

This thesis uses a comparative method, aiming to investigate the reasons for Italy's success in stone conservation and how these successful strategies can be applied in the TRNC, by comparing the stone conservation and restoration practices of Italy and the TRNC in terms of techniques, methods, and results. The research examines the history and development of stone conservation and restoration practices in Italy and TRNC, using the comparative method in a historical context. By presenting observations based on qualitative characteristics, investigations are carried out through data obtained from workshops, daily notes, and technical reports held throughout the research.

Chapter 2

PROGRAMMING IN ARCHITECTURE AND CONSERVATION OF HISTORICAL BUILDINGS

The contemporary understanding of programming and planning in architecture is crucial for determining the scope of projects and organizing the design processes. Architectural Programming is the research and decision-making process that involves understanding client needs, spatial requirements, and the intended use of the building. This process includes analyzing the client's goals, budget, and expectations; defining the sizes and relationships of spaces; ensuring functionality, sustainability, and energy efficiency; planning for current and future technological needs; complying with local building codes; and assessing site conditions and potential constraints (Hafsa, 1999).

Architectural Planning is the strategic process of organizing the design and development phases of a project. This involves understanding site conditions, ensuring compliance with zoning laws and land use regulations, creating initial design concepts, developing long-term plans for large-scale projects, sequencing construction activities and project milestones, involving all stakeholders in the process, identifying potential risks and developing strategies to mitigate them, and creating detailed timelines for the design, approval, and construction phases (Verma, 2023). In contemporary architectural practice, programming, and planning are often integrated to ensure that all aspects of a project are considered from the outset. This integrated approach leads

to more efficient, functional, and sustainable outcomes and requires collaboration among architects, engineers, clients, and other stakeholders (Féria et al., 2019).

2.1 Programming in Architecture

Architectural programming involves the stages of designing and developing a pattern. This includes understanding site conditions, ensuring zoning rules and land use regulations, variations of initial design concepts, using long-range plans for major alterations projects, sequencing construction processes and project phases, adding all units, identifying potential risks, and mitigating them (Verma, 2023).

Programming and planning are often integrated to ensure that all registers of a system are considered from the beginning. This enables the integrated approach to be maintained in a more efficient, functional, and sustainable way and requires collaboration between architects, engineers, clients, and other members (Féria et al., 2019). Analyzing the goals, budget, and expectations of this process; sustaining functionality, sustainability, and energy, expanding the size and scope of spaces; planning for current and current technological needs; local building code compliance and assessment of site conditions and potential constraints (Hafsa, 1999).

The programming process is very important to be able to realize high-level solutions by recognizing problems and exploring potential solutions. According to Yüreğir (2000), the success of real-world applications is achieved through solid knowledge and effective use of this quality to suggest and evaluate different options. This allows for achieving original and new design solutions (Alomari, 2003).

It can be seen that more than one person's perspective has been expressed in the relationship between the design and programming process. Webster (1966) defined programming as the process of managing and emphasized that the degree of brightness associated with the design process increases at each level. He argued that the aim of this process is to create environments that meet users' demands and diversity.

Duerk (1993) divided it into two main parts: evaluation of the current situation and determination of the deterioration situation and made analysis accordingly. This includes collecting existing data, examining the planned area, evaluating user characteristics, and distributing warehouses. The second category, “Identification of future degradation,” focuses on evaluating whether the design will effectively achieve its purpose. This includes consideration of the elements necessary for a successful design and explanations of concepts derived from previous evaluations. In essence, Duerk perceives architectural programming as the first stage of defining the problem.

2.1.1 Planning and Programming Steps

Architectural programming is a methodical explanation of briefly examining and defining design issues. This process involves examining and collecting data on current conditions and variations, taking into account the wishes and records of beneficiaries, users, and society. The goal is to generate potential solutions and alternatives to address the design solution. Details of important programs that should be carefully considered and planned to be included in the design programming phase:

1- Client Needs and Goals.

2- Space Requirements

3- Field Analysis

4- Regulatory Requirements

5- Budget and Program
6- Sustainability and Environmental Issues
7- Stakeholder Participation
8- Documentation.

1. Client Needs and Goals: Architectural programming relies heavily on understanding the client's vision, which is attained through meetings and interviews to learn about the client's goals, preferences, and project expectations. As a guide for the ensuing design stages, this procedure involves creating a vision statement that summarizes the client's main objectives and expected results. Setting priorities is crucial for separating desired features from necessary needs and making sure that the project is in line with the client's vision at every stage (Siva & London, 2012).

2. Space Requirements: This process involves creating a comprehensive space list that outlines essential areas like offices, meeting rooms, storage facilities, and recreational spaces. Calculating the precise square footage for each space, considering its intended purpose and occupancy, ensures optimal utilization. Additionally, developing an adjacency matrix or bubble diagram helps visualize and strategize spatial relationships and circulation patterns among various areas, enhancing overall workflow and usability (Ching, 2014).

3. User Need: Wilson (2006), emphasizes the importance of understanding users' values, aspirations, and goals in the design process to create products that effectively meet their needs. This involves delving into the user's personality, studying their past experiences, considering different user types, and imagining user personas. By doing

so, designers can gain insights into users' needs, behaviors, and goals, thereby designing products that aim to fulfill these aspirations.

4. Site Analysis: To create effective designs, thorough site analysis is essential, covering topography, soil, vegetation, and existing structures. Sustainable practices, informed by climate data (sun paths, wind, precipitation), enhance environmental performance. Understanding the site's cultural and historical context ensures designs respect its legacy, integrating seamlessly with its surroundings. (Abady, 2024).

5. Regulatory Requirements: Obtaining project approval and ensuring compliance through design and construction phases hinge on adeptly navigating regulatory frameworks. This involves scrutinizing construction codes to meet safety and structural standards. Understanding zoning regulations is critical, in governing land use parameters like building height, setbacks, and density limits. Familiarity with the approval process and assembling necessary documentation facilitates a streamlined approach, ensuring all regulatory obligations are met efficiently (Archistar, 2024).

6. Budget and Schedule: Setting realistic financial and time parameters is crucial for project feasibility. This involves creating a preliminary budget covering construction costs, materials, labor, and contingencies. Securing funding sources like loans or grants is key. Developing a detailed project timeline with milestones ensures efficient progress through design and construction. These steps ensure the project stays within budget, meets financial goals, and progresses according to planned schedules, enhancing overall feasibility and success (Awadh, 2017).

7. Sustainability and Environmental Considerations: Sustainability must be included if environmental stewardship and project lifespan are to be achieved. This includes using sustainable materials, reducing waste, and designing with energy efficiency in mind (e.g., passive solar, insulation, HVAC). Aiming for certifications such as BREEAM or LEED strengthens environmental guidelines and promotes healthier construction environments. By promoting tenant well-being and environmental protection, these initiatives guarantee project sustainability and community benefits (Awadh, 2017).

8. Stakeholder Engagement: Stakeholder participation is crucial for an inclusive design that satisfies a range of needs, involving the public through community workshops to gather local feedback. Collaboration with interdisciplinary teams of engineers, planners, and landscape architects integrates diverse expertise, promoting creative problem-solving. Continuous feedback loops ensure stakeholder input is consistently incorporated, fostering transparency and responsiveness to successfully meet project objectives and community expectations (Kempenaar, 2021).

9. Documentation: Clear and comprehensive documentation is necessary for the project's flow. It entails putting together an extensive program report that covers the conclusions and choices made during the programming stage. Diagrams and sketches are good visual aids for communicating space requirements. Technical specifications set forth the conditions and standards in detail, directing construction and design to adhere to standards. These procedures facilitate communication, aid in making well-informed decisions, and guarantee that the design intent is carried out (Van Heesch et al., 2012).

2.2 Programming Conservation of Historic Buildings

Conserving historic buildings is a delicate balance between meeting modern standards and requirements while retaining their original character. The process involves understanding the historical significance, assessing the current situation, and planning interventions that respect the building's heritage (Okoli et al., 2023).

2.2.1 Basic Principles

Conservation and restoration are of great importance in transferring historical and cultural heritage to future generations. This process aims to ensure that the buildings maintain their structural integrity and functionality while conserving their original character. Various principles adopted in restoration work make it possible to conserve buildings in their original state with minimal intervention as follows:

1- Minimal intervention
2- Reversibility
3- Compatibility
4- Documentation
5- Sustainability.

These principles serve as a guide for the protection of historical and cultural heritage and ensure that restoration works are carried out effectively and consciously (Nafree, 2019).

1-Minimal Intervention

This principle argues that only changes that are necessary to preserve the integrity of the building should be made, and interventions on the building should be planned and carried out in a way that will cause the least damage to the original structure (Gümüş,

2021). One of the important points to be considered in these minimal interventions is the cleaning and repair phase. This phase involves cleaning, repairing, and protecting worn or damaged materials. For example, a good example of this would be cleaning and renewing the existing mortar instead of replastering the original stone walls.

Another important point is structural support. This approach, which recommends strengthening the existing structure instead of adding additional supports to the existing structure, when necessary, keeps the intervention to a minimum while preserving the structural integrity of the building (Güngör, 2021).

2-Reversibility

According to the principle of reversibility, interventions should be carried out in such a way that, whenever possible, future generations can return the building to its original state. In this approach, it is essential that new interventions are easily reversible and do not damage the original structure. Additionally, it is important that the materials used are easily removable and reusable when necessary. In this way, the building is both protected and the principles of sustainability are followed. (Petzet, 2004).

3-Compatibility

According to the principle of compatibility, new materials and techniques must be compatible with the original structure and not damage the building. In this approach, it is essential to ensure that new materials and techniques are compatible with the original structure. For example, when choosing materials, care should be taken to ensure that new materials have similar physical properties (e.g. permeability, thermal expansion) to the original materials (Schueremans et al., 2011).

In terms of technical compatibility, it must be ensured that the techniques to be used are compatible with the characteristics of the original structure. In this context, for example, if the mortar of the original brick structure was made with lime mortar, lime mortar should be used in repairs, and materials compatible with the paints and coatings of the original structure should be preferred; in this case, permeable types of paint can be used. In this way, the structural integrity of the building is preserved and both aesthetic and functional compatibility is achieved (Polo López et al., 2021).

4-Documentation

According to the documentation principle, all changes and the current condition of the building must be documented in detail before any work begins. In this approach, it is important to document the current condition of the building with photographs and technical drawings, to keep detailed written records of all interventions, and to use technological tools. For example, it is necessary to take comparable photographs of the situation before and after the intervention and to keep a project diary in which all actions taken during the intervention are recorded with dates. Additionally, the use of 3D scanning and modeling technologies can make the documentation process more detailed and precise (Mezzino et al., 2017).

5-Sustainability

According to the principle of sustainability, sustainable practices, and materials should be used to ensure that the building remains suitable for future use. In this approach, it is essential to pay attention to the environmental friendliness of the materials used during renovation, to implement practices that will increase the energy efficiency of the building, and to use durable, long-lasting materials (Hafez et al., 2023). Using

recyclable materials to minimize construction waste and reducing energy consumption by utilizing natural ventilation and sunlight are part of a sustainable approach.

2.3 Programming the Conservation

Programming the conservation of historic buildings requires a multi-phase approach to ensure the careful treatment of these cultural treasures. Each phase is critical to preserving the building's structural integrity, historical significance, and usability (Chen et al., 2018). This comprehensive strategy includes:

1- Historical Research Phase

2- Planning Phase

3- Implementation Phase

4- Maintenance Phase.

1- Historical Research Phase

Historical research, which involves gathering detailed information about the building's history, architectural style, and significance, is one of the first steps in the strategy. This stage includes archive research, oral history studies, and examination of previous studies and sheds light on us to understand the historical and cultural value of the building (Della Torre, 2015). Methods that can be used to achieve this stage may include examining historical documents, plans, maps, and photographs to gather detailed information about the history of the building.

Apart from the sources we can touch, we should not forget the oral sources, which have one of the biggest shares in the spread of culture and history from generation to generation. People who have lived around historic buildings for a long time, relatives of property owners, city stories, personal stories, and interviews are sources of

considerable importance that form the layers of history. Existing studies are also productive sources for us to collect information about buildings or similar structures (Tassel, 2012).

We can easily understand previous interventions, changes, and damages to the building with the technical report prepared by an expert who knows how to read. This is an important resource to provide a basis and guidance for potential interventions that can be made in future generations. Of course, in order to successfully implement all of these items, colleagues who are experts in their field and work must work together in a disciplinary manner. Must collaborate with historians, architectural historians, and conservationists to provide comprehensive and accurate historical research (Carbonara, 2012).

The second of the evaluation stages is the situation evaluation stage. It recommends a comprehensive survey to assess the current condition of the building and identify areas of damage and deterioration. Assessing the current condition of the building involves identifying areas of damage and deterioration, and visual inspections, material analysis and non-destructive testing are part of this process (Tassel, 2012).

Comprehensive visual inspections are carried out to identify obvious signs of damage or deterioration such as cracks, leaks, or material deterioration, material analysis is performed using techniques such as core sampling and petrographic analysis to understand the composition and condition of building materials, and finally, groundwork to detect hidden problems without damaging the structure. Advanced methods such as penetrating radar, thermal imaging, and ultrasonic testing are used for non-destructive testing (Della Torre, 2015).

2- Planning Phase

The conservation plan provides a detailed road map for the preservation of historical buildings, outlining the replacement processes, methods to be used, and time periods. The aim of this plan is to provide clear guidance for conservation efforts. Components of the plan include the scope of work, i.e. defining the specific tasks and interventions required for the conservation project, methodologies, i.e. outlining the techniques and approaches to be used, timelines, i.e. establishing a clear program with key milestones and deadlines (Miran & Husein, 2023)

Additionally, budgets, i.e. preparing a detailed budget covering all aspects of the conservation work, including materials, labor, and contingency funds, risk assessments, i.e. identifying potential risks and challenges and developing strategies to mitigate them, and unexpected discoveries, i.e. those that may arise during the conservation process. Making plans to address unforeseen findings or problems (Della Torre, 2015).

Stakeholder engagement in this process, aims to ensure that all interests are recorded and informed, including heritage rules, local authorities, and the community. This includes organizing meetings and discussions with the local community to gather views and address concerns through public consultations, events with local heritage organizations, conservationists, and community groups to encourage collaboration and knowledge sharing through workshops, and regular consultations with funders and authorities on the progress of the project through meetings. This comprehensive and holistic approach offers effective and sustainable solutions for conserving historical buildings, both conserving the values of the past and adapting to modern requirements (Chen et al., 2018).

3- Implementation Stage

At the implementation stage, after a certain point, things are left to the workforce and knowledge. No matter how good the planning and programming are, when it comes to the final stage, implementation, things become a little more sensitive and we see once again the importance of applying the right techniques correctly. For this reason, in addition to having a talented workforce, it is also important to observe correctly and be informed about the work being done (Della Torre, 2021).

The aim of a talented workforce is to achieve high-quality workmanship. Craftsmen and contractors who specialize in historic stonemasonry, carpentry, metalwork, and other related fields should be hired. These experts have experience in understanding the characteristics of historic structures and the precise techniques required to conserve them. For example, stonemasons must be familiar with ancient construction techniques and materials. Likewise, carpenters must be experts in historic woodworking, and metalworkers must know and be able to apply ancient metalworking methods (Chen et al., 2018).

Training in conservation techniques should be provided to ensure that all workers involved in the project have the necessary skills. This training covers the best practices, materials, and methods used in the conservation of historical buildings. Training programs aim to improve both theoretical knowledge and practical skills of workers. Additionally, workers who receive advanced training in specific conservation techniques can guide other workers in the field and share information.

After the importance of workers requiring such capacity, it is equally important to observe how the planned project is reflected in practice. Regular site visits should be

made to monitor progress and resolve any issues that arise. These visits are critical to verify that the project is progressing according to the established timeline and quality standards. Additionally, observations made during site visits provide immediate and direct feedback on the progress of the project so that necessary adjustments can be made quickly (Carbonara, 2012).

Frequent meetings should be held to assess the status of the project, any challenges encountered, and any necessary adjustments. These meetings ensure that all members of the project team are on the same page and communication is clear. Additionally, progress meetings help develop proactive solutions by identifying potential delays or problems in advance.

Rigorous quality control measures must be implemented to ensure that all work complies with the required standards. It's a process where everything from the quality of materials to the level of workmanship is constantly evaluated and documented. Quality control processes also include final inspections to ensure all work meets required standards before the project is completed (Morais et al., 2019)

Specialized software should be used to track progress, manage tasks, and document any changes or problems. This software allows you to manage all aspects of the project on an integrated platform, so the flow of information is more orderly and effective. Additionally, project management software can also be used for reporting and data analysis, increasing the overall efficiency of the project (Stulens et al., 2012).

This comprehensive approach ensures high-quality workmanship in the conservation and preservation of historic buildings and strict adherence to the conservation plan.

Thus, both the physical preservation of historical buildings and the sustainability of their aesthetic and cultural values for future generations are ensured.

4-Maintenance Phase

During the maintenance phase, regular inspections and routine maintenance plans are critical to preserving historic buildings. The purpose of regular inspections is to prevent deterioration and detect problems early. In this context, potential problems are identified and taken seriously through seasonal inspections carried out at least twice a year. Possible damages are checked by additional inspections, especially after major weather events. Drone technologies are used to inspect hard-to-reach areas, such as roofs and facades, without the need for scaffolding (Osanna et al., 2018).

In addition, a routine maintenance plan is developed and periodic maintenance tasks and programs are determined. This plan includes routine tasks such as cleaning rain gutters, checking drainage systems, and repairing minor damage. In addition, major repairs and restorations that need to be carried out at regular intervals, such as cyclical repairs such as roof renewal or mortaring of stone walls, are also planned. A budget and timeline are determined so that all these maintenance activities can be carried out regularly. This ensures that ongoing conservation efforts are adequately financed and managed (Prieto, 2019).

Conservation of historic buildings requires a careful and conscious approach that honors the past while considering today's needs and the future. This process is important for preserving the historical texture, balancing modern needs, and leaving a legacy for future generations. By adhering to these basic principles and programming processes outlined in this chapter, it is possible to preserve historical buildings.

However, in order to protect the historical stone structures within the scope of historical buildings, it is vital to know the stone and apply these stages accordingly, in addition to correctly fulfilling the requirements of these stages. For this reason, after examining the planning stages that are effective in the preservation and restoration of historical buildings, Chapter 3 will discuss the characteristics of stone structures, types of deterioration, difficulties, application techniques, and the use of stone on the scale of TRNC, starting from the Mediterranean region, and the conservation strategies applied in these regions.

Chapter 3

STONE CONSERVATION: PRACTICES & CHALLENGES

Stone has been the preferred building material for many civilizations throughout human history because of its exceptional durability, ease of application, and aesthetic appeal. In order to pass on cultural heritage to future generations, stone constructions must be preserved. Many issues pertaining to stone conservation must be resolved in order to preserve stone structures. In this subject, a number of concepts and application strategies are crucial. The relevance of historical context, the function of archaeology, the location and selection of stone for restoration, consolidation, cleaning methods, and conservation through sound practices are all given top priority in the foundations of stone conservation (Zakar & Eyüpgiller, 2015). The field of stone conservation has seen shifts in its area of study over time. Preventive conservation, archaeological site preservation, and rock art preservation were prioritized at first. Effective stone conservation strategies require a thorough research and development analysis as well as a detailed assessment of the site's advantages and disadvantages (Doehne et al., 2010).

In this chapter, the study will explore various aspects of stone conservation by focusing on the practices and challenges associated with conserving stone structures by examining the common causes of stone deterioration and highlighting the factors that contribute to the degradation of stone materials. This will be followed by a review of

the different conservation techniques employed in the maintenance and restoration of stone structures, providing an overview of the methods used to address stone deterioration. The chapter will also analyze conservation methods on historical stone buildings, emphasizing the significance of protecting cultural assets through efficient conservation techniques. In addition, the study is about the efforts being made to conserve stone structures throughout the Mediterranean, with a particular emphasis on TRNC, where the study will examine the unique challenges and traditions that exist there. Through this comprehensive examination, the aim is to understand the current state of stone conservation and offer insights for improving conservation efforts.

3.1 Intervention Methods for Stone Structures

Conservation of historical stone structures includes the protection of not only structures but also the intangible values and information contained in these structures. Successful conservation initiatives require not only scientific and technological advances but also the active participation of local communities and the adoption of sustainable principles. In order to effectively develop conservation interventions for historical stone buildings, a comprehensive understanding of the characteristics of the buildings, their specific locations, and the paths to be followed for intervention is required (Vicente et al., 2018).

Scientific methodologies, theories, and practices need to be examined and managed to preserve historical and cultural heritage. Each historic structure presents different conservation challenges that require innovative solutions (Afza, 2023). To develop conservation interventions for stone buildings, it is important to have a comprehensive understanding of the specific architectural features of these structures, as well as their

specific features, locations, and intervention methods. These interventions cover a number of important conservation tasks, including:

1- Conservation
2- Reconstruction
3- Restoration
4- Rehabilitation
5- Diversification (Bouregh, 2021).

1-Conservation

Conservation includes interventions aimed at keeping the current state of the historic building stable for as long as possible. This method involves taking necessary precautions to prevent deterioration of the structure and preserve the original materials and techniques. For example, repairing roofing or replacing the roof to provide moisture control may be part of conservation efforts (Ahunbay, 2009).

Regular monitoring and maintenance are essential to ensure the protection and sustainability of the building during conservation. This includes routine activities such as cleaning, repairs, and inspections, as well as ongoing research to discover new materials and technologies that can improve the conservation process. (Sánchez et al., 2020). In light of all the factors, the practice of architectural conservation serves as a crucial mechanism to preserve our built heritage and ensure that historic structures remain important and functional elements of our societies (Forster and Kayan, 2009).

2-Reconstruction

ICOMOS defines reconstruction as the process of returning a space to its original state by adding new materials, similar to the concept of restoration. The most

comprehensive type of reconstruction involves building a replica of a demolished building. The aim of reconstruction for interpretive purposes is to offer visitors a representation of lost features by replicating aspects of the building that no longer exist or have survived. Unlike restoration, which does not exactly replicate the appearance of a specific time period, reconstruction is sometimes used to illuminate fictional circumstances or fill in gaps in historical documents (The Burra Charter, 2013).

3- Restoration

Restoration attempts to return a building or area to its pristine condition or to a specific significant period. It is of great importance to preserve the historical texture and qualities of the existing building or region during the restoration process. This often entails a procedure of copying or renewing architectural styles, materials and details from a specific historical period. Restoration allows us to understand the progress and transformation of a building over the years and reveals its historical and cultural significance (Ahunbay, 1995).

4-Rehabilitation

Rehabilitation is the process of making a historical building suitable for today's needs. This often requires introducing new functionality into the building or enhancing existing functions, whilst ensuring that its historic character and appeal is maintained. The aim of the rehabilitation procedure is to preserve the original identity and architectural features of historical buildings while also preserving their practical functionality (Silveira et al., 2007).

5-Diversification

Diversification enables the historical building to be reused by gaining new functions and to meet modern needs. In this method, while the original character of the structure is preserved, new functions are added to it. For example, repurposing an old factory as a museum or cultural center could be an example of a diversification method.These approaches offer different but complementary solutions for the protection and long-term survival of historical and cultural assets. Each asset plays an important role in preserving the value of traditional stone buildings while passing on the legacy of the past to future generations. The aim is to ensure that the work is carried out in a way that preserves the historic structure and essence of the building while ensuring that any changes can be documented and reversed (Viñas, 1988).

3.2 Conservation Techniques for Stone Structures

Stone structures are constantly exposed to ongoing risks such as their natural structure, flares, and human work. In this chapter, the different techniques used in the conservation of stone structures are elaborated, building on the earlier discussion of the factors affecting their eruption.

The conservation process in architecture includes techniques used to preserve, renovate, and adapt old buildings and structures. The aim is to preserve the originality and distinctiveness of history, while also preserving its preservation and sustainability for modern needs (Vafaie et al., 2023). Contemporary stone conservation services are built on the combination of scientific research, modern technologies, and sustainable systems. The purpose is to emphasize the conservation of the flexibility and visual appeal of stone structures around the world, increasing this structure (Ersen, 2013).

1-Comprehensive Review

A comprehensive review involves a detailed examination and evaluation of various methods and practices used to conserve stone buildings. There are several stages that involve a comprehensive review of the building's significance, historical background, and state of conservation. This evaluation involves investigating the original architectural design, construction techniques, and materials used, as well as documenting any changes or expansions that have occurred over the years. This assessment also includes a physical examination to identify areas of damage or degradation (Saisi et al., 2023). Using this assessment, a conservation strategy is produced that details the tasks required to preserve or restore the structure, taking into account the historical and cultural significance of the building and its current functional needs (Menéndez, 2016). It is possible to start conservation work after the proposal is approved.

2- Comprehensive Documentation

Comprehensive documentation and evaluation are essential elements of stone conservation. This involves meticulously recording the entire conservation process, including the materials and procedures used as well as the results achieved (Diamachadmin, 2023). This record is very important for future reference and to guarantee the reversibility of the conservation process. A multidisciplinary strategy is required to effectively preserve stone structures. This approach should include non-destructive procedures, diagnosis, cleaning, assembly, preservation, non-destructive field testing, laboratory testing, complete documentation, and evaluation. These strategies are of great importance in transferring the cultural and historical importance of these rich treasures to future generations. The integration of conservation and

restoration techniques is of great importance in terms of preserving the historical, aesthetic, and cultural importance of stone structures, guaranteeing their durability, and transferring them to future generations (Ersen, 2013).

3.2.1 Investigational and Practical Techniques

Accurate diagnosis is critical to effective stone preservation outcomes. In this region, a variety of therapeutic techniques are available. These consist of investigational and practical techniques listed such as:

1- Cleaning

2- Strengthening

3- Cosmetic and plastic restoration

4- Surface Protector.

1-Cleaning

According to James and James (2024), cleaning is the process of removing dirt, stains, and other undesirable substances to reveal the different colors and textures of the components of a building. For example, the laser cleaning method removes dirt and biological materials from the stone surface using a laser beam. Ultrasonic cleaning cleans dirt and stains on the stone surface with ultrasonic waves. Chemical cleaning removes dirt and biological growth using specific chemical solutions (see figure 2).

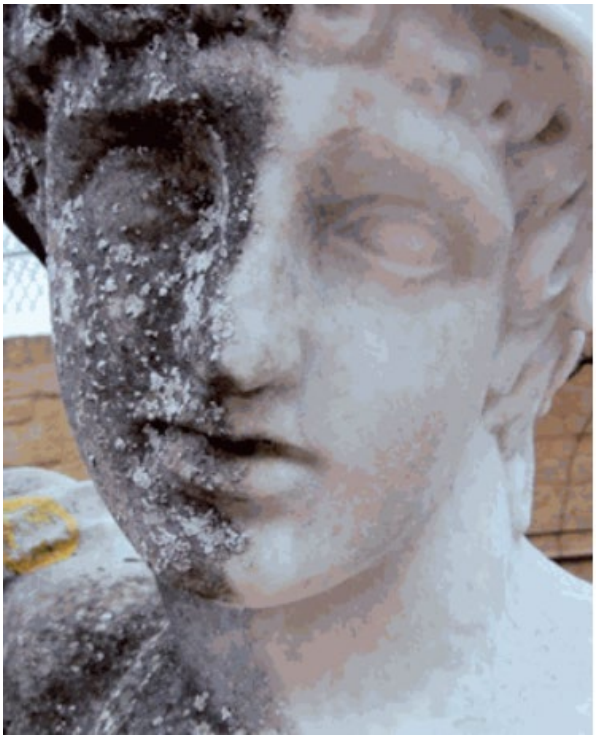

Figure 2: Laser cleaning of marble statues (URL1)

2-Strengthening

Strengthening is the process carried out to increase the structural integrity of stone structures. It strengthens stone structures and includes various methods to increase the structural integrity and abundance of these structures. Reinforcement methods include filling formations with cement and chemical conversion, anchoring with metal rods or cables, disrupting the joining of steel or carbon fiber sheets to external surfaces, and replacing worn stones with new ones. Modern technologies such as laser scanning and 3D systems provide more precise preparation of improvement plans, while flexible health monitoring systems provide instant status assessments. However, these not only prolong their life but also preserve historical and cultural productivity (Zakar & Eyüpgiller, 2015).

Figure 3: Masonry wall from the inside with steel mesh (Meireles & Bento, 2013, p:11)

3-Cosmetic and Plastic Restoration

Cosmetic restoration aims to renew the aesthetic appearance of the stone. This includes rejuvenating color tones and increasing aesthetic appeal. Plastic restoration aims to restore the physical integrity of the stone. For example, the sandblasting method cleans the dirt on the stone surface and renew the surface by using high-pressure air and fine sand (Lazzari & Rochette, 2012).

Figure 4: Stone and brick sandblasting (URL2)

4-Surface Protectors

Surface protectors are applied to protect the stone surface from environmental factors. Nano coatings are applied to stone surfaces, making the surface waterproof and dirt-repellent. These coatings ensure that the stone is long-lasting and less affected by environmental factors. Impregnated sponge cleaning is a method in which sponges impregnated with chemical solutions are used to effectively clean the dirt on the stone surface (Zakar & Eyüpgiller, 2015).

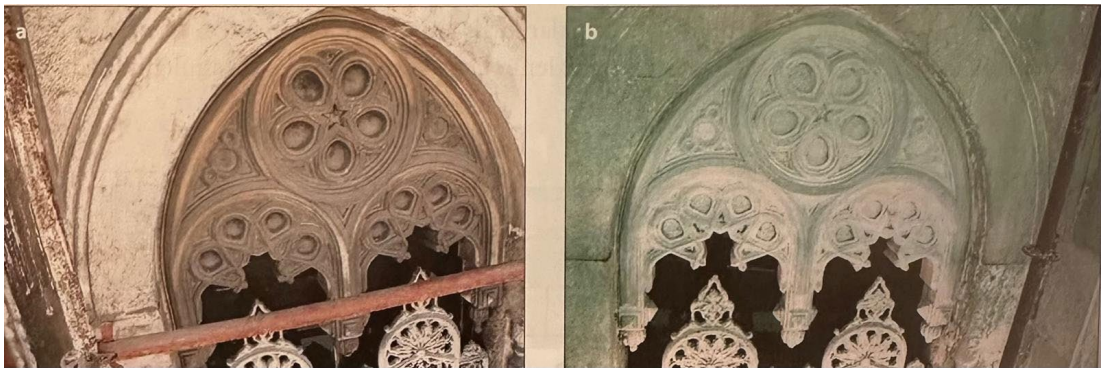

Figure 5: Pertevniyal Valide Sultan Mosque gel cleaning before and after (Zakar & Eyüpgiller, 2015, p:122)

Treatment methods used in the conservation of stone structures aim to preserve the aesthetic and structural integrity of the stone while also extending its life. Correct diagnosis and the use of appropriate treatment methods are essential to ensure that stone structures remain long-lasting and durable (Fort, 2006).

3.2.2 Traditional Techniques

Conservation of stone buildings includes a variety of traditional techniques. These methods aim to protect the building's structural integrity and aesthetic values while respecting their cultural and historical significance. Some of the traditional methods can be listed as:

1- Patching

2- Welding

3- Bonding

4- Pressure Washing

5- Chemical Cleaning

6- Sandblasting (Zakar & Eyüpgiller, 2015).

Figure 6: Final patching repair (URL3)

1-Patching

Patching is the process of filling missing or damaged stone sections with the same type of stone or suitable material. This process helps preserve the original appearance and structural integrity of the stone. For example, repairing missing stone pieces on the wall of a historical building by filling them with stones of the same type is considered a patching process (Isebaert, 2016).

2-Welding (Grouting)

Welding is a repair method performed by injecting a suitable mortar or cement mixture into cracks or gaps. This process fills the voids inside the stone, increasing the structural integrity and ensuring the durability of the stone. For example, hydraulic lime mortar used to fill cracks and voids is an example of the welding process (Miranda et al., 2018).

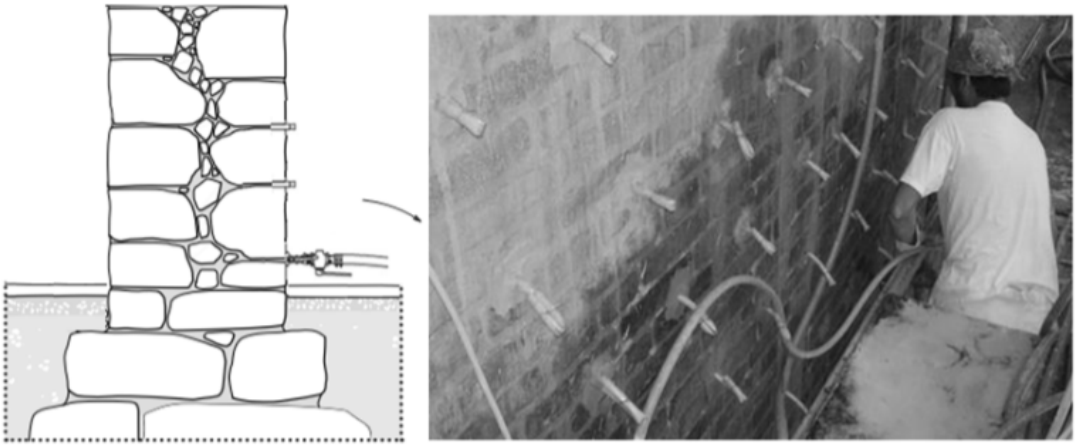

Figure 7: Detail of the grout injection on a stone masonry wall (Baltazar, L. G., Henriques, F. M., & Cidade, M. T., 2019, p:2)

3-Bonding

Bonding is the use of metal or wooden rods to hold broken or cracked stone pieces in place. This technique ensures that the stone pieces are fixed and stay in place. For example, holding broken pieces of a large sculpture together using metal rods is an example of bonding (Lazzari & Rochette, 2012).

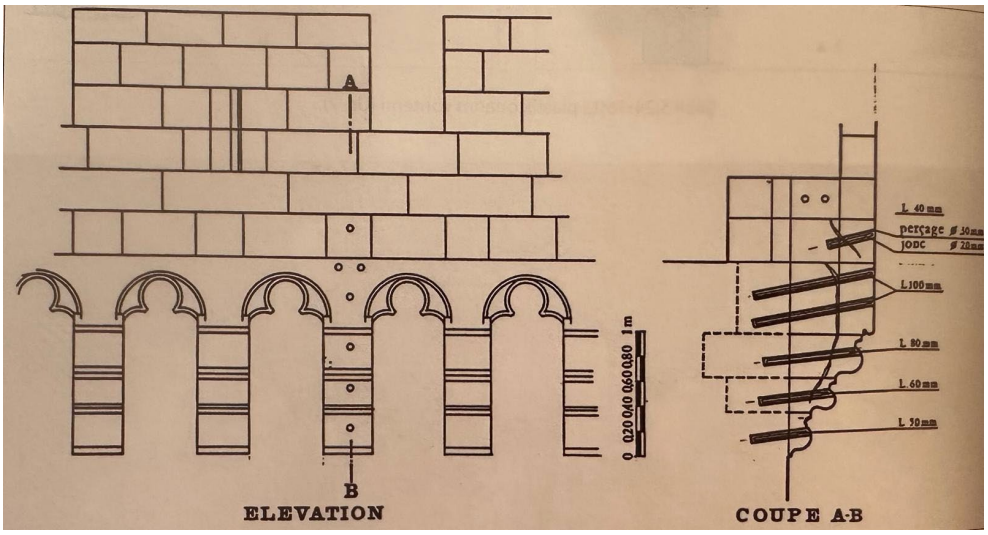

Figure 8: Repair of stone with the help of metal reinforcement (Zakar & Eyüpgiller, 2015, p:126)

4-Pressure Washing

Pressure washing is a process using water and pressure to clean stone surfaces. This method is effective for removing dirt, algae, and other biological matter that accumulates on the surface. For example, cleaning the exterior of a cathedral by washing it with pressurized water is an appli cation of this technique (Isebaert, 2016).


Figure 9: Pertevniyal Valide Sultan Mosque pressure washing cleaning before and after (Zakar & Eyüpgiller, 2015, p:119)

5-Chemical Cleaning

Chemical cleaning removes dirt and biological growth using certain chemical solutions. This method aims to clean the contaminants on the stone surface by dissolving them through chemical reactions. For example, cleaning graffiti and stain marks on the surface of a historic building with chemical solvents is an example of a chemical cleaning method (Zakar & Eyüpgiller, 2015).

Figure 10: After cleaning with an alkaline paint remover (Weaver, M. E.,1995).

6-Sandblasting

Sandblasting is a method that cleans the dirt on the stone surface by using high-pressure air and fine sand (Fig. 4). This technique is used to renew and clean the stone surface. For example, cleaning dirt and stains on the surface of an old stone bridge by sandblasting is an application of this technique (Miranda et al., 2018).

3.2.3 Innovative Techniques

Innovative techniques as well as traditional techniques play an important role in the restoration of stone structures. Innovative techniques aim to extend the life of stones and reduce maintenance requirements by providing more precise and effective results. The most common innovative techniques are:

1- Laser Cleaning
2- Ultrasonic cleaning
3- Bacterial Poultice
4- Heat Lances
5- Impregnated Sponge Cleaning
6- Nanotechnology Applications (Acun & Arioğlu, 2006).

1-Laser Cleaning

Laser cleaning ensures that dirt and biological substances on the stone surface are cleaned using laser beams. This method is especially effective on thin and sensitive stone surfaces and cleans without damaging the surface. For example, cleaning dirt and stains on the surface of a historical statue with a laser beam is an application of the laser cleaning technique (Prieto, 2019).

Figure 11: Laser cleaning on historic statues, (URL 5)

2-Ultrasonic Cleaning

Ultrasonic cleaning ensures that dirt and stains on the stone surface are cleaned with ultrasonic waves. This method is based on the principle that ultrasonic waves penetrate the stone surface and break down dirt and biological substances. For example, removing dirt and stains from the surface of stone works in the museum collection by ultrasonic cleaning is an example of this technique (Miranda et al., 2018).

3-Bacterial Poultice

The bacterial poultice method enables specially grown bacteria to biodegrade organic dirt and stains. This method aims to clean organic matter on the stone surface naturally. For example, cleaning moss and lichens on the stone walls of a historical building with the bacterial poultice method is an application of this technique (Zakar & Eyüpgiller, 2015).

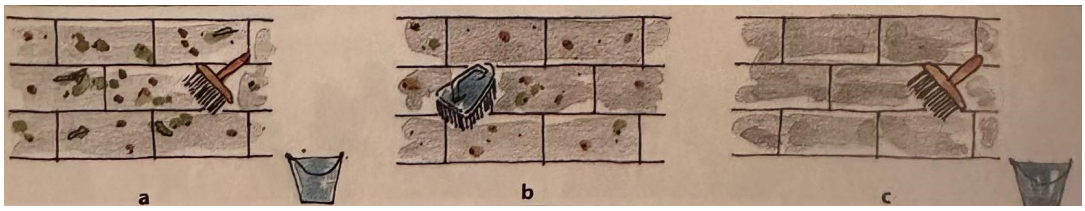

Figure 12: Cleaning fungus from the wall (Zakar & Eyüpgiller, 2015, p:121)

4-Heat Lances

Heat lances use high heat to clean dirt and biological substances on the stone surface. This method is based on the principle that heat cleans the dirt and biological substances on the stone surface by burning them. For example, cleaning dirt and biological materials on the exterior of a historical building with heat spears is an example of this technique (Fort, 2006).

5-Impregnated Sponge Cleaning

Impregnated sponge cleaning allows stone surfaces to be cleaned by using sponges impregnated with chemical solutions. This method is based on the principle that sponges dissolve dirt and stains by applying chemical solutions to the stone surface. For example, removing stubborn stains on the stone walls of a historical building with impregnated sponge cleaning is an application of this technique (Miran & Husein, 2023).

6-Nanotechnology Applications

Nanotechnology applications enable the surface to be waterproof and dirt-repellent with nano coatings applied to stone surfaces. This method is based on the principle that nano-sized particles penetrate the stone surface and form a protective coating. For example, making the stone surfaces of a historical building waterproof and dirt-repellent with nanocoating is an example of nanotechnology applications (Prieto, 2019).

Figure 13: Combination of innovative techniques, laser scanning, (URL6)

As a result, innovative techniques used in the restoration of traditional stone structures offer great advantages in terms of protecting the stones and extending their life. Methods such as laser cleaning, ultrasonic cleaning, bacterial poultices, heat spears, impregnated sponge cleaning, and nanotechnology applications allow stone structures to be restored precisely and effectively. These innovative techniques, when used together with traditional methods, help to achieve the best results in the preservation of traditional stone structures.

3.3 Stone Deterioration

Stone conservators encounter multiple challenges in their endeavors to safeguard and renovate stone structures and artifacts. Stones degrade due to climatic, biological, natural, and anthropogenic causes. Decay is the result of the presence of harmful gases, salts, and frost in the atmosphere, whereas basic deterioration, such as discoloration, is produced by the presence of moisture, rain, and metals. Multiple causes, including wind, temperature variations, fire, human activities, animal activity, plant development, and microorganisms, can all contribute to the degradation of stones. Various intervention strategies are necessary to address these deteriorations, which vary depending on the composition of the stone (Zakar & Eyüpgiller, 2015). akarThe stone deteriorates as a result of chemical and physical changes brought on by air exposure. The characteristics of the stone and its specific use determine the degree and kind of deterioration. Stone's surface develops a patina, or protective film coating when it is extracted from the quarry. Regardless of a contaminated environment, patina alters the stone's hue and guarantees its conservation (Küçükkaya, 2004). The most common deteriorations that stone can have, can be listed as follows:

1- Water Deterioration

2- Salt Deterioration

3- Acid Deterioration

4- Freezing

5- Anthropogenic Factors

1-Water Deterioration

Water deterioration poses a significant threat, particularly to stones with minuscule pores, such as limestone. This is due to the presence of detrimental chemicals in water that lead to erosion and corrosion. Moreover, bacteria present in monuments can engage with the surroundings, leading to additional degradation of the stone. (Tosunoglu, 2014). Water-soluble salts originating from the environment can infiltrate stones and induce harm and decay by forming salt crystals. Furthermore, environmental elements such as precipitation, air currents, and soluble minerals play a crucial role in the deterioration of stone surfaces and impact their long-term conservation. These challenges emphasize the intricate interplay between environmental factors and the conservation of stone heritage, underscoring the necessity for thorough and cautious conservation measures to properly mitigate these environmental impacts. (Martelli, 2020).

Figure 14: Example of water deterioration on the fountain of Braga (NW Portugal): (a) general view showing the position of the eroded portions to the water flow (b) detail of the erosive features (Alves et al., 2021, p:7)

2-Salt Deterioration

According to Ashurts (1990), the primary factors contributing to the deterioration of stone are salt crystals, acidic gases in the atmosphere, and frost. During the process of evaporation, the salt crystals dissolve and accumulate in the pores of the stones. This deposit progressively degrades and harms the stone tissue. The primary salts that contribute to this process are sodium, potassium, and magnesium salts. Salt crystals can induce both optical aberration and structural deterioration in the stone. The occurrence of salt buildup on the surface, commonly referred to as " Efflorescence ", is caused by the progressive formation of salt crystals at the microscopic scale, resembling dust, over a while (Zakar & Eyüpgiller, 2015).

Figure 15: Efflorescence on masonry surfaces (URL 7)

3-Acid Deterioration

The occurrence of sulfuric acidic gasses, carbonaceous matter, and tar particles in the atmosphere can lead to the corrosion of stones. Acids chemically react with limestone, resulting in the formation of a solid layer referred to as a "crust".

Figure 16: Examples of black crusts in limestone (Rodrigues, 2015, p:270)

The dark hue of the crust crystals is caused by the buildup of dust and other particles, creating what is referred to as black crust. The black crust on stone surfaces diminishes or vanishes when they are consistently cleansed with rainwater. When exposed to acid, limestones, and marbles undergo a chemical reaction that results in the formation of a plaster-like layer (Şener, 2020).

4-Freezing

Historic stone constructions are particularly vulnerable to the phenomena of freezing, which results in noticeable degradation. The pores in the stones are harmed by the expansion of frozen water. When water is present in the pores, fissures occur, which permit the buildup of more fluid. These gaps get wider with repeated cycles of freezing and thawing, which breaks down and disperses the stones. Usually, impacts are seen on the outside or nearby surfaces of the stones (Zakar & Eyüpgiller, 2015).

5-Anthropogenic Factors

In addition to natural processes, human influences also play a significant role in the degradation of stone. There are many threats to the conservation of cultural assets, including growing populations, building initiatives, unauthorized excavations, the

smuggling of historical artifacts, and ideological harm. War, societal unrest, and economic hardships can cause historical sites to be neglected. However, industrial and cultural areas' high population density, heavy traffic, and air pollution can harm cultural heritage—especially old stone structures—mechanically, physically, and chemically (Ahunbay, 2009).

Conservation of stone structures and fragments poses significant challenges due to various stress and human-induced events. Climatic, biological, natural, and anthropogenic characteristics of stones increase the complexity of conservation. While factors such as water, salt, acid, and freezing cause serious damage to stones, human activities also accelerate this deterioration. For this reason, various interventions have been developed to protect and repair stones, and these strategies differ depending on the composition carried. The next look will give information about the conservation and restoration techniques of traditional stone structures during the preservation period, and you can have an idea about what kind of application can be made against the type of deterioration the structures have.

3.4 Stone Conservation in the Mediterranean Region

Stone structures in the Mediterranean region are important elements of the historical and cultural formations of the region. The preservation of these structures adds value to the cultural and emotional change of both the local people and the human civilization.

The Mediterranean region has been considered the cradle of many ancient civilizations throughout history and has made significant contributions to humans (Saglamer, 2023). Due to its strategic location, the Mediterranean has become the center of

commercial, cultural, and religious communications. This tradition has had a profound impact on the formation of stone building materials, giving rise to numerous stone eruptions, medieval cities, and historical landmarks in the region (Hannibal et al., 2020).

In ancient Greece and Rome, theaters, aqueducts, amphitheaters, and temples were built using local options (Zhou et al., 2022). These stone structures are considered exceptional and irreplaceable structures that cleanse the region's history, culture, and religion (Reynard and Giusti, 2018).

The Mediterranean region hosts a wide variety of lithotypes due to unique geological conditions (Cavazza and Wezel, 2003). Limestones, conglomerates, sandstones, clay, marl, serpentinites, and basalts, which are common along the coastal edges, show the richness of construction materials in this region. These methods were used in building construction from ancient times until decay (Hannibal et al., 2020).

Stone structures in the Mediterranean are susceptible to various forms of deterioration, such as weathering, climate change, and mechanical effects (Modestou et al., 2015). The surface condition of these stones can vary due to inadequate cleaning and excessive consolidation, which can lead to additional problems. For this reason, surface treatments must be carried out carefully (Rodrigues, 2001).

Conservation of stone structures faces several challenges. Issues such as determining the amount of new stone, indicators of effective cleaning methods, and protection against factors are important components of the stone conservation system (Snethlage and Sterflinger, 2011). It contains the necessary information to prevent damage to the

structure of these structures and to repair and protect damaged parts.Today, scientists, conservators, and other producers collaborate to preserve lithic structures in the Mediterranean (Knodell et al., 2022). These efforts aim to preserve the fragility and integrity of the structures. It is imperative that these efforts be continued in order to transfer the cultural and historical richness of the region to future generations.

3.5 Stone Conservation in TRNC

Located at the meeting point of Europe, Asia, and Africa, Cyprus has hosted many different civilizations throughout history. Cyprus, the third largest island of the Mediterranean, has preserved many tribes such as the Hittites, Persians, Egyptians, Assyrians, Ionians, Phoenicians, Romans, Byzantines, Arabs, Lusignans, Venetians and Ottomans, and each of them has left on the history and identity of Cyprus. (Hoşkara and Doratlı, 2007). The island, which joined the Ottoman Empire in 1571, was administered by the British until 1960. With the Cyprus Peace Operation in 1974, the island was politically divided (Tuncay, 2016).

In this section, it is emphasized that cultural change in TRNC and the conservation of traditional stone structures are not only related to structures with historical and aesthetic value but also the political, systematic, and social parts of this use should be addressed. The effects of this unity on the conservation of the complex structure of the region and the cultural structure of this complexity are detailed.

3.5.1 Traditional Architecture and Modern Influences

Foreign knowledge, values, building materials, and economy that have come to TRNC since the 20th century have disrupted both the physical and cultural continuity of traditional architecture. This situation has led to a significant deterioration of the traditional structure of the island, with developments isolated from its surroundings

and architectural zones. It has become evident in historical and cultural periods, especially in recent years (Dinciyürek & Olgaç Türker, 2007).

Stone is widely used in Cyprus not only in walls, houses, ports, and other structures but also in the products of ordinary items. The popularity of the stone is due to its wide availability, ease of processing, and information about its parts (Christou and Elliotis, 2016). Ancient stone structures, walls, towers, and old houses represent distinctive and important elements of traditional Cypriot cultures, bearing traces of all past and civilizations. However, not enough effort is being made to maintain this (Di Cesnola, 2015).

The conservation of the stone buildings, tools, and other stone products on the island provides important information. Stone has been a common building material in TRNC due to its natural availability, high accessibility, quantity, and seismic resistance (Snethlage and Sterflinger, 2011). It is seen that this powerful material is preserved in the best way to conserve the ancient civilizations and the soul for future generations and this state of affairs is quite present (Hoskara and Doratlı, 2007). The protection of stone buildings in TRNC faces many obstacles. Traditional building materials require special maintenance methods and require detailed inspection and careful treatment. However, interest in the history and course of society is not structured at a certain level so far. While contemporary influences are changing the traditional perception of housing, harmful human actions and socio-economic changes are damaging cultural heritage. Importance is given to the preservation of these traditional, cultural, architectural, and structural features. However, the succession of social and economic dimensions causes conservation efforts to be insufficient (Hoşkara and Doratlı, 2007).

3.5.2 Cultural Heritage and Conservation Studies in TRNC

After 1974, the Turkish Cypriot community took on the responsibility of managing a significant portfolio of cultural heritage left to them. This heritage is not limited to buildings from the Ottoman and Turkish-Islamic periods but also includes works from the Byzantine, Venetian, and British periods. Due to limited local resources, conservation efforts rely largely on external financing (Hyland, 1999). Turkey is the largest provider of foreign aid to TRNC, providing financial support for various restoration and conservation projects. In addition, international actors such as the United Nations and the European Union also contribute to conservation efforts in the region. These external supports provide both financial resources and technical knowledge. However, this situation also brings with it various political and diplomatic dynamics. This section provides detailed information on the way these external supports are provided and the selection and implementation of projects.

The protection of cultural heritage in TRNC is carried out by local authorities. However, the lack of international recognition of these officials causes some significant problems. There are difficulties in conservation studies, such as the implementation of international standards and the sustainability of these studies. In this context, the attitude of the Republic of Cyprus also plays an important role. They take the protection of the cultural heritage in TRNC as dependent on the solution to the general Cyprus problem. For this reason, some conservation projects remain overshadowed by political strife. On the other hand, the presence of international actors in TRNC and the support they provide led to an increase in heritage diplomacy activities in the region. Conservation and restoration work has an important place in the context of the TRNC.

The conservation of stone structures in TRNC faces several challenges, including the impact of war and natural disasters, inadequate legislation, inappropriate conservation practices, and lack of information on on-site management. To overcome these challenges, it is necessary to understand the cultural significance of the structures, document them, investigate the factors that cause their deterioration, and apply appropriate conservation methods (Christou and Elliotis, 2016). Many areas of TRNC are experiencing rapid degradation. Ancient stone structures, walls, towers, and historical residences are prominent and important components of traditional Cypriot culture. The protection of cultural assets in TRNC faces many obstacles. Traditional building materials require special restoration methods and require detailed examination and careful treatment. However, interest in history and conservation in society is at a very low level (Hoşkara and Doratlı, 2007). While contemporary influences change the perception of traditional housing, harmful human actions and socio-economic changes also damage cultural heritage. Ancient stone structures, walls, towers, and old houses represent distinctive and important elements of traditional Cypriot culture, bearing traces of all past cultures and civilizations (Aliyu, 2009). However, not enough effort is being made to keep this culture alive.

Foreign ideas, values, building materials, and methods that came to TRNC since the mid-20th century have disrupted both the physical and cultural continuity of traditional architecture. This has led to a significant increase in the number of buildings isolated from the traditional built environment and architectural language of the island. The erosion of the historical and cultural fabric has become especially evident in recent years (Dincyürek and Olgaç Türker, 2007).

The preservation of cultural heritage in TRNC brings with it many complexities and ethical issues. On the one hand, the lack of international recognition of local governments creates serious difficulties in the financing and sustainability of conservation efforts. However, there are also ethical issues associated with using foreign funding for political objectives. The independence of these investigations could be jeopardized, for instance, by giving particular initiatives priority or by supporting them under particular political circumstances. Another significant ethical concern that comes to light is the degree to which conservation efforts align with the requirements and expectations of local populations.

Recognition and preservation of historical heritage are vital to the economic and social well-being of a society. It is necessary to develop a renewed and deep understanding of cultural heritage to support conservation efforts undertaken by individuals and independent groups (UNESCO, 1972). Preserving and appreciating the ancestral wisdom of indigenous communities is crucial to the long-term preservation and appreciation of this knowledge. Understanding and appreciating this knowledge and understanding by future generations can contribute to the revitalization of poor regions due to their traditions and customs. Central and municipal governments, as well as local communities and civil society groups, need to actively contribute to conservation efforts.

Chapter 4

MULTI-DISCIPLINARY APPROACH TO STONE CONSERVATION

A multidisciplinary approach to stone conservation in architecture involves the collaboration of professionals from various fields such as architecture, engineering, conservation science, geology, chemistry, and materials science. This approach recognizes that the conservation of historic stone structures requires expertise from different disciplines to address the complex challenges involved (Polat Pekmezci, 2024). By integrating knowledge and techniques from multiple fields, practitioners can develop comprehensive conservation strategies that take into account the historical significance of the structure, the properties of the stone material, environmental factors, structural integrity, and long-term preservation goals (Snethlage & Sterflinger, 2011).

Research in this area often focuses on developing innovative conservation methods, understanding the deterioration mechanisms of stone materials, assessing the impact of environmental factors on stone degradation, and finding sustainable solutions for preserving historic stone structures (Guerriero et al., 2022). Academic institutions, research organizations, and professional associations play a crucial role in advancing knowledge and promoting interdisciplinary collaboration in the field of stone conservation in architecture (Price, 1996). Workshops, conferences, specialized courses, and collaborative projects provide opportunities for experts from different

disciplines to exchange ideas, share best practices, and work together toward the common goal of safeguarding our architectural heritage for future generations.

4.1 The Role of Conservators

Conservators play a crucial role in the conservation of stone in architecture. For the benefit of future generations, they are in the position of protecting and conserving the integrity of artistic and historic items, especially stone constructions. In order to comprehend the characteristics of conventional building materials and create effective conservation procedures, conservators conduct scientific studies and assessments.

The expertise, experience, and understanding needed in many material fields are unclear, nevertheless. Within the architectural conservation community, there is a perception of a blurring of the lines between traditional building craft skills and specialized labor, which raises concerns regarding professional accreditation, career trajectories, and suitable training. As professionals specialized in materials science, art history, and conservation methods, the responsibility of preserving the integrity and authenticity of these artistic and architectural treasures has been entrusted to them (UNESCO, 1972).

Through meticulous scientific studies and condition assessments, conservators comprehensively understand the properties of traditional building materials and the mechanisms of their deterioration (Historic England, 2006). Collaborating with a multidisciplinary team of scientists, archaeologists, property owners, architects, art historians, and other stakeholders, they develop targeted conservation strategies to ensure the long-term preservation of stone structures (Narvaez, 2021).

Utilizing both time-honored craftsmanship techniques and the latest technologies, conservators apply various intervention treatments to stabilize and restore historic stone buildings (Muñoz Viñas, 2005). According to UNESCO (1972), the duties of conservators include processes such as consolidation to strengthen deteriorated surfaces, gentle cleaning to remove harmful deposits, and restoration to return elements to a known previous state, while respecting the significance of the elements and minimizing future deterioration by controlling the environment. Additionally, they ensure the proactive protection of stone structures against the effects of time, climate, and human impact by carefully monitoring and maintaining optimal conditions (Historic England, 2006).

Through their specialized knowledge, technical skills, and ethical commitment to cultural heritage preservation, architectural conservators play a vital role in sustaining architectural heritage for the education, recreation, and inspiration of present and future generations (Narvaez, 2021).

By implementing conservation interventions such as consolidation, cleaning, and restoration in a minimally invasive and reversible manner, and by developing comprehensive conservation strategies tailored to each heritage site, they collaborate with multidisciplinary teams of scientists, architects, and art historians.

Figure 17: Collaborative work of TCCH, TCCH's Heritage Youth Ambassadors, Europa Nostra members, representatives from the European Commission, UN, and UNDP, 2021, Europa Nostra Awards (URL8)

Additionally, stone conservators monitor and control environmental conditions through preventive conservation measures to prevent further deterioration. Overall, their work is crucial in preserving the physical integrity and historical significance of architectural heritage, ensuring that these structures can be appreciated and studied by current and future generations, thereby safeguarding our shared cultural heritage (Price, 1996).

Stone conservators encounter various challenges in the conservation of architectural heritage, requiring them to understand the chemical and physical properties of heritage materials to overcome these challenges. Stone structures are prone to deterioration due to factors such as pollution, climate change, and natural weathering processes, making the management of environmental conditions crucial. Considering the impacts of climate change on heritage sites, researching the mineralogical and chemical composition of building stones, and understanding their interactions with the

environment are critically important for effective conservation. Therefore, staying abreast of advancements in technology and being aware of innovative conservation techniques, such as non-invasive methods like laser ablation, and new materials and methodologies, is crucial for conservators to protect heritage structures (Schiavone et al., 2023; Michoinova, 2017).

Figure 18: TCCH, UNDP, and EU Members at the opening of Canbulat Gate, 2023 (URL9)

Stone conservators not only stabilize and restore historic stone buildings and monuments but also address deterioration and damage caused by human activities such as tourism and urbanization, ensuring the long-term sustainability and management of conservation efforts. However, another important task and challenge for conservators at this point is to preserve the authenticity and integrity of heritage sites, respecting their original character and significance, and avoiding unnecessary alterations or reconstructions to ensure that the works can be accessed by future generations in their original form (Michoinova, 2017; Akin, 2015).

4.2 Architects, Engineers, and Science

Architects, engineers, and scientists collaborate to play a crucial role in the effective preservation of historic stone buildings and monuments, each contributing specialized knowledge and skills to safeguard these cultural heritage assets (Tosunoğlu, n.d.). Indeed, as expressed by Winkler (1997) and Doehne & Price (2010), architects hold a

significant role in the preservation of stone structures. This role involves providing expertise in design, material selection, and construction techniques to ensure the preservation of historical and aesthetic values. Additionally, they collaborate closely with other experts to assess the condition of stone buildings and determine appropriate treatments. In this process, they offer expertise in understanding historical and aesthetic significance, assessing deterioration, developing conservation plans that preserve the original character, selecting suitable repair materials and techniques, and collaborating with other experts to develop holistic strategies.

According to Delgado Rodrigues (2021), engineers working in the field of architecture are essential for evaluating the structural stability of stone buildings and preserving their integrity. In this context, they assess potential risks during conservation efforts and implement stabilization techniques to maintain structural integrity. Furthermore, they collaborate with architects and scientists to develop holistic conservation strategies. The responsibilities of engineers include evaluating the structural stability and integrity of stone buildings, identifying potential risks, implementing stabilization measures, designing repairs to preserve structural integrity, collaborating with architects and scientists on conservation plans, and ensuring the safety and longevity of stone structures (Winkler, 1997). In a broader context encompassing various fields of science and education, multidisciplinary collaboration is crucial in conservation and restoration practices. Scientists contribute fundamental knowledge about the composition, degradation mechanisms, and preservation of stone materials. They conduct material analysis and tests to guide the selection of cleaning, consolidation, and repair methods.

Collaborating with architects and engineers, scientists develop customized treatments tailored to the specific needs of each historic stone building (Winkler, 1997; EverGreene, n.d.). The collaboration among architects, engineers, and scientists is essential for developing effective and sustainable conservation plans for stone heritage. By pooling their combined knowledge and experience, these experts can ensure the long-term preservation of historic stone buildings and monuments for the benefit of current and future generations (Getty Conservation Institute, 2014).

Figure 19: GCI, Interdisciplinary discussions held with the participation of 30 different experts, 2023, (URL10)

4.3 International Bodies, NGOs, and Associations

Institutes, NGOs, and associations are of vital importance in conservation and restoration efforts due to their expertise and knowledge in subjects such as historical research, architectural conservation, and sustainable development (Labadi et al., 2021). The participation of the nearby locals is crucial to the conservation project's success. Together, local government agencies, groups, policymakers, and subject-

matter educators should develop the appropriate policies that could contribute to increasing knowledge in the field (Oktay & Mısırlısoy, 2023). These organizations provide the necessary financial resources for activities such as conducting research, implementing conservation plans, and carrying out physical restoration work through government support, private donations, and international funds. Additionally, they engage in capacity-building activities by educating local communities and professionals in conservation practices, fostering collaboration among stakeholders, and contributing to the formation of effective cultural heritage preservation policies and the influence of legislation at local, national, and international levels (The Congress & Council of Europe, 2021).

As it will be covered in more detail later in the research, there are different committees and NGO's that work in the field of protecting the cultural heritage of TRNC. The Technical Committee on Cultural Heritage is one of the most active communities that is committed to providing a mutually acceptable system for practical actions for the correct preservation, physical protection, and restoration of Cyprus's cultural heritage. Thirty-one heritage sites—including Orthodox, Maronite, and Armenian churches, mosques and minarets, fortifications, baths, aqueducts, and watermills—have been conserved, structurally supported, physically protected, or restored by the Technical Committee on Cultural Heritage since 2012, with funding from the EU and UNDP (TCCH, 2018).

International bodies play a pivotal role in the field of architectural conservation by conducting extensive research and documentation on historical structures and sites, ensuring a deep understanding of heritage value. They offer educational programs and training to students, professionals, and the public, building expertise in conservation

techniques and sustainable practices. By influencing policy development, institutes advocate for protective legislation and provide expert advice on conservation standards. They also facilitate funding and grants for conservation projects, supporting research, restoration, and implementation efforts (Okoli et al., 2023). Offering technical support and consultancy, institutes assist in structural analysis, materials conservation, and modern preservation technologies. They raise public awareness through exhibitions, conferences, and lectures, engaging communities in the importance of preserving cultural heritage. Facilitating collaboration and networking, they create platforms for sharing knowledge and best practices. Additionally, they develop and disseminate guidelines and standards to ensure consistent and effective conservation efforts. Through these roles, institutes significantly contribute to maintaining, protecting, and appreciating architectural heritage for future generations (Ierek, 2004). One of the most popular and active institutes in this manner is the Getty Conservation Institute.

The Getty Conservation Institute (GCI)

Founded by the Getty Trust in 1985, the Getty Conservation Institute (GCI) is a global institution focused on the protection and long-term survival of cultural assets. GCI identifies the dangers of cultural diversity, develops protection plans, conducts scientific research, and participates in training and capacity-building activities. It promotes the adoption of effective conservation methods and supports the exchange of knowledge through projects and collaborations. GCI's overarching focus is the on-site collection of museum collections, archaeological artifacts, artifacts, historical architectural structures, and the protection and assurance of environments.

GCI is committed to planning, research, and capacity building through cultural transmission. It focuses on education, information dissemination, and public awareness. It raises awareness among professionals and local communities by organizing training programs on conservation, restoration, and sustainable management. In addition to the publication of technical reports, monographs, and publications, events are organized to provide information on the preservation of cultural diversity. It ensures the protection of cultural heritage by running Christmas campaigns on social media and digital platforms. These initiatives ensure that cultural productions are passed on to future generations by encouraging communities to actively participate in conservation efforts.

Non-Governmental Organizations (NGOs) are essential to the conservation of historic structures because of their diverse range of initiatives, which include finance, education, lobbying, technical assistance, and direct project involvement. They actively push for more robust legal protections and efficient procedures to preserve heritage places in order to have an impact on public policy and legislation. Through the planning of media outreach, events, and awareness campaigns, NGOs inform the public about the value of protecting historic buildings and the dangers they face. NGOs help the local population develop a sense of ownership and responsibility towards their cultural heritage through educational programs, workshops, and community involvement projects.

NGOs also make a significant financial contribution by planning fundraising events to raise funds and giving grants and donations to conservation projects. In order to guarantee that conservation work complies with the highest standards and best practices, their technical help entails study, documentation of historic building

conditions, and professional guidance. NGOs frequently oversee and manage maintenance and restoration projects, making sure they are carried out quickly and efficiently while upholding high levels of craftsmanship. There are three organizations that we can list among the organizations that have the most active role in this field such as:

1- ICOMOS
2- ICCROM
3- UNESCO.

They not only carry out many projects around the world, but also make great efforts to preserve all movable and immovable parts of the cultural heritage and pass them on to future generations.

1-International Council on Monuments and Sites (ICOMOS)

ICOMOS, established in 1965, is a global organization dedicated to the conservation, restoration, management, and sustainable use of cultural heritage. Its mission is to promote international cooperation in safeguarding the universal value of cultural heritage and transmitting it to future generations. ICOMOS's principles include scientific research, education, policy development, and the promotion of best practices. It also prioritizes cultural diversity and community participation, actively engaging in international forums for knowledge exchange among member countries.

ICOMOS undertakes numerous projects aimed at the conservation and management of cultural heritage, including collaborating with UNESCO's World Heritage Committee to evaluate cultural sites nominated for the World Heritage List. It also provides advisory services for the protection of World Heritage sites in danger,

identifying at-risk sites, formulating conservation plans, and overseeing their implementation. ICOMOS also establishes International Scientific Committees (ISCs) to research and develop best practices for cultural heritage conservation, restoration, and management.

ICOMOS also works with the Organization of World Heritage Cities (OWHC) to ensure historic cities are preserved and developed in harmony with modern life. It also addresses the impacts of climate change on cultural heritage and develops risk management plans and emergency response strategies. It also evaluates and manages the positive and negative effects of tourism on cultural heritage sites.ICOMOS also raises public awareness about cultural heritage conservation through various activities, such as the International Day for Monuments and Sites, educational programs, publications, and campaigns.

2-International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM)

ICCROM, founded in 1956 in Rome, Italy, is a global organization dedicated to the preservation and restoration of cultural assets. Established by UNESCO, it focuses on sustainable and environmentally friendly outcomes. ICCROM upholds values of diversity, participation, and fairness in the preservation and repair of cultural heritage. It has provided funding for conservation and restoration initiatives in Rome, established the Venice Charter, and created the Cultural Assets First Aid program for emergencies. It also enhances knowledge in stone conservation through its Stone Conservation Programme. ICCROM's primary goal is promoting preventive conservation approaches through the PREMO project. ICCROM also provides specialized education programs and workshops on conservation techniques, promoting

public knowledge and practical application. It also organizes programs and workshops to educate individuals on the protection and long-term viability of cultural material. These efforts aim to ensure a sustainable future for cultural heritage.

The ICCROM's programs focus on preserving and retrieving cultural heritage during crises, restoring stone structures, promoting preventive conservation, managing intangible cultural heritage, and preserving historical records in libraries and archives. These initiatives aim to enhance the global conservation, administration, and durability of cultural heritage, ensuring the long-term viability of traditional skills and practices. The Stone Conservation Program offers specialized knowledge in stone preservation and restoration.

3-United Nations Educational, Scientific and Cultural Organization (UNESCO)

UNESCO, established in 1945, operates globally in education, science, culture, communication, and information. Its primary mission is to promote peace and sustainable development, improving human quality of life. It focuses on five main areas: education, science, culture, communication, and information. In education, it implements programs to enhance access, improve quality, and promote literacy.

In culture, UNESCO preserves cultural heritage, promotes cultural diversity, and supports cultural industries. The World Heritage Program aims to protect significant cultural and natural heritage sites and transfer them to future generations. In communication and information, UNESCO promotes media freedom, enhances access to information, and raises digital literacy awareness. The organization's structure is based on the General Conference and the Executive Board, with the participation of member states worldwide. UNESCO's global initiatives serve the common interests of

humanity, focusing on peace, sustainable development, and cultural diversity preservation. (Adams, 2012).

Cultural heritage is the legacy of the past, preserved in the present, and valued for transfer to future generations to ensure cultural sustainability. Heritage buildings, as tangible remnants of civilizations, provide historical insights and contribute to economic development through tourism. Preserving these assets is essential for cultural, social, and economic sustainability, making conservation and restoration critical tools for this purpose. Preservation is a universal duty, and raising awareness about conservation is the first step. This responsibility lies with every community member, emphasizing the importance of creating awareness in conservation efforts (Oktay, M., & Mısırlısoy D., 2023).

Maintaining stone buildings, for instance, necessitates collaboration among experts from different disciplines. Comprehensive conservation plans integrate diverse methodologies to ensure structural stability and long-term preservation. Organizations, associations, NGOs, and research institutions provide essential support through funding, advocacy, and technical expertise (Green & Johnson. 2015).

Interdisciplinary collaboration and innovative conservation techniques are crucial for protecting architectural heritage for future generations. Institutions must engage in global discussions on restoration and conservation strategies, implementing them with equal emphasis. The study examines how Italy and the Turkish Republic of Northern Cyprus (TRNC) approach conservation and restoration, focusing on the roles and effectiveness of their institutions.

A detailed look at the conservation and restoration mentalities in Italy and the TRNC reveals the kinds of institutions involved, their functions, and their impact on the field. After a brief overview of state and organization-based efforts, the study delves into specific initiatives and systems in these countries, highlighting their approaches to preserving cultural heritage.

By integrating educational initiatives, raising public awareness, and fostering interdisciplinary collaboration, we can create long-term solutions to protect our shared cultural heritage. Institutions must promote global discussions on restoration and conservation, implementing strategies with equal emphasis and attention to detail. Through continued research, innovative conservation techniques, and collective efforts, we can ensure that future generations enjoy and learn from these priceless cultural artifacts.

Chapter 5

INTERNATIONAL COLLABORATION IN ITALY AND CYPRUS

In order to fully comprehend the overall structure, as well as specific definitions, objectives, and future plans, it is crucial to understand the historical evolution and present state of international agreements and publications regarding architecture and stone conservation (Al-Sakkaf 2020). International agreements and documents should be taken into consideration and treated as trustworthy sources when creating guidelines and best practices for conservation and restoration projects that are compatible with local cultures, traditions, histories, and natural circumstances (Tarrafa, 2012).

5.1 International Collaborations

Several significant international agreements and conventions for the restoration and conservation of architecture were developed and put into effect globally in the 20th century. The importance of preventive conservation in the maintenance of architecture is emphasized by international agreements and publications, particularly when it comes to stone conservation (ICOMOS, 2003). The prestigious non-governmental organization ICOMOS (International Council on Monuments and Sites) was established at an international conference held in Venice in 1964 (International Charter for The Conservation and Restoration of Monuments and Sites, 1964). An important milestone was reached with the establishment of the Council. During the second half of the 20th century, efforts were made at the international level to protect global heritage sites.

In order to establish a global framework for architectural restoration, the Convention Concerning the Protection of the World Cultural and Natural Heritage was approved by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in 1972. The UNESCO Conventions and Recommendations for the Protection of the Cultural Heritage, which were formed in 1983, include the Conventions, Resolutions 32-C/Resolutions-50, 51, and 52. It became clear how crucial international standards are to the safety and preservation of historical landmarks and archaeological sites. It was underlined that when cities, towns, churches, or historic buildings are added to the World Heritage List, they should be added first.

In addition to fostering international collaboration on conservation projects, UNESCO has made great strides toward guaranteeing consistency and coordination across national conservation regimes. The World Heritage Convention, European Union conventions, UNESCO conventions, the Hague Convention, the Venice and UNESCO conventions, the Dublin Principles, the Florence Convention, and the Krakow Convention are a few notable international agreements. International agreements set down precise measures to be taken in the event that cultural property is damaged or if agreements become relevant. They also regulate the protection of cultural property. Important documents created for this purpose include the Hague Convention of 1954, the World Heritage Convention of UNESCO (1972), the European Convention on Crimes Relating to Cultural Property (1985), the Nara Declaration of Authenticity (1994), and the Eurasian Convention for the Protection of the Architectural Heritage (2009). to ensure the preservation of cultural treasures and to stop harm to them.

Whenever cultural property is damaged or when agreements become applicable, specific actions are outlined in international agreements. They also control how

cultural property is protected. To ensure the preservation of cultural treasures and to stop harm to them, important documents created for this purpose include the World Heritage Convention of UNESCO (1972), the Hague Convention of 1954, the European Convention on Crimes Relating to Cultural Property (1985), the Nara Declaration of Authenticity (1994), and the Eurasian Convention for the Protection of the Architectural Heritage (2009).

It is a difficult effort involving multiple international conventions and agreements to preserve cultural property and implement stone conservation procedures. Because our cultural history is closely linked to the values of the environment, these restrictions are essential for today's ecologically concerned society. The global initiatives for the conservation and restoration of cultural and architectural heritage are examined in this section. It highlights the part that international agreements, conventions, protocols, and civil society play in safeguarding cultural assets. Collaboration between many specialists and consideration of regional customs, cultures, and environmental elements are essential to the success of these initiatives. Current international agreements and procedures should serve as the foundation for future conservation initiatives. Advances in science and technology will make it easier to create long-lasting and more effective conservation plans.

5.2 Case of “Italian Code of Cultural Heritage and Landscape”

The "Italian Code of Cultural Heritage and Landscape Code", also known as the “Codice dei Beni Culturali e del Paesaggio”, establishes a thorough legislative structure to safeguard and oversee the preservation of cultural and natural assets The Code's mission is to preserve Italy's cultural heritage for future generations and promote its sustainable use. Its vision is to establish a global standard for safeguarding

and managing cultural and natural heritage, while also promoting the universal value of Italian heritage and encouraging its utilization through tourism, education, and social awareness. This is done to ensure its assessment and evaluation (Della Torre, 2010).

The code's general provisions establish the obligations of the state, regional, and local governments in safeguarding cultural and natural assets. This is achieved by specifying the code's goal, scope, and fundamental definitions. This code encompasses the definition, categorization, and inventory of cultural heritage, as well as the rules and techniques for protecting, restoring, and maintaining cultural assets. It also includes regulations pertaining to the transit, transfer, and trading of cultural property (Rotondo & Mangialardi, 2024). The law encompasses the establishment and preservation of natural heritage and landscape, guidelines for the administration and utilization of protected areas, and the sustainable utilization and assessment of the landscape. The code (Iaione et al., 2022) primarily focuses on securing funding and providing incentives for the preservation of cultural and natural heritage. It also emphasizes the importance of collaborative efforts between the government, business sector, and civil society in planning and executing conservation and restoration projects.

Furthermore, legal penalties and regulatory measures have been implemented to address violations of the heritage code and to enforce control mechanisms for the preservation and administration of cultural and natural resources. The code also includes international agreements and cooperation for the safeguarding of cultural and natural heritage, as well as efforts to combat the illegal trading and smuggling of cultural material. This code strives to guarantee the sustainable management and transfer of this asset to future generations. It provides a comprehensive framework for

the conservation of cultural and natural heritage, setting a precedent at both national and international levels (Della Torre, 2010).

5.3 Government and Organizations in Italy

The conservation and restoration legislation in Italy are characterized by a complex and intricate framework. Legal restrictions exist at multiple levels to safeguard historical and cultural heritage, and these regulations are often enforced at the national, regional, and municipal levels (Ministero per i beni e le attività culturali, 2004).

NGOs in Italy play a highly active role in addressing conservation and restoration matters across a wide range of domains. These non-governmental organizations typically focus on matters such as safeguarding cultural heritage, renovating historical structures, protecting the environment, and promoting sustainable development.

1-The Ministry of Cultural Heritage, Activities and Tourism (Ministero dei Beni e delle Attività Culturali e del Turismo- MiBACT)

MiBACT is the primary governmental organization responsible for safeguarding, administering, and advancing Italy's cultural legacy. It carries out a range of duties and obligations aimed at safeguarding Italy's abundant cultural legacy and transmitting it to future generations. The organization is responsible for fundamental tasks such as safeguarding and repairing historical and archaeological sites, monuments, museums, archives, and libraries. It also conducts research and documentation of cultural heritage using scientific approaches and allocates the required funding and resources for the protection and restoration of cultural heritage (Ministero dei Beni e delle Attività Culturali e del Turismo, n.d.).

The organizational structure of MiBACT comprises central management units and local offices. The main components consist of General Directorates. General Directorates are responsible for overseeing various aspects related to cultural heritage, including the protection of cultural artifacts, conducting archaeological excavations, managing museums, and preserving and restoring art and historical works. On the other hand, local offices focus on safeguarding and managing the cultural heritage specific to a particular region. MiBACT also engages in significant efforts to enhance cultural heritage knowledge and promote social involvement in Italy (Ministero dei Beni e delle Attività Culturali e del Turismo, n.d.).

2-Regional and Local Conservation Boards (Soprintendenza)

Regional and Local Conservation Boards, also known as Soprintendenza, are governmental bodies responsible for the preservation and protection of cultural heritage at the regional and local levels. In Italy, the term Soprintendenza refers to official institutions that are responsible for carrying out a range of responsibilities linked to the safeguarding and administration of cultural assets (*ICCROM*, n.d.). Sopraintendenza is a network of local establishments that was formed in 1909 with the purpose of safeguarding monuments and fine arts, as well as overseeing the process of cataloging cultural resources. The general directorate is responsible for conducting thorough research in the field of art and construction, which can uncover new and unexpected findings in history. Its main role is to examine and protect monuments, ensuring that all applications adhere to the established criteria and are not influenced by haste, simplicity, or emotional factors (ICCROM, n.d.).

The Soprintendenza is responsible for tasks such as safeguarding archeological sites, overseeing excavations, protecting historical monuments and ancient cities, and managing museums. The Soprintendenza also takes care of the protection and repair of exhibited works. Soprintendenza focuses on safeguarding, repairing, and responsibly overseeing historical structures and monuments. Additionally, it is involved in tasks such as coordinating cultural events, administering heritage sites, and guaranteeing public accessibility to cultural assets (Della Torre, 2010).

The Soprintendenza in Italy is often led by a government-appointed official and can be further divided into regional subunits (such as regional Soprintendenza) or local subunits (such as municipal Soprintendenza). These institutions have a crucial role in safeguarding and maintaining cultural heritage. They frequently collaborate with teams of skilled archaeologists, restorers, historians, and other experts dedicated to preserving cultural heritage (Della Torre, 2010).

3-The National Association of Italian Cities and Sites (ANCSA)

Established in 1960, this organization is a national society dedicated to safeguarding and promoting the preservation of historical and artistic places in Italy. ANCSA is a significant non-governmental organization dedicated to safeguarding Italy's abundant cultural heritage and formulating sustainable urban development plans (Ancsa, 2024).

The objective of ANCSA is to safeguard and enhance Italy's historical and artistic legacy. Within this particular framework, it facilitates and sustains initiatives aimed at the recovery and preservation of natural habitats. It promotes the growth and preservation of historical city cores in alignment with contemporary urban planning standards (Aisuadmin, 2020). The objective is to conserve historical edifices while

simultaneously enhancing the habitability of these regions. It educates and informs the general public and authorities about the significance of conserving cultural assets. To achieve this objective, it arranges seminars, conferences, and training programs. The organization engages in research about the preservation of cultural heritage and the formulation of urban development strategies. It also provides policy suggestions in this domain (Ancsa, 2024).

Italy has a vibrant civil society movement focused on safeguarding and renovating cultural assets. Non-governmental organizations (NGOs) have significant influence in shaping public opinion, promoting education, and policy development. Generally, society is highly aware of and responsive to these issues.

5.4 The Case of TRNC

The Department of Antiquities and Museums is the primary entity responsible for the preservation and study of historical artifacts and cultural heritage in the TRNC. The Ancient Works Law, specifically outlined in document (60/94), pertains to both immovable and moveable ancient works, as well as monuments and their immediate surrounds. The law encompasses various aspects, including the identification of historical monuments, their listing, the determination of conservation areas, the management of these areas, the establishment of intervention laws, the utilization of historical buildings, and the rights and obligations of their owners.

Understanding the necessary actions for protecting ancient monuments and planning properly is of utmost importance. In order to ensure successful applications, the project necessitates financial backing in conjunction with the establishment of an organizational and legal framework. The provision of these supports is typically

facilitated by entities such as UNOPS (United Nations Project Services), the Preservation of Antiquities and Historical Monuments budget, earnings generated by historical buildings, and financial donations from Turkey (Özay, 2005).

The current legislative framework in TRNC is not sufficient to ensure the sustainable development of conservation and restoration features of buildings in the natural environment. This is due to the inherent complexity of such projects, the fact that the laws belong to different periods, and the variability of the solutions they regulate (Hristov, 2014). Moreover, the presence of divergent (and occasionally contradictory) perspectives regarding the remaining duration of service and the level of effort to be exerted in the face of existing difficulties give rise to substantial regulatory intricacies and pose obstacles to the adherence and enforceability of laws. Secondary legislation also faces significant challenges, such as a lack of transparency caused by rules in regulations. Additionally, there are many forms of costs associated with the execution of norms, which can vary among professionals (Ozay, 2005).

5.5 Government and Organizations of TRNC

TRNC delegates the protection of cultural heritage to the state personality and civil society events that determine it. Comprehensive ministries in this field include the TRNC Ministry of Tourism and Environment, the Ministry of National Education and Culture, and Local Governments (Municipalities).

TRNC Ministry of Tourism and Environment is the main state body responsible for ensuring the preservation and compatibility of historical publications (Timucin Hayat, 2019). The Department of Antiquities and Museums, which falls under the jurisdiction of the Ministry, is responsible for the protection of cultural heritage, the operation of

museum systems, and the continuation of archaeological excavations. This institution consists of the necessary parts for the comprehensive unification, preservation, and restoration of the country's general history and culture and cooperates internationally.

The Department of Antiquities and Museums is responsible for various tasks related to the protection and preservation of historical artifacts, women, archaeological innovations, and cultural heritage elements. These services include payment of conservation costs, continuation of repair and conservation projects of historical buildings, multiplication of museums throughout the country, organization of exhibitions, protection of museum collections, and supervision of excavations of archaeological sites (Department of Antiquities, n.d.). Its responsibilities include promoting public awareness of the importance of cultural heritage and matching educational initiatives that play an important role in preserving the historical strength of TRNC.

In the TRNC, both government institutions and non-governmental organizations (NGOs) are actively involved in the conservation of the cultural heritage. These NGOs create initiatives aimed at preserving and developing cultural formations. They participate in research markets and organize campaigns to raise public awareness on this issue. They also take part in the global expansion of TRNC's cultural production by collaborating with foreign organizations.

Various organizations such as the Association for the Protection of Cultural Heritage, the Turkish Cypriot Antiquities Association, the Famagusta Cultural Heritage Association, the TRNC Museum and Archeology Foundation, and the Nicosia Turkish Municipality Culture and Art Center are responsible for the protection of cultural

assets in TRNC (Çiftçi et al., 2020). There are organizations and institutions that dissipate natural degradation, and restorative and responsible management. These programs include continuing creation in the field of cultural heritage, supporting educational initiatives, undertaking restoration projects, organizing exhibitions, conferences, concerts, and other cultural events, increasing interest in cultural heritage, and providing financial and technical assistance to cultural heritage. In addition, these organizations cooperate with international organizations. However, as in many other countries, the TRNC faces various difficulties with these forces.

Lack of sufficient financial support poses a major obstacle in these strategies, which play an important role in preserving cultural values and transferring them to future generations. The lack of financial support that startups need to receive creates an additional difficulty, highlighting the lack of recognition of the TRNC on international platforms (Hoskara and Doratli, 2007). Due to insufficient funding and support, this initiative cannot be implemented and is subsequently neglected and discarded, like carefully preserved cultural materials. While this situation is undeniably a tragic event, it highlights a renewed emphasis on social awareness, which can be seen as a shortcoming or deficiency.

In conclusion, we can state that if we cannot protect values and show sufficient sensitivity, it is unreasonable to expect another society to take responsibility for the cultural heritage and take action. At this point, we understand the importance of social awareness. Social awareness in the field of restoration and conservation requires raising public awareness about the preservation of our cultural and historical heritage and ensuring active participation in this regard. Understanding the importance of this is very important for the protection and maintenance of cultural heritage.

Conscientious societies give priority to the preservation of historical buildings and artifacts to ensure that these cultural qualities are transferred to future generations. Training and awareness campaigns, especially in the domain of stone conservation, need to be organized to increase this awareness, which reinforces the sense of social identity and belonging. Additionally, involving local individuals in projects through practice-oriented training that strengthens emotional bonds by involving them in hands-on learning experiences can further strengthen their sense of belonging. Additionally, the implementation of legal regulations and incentives can contribute to this effort and provide support to communities. It is very important to benefit from the influence of media and art, as well as cooperation with neighborhood organizations and municipal governments (Halim & Tambi, 2021).

Therefore, developing social awareness about the protection and rehabilitation of historical monuments in TRNC is of great importance for the long-term protection and survival of cultural assets. For this reason, there are organizations, and associations working in TRNC, that focus on preserving the traditional structures and culture of the island. They are open to international support and work for the development, unity, solidarity, and preservation of culture:

1- Technical Committee on Cultural Heritage (TCHH)
2- United Nations Development Program (UNDP).

1- TCHH

The island of Cyprus has a rich and diverse cultural heritage but the turbulent events and the political unrest created serious obstacles to the conservation of the cultural heritage. The Turkish Cypriot community also faced difficulties in preserving their

cultural heritage as a result of being economically and culturally isolated. However, the establishment of the Technical Committee on Cultural Heritage (TCCH) in 2008 represented significant progress in resolving these concerns (Reid, A., 2021).

TCCH, composed of experts from both communities, has established cooperation procedures and initiated a number of initiatives for the protection of cultural heritage. TCCH has successfully preserved the common cultural heritage of Cyprus, primarily through the restoration of monuments and educational activities for younger generations (Tuncay, 2009). By entering into collaborations with the European Union and other international organizations, it has successfully received financial aid and gained international recognition for its programs. TCCH's efforts have proven that it is possible to preserve a common cultural heritage despite the existence of ethnic and religious inequalities in Cyprus. These successes can serve as a paradigm for comparable areas of conflict (Grchev & Dincyurek, 2019).

However, TCCH's future prosperity depends on its capacity to overcome constraints in both financial and human resources. Moreover, the effectiveness of their projects is currently constrained by political restrictions and social differences. Therefore, the progress of TCCH will depend on efforts to increase public communication, expand community participation, and encourage increased participation in its projects (Goryunova & Wei, 2021).

Out of hundreds of projects that held on with the cooperation of UNDP, TCCH completed a lot of restoration and conservation projects at the TRNC. Some of the projects that completed by TCCH can be listed as:

1- Othello Tower

2- Venetian Walls Between the Arsenal and Sea Gate

3- Bedesten

4- Paphos Hamam

5- Bandabulia.

Each of these projects is important and successful example for us to understand the importance of inter-institutional cooperation and cooperation in the protection of cultural heritage. For better understanding, these two examples can be explained.

1-Othello Tower

The Othello Tower - also known as the Citadel which forms a gateway between port and sea, crowning city walls - is an important monument in the histories of Famagusta, Cyprus, and the Mediterranean (TCCH, 2018). Through its gates, an unmistakable sense of what this citadel once came the lion-scared centuries-old Lion of Venice that still reigns from on high (Fig.11). Priority intervention project of one of the Technical Committee on Cultural Heritage. There is a series of installation panels in the Great Gallery that explain some history, values, and conservation progress on-site to educate visitors (UNDP, 2023)

Figure 20: Lion Figure of Othello Tower, UNDP Photo/Okan Erguler, 2015

The Committee embarked on a Survey, Investigations Assessment, and Project Design study in 2012 to prioritize issues of note learned from the monument materials for stabilization, consolidation interventions sites rendering a safe/secure accessible environment/passageway, particularly for Persons with Disability. Project objectives included emergency masonry stabilization, development to areas of collapse or severe damage, construction of an appropriate drainage system, new roofing layers, amenities for site wayfinding, and interpretive elements complimentary with the tower's architectural setting level access including restroom facilities for disabled visitors (TCCH, 2018).

2-Venetian Walls Between the Arsenal and Sea Gate

Famagusta is famous throughout Europe, the Middle East, and North Africa for its fortresses that were built by various kings over time and changed to fit the weapons of today. After the Third Crusade Lusignans probably first erected defenses which subsequently were also built by Genoese, Venetians, Ottomans, and British. In order to keep these walls undamaged and protected, most of them are made up of red ashlar facing and rubble masonry (UNDP, 2023).

From April through August 2014, the 'Survey, Investigations, Assessment, and Project Design' took place. The outcome of this was a study and condition evaluation for the city and port walls of fortifications dividing the Arsenal from Othello Tower (UNDP, 2023).

The study sought to first identify key issues, research into and understand the monument, and then make plans on how to ensure it is stable and its most fragile elements are protected in line with international conservation standards. Works were

focused only on the city side of the walls that stand between the Arsenal and Sea Gate including brickwork as well as stonework, facilities for managing drainage systems, cleaning of site and vegetation, access for disabled people as well as visitor information points (TCCH, 2018).

Figure 21: Venetian Walls Between the Arsenal and Sea Gate, Kerim Belet, 2017

To summarize, TCCH's efforts to preserve cultural heritage have not only strengthened diplomatic ties and promoted sustainable development, but also strengthened mutual understanding and respect between different communities.

2- UNDP

The United Nations Development Program (UNDP) has been supporting the preservation of Cyprus' cultural heritage since 2010 through its annual work for The Technical Committee on Cultural Heritage (TCCH). Working in close partnership with the European Commission in Cyprus, UNDP backs support to increasing the capacity of TCCH for inclusive consultation on technical and strategic dimensions of its work. These consultative dialogues include the convening of religious leaders from both sides, relevant technical departments, and local media (UNDP, 2023).

UNDP conducts joint monitoring visits with the Advisory Board of the TCCH and holds regular meetings to encourage full participation in all stages of the project cycle by stakeholders. When technical teams from both sides are actively involved, with architects working alongside archaeologists and engineers, etc., over the long term this contributes towards team- and confidence-building as well as further exchange of experiences between Greek Cypriots and Turkish Cypriots for example, which is also a demonstration of successful joint-working (UNDP, 2023).

UNDP also assists the TCCH in planning and organizing consultative processes to ensure that stakeholder aspirations and concerns are understood, beneficiary needs are addressed, and feedback is shared. Under the current project cycles, public consultations are held at the beginning of each project, and public outreach exercises/surveys are conducted by dedicated personnel in each project location with the support of village representatives and local communities. Moreover, UNDP provides logistical and strategic support to the TCCH in its efforts to re-establish community links between villages and their former residents and encourage cross-community exchanges (TCCH, 2018).

Figure 22: The Technical Committee on Cultural Heritage during a monitoring visit to the Famagusta Walls, Olkan Erguler, 2014 (URL11)

Chapter 6

CANOVA ASSOCIATION

The Canova Association is a well-known international non-profit organization founded in 2001 as a prominent global non-governmental organization dedicated to restoring and preserving the original stone structures in the medieval village of Canova, located in the Crevoladossola (VB) region of Italy. The main goal of the association is to evaluate the historical architectural heritage of the region through educational, promotional, and artistic efforts. Maurizio Cesprini and Ken Marquardt have witnessed the progressive transformation of this isolated historic town into a livable setting by following the traditional knowledge of the residents.

Through extensive involvement in the field of conservation and restoration and years of dedicated practice, they have developed a profound comprehension of conservation and restoration approaches. Maurizio and Ken founded the "Canova International Meeting of Architects" in the association's first year. During the last twenty years, this event has hosted more than sixty renowned architects from different nations. The group's purpose is to disseminate knowledge about the historical techniques employed in the Romanesque style, which Ossola has primarily preserved. The association actively strives to enhance public awareness of the historical significance and aesthetic elegance of indigenous architectural traditions. They organize a diverse range of educational, cultural, and artistic events and activities.

The Canova Association has undertaken several influential efforts aimed at revitalizing derelict homes. Their main objective is to restore and rejuvenate Canova's eight buildings and the surrounding area, which includes Ghesc. To make sure that the restoration projects are genuine and long-lasting the team carefully considers the opinions of everyone involved encourages using recycled materials and supports the preservation of building methods. The organization enhances discussions, on restoration and conservation by blending approaches, with an understanding of how materials are used. Moreover, it fosters a learning environment by offering hands-on workshops and academic courses.

Figure 23: Canova sign, photo by author, Italy, 2023

These educational programs provide an insight into the social dynamics involved in stone construction projects while also covering the essential technical aspects needed

for conserving heritage sites. The Canova Association collaborates with respected academic institutions, such as the ABC Department of the Politecnico di Milano, to establish state-of-the-art laboratories, such as the "Laboratory of Places," and also offers practical courses. This area serves as a hub for sharing the latest information on photogrammetry and laser scanning techniques used for accurate measurements. The company also conducts research particularly studying how well stone walls conduct heat during winter. They use advanced contact thermo flow meters, for this research. The company has partnered with institutions like the Interuniversity Department of Regional and Urban Studies and Planning (DIST) at the Politecnico di Torino, for research collaborations. The association's dedication to scholarly research and dissemination of knowledge is seen in these joint endeavors, which seek to safeguard and honor architectural legacy.

Since 2010, the Canova Association has undertaken a substantial conservation effort. They obtained a group of buildings to be used as a location for annual workshops and field trips focused on educational projects. The current state of things is that two are being repaired while the rest coming up to three are proposed restoration for residential purposes only. Restoration activities demand that traditional practices be preserved in which the ideas of participants are obtained and reused such as using salvaged materials like stones or debris from old structures. This strategy aims to uphold traditional construction techniques that have been transmitted across generations (Cesprini & Marquardt, 2020).

Associazione Canova has been organizing summer school camps for more than fifteen years. These programs aim to raise awareness about the conservation and improvement of stone architectural heritage and its historical influence on the natural environment.

A detailed experience that mixes theory teaching with on-site practical training is what these courses offer. The reason for these summer schools is to assess the local architectural heritage and fully investigate its traditional and contemporary building methods. The basic aim of elementary instruction courses was to renovate community landmarks such as churches, washhouses, bakeries, and factories. Indeed, these buildings have significant historical importance within their settlements.

6.1 FoRTI (Formazione Recupero Radizione Innovazione)

FoRTI is a group of students studying Architecture, Design, and Engineering at Torino Polytechnic University, formed to emphasize the importance of direct interaction with materials. Although the university offers a rich education in terms of project experiences and group work, the practical application of acquired knowledge is rather neglected. Forti therefore prefers to interact directly with materials and masters to support a participatory and alternative learning model.

As mentioned in the Technical Report of FoRTI (2022), the method of “learning by doing” adds an additional value to traditional education: the implementation of construction techniques encouraged in educational sites promotes a more conscious approach to designing intervention proposals. In the university experience, it is often challenging to determine the effectiveness of proposed project hypotheses and understand the technical-operational procedures required by these hypotheses. Therefore, they propose a hands-on approach that encourages direct interaction with materials, and the opportunity to experiment with many possibilities, and thus the ability to determine the most suitable technique for each case study. Each individual contributes to the realization of a concrete project that they might benefit from in the future as part of the construction process.

The FoRTI team aims to complete the restoration of the Fresco House and make this used by future students in addition to the association and school camps. The team, which believes in the value of achieved success, aims to transfer these successes to the new students who will take over the project. The project has great potential and the training course, with direct contact with local workers and businesses, provides a significant amount of practical knowledge. In this regard, a “transfer” method has been organized where former students are professionally supported from outside, enabling them to eventually take over the project. The aim is to enrich students' teaching experiences through theoretical and practical workshop activities, providing them with opportunities to participate in practical work areas by engaging in traditional heritage conservation efforts from the early stages of education. Furthermore, it promotes future-oriented collaboration and cultural exchange by establishing a network consisting of beneficial associations, experts, and companies for professionals.

6.2 Ghesc “Laboratory Village”

Ghesc is a small village that is eight hundred years old and is located in the dense woodlands of the Val d’Ossola. It is situated between the path of the river Toce and the medieval settlement of Canova. Ghesc is one of the many ancient villages in the valley. Val d’Ossola, a region located on the border, between Switzerland and Italy has long been a crossroads where various cultures come together. It has been a foundation for the growth of Roman societies leading to the formation of numerous settlements.

Figure 24: Location of Ghesc Village, Italy (URL12)

These villages primarily settled on elevated terrains and employed diverse methods of construction. Currently, Ghesc is the location of noteworthy revitalization endeavors that were commenced in 2010 by Maurizio Cesprini and his associate Paola Gardin. This settlement left deserted for almost a century, was engulfed by the thick and untamed vegetation that surrounded it. However, it managed to retain the key characteristics of the local architecture, thereby avoiding the significant architectural influences of the 19th and 20th centuries.

Figure 25: Ghesc Village, Ghesc, Italy (URL13)

Today, the village of Ghesc, which consists of eight houses, three of which have been acquired by Associazione Canova since, has been opened to participants. The purpose of this opening is to further the project of preserving Ossola's traditional stone heritage through summer workshops. There are five houses in the village that are designated for private housing.

Out of them, four houses have already started the process of architectural improvement. In 2007, Maurizio Cesprini and Paola Gardin purchased a building in the village called Alfio House. They personally renovated the house and relocated here permanently in 2012, becoming the initial inhabitants of the town.

The initiative by Associazione Canova intends to establish Ghesc as a permanent 'laboratory village' for the purpose of studying and gaining in-depth knowledge of stone architectural heritage and traditional construction processes.

Figure 26: Ghesc sign, photo by author, Italy, 2023

The summer workshops, which annually draw in numerous students, implement improvement projects using self-construction and participatory design methods within a span of 10 days. Building reuse projects advocate for the utilization of sustainable materials, enhancing the worth of pre-existing structures, and occasionally include the repurposing of demolished components. Additionally, its objective is to repurpose and reinterpret the existing cultural legacy by employing cutting-edge technology and methods that align with energy conservation and sustainable construction objectives.

6.3 Case Study: Casa Dell’affresco

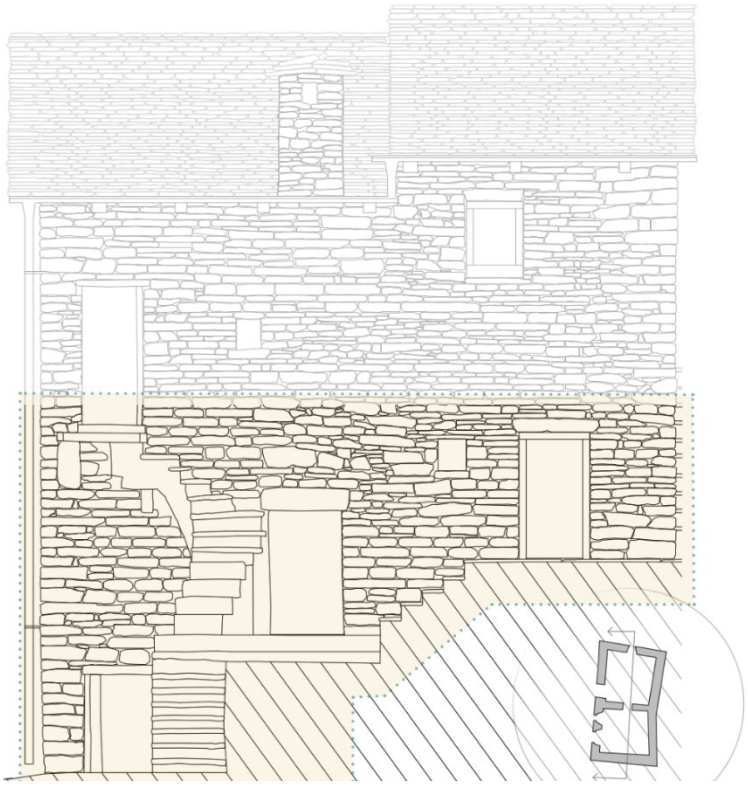

Figure 27: Casa Dell'affresco, (FoRTI, 2023)

Nowadays, as the responsibility to protect the environment increases, two basic tasks come to the fore in the field of construction and building management. First, recycling and reuse of existing structures becomes a priority in order to minimize the construction of new buildings and land use. Secondly, reducing the energy consumption of buildings is aligned with sustainable development goals. There are two responsibilities since preserving the environment is unavoidably necessary.

- Firstly, a highly effective approach to minimize the construction of new buildings and utilization of land, potentially even eliminating them entirely, is to prioritize the recycling and repurposing of existing buildings.
- Secondly, it is crucial to decrease the energy requirements of buildings (Consoli, Bocco, Raimondo 2020). Traditional buildings typically employ

indigenous materials and frequently utilize solid masonry construction, with a breathable wall structure.

Stone buildings serve as a prime illustration of this architectural approach. The primary objective for historic structures should be to maximize energy efficiency without compromising the buildings' character by raising the potential for long-term structural damage. The building being intervened is known as Casa Dell'affresco and is an essential component of the complex of stone structures, originally built in and owned fully by Canova Association.

The building, situated on multiple stories, has already undergone conservation rehabilitation interventions by Canova. Presently, the stone-bearing framework and the stone roof, constructed in adherence to local customs, have been fully repaired. The redevelopment operations have also encompassed the upstairs and rooftop spaces (Recupero di un edificio in Pietra in Valle D'Ossola, 2023).

The project's main objective is to have a fully functional commercial kitchen including public washrooms and utilities on the upper level of the first floor and in the basement. The proposed project aims to improve energy efficiency and indoor comfort by embracing sustainable technologies while combining traditional methods with innovative solutions. It also aims to finalize the design of the service areas required for the future kitchen. The project entails the refurbishment of the ground floor and the upper-level area on the first floor (west side), including the installation of glass walls and flooring made of natural lime and Ossola Stone. Additionally, the tiling of the east room on the first floor will be carried out. The walls on the east side will be reinforced by installing steel beams and defining the interior spaces. Additionally, partition walls

will be raised using lime and hemp blocks, and various natural insulation materials like hemp, cork, and straw will be used for internal insulation. There is a need to prioritize the use and evaluation of several organic materials that have features such as low energy needs, zero or negative carbon print, biocompatibility, and recyclability. An emphasis was put on structural and environmentally sustainable solutions in keeping with historical architectural values. Simple rudimentary technological solutions are becoming more popular in educational context.

6.3.1 Structures of the Project

The materials were chosen based on predetermined criteria. The preference was given to natural materials that have had little processing and are free from hazardous compounds. This choice enables local sourcing and ensures compatibility with the existing resources. The exceptional efficiency of architecture, contingent upon its purpose, guarantees that future applications will have minimal ecological consequences and enhances its appropriateness for self-building. Moreover, there is significant educational merit in acquiring knowledge of both high and low-efficiency construction methods. These deliberate and environmentally conscientious choices contribute to sustainable construction by reducing the ecological footprint (Recupero di un edificio in Pietra in Valle D'Ossola, 2023). Here are the eco-friendly materials used in the process of construction:

1- Lime-Hemp
2- Soil-Straw
3- Stone
4- Cellular Glass.

1-Lime Hemp

Hemp lime absorbs and releases moisture, protecting timber frames while also promoting ventilation and helping to manage indoor humidity. Its superior thermal inertia facilitates natural ventilation, helping to maintain interior air quality. The material is long-lasting, resistant to fire and moisture, and has high acoustic and insulating performance. Because hemp lime sequesters more CO2 than it releases during building, it has a net negative carbon footprint. It is used for thermal plaster and bricks for insulation and partitioning, and it is adaptable enough to be mixed and poured on-site (Shea, et al., 2012).

Figure 28: Lime hemp, Ghesc, Italy, photo by author, 2023

2-Soil-Staw

People have built structures out of natural materials like soil and straw throughout history. This mixture of straw fibers and mud—a mixture of soil and water—acts as an efficient insulator. These materials have good thermal inertia that helps control indoor temperatures and lowers energy usage for air conditioning. They are also reasonably priced and easily accessible in the area. By absorbing extra moisture and releasing it

when the air is dry, they also control humidity. In order to reduce waste, the materials can be reconstituted with water and show a strong resistance to compressive stress. By varying the proportions of straw to soil, mixtures with varying densities that are cohesive and simple to assemble can be made for a range of uses (Tlaiji et al., 2022).

3-Stone

Utilizing stone flooring is a deliberate decision that pays homage to the artwork and upholds the longstanding architectural history of the Ossola building, characterized by the use of huge stones.

Figure 29: Traditional Ossola Stone, photo by author, Ghesc, Italy, 2023

Sizeable fragments shall be placed horizontally on the screed that has been treated with lime, following the specified drying period of the screed. This option presents a material that is commonly overlooked but is well-suited for environments located above ground level. It is suitable for the intended purpose of the rooms, is straightforward to use, and has minimal negative effects on the environment. Additionally, it provides an environment that allows students to learn traditional architecture and building methods (FoRTI, 2023).

4-Cellular Glass

Cellular glass is a resilient and long-lasting substance that provides insulation. Due to its qualities, it is highly effective as an insulator for demanding applications including insulation and waterproofing beneath foundation floors. The pulverized recycled glass is combined with environmentally safe activators and expanded in a continuous furnace. There are two options for cooling: either forming sheets or granules, depending on the specific circumstances. For our project, we opted for loose cellular glass, which was probably recycled (given its high energy use) to minimize environmental consequences, and subsequently compacted on the premises. This material possesses key characteristics such as impermeability to water and vapor, exceptional mechanical strength, resistance to fire, and effective thermal insulation (FoRTI, 2023).

6.3.2 Interventions to Casa Dell'affresco

Since 2019, various interventions have been carried out at Casa Dell'affresco with different resources and implementation methods. These interventions have been approached from many angles and exemplify a diverse collective effort to preserve small productivity (FoRTI, 2022). Before the study begins to examine the interventions from FoRTI Technical Report for Casa Dell'affresco by year, it will evaluate the conservation and restoration works carried out at Casa Dell'affresco. These interventions include:

1- 1st Floor Door Opening
2- East Room 1st Floor Rooftop
3- Plate Resistances
4- Sections
5- Thermal Insulating Plasters

6- The East Room First Level (Covered with Plaster)

7- East Room 1 (Plaster)

8- West Room 1 (Plaster).

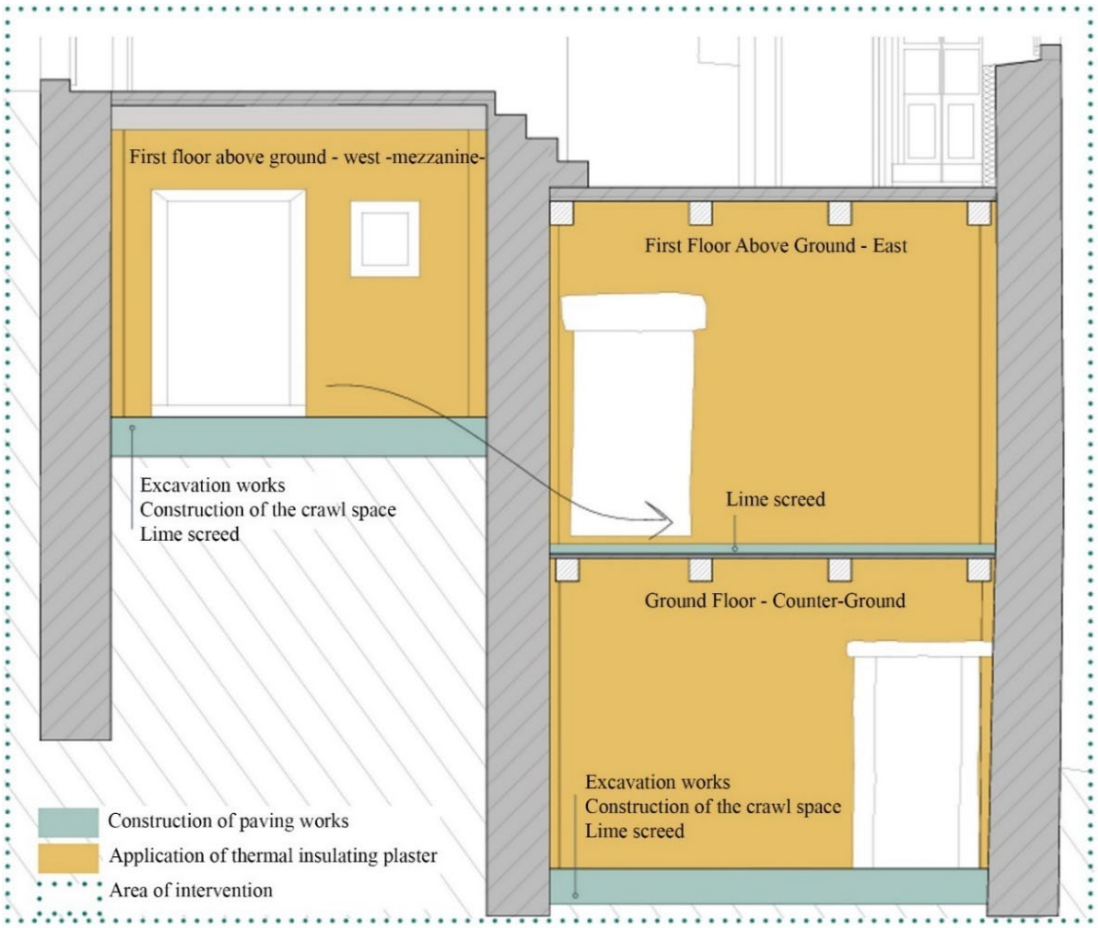

Figure 30: Interventions to Casa Dell'affresco, (FoRTI, 2022)

1-First Floor Door Opening

The demolition of wall partitions and seams was done by hand in order to properly match the seams of the new connecting door between the 1st Floor East and West 1st Floor, which varied in height by around 80 cm.

2- East Room 1st Floor Rooftop

Installing an IPE 160 steel carrier beam, larch cladding, wire mesh, breathable fabric, and a cast NHL5 natural hydraulic lime plate are the steps involved in removing the existing coating. Flooring made of Ossola Stone (Gneiss) will be put in.

Area:13,4 m²

3-**Plate Resistances**

The first floor on the west side and the ground floor on the east side are where this is supposed to be done. As a first step toward the intervention, the Canova Association carried out appropriate excavation work, which included installing the stratigraphic package. Compressed granular cellular glass is employed as the screening area, and TNT (non-woven fabric) is used. The screed is composed of lime-based natural hydraulic NHL 5 with galvanized reinforcement mesh and a breathable membrane. Ossola stone is used for the flooring.

Ground Level on the Eastern Side: 13,4 m²

West Side of the First Floor: 11,8 m²

4- Sections

Once the systems are ready, partition walls will be built in the three specified rooms using 12 cm thick hemp-lime brick blocks. A specific mortar that is suitable for sealing the joints will be used to set the bricks. Once the gaps and discontinuities have been filled, the binder will completely cure before a layer of plaster retention mesh and a lime-based finish are applied.

5-Thermal Insulating Plasters

Insulating stone buildings' perimeter walls is a major topic of discussion when it comes to energy efficiency. Although thermal insulation and the mitigation of thermal bridges are two advantages of exterior coating insulation, keeping an aesthetically pleasing appearance and integrating it with the roof covering are two problems. Plastering stone walls is forbidden by local commissions and ordinances, even though it is a long-standing custom. Both the amount of internal thermal storage capacity and habitable area are decreased by internal insulation. Custom-made mixes will be used for interior thermoplastic coating installation on-site. The term "soil straw" describes the addition of straw to soil for a variety of objectives, such as strengthening the soil's structure or increasing its capacity to hold water.

6-The East Room First Level (Covered with Plaster)

Thermoplaster will be made of a mixture of natural elements, including hydraulic lime, hemp, and cork. The manufacturer's instructions will be followed when preparing the mixture on the construction site. After that, a trowel will be used to physically apply it to the wall, making sure that the entire thickness is 10 cm. To prevent thermal bridging, the same mixture and installation technique will be used to insulate the edges of the apertures and the parts that are next to the slab. In order to give structural support for the final fixing, which is composed of natural hydraulic lime, the walls will be strengthened with jute plaster support mesh.

Area 24.5 m^2

7-East Room 1 (Plaster)

The room will be installed with thermoplaster using a distinct method that combines hydraulic lime and cork. The manufacturer's instructions will be followed to produce this mixture on-site, and it will be physically troweled onto the wall until it reaches a total thickness of 7 cm. To prevent thermal bridging, the margins of the holes and the areas surrounding the slab will be insulated using the same mixture and assembly method. The natural hydraulic lime-based final fixing will subsequently be supported by jute plaster support mesh applied to the walls.

Area:30 m²

8-West Room 1 (Plaster)

Two distinct methods are scheduled to take place in the second-floor west chamber. The interior cladding in the northern section will be constructed of linden hemp and will be attached to the wall with a wooden frame that is 10 cm thick. This decision was made in order to maintain the top-level wall's continuity, as it was altered in 2021 and a connecting staircase will be erected next to it in the future. There will be a hemp lime skim coating and jute plaster support mesh used.

For the other three walls, a mixture of straw and soil with a high percentage of clay will be used, creating a wooden frame fixed to the wall with a total thickness of 10 cm of jute plaster support mesh and a clay-based leveling compound. The edges of the openings and the terminal part close to the plate will be sealed with a straw-soil mixture.

The hemp lime surface area: 4.5 m²

The soil-straw surface area:20 m²

6.3.2.1 2022 Interventions

During the workshop, a total of 10 students took part in the workshop, with the majority of them being enrolled in Architecture, Master's, and Undergraduate-level courses. The following interventions have been executed: The location is on the first floor, specifically in the east room, with a corridor that opens on the same floor. The purpose of the insulation is to plaster the walls (Recupero di un edificio in Pietra in Valle D'Ossola, 2023).

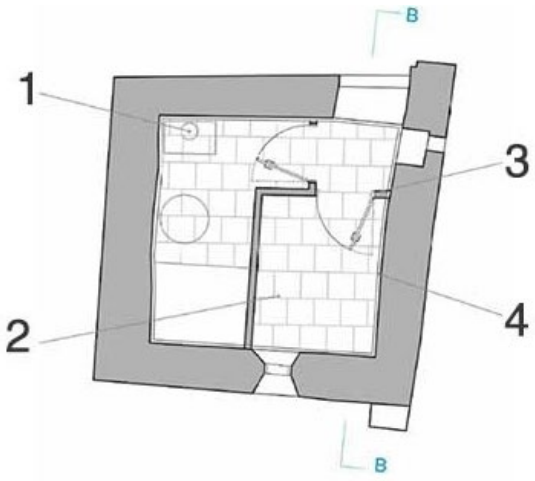

Figure 31: Casa Dell'affresco Detail of the works planned on the ground floor, (FoRTI, 2022)

Explanation of interventions illustrated in Figure 31:

1-Heating System

Boiler and Distribution

• Biomass boiler with storage, 500 liters heater, and smoke exhaust on the roof

2-Flooring

• Excavation of foundations.

• Loose ground leveling with gravel and installation of geotextiles.

• Installation of expanded cellular glass and installation of waterproof layer.

• Distribution network with NHL5 hydraulic lime jet, 5 cm thick.

• Stone flooring installation.

3-Construction Part

• Made of fiber bricks compressed hemp and lime, 8 cm thick

• Terracruda thermoplast

• 12 cm thick thermoplastic made from a mixture of straw and terracotta

4-Thermoplast in Raw Soil

• 12 cm thick thermoplast made from a mixture of straw and raw soil

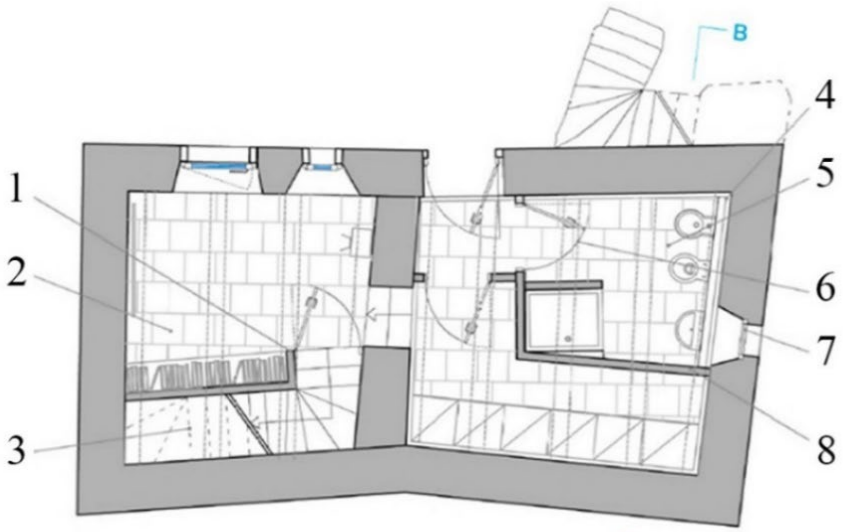

Figure 32: Casa Dell'affresco Detail of the works planned on the ground floor, (FoRTI, 2022)

Explanation of interventions illustrated in Figure 32:

1- Creation of Sections

• Made of compressed hemp fiber and lime bricks, 8 cm thick

2 - Flooring

• Excavation at the base of foundations

• Ground leveling with loose gravel and installation of geotextiles

• Installation of 30 cm thick expanded cellular glass and installation of waterproof coating

• Nhl5 hydraulic lime jet with distribution network, 5 cm thick

3- Interior Staircase

• Brick Stairs

4- Lime and Hemp Thermoplast

• Application of hemp lime thermoplast consisting of one coat of NHL5 hydraulic lime plaster

• Installation of 12 cm thick hemp lime-type thermoplastic

• Application of the final coat

5 - Floor Plate

• 5 cm thick fir plank laid on a wooden carrier beam (available)

• Establishes a vapor barrier

• Installation of systems

• Substrate casting in NHL5 hydraulic lime

• Installation of local stone flooring

6- Interior Window

• Made of solid larch wood

7- Flooring Frame

• U=1.3W/m2K certified solid larch wood windows and doors

8- Construction of Sections

• Made of compressed hemp fiber and lime bricks, 8 cm thick

Figure 33: Casa Dell'affresco Detail of the works planned on the first floor - House of Arches, (FoRTI, 2022)

Explanation of interventions illustrated in Figure 33:

1- Creating an Insulated Floor

• Solid larch cladding (available)

• Vapor barrier

• Installation of systems

• Substrate poured from nhl5 hydraulic lime; 6 cm thick

• Acoustic protection mat, 1 cm thick

• Installation of 16 cm thick and 60 cm spaced larch beams

• Filling with loose hemp insulation material

• Installation of 3 cm thick solid chestnut flooring

2 - Laying the Frames

• Certified solid larch wood windows and doors, transmittance U=1.3W/m2K

3- Lime-Hemp Thermoplast

• Application of hemp lime thermoplast consisting of one coat of NHL5 hydraulic lime plaster

• Installation of 12 cm thick lime-hemp type thermoplastic

• Application of the final coat

6.3.2.2 2023 Interventions

The data collected from three separate workshops, each lasting 10 days, held between July 10 and August 8, 2023, was analyzed under this heading. The analysis was based on the author's notes and visuals from the final 10-day period, as well as contributions from Team ForRTI. The information obtained from the annual technical report supports the presentation to the reader.

A total of 16 students, who were attending workshops, together with 2 representatives, primarily from Torino Polytechnic Architecture, consisting of both master's degree and three-year study students from Urban and Regional Planning courses, took part in the activity. Throughout the duration of the project, the students resided at a nearby lodging establishment and labored from 09:00 to 18:00, with a midday break from 13:00 to 14:00. The site's enormous space and the scope of the project allowed for the formation of multiple groups, each consisting of approximately 10 individuals.

This division facilitated effective management and organization of the available space, ensuring that everyone had the chance to actively participate, experiment, and

contribute to every stage of the construction process. The issue of safety, particularly at construction sites, was a significant factor in the planning of workshops. In collaboration with the PROGES Directorate Security Service, a "Training Construction Sites Work and Risk Management Plan for the Student Team" was developed. This plan includes a table that identifies hazards and conducts risk assessments (Forti, 2023). During the program, Maurizio Cesprini provided basic information and lectures on natural materials in construction, as well as the concerns related to heritage and historical stratification. Additionally, trips were organized outside the city and to adjacent villages.

Explanation of interventions illustrated in Figure 34:

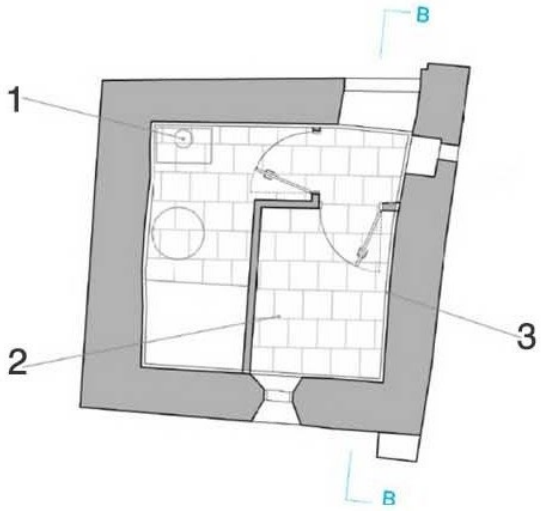

Figure 34: Casa Dell'affresco Detail of the works planned on the ground floor, (FoRTI, 2023)

1-Heating System

Boiler and Distribution

- Excavations for the preparation of electrical and hydraulic systems.

- Preparation of electrical-hydraulic systems for a biomass boiler with 500 liters of heat storage and smoke extraction on the roof.
- Application of the final coat

2- Flooring

- Excavation of foundations down to their foundations.
- Ground leveling with loose gravel and laying geotextiles.

3- Thermoplast in Hemp Lime

- Application of hemp lime thermoplast consisting of one coat of NHL5 hydraulic lime plaster
- Installation of 12 cm thick hemp lime-type thermoplastic
- Application of the final coat

Explanation of interventions illustrated in Figure 35:

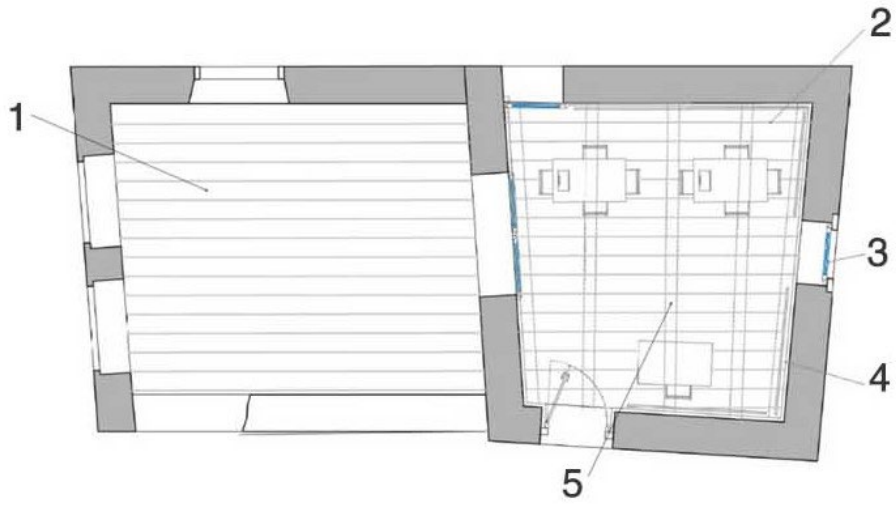

Figure 35: Casa Dell'affresco Detail of the works planned on the ground floor, (FoRTI, 2023)

1-Slab on the ground

- Excavation at the base of the foundations
- Ground leveling with loose gravel
- **2- Lime and Hemp Thermoplast**
- Application of hemp lime thermoplast consisting of one coat of NHL5 hydraulic lime plaster
- Installation of 12 cm thick hemp lime-type thermoplastic
- Application of the final coat

3- Lime and Hemp Thermoplast

- Application of hemp lime thermoplast consisting of one coat of NHL5 hydraulic lime plaster
- Installation of 12 cm thick hemp lime-type thermoplastic
- Application of the final coat

4- Floor Intermediate Plate

- 5 cm thick fir plank laid on a wooden carrier beam (available)
- Establishes a vapor barrier
- Installation of systems
- Substrate casting in NHL5 hydraulic lime

5- Construction of Sections

- Construction of timber frame structure
- Filling of walls made with stone and mortar

Explanation of interventions illustrated in Figure 36:

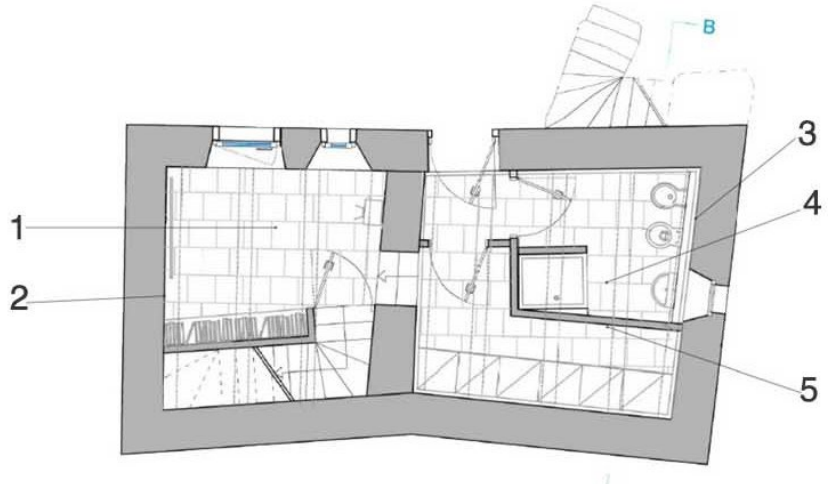

Figure 36: Casa Dell'affresco Detail of the works planned on the first floor - House of Arches, FoRTI, 2022

1-Concrete Slab Construction

- IPE steel beams
- corrugated sheet
- Tecnaria connectors for steel
- Electro-welded mesh
- Structural concrete pouring 1600 - rck 35

2- Creating an Insulated Floor

- Solid larch cladding (existing), repositioning of beams

3- Floor Frame

- Preparation of chassis/false chassis

4- Lime and Hemp Thermoplast

- Application of hemp lime thermoplast consisting of one coat of NHL5 hydraulic lime plaster
- Installation of 12 cm thick lime-hemp type thermoplastic
- Application of the final coat

5- Creating a Ceiling from Reclaimed Wood

- Restoration of recycled wooden beams
- Cutting and laying planks

6.3.2.3 Steps to Construct a Stone Wall

The next 2023 summer workshop aims to convert the lowest two rooms of the frescoed home in Ghecs village into storage spaces and toilets as part of the restoration process. In order to carry out this transition, different techniques for constructing partition walls were assessed, and ultimately a timber frame filled with stones and lime mortar was selected. Due to the elevated humidity levels, it was concluded that timber logs were not acceptable since they are prone to fungal and mold damage.

Figure 37: Beginning of the wall construction, FoRTI, 2023

Additionally, brick masonry was not consistent with the age and characteristics of the construction. The selected approach entailed constructing a timber framework, filling it with stones and mortar, and subsequently applying insulating lime plaster as a covering.

1 - Analyzing a Reference

The construction of the wall commenced by scrutinizing the preexisting wall, which was constructed using the identical method in the village of Croppomarcio over four centuries ago. The primary objective of this study was to comprehend the manner in which the timber elements of the wall are interconnected. We have already proposed alternative methods for establishing a connection. Nevertheless, comprehending the construction techniques employed in the wall in previous times was of utmost importance. The initial wall was not securely attached to the floor. Two side walls provided support for the wooden beams. Due to the absence of a physical link between the beam and the floor, it was effortless to insert your hand through the opening.

The wooden posts are secured to the beam using wood frame inserts, with one inserted from the top and another from the bottom. However, the angle components are positioned independently without any interconnection: neither piercing nor cutting is performed. It seems that these were inserted at various stages during the construction process. The majority of them are positioned at a 36° inclination. We have chosen to implement this design on our wall. The timber structure is tightly packed with mortar and stones.

2 - Preparing for the Construction of The Wooden Frame

We conducted a thorough examination of the construction and used a basic pencil to precisely establish the position of the future wall on the ground. For the selected section, we utilized 6x8 panels and expanded the width by two cm on both sides, considering the need for future plastering. Consequently, the thickness of our wall increased to 12 centimeters. Wood frame building commenced with the process of sawing wooden planks.

3- Construction of the Timber Frame

After perforating the objects, we proceeded to securely attach the wooden panels to the stable floor using screws. In order to assist in the installation of vertical wood pieces in the corners, we strategically positioned screws 10 cm away from the ends of the wood board. We equally dispersed the supplementary screws across the wooden planks. Next, we repaired the vertical components. In order to do this, the positions of the wooden poles were first established by marking the existing wooden beam.

Special attention was given to ensure that the wooden poles did not interfere with the beam screws. The asymmetry in the frame structure enabled the positioning of components. The vertical poles of the frame construction were constructed using timber pieces that had cross-sectional dimensions of 6x8 cm. Screws were used to fasten vertical parts to horizontal elements.

Following the project specifications, the central portion of the wall was designated for the installation of plumbing necessary for the sink and water supply. Thus, a conspicuous vertical timber column was intentionally excluded from this specific section of the wall. Alternatively, two horizontal beams and two upright reinforcements were incorporated into the lower portion of the wall.

4-Application of Mortar and The Placement of Stones to Finalize the Building

Prior to the process of wall-filling, we affixed wooden boards to a single side of the wall. This facilitated the rapid and secure filling of the walls, preventing any mortar leakage or the collapse of the stone fill.

The wall building was accomplished using lime mortar and stones (Fig 38). As the stones were solely utilized as fillers, we positioned them in a haphazard manner. In order to preserve the wall's smoothness, we typically utilized stones that were less than 8 cm in thickness. If the stones exceeded a size of 8 cm, we pulverized them with a hammer in order to achieve the appropriate dimensions.

Figure 38: Stone wall filling, photo by author, Ghesc, Italy, 2023

Occasionally, we faced the issue of wall collapse due to the swift construction process and the irregularity of the stones. In this instance, we eliminated the stones and reconstructed the wall with an alternative method, thereby decreasing the quantity of mortar or achieving a smoother surface by exerting upward pressure on the wall with a plastering trowel. During the construction of the wall portion that included the electrical plastic box, we utilized a spirit level to verify its horizontal alignment both before and after filling the area around the box. In addition, we effectively blocked the entry of mortar by adding tape to the box. Once we had filled the section entirely and

given the mortar sufficient time to harden, we proceeded to remove the wooden planks and relocate them to different parts of the wall in order to continue our task (Fig 39).

Figure 39: Placement of Electric Box, photo by author, Ghesc, Italy, 2023

6.4 Workshop as Education

The project's objective is to provide students with a comprehensive experience through the implementation of three workshops and extra training activities conducted during the construction phase. Emphasis was placed on ensuring the safety and education of the participants, and a dynamic process of active learning and application was implemented throughout the project. Participants acquired valuable expertise through their involvement on an actual building site and made beneficial contributions to the project. The project is structured into three workshops, each lasting 10 days. Each participant is expected to dedicate roughly 75 hours to each program. Throughout the study session, students resided overnight in a nearby lodging facility in close proximity to the building site. The individuals engaged in labor for a duration of 8 hours every day, commencing at 9 am and concluding at 6 pm. Additionally, a lunch break was conveniently offered in the workplace. Participants, organized into groups of around

10 individuals, were given the chance to actively engage, explore, and take part in every stage of the construction process. Each process includes training, information, and discussion regarding the individual tasks, procedures, materials, and their qualities. The studies were conducted safely under the supervision of the instructor and contact individuals. The study was facilitated by training sessions and discussions, as well as organized activities such as field visits and introductory lectures.

The project idea is the outcome of collaboration across multiple working groups and was executed by students who were given this opportunity. The group's multinational and interdisciplinary structure enables students to utilize their abilities and uncover their potential, while simultaneously enhancing their experiences through cultural interchange. The goal of intervention planning is to guarantee that all aspects of the process, including building site schedules, materials selection, supply, and transportation, are in line with the present circumstances. Throughout this process, the focus has consistently been on prioritizing both environmental and economic sustainability.

Visiting the building site provides students with the chance to acquire novel techniques, as well as get insights into management and organizational issues, which will enhance their readiness for a future professional career. The objective is to cultivate consciousness of environmental issues, facilitate the chance for communal cultural interchange, and embrace an ecologically sustainable lifestyle in everyday existence. Within the project, it will become evident that these activities have the potential to generate a collective influence.

The program aims to exert influence and promote a broader audience both within and outside the university through a comprehensive communication and dissemination plan. The project's adjustment to the present circumstances provides a replicable model for intervention. The foundation of this paradigm is in the collaboration and administration between the academic realm and local groupings.

The objective of the project is twofold: to preserve a neglected location and instruct on historical construction methods, while simultaneously experimenting with innovative intervention techniques and technologies that align with the existing structures. The purpose is to provide the collected results as a model for future enhancement projects of the current legacy.

Chapter 7

FINDINGS & DISCUSSIONS

The conservation and restoration of stone structures is a complex and multifaceted combination of scientific, technical, and cultural integrity. This thesis aimed to make a comparative analysis between stone conservation practices in Italy and divisions in the TRNC. The study aimed to determine an effective configuration for conserving the rich heritage of the TRNC by examining Italy's applied methodologies and their potential in the TRNC.

As a result, this study provided valuable information about the diversity and compatibility of programming the stone conservation and treatment methods between Italy and TRNC, providing an important basis for their current appearance. Our innovative suggestions will support TRNC's progress in this field and guarantee the permanent conservation of cultural exchange. The study provides a significant contribution to the advancement and development of research in this field. The comparative case study between Italy and TRNC may encourage the development of new treatments for the protection of cultural assets and the lack of importance for similar places on a global scale.

7.1 Summary of Findings

This thesis study aimed to analyze and compare the differences and similarities in stone conservation and development algorithms between Italy and the TRNC. The success observed in Italy's stone conservation and restoration is attributed to the active

participation of non-governmental organizations and the strong support of educational institutions, expanding in many countries. These variables offer significant benefits in terms of both technical applications and the conservation of cultural change.

However, stone conservation and restoration efforts in TRNC face obstacles such as financial scarcity and lack of organization, promotion, and education. However, this study suggests techniques and development that can increase the potential of TRNC in this field. Especially the programming schemes and information from Italy and the applications recommended by these techniques can ensure the protection of the heritage of the TRNC more effectively. The Ghesc Village Project shows that the individual education paradigm can be effectively implemented in TRNC. This algorithm could have a significant impact on the preservation of cultural assets by supporting technical information and encouraging the active participation of local people by programming and facilitating on a certain level.

As a summary of the findings, we can present a certain structure of the gathered information, regarding the following:

1- Italy’s Success in Stine Conservation
2- Challenges in TRNC
3- Comparative Analysis.

1-Italy's Success in Stone Conservation

A number of elements are responsible for Italy's success in stone conservation and restoration. Major contributors include the country's solid legal systems, the general organization of civil society and government, and the high degree of public admiration

for cultural heritage. The Italian model is enhanced by detailed documentation, extensive research, and features of both traditional and advanced techniques.

The workshop organized by the Canova Association in Ghesc Village is an example of Italy's approach. The workshop's methodology and programming combine practical, hands-on learning with theoretical knowledge, providing a comprehensive understanding of traditional stone conservation. This approach not only educates products but also actively contributes to the conservation of cultural heritage.

2-Challenges in TRNC

On the other hand, TRNC faces various difficulties in stone conservation works. These include inadequate legal regulations, limited financial resources, and a lack of coordinated efforts among local organizations. In addition, there is a noticeable lack of public awareness and appreciation of the value of cultural heritage, hampering conservation efforts. Lack of awareness in society and the desire to protect cultural heritage result in a very low share of the public sector that can be built and expanded. The lack of demand and support consistently results in significantly lower running times.

3- Comparative Analysis

Comparative analysis revealed significant differences in the conservation practices of Italy and TRNC. Italy's integrated approach, involving multiple stakeholders and comprehensive planning, stands in stark contrast to the fragmented efforts observed in the TRNC. Moreover, the successful implementation of conservation projects in Italy can largely be attributed to the synergy between scientific research, practical implementation, and social participation.

The analysis highlights numerous similarities between the two countries that cannot be ignored. First of all, the common feature of being Mediterranean countries leads to parallels in terms of historical richness. Both Italy and TRNC are regions known for their rich historical and cultural heritage. There are many old buildings, historical cathedrals, castles and other important architectural structures in these countries. The presence of many historical buildings in both countries has led to the development of the tourism sector, which is an important source of economic income. Both countries attach great importance to preserving their historical and cultural heritage and transferring this heritage to future generations. For this reason, they have great respect for the methods, successes, and failures in the field of restoration and conservation.

However, the research reveals that although there are some good similarities in TRNC, there are also differences that negatively impact conservation techniques. Italy has significant financial resources and access to abundant resources for conservation and restoration initiatives at the national level. In Italy, which has multiple local organizations, associations, and foundations that work in this field and are very active in conservation and restoration, these studies are enthusiastically supported by these sub-organizations as well as the state. On the other hand, TRNC has more limited resources in this field and is more dependent on international financing. The lack of support and funds due to the small number of local organizations and their insufficient activity in this field is another factor that binds the TRNC to external financing. Italy is known for its abundance of educational institutions and experts in the field of conservation and restoration. However, compared to Italy, TRNC has fewer resources and expertise in this field, resulting in less comprehensive and detailed legal regulations.

As a result, practices in the TRNC are carried out with less strict supervision and control. It creates the necessary conditions or establishes the environment. These similarities and differences create a broad framework for comparing the conservation and restoration approaches of Italy and TRNC.

7.2 Recommendations for TRNC

As a set of recommendations for TRNC, we can suggest the following items;

- **Establishing a Legal Framework**

  A solid legal framework needs to be established and implemented to improve TRNC's stone conservation efforts. This framework should mandate the protection of cultural heritage and provide clear and unambiguous guidelines for this purpose. Legal regulations should include rules that encourage the protection of historical buildings and deter violations. Additionally, the effectiveness of the legal framework should be supported by regular auditing and mechanisms that increase its applicability. Such a structure helps ensure the consistency and long-term success of conservation projects.

- **Increasing Financial Support**

  Providing adequate financial resources is critical to the success of cultural heritage conservation projects. This can be achieved through government funding, international grants, and partnerships with the private sector. Financial support not only preserves cultural heritage but can also promote tourism, contributing to local economies. In this context, diversifying financial strategies and ensuring sustainable resources increases the impact of conservation projects and supports successful long-term results.

- **Support from Associations and Organizations**

  The role of associations and cultural organizations in conservation and restoration efforts is extremely critical. These organizations carry out awareness-raising and training activities for the protection of cultural heritage and undertake functions such as providing financial support and encouraging volunteer participation. They promote heritage through international collaborations and cultural events and encourage the active participation of society in this process. The existence and activity level of associations and organizations will play a vital role in the sustainable preservation of cultural heritage in TRNC.

- **Promoting Public Awareness and Education**

  As Oktay & Mısırlısoy (2023) stated, historical and environmental conservation education ought to be incorporated into all faculty curricula as a required subject, rather than being exclusive to architecture education in institutions. Since each person must maintain the continuity of the cultural legacy.

  Raising public awareness plays a critical role in the protection of cultural heritage. Educational programs and community engagement initiatives can help develop a sense of community pride and responsibility in preserving historic structures. A conscious society better understands the value of heritage and actively contributes to conservation efforts. When awareness campaigns are carried out through various media and events, social support for heritage conservation increases and this support supports the success of conservation projects.

- **Implementation of Comprehensive Documentation and Research**

  Comprehensive documentation and scientific research are of great importance in the preservation of cultural heritage. Italy's meticulous approach to this issue includes keeping detailed records of historical structures and carrying out scientific analysis. These methods provide a solid foundation for effective restoration projects. Detailed documentation and research help understand the history of buildings, their structural features, and previous restoration processes, thus enabling conservation work to be carried out in a more effective and informed manner.

- **Adaptation of the "Laboratory Village"**

  The workshop model developed by the Canova Association offers an applied training framework for TRNC. This model supports the development of technical skills and encourages international cooperation by providing practical training for local practitioners. Workshops increase the knowledge and skills of conservation professionals, while also increasing the success of projects by creating a collaborative working spirit. Such studies enable local experts and international stakeholders to achieve common goals by sharing their experiences.

Future research and conservation projects should focus on several important guidelines to further enhance the protection of cultural heritage in unique places such as the TRNC. First, it is of great importance to develop conservation techniques that address region-specific challenges and respond to the unique needs of the TRNC. This requires the creation of specific strategies that take local conditions into account. Collaboration with international

conservation institutions can facilitate the exchange of information and the adoption of best practices, supporting the alignment of local practices with international standards.

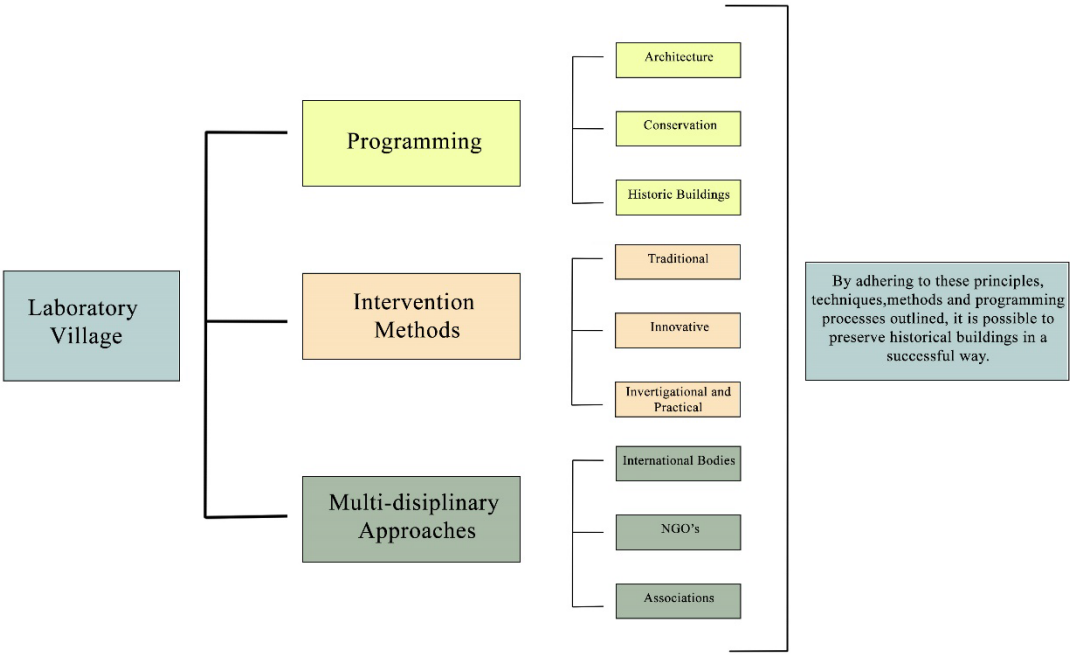

Figure 40: Conservation process of historical stone buildings (Author, 2024)

The factors detailed in Figure 40 play a fundamental role in the conservation process of historical stone buildings. The concept of the "Laboratory Village" provides a suitable environment to test conservation methods and multidisciplinary approaches in real-world conditions. This concept offers a practical synthesis of programming, intervention methods and multidisciplinary methods, enabling the sustainable conservation of historical structures.

While programming offers an adaptable framework for organizing conservation initiatives and intervention strategies, stone interventions are outfitted with traditional, innovative, and practical methodologies. These methods are arranged to satisfy

contemporary requirements without compromising their uniqueness. Specifically, historical building restoration and conservation are collaborative, adaptable, innovative architectural practices that are essential to preserving these buildings for future generations.

Multidisciplinary approaches emphasize the integration of individuals from different scientific disciplines and various interdisciplinary techniques in conservation. In this context, it encourages cooperation between various bodies such as international organizations, non-governmental organizations, and associations. Such cooperation increases conservation by allowing the use of a wider pool of knowledge and experience.

Cultural heritage is an important tourism resource around the world, and many places turn to this resource to achieve their socio-economic development through tourism. Heritage tourism is a sub-branch of cultural tourism and is one of the oldest and most common types of tourism. Historical monuments and cultural assets attract people from different societies due to their heritage values and are valuable as tourism resources. Heritage tourism involves seeing or experiencing built heritage, living culture, or contemporary arts. Visits are carried out for various motivations, such as improving one's own cultural self, learning something new, or satisfying one's curiosity (Mısırlısoy & Günçe, 2021).

The successful completion of the workshop practices, when carried out in a TRNC village with traditional design architecture, such as the Ghesc “Laboratory Village”, which is the case study, can enable the village to become a center that continues to operate actively and revitalizes tourism.

Figure 41: International Conference of Architects, 2023. Ghesc. (URL 14)

A village brought back to life with such an application can create a gathering area where events such as workshops, workshops, concerts, and markets can be organized. Thus, while the village contributes to economic development, it can also revive the sense of unity and solidarity among the community. This process shows that we have the power to bring back to life a formation that is in danger of extinction and creates an invisible emotional bond between us.

- **Application of Programming Process to Stone Heritage**

  The study investigated the significance that programming plays in the process of conservation as well as architecture. The study indicated that programming applications in a variety of fields, including process optimization, data analysis,

and decision support, can significantly enhance stone conservation in architecture. Certain methods are seen as conventional, whilst others use contemporary technology. There are various ways that programming can be applied to improve the process of conserving stone architecture, such as:

1- Data Analysis
2- Simulation and Modeling
3- Remote Monitoring
4- Decision Support Systems
5- Education and Training
6- Public Engagement and Management
7- Project Management (Chen et al., 2023).

1-Data Analysis

Data regarding the materials utilized, weather patterns, and other pertinent aspects, as well as the state of the stone structures, can be analyzed through programming. According to Chen et al. (2023), this data analysis can assist predict future problems, shed light on deterioration patterns, and contribute to the development of conservation solutions;

- **Digital Surveys and Documentation:** 3D scanning and photogrammetry are two examples of digital tools that can be created using programming to survey and document stone structures (Fig. 42). This can offer accurate measurements and thorough documentation.

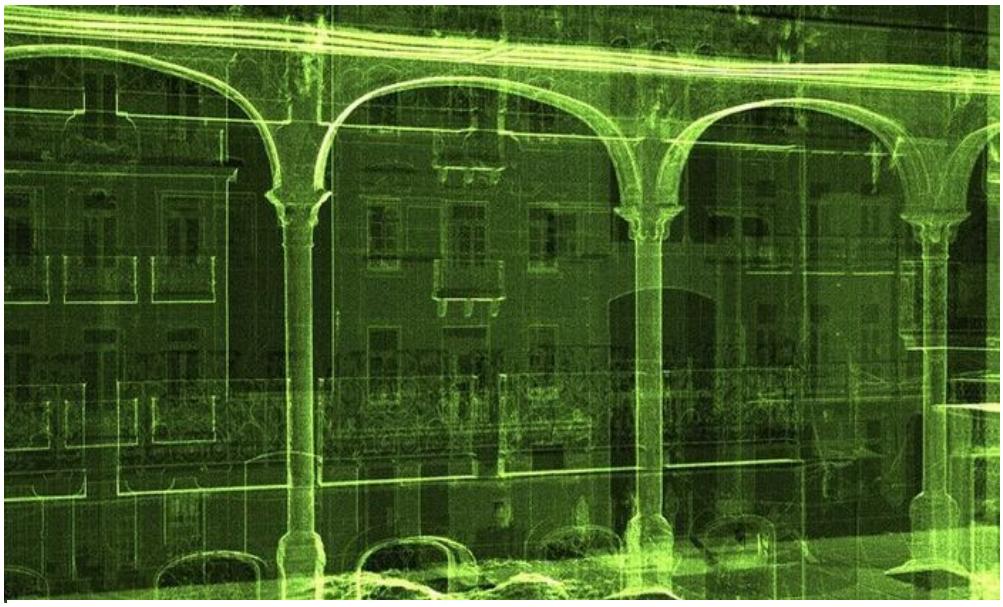

Figure 42: 3D laser scanning of a building facade (URL 15)

- **Evaluation of Conditions:** Provide software to examine information from sensors (temperature, moisture, etc.) incorporated into stone constructions. This aids in keeping an eye on the stone's state and forecasting any deterioration (Warke et al., 2003).

- **Historical Data Management:** Establish databases for the simple retrieval and study of historical documents and prior conservation initiatives (Chen et al., 2023).

2-Simulation and Modeling

Stone structures can be simulated and modeled using programming to learn how they react to various environmental factors. This can assist in determining the most appropriate strategies and forecasting the outcomes of conservation measures (Zhao et al., 2022).

- **Environmental Impact Simulation:** Create simulation models to forecast the long-term effects of environmental variables (such as pollution and weather) on stone constructions.
- **Structural Analysis:** To model the mechanical behavior of stone under various loads and pinpoint probable failure sites, use finite element analysis (FEA) software (Hemeda, 2019).

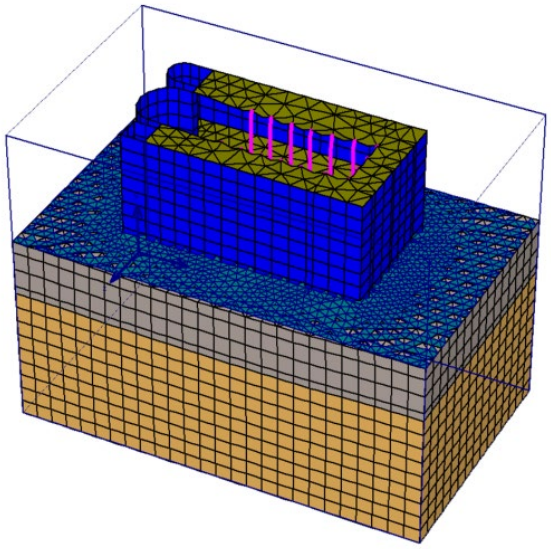

Figure 43: 3 finite elements discretization of the PLAXIS model and deformed generated mesh (Hameda, 2019, p:9)

- **Simulation of Conservation Techniques:** To identify the best practices before implementing them, model the impacts of different conservation techniques (Zhao et al., 2022).

3-Remote Monitoring

Programming can be utilized to set up remote monitoring systems that collect data on the condition of stone structures in real time. This can help in detecting issues early on and taking timely conservation actions (Sangirardi et al., 2022).

- **Image Processing**: Implement machine learning algorithms to analyze photographs and identify signs of damage, such as cracks or biological growth, which the human eye might miss (Soleymani et al., 2023).
- **Structural Health Monitoring**: Use programming to process data from non-destructive testing methods (e.g., ultrasonic testing, ground-penetrating radar) to monitor the internal condition of stone structures (Soleymani et al., 2023).

4-Decision Support Systems

Programming can be used to develop decision support systems that assist conservation professionals in making informed decisions about the conservation of stone structures. These systems can incorporate data analysis, simulation results, and expert knowledge to recommend suitable conservation strategies (Turk et al., 2019).

- **Risk Assessment**: Create algorithms to assess the risk levels of different parts of a structure and prioritize conservation efforts accordingly.
- **Resource Allocation**: Develop tools to optimize the allocation of resources, ensuring that the most critical areas receive attention first.
- **Cost-Benefit Analysis**: Implement software to perform cost-benefit analysis for different conservation strategies, helping stakeholders make informed decisions.

5-Education and Training

- **Virtual Reality (VR) and Augmented Reality (AR)**: Develop VR and AR applications for training conservation professionals, allowing them to practice techniques in a virtual environment before applying them in the field.

- **Interactive Learning Tools**: Create interactive applications that educate about different stone conservation methods, materials, and their appropriate use cases (Doehne & Price, 2010).

6-Public Engagement and Awareness

- **Web Platforms and Mobile Apps**: Build platforms and apps that allow the public to report issues with stone structures, enhancing community involvement in conservation efforts.
- **Virtual Tours**: Develop virtual tours of historical stone structures to increase public awareness and appreciation, potentially leading to more support for conservation projects.

7-Project Management

Project Management requires workflow automation which is using project management software to streamline the workflow of conservation projects, from initial assessment to implementation and follow-up. Also, collaboration tools can be used at the point of developing platforms that facilitate collaboration between conservationists, historians, architects, and other stakeholders (Doehne & Price, 2010).

8-Machine Learning and AI

Programming can incorporate machine learning and artificial intelligence techniques to analyze complex data sets and provide insights into the conservation of stone structures. These techniques can help in identifying patterns, predicting future deterioration, and optimizing conservation strategies.

By integrating programming into the field of stone conservation, professionals can enhance their ability to assess, monitor, and conserve these historical structures effectively. It is essential to collaborate with experts in both programming and conservation to ensure that the tools and systems developed meet the specific needs of the field (Karadag, 2023).

Chapter 8

CONCLUSION

While the preservation of cultural heritage is of great importance in terms of preserving the identities and history of local communities, the ethical and political problems encountered in this process also need to be taken into account. The lack of recognition of local governments at the international level creates serious difficulties in the financing and sustainability of projects. Ethical issues such as the use of external financing for political purposes and whether conservation efforts are compatible with the needs and expectations of local communities should also not be ignored.

In this context, projects such as Othello Tower, Venetian Walls, Paphos Hamam, Bandabulia etc. offer successful models for the protection and sustainable use of stone structures and cultural heritage in TRNC. These projects were implemented due to the effective cooperation of local and international actors and their ability to overcome the challenges encountered. In future conservation studies, the experience and information obtained from these projects will contribute to the further development of efforts to protect cultural heritage.

Conserving stone structures is of vital importance in terms of conserving cultural heritage and transferring historical heritage to future generations. By learning from Italy's successful stone building conservation practices and addressing specific challenges in the TRNC, important steps can be taken to conserve the region's rich

architectural heritage. This study highlights the importance of a multidisciplinary approach that includes scientific research, practical application, and community engagement in achieving sustainable conservation outcomes. Through joint efforts and strategic planning, TRNC can improve conservation practices and ensure the longevity of its cultural treasures.

The Ghesc project has the potential to make significant contributions to the literature on the conservation and sustainability of stone architectural heritage. This project combines traditional construction techniques with modern conservation methods, offering innovative solutions to increase the energy efficiency of historical structures and ensure environmental sustainability. Ghesc aims to bring local cultural heritage back to life through participatory design and self-construction methods in the process of revitalizing a long-abandoned village.

This approach creates a viable and sustainable model for future conservation projects by benefiting from the knowledge of local people and students. By bringing together academic and practical knowledge, the Ghesc project draws attention to issues such as the use of environmentally friendly materials in conservation works, the importance of community participation, and the integration of traditional construction techniques with contemporary construction practices and provides valuable contributions to the existing literature in these areas.

In this context, this study has the status of a study that we have not experienced in the Turkish Republic of Northern Cyprus and is quite suitable for application. Any village with traditional stone houses that is abandoned or about to be abandoned can be easily organized in the concept of a "Laboratory Village" and turned into an experimental

village in order to contribute to the education of the public and students, to add new methods to the literature, to ensure that the public embraces their past and to strengthen their closeness to each other through cultural ties. At the same time, since this approach will be a very interesting experiment by organizations, institutions and government bodies, it will be on a more solid ground with the support of important institutions as well as the public, and with this support, the Laboratory Village will grow healthier.

Restoration and conservation serve as methods to conserve the importance of qualified workmanship and cultural principles passed down from past to present. This neglected art, like stone structures, conserves the indelible traces of human hands and the essence of the human spirit. The intricate engravings on each stone, the narratives outlined within each wall, and the cultural heritage embodied in each structure are not only poignant reminders of history but also a reflection of our collective identity. It is of great importance to approach this process with respect for the past and an optimistic perspective on the future in every action. This is a vital step in conserving our cultural heritage and the collective memory of humanity. We must be conscious of our obligation to ensure that these principles are maintained in the future.

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