

LEARNING SUSTAINABILITY THROUGH ARCHITECTURAL PRESERVATION

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Abstract

Sustainability represents a too used and till some point wasted word because of an improper and often commercial use of it. Sustainability, as a value of environmental, social, cultural respect and economical and energy-saving is nevertheless one of the values that students of any discipline should learn. It is a general concept applicable to any field of knowledge, production, use and management. In the case of architecture, sustainability is a concept that may apply to its whole vital process, from the extraction of raw materials, elaboration of the constructive elements, to the construction process, use, possible re-use and destruction of it. Sustainability and architectural conservation have many common points that the authors of this paper try to offer to the students of the subject Architectural Conservation, within the architecture curriculum of the School of Architecture at the Universitat Politècnica of Valencia. The study of traditional architecture, its materials and constructive techniques allow the student to have an approach to sustainability from the point of view of the relationship and the respect for the place of origin of the architecture, its symbiosis with the landscape, its adaptation to the climate, the use of natural resources and the energetic saving. Besides, the subject architectural conservation is focused within the projects that the students develop during the academic year as recovering of the cultural and social memory, traditional and centuries-old culture of maintenance of buildings, as well as a respectful intervention in the surroundings through the choice of materials, products and processes compatible with the building and the environment. The concept of sustainability is thus approached through its meaning of compatibility in a vast sense, comprising use, materials, environment respect, social aspects, energetic cost, economic investment, etc.

Keywords: sustainability, compatibility, architectural conservation.

1 INTRODUCTION

The word sustainability is overused and to some point squandered due to its improper and often commercial use. Sustainability, as an environmental, social, cultural, economical and energy-saving value is nevertheless one of the concepts that students of all discipline should study. It is a global concept applicable to any field of knowledge, production, use and management. The overall concept can not only be applied to every area of knowledge but should be studied at all levels of education, from the most basic to the most specific step. In higher education, such as university education, the student needs to learn the specific application of the concept in their own disciplinary field, with all its strengths and peculiarities. In the case of architecture, sustainability is a concept that may be applied to the entire life cycle of a project: from the extraction of the raw materials, elaboration of the constructive elements, to the construction process, use, possible re-use and destruction. The world of architecture currently finds itself at a turning point, where we are forced to reflect on the errors of the architecture of our times and consider more sustainable methods. A look at traditional architecture brings us to reflect on the lessons of sustainability that we can learn from it.

2 THE NOTION OF SUSTAINABILITY IN ARCHITECTURAL CONSERVATION

Architectural Conservation, as act of recovery, consolidation and reuse of existing architecture, could be understood from the premise as a discipline with sustainable principles. Nevertheless we must clearly distinguish the concept of architectural conservation, which corresponds to a clear and distinct discipline, from the "newer" concept of recycling. Although the latter may seem to be a path to sustainability due to the parallel we naturally draw with the recycling of waste and rubbish, its principles & criteria are nevertheless a far cry from those of architectural conservation.

According to the definition provided by the María Moliner dictionary, "Recycling" means "to recover waste material and reuse it in the development of a new product" [1]. In the concept of recycling, therefore, the building is understood as an accumulation of waste materials without value nor interest

(i.e. rubbish, in simple terms), recovered only in terms of its potential reuse as a completely different product where in many cases it will retain no semblance of the original building. One of the principles at the heart of Architectural Conservation is the conservation of old buildings, monumental or not, precisely because they are not merely waste materials but because they hold important values (rubbish has no value) linked to history, memory, culture, etc. The sustainability of Architectural Conservation therefore does not lie in the mere act of recovering re-usable materials, but in a much broader understanding and appreciation of the culture and history of our ancestors, the memory of those cultures and their knowledge.

2.1 Sustainability of traditional architecture

Traditional architecture is that which is born of a close link to the landscape, the fruit of the wise combination of materials available in that environment, and the building and craftsmanship techniques that have been created by the hands of its residents over the course of generations, all of which meet strict functional requirements. Similar environmental conditions generate results with logical similarities, but still it could be argued that there are as many families/branches of traditional architecture as there are climatic conditions, materials and social aspects.

The advent of industrialization has completely changed the nature of the production of popular architecture, which with increasing frequency, is no longer linked to the raw materials found in the surrounding environment, but to the materials of commercial construction. In many corners of the world, traditional architecture has ceased to exist as an active trend. In the rest of the world, traditional architecture survives in cases of isolation and lack of resources, but its disappearance in the short and medium term is foreseeable, and as such we should begin to look at ways to encourage its conservation. The precise values, both of *integration and symbiosis with the environment*, and the value it holds as a *historical evidence* of a sustainable building culture, turn traditional architecture into something even more valuable at a time when sustainability is becoming imperative.[2]



Fig. 1. The integration of traditional architecture into the landscape is guaranteed by the use of local materials

2.2 Sustainability during a Project of architectural conservation

If the architectural conservation process arises from a desire to conserve historic architecture, materials and construction techniques at the same time as ensuring the compatibility of the new materials and work with the existing building, then this process can be considered sustainable. The basic principles themselves of the discipline, born directly of cultural and historical values identifiable in the historic building, can be considered sustainable not only in terms of the reuse of a building or reuse of materials, but from a broad cultural perspective. The basic principles of Architectural Conservation can be identified as [3]: conservation of material, conservation of authenticity, minimal intervention, reversibility, compatibility, architectural language, and durability

Respect for these principles in the conservation process not only ensures a respectful semblance to the original building, traditional materials and ways of working, but also to the culture that produced it and its historical memory. In addition the principles of minimal intervention and of compatibility provide

a lot to think about in terms of sustainability. The required compatibility refers to various aspects of the intervention process: the compatibility of the materials, as well as structural, functional, and economical compatibility.

The materials and techniques used in the conservation process must be compatible with the existing ones, with the most compatible (aside from using the same traditional materials) being breathable, flexible, and potentially natural materials, etc. An environmentally friendly material is potentially more compatible with the architecture born in that same place [4]. Therefore, the best way of guaranteeing environmental sustainability is through the use local materials, made using traditional production methods.



Fig. 2. Conservation using traditional locally produced materials and the work of local hands ensures sustainable local economic development

2.3 Economic and social sustainability in the conservation process

It can easily be demonstrated [5] that the conservation and conservation of traditional architecture, following the principles described previously, encourages and develops local employment and industry not only because it provides the craftsmen and small businesses of the area with work, but because a large proportion of the main profits from this activity in the form of labor/manpower return to the local territory, in contrast to new builds, many of which use materials and equipment not produced locally, but in large cities.

Firstly, conservation of traditional architecture, understood in terms of respect for traditional materials and techniques, finds solutions that cost the same or even less than the other more usual methods that are less considerate of the architectural heritage. Moreover, in most cases where satisfactory technicians and constructors are involved, the overall cost of restoring of an existing building is cheaper than the cost of a similar new build.

In addition the conservation of traditional architecture has a clear economic facet to it, since the maintenance of walls, floors, roof and other construction elements relies on the optimum utilization of the inherited resources, that are simply preserved or strengthened to the detriment of more expensive solutions such as the widespread replacement of all the elements. Indeed, the careful conservation of the building consumes far fewer resources and energy and releases far less carbon dioxide into the atmosphere during its execution. The by definition sustainable nature of conservation and of traditional architecture with its ecological and bio-constructive virtues, is highly topical in the current times where environmental matters are top of mind for a large number of technicians and future homeowners.

3 TEACHING & LEARNING ABOUT SUSTAINABILITY THROUGH ARCHITECTURAL CONSERVATION

The discipline of Architectural Conservation, as we have seen before, can be considered an important and formative area of study for future architects regarding two aspects of sustainability: the lessons on sustainability that can be learnt from traditional architecture as a starting point both in terms of its appraisal and therefore its subsequent protection and conservation as an example of sustainable

architecture, and on the other hand, the conservation process itself hosts a number of practices that make us reflect on a more sustainable approach to the profession of architecture. The teaching of this discipline encourages a discussion of these values.

3.1 Teaching & learning architectural conservation in ETSAV School of Architecture

The subject “Architectural Conservation” is taught at the Escuela Técnica Superior de Arquitectura of the Universitat Politècnica of València (ETSAV) as a compulsory semester-subject of 4.5 credits (45 teaching hours), including 3 credits (30 hours) of theory and 1.5 credits (15 hours) of practical training, both of which take place in the classroom. The subject is being taught in the first semester of the 5th year and, although it is doesn't yet officially fall under the Bologna Plan, it has been taught since 2006-2007 using a very practical, professional and applied-to-reality approach, as the students are in their last year,, and close to becoming architects. The methodology of teaching-learning that we use throughout the Architectural Conservation course is based on a combination of methods and techniques. The methodology is both complex and comprehensive, and always uses most appropriate method in order to achieve the intended results and objectives in the most effective way possible [6]. The teaching/learning methodology is based on the application of different techniques depending on the educational objectives, skills and content: participative lectures; seminars and debates [7], practical work, classroom activities, tutoring, instructive visits, complementary activities. The practical project work is an important part of the Architectural Conservation course because it allows the students, who are divided into groups according to the difficulty and complexity, to work on their analytical and project skills in relation to the preservation of a historic building. The practical project work is therefore intended to be as true to life as possible, based on the analysis and the preservation of a historical building that the students themselves have chosen from the real world. It is a real simulation of the type of commission for a project of analysis and preservation that the students may soon receive in their professional life they get their degree [8].

ELEMENTO CONSTRUCTIVO: PAVIMENTO

Técnica Constructiva: Baldosas hidráulicas

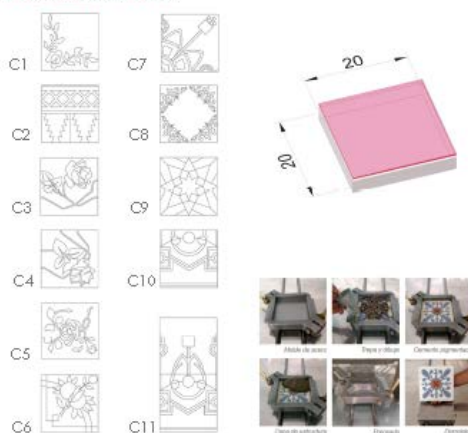
Localización del elemento en planta:



Fotografía del elemento:



Detalle constructivo:



Descripción del elemento:

Las baldosas de tipo hidráulico están realizadas de manera artesanal. Este tipo de baldosas poseen 3 capas diferenciadas.

1_ Aplicación de la decoración sobre la matriz que separa los colores. Esta capa tiene un grosor de 5 mm aprox. y está compuesta de cemento Portland blanco con minerales colorantes o pigmentos.

2_ Es una masa intermedia cuya finalidad es absorber el agua de la capa anterior. Tiene unos 5 mm de espesor con una mezcla de cemento Portland gris y arena fina.

3_ Es la capa que da la estructura de la baldosa. Son 3cm de cemento Portland y arena. Es muy porosa, lo que permite una unión mucho más fuerte con la argamasa que le sujeta al suelo.

Este proceso se realiza mediante un molde de acero al que se le acopla una trepa con el dibujo deseado, este elemento permite la separación de los diferentes colores que generan el diseño.

Es importante destacar que este tipo de elemento no pasa por un proceso de cocción, sencillamente se deja secar dentro de el molde que hemos comentado.

En el caso concreto de Muntalar, las baldosas se encuentran sobre un lecho de hormigón en masa que regulariza el terreno. Esa solución no está dotada de lámina impermeable, por lo que en la actualidad, muchas de ellas se han desprendido por la humedad y la degradación de la capa inferior.

Fig. 3. Case study of the building techniques and production processes developed in practical project work from the Architectural Conservation course prepared by students (authors drawing: John Barber, Lidia Escuder, Nuria forques, Julia Pineda, Jaume Puchalt, María Silvestre)

3.2 The learning experience in the ETSAV regards to sustainability

Throughout the Architectural Conservation course the principles and concepts of sustainability are learnt by studying both the sustainability of traditional architecture and the potential for sustainability in the conservation process.

3.3 The learning objectives of the Architectural Conservation course

Among the specific competencies set out in the White Paper for the title of Architect that are assigned to specialty of Architectural Composition in which the subject of Architectural Conservation is found, knowledge relating to "ECOLOGY AND SUSTAINABILITY" is described: understanding or knowledge of the responsibility of the architect regarding the basic principles of ecology, sustainability and conservation of resources and the environment in building, urban planning and landscaping "[9]. This required competency clearly indicates that students must be aware of their own professional responsibility in terms of ecology and sustainability. As mentioned previously, the teachers of Architectural Conservation at the ETSAV and the authors of this text are particularly keen on the students being able to learn, through the subject they teach, the professional involvement of architects in the vision of sustainability of architectural conservation.

Therefore, from the very first year of the course, the fundamental objectives of sustainability training are focused in two main areas: on the one hand, the sustainability of traditional architecture and the lessons that can be applied to achieve sustainable architecture today, and on the other hand, the responsibility of the architect in terms of sustainable material, both in new builds and in the conservation of existing buildings.

These objectives can be reached through the consideration of various topics: the appreciation of culture, identity and local history, finding a suitable purpose for the building compatible with the building itself in order to avoid unnecessary interventions, and in particular, out of respect for the local building culture, the compatibility of materials, the selection of sustainable materials and construction processes, and a sustainable approach to the project from the point of view of avoiding unnecessary expenditure and aiding the economic development of the local economy, etc.



Fig. 4. A small historical building analyzed in one of the practical projects from the Architectural Conservation course

3.4 Methodologies used in the teaching of the degree subject

The methodology used to achieve the objectives described above is complex and utilizes all the methods available to us [10]. Firstly, various classes are given focusing on; the analysis of the values of historical architecture (all the values linked to local history and culture values are obviously included); the analysis and understanding of the materials and building techniques traditionally used as well as their relationship with the area (topography, climate, available materials, etc.). Various

examples of traditional architecture, their implementation in the area in terms of climate and functionality, examples of conservation techniques and the evaluation of their impact on the environment and on the health of the locals, etc.

Moreover, these topics are put into practice through the practical project work where the students themselves have to choose a building, analyze it and write up a conservation paper. Firstly, the students are required to choose a small traditional building often closely linked to the place in which it was built. Secondly, the project team has to analyze the values of the building (including those linked to the notion of sustainability), the materials, production processes and building techniques that were used in the construction of the building, and the causes of the damage which in some cases might be linked to pollution or climate. Lastly, the students must draft a conservation project compatible with the building in all aspects (materials, structure, function, economy, etc.). In the writing of this proposal the student needs to demonstrate the reasoning behind the decisions they have made pertaining to the chosen materials, their impact on the environment and the health of the users of the building, the choice of materials and intervention techniques in relation to the place where the building is situated, the available materials and trades, etc.

3.5 Final year project experiences

Finally, it is worth mentioning that in recent years some final year projects have been submitted specifically on the relationship between conservation and sustainability. An example is the project "*Valutazione della sostenibilità nel recupero degli edifici storici. Un caso di studio a Valencia*" written by Caterina Careccia in 2011-2012 and led by Professors Fabio Fatiguso of the Polytechnic University of Bari and Camilla Miletus of the Polytechnic University of Valencia, [11] as well as the project that is currently being developed under the leadership of the same team by another exchange student from the Polytechnic University of Bari, Cosimo Tagliente.

These studies focus on the evaluation of sustainability from a wide perspective, thanks to the research and analysis of the life cycle of the materials used in the intervention (Life Cycle Assessment), and the analysis and comparison of various possible alternative interventions. The projects focus on the evaluation of the entirety of the impacts created by the materials, production and implementation processes, and the use of energy and transport on three different areas: Human Health, Ecosystem Quality, Resources. Every single intervention has been evaluated in these terms allowing the writer to draw a reliable picture of the damage and create a basis from which to choose the most sustainable materials and techniques.

4 CONCLUSIONS

Through the teaching experiences described in this text our aim has been to show how the subject of Architectural Conservation provides training in some of the basic concepts of sustainability at the same time as to demonstrate the professional responsibility of the architect in this regard. Clearly sustainability, as a concept, is cross-disciplinary and, as previously mentioned, should be studied at all levels of education and in all subjects. But it is evident that the discipline of Architectural Conservation, when focused on the respectful analysis of traditional architecture, the understanding of its value, the conservation of materials and construction techniques and ultimately an approach to the conservation project which is compatible with the original building, provides the student with a training that can result in the creation of a sustainable consciousness in architecture.

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