Conservation of Vernacular Architecture

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The first reflection to be made before beginning to talk about the restoration of traditional vernacular architecture has to do with understanding why the restoration is so urgent or important. Traditional architecture has a series of values that are still appreciated by our society today and that is why conserving and restoring them is considered important. The appreciation of these values in traditional architecture and the fact that they are identified as lessons to be learned by contemporary architecture means that it is deemed worthwhile to conserve them and seek a restoration alternative that will respect these same values.

Traditional architecture, be it urban or rural, is above all an architecture related to the place where it stands: the constructive techniques are developed according to the materials available and the means available to prepare them; the morphology of the building is closely linked to the climate and the orography of the land; the functional and spatial organisation of public, semi-public or private spaces is closely linked to the local society and culture. The relationship between place, society and architecture no doubt constitutes one of the most amazing lessons to be learned from this architecture, which is not only monumental but often quite modest.

On the other hand, thanks to constructive skills and extreme adaptation to climatic conditions and human needs, traditional architecture still shows us how we can achieve with a limited sum of money results of great constructive, functional and spatial quality. A rational use of materials and natural resources and production is accompanied by admirable sensitivity towards the human factor, the human scale, functionality, the delicacy of the finish, in a word, by an attention to aesthetics that is not neglected because of limited funds. An important portion of the aesthetic result of the treatments, of the architectonic elements and, consequently, the quality of the spaces depends on the constructive skill of the tradesmen, who, with their conscientious craftsmanship, nurture the details, the joints, the textures, the finish of the execution of their products. Craftsmen work proudly to achieve a good result in their work, fostering each step along the way from the choice of initial material to the final execution of the work. Finally, traditional architecture often represents an architecture of the community where the appreciation of buildings and public spaces resides in the common interest of collective property. The city and the town form a common heritage, belonging to the community, and looking after it is also a task where all the residents help each other and the tradesmen participate in the construction and maintenance of the buildings with their age-old knowhow (Vegas & Mileto 2013).

The restoration of traditional architecture is merely the last step in a larger and more complex process that starts by getting to know this architecture and valuing it and, therefore, identifying it as something that needs to be conserved. Only after getting to know and appreciate it do the decision is taken to restore the architecture to embellish it and, above all, to maintain it as part of the cultural landscape or the heritage of the contemporary society that started there and has developed to its current state. Therefore, the first step for the restoration of traditional architecture is getting to know it.

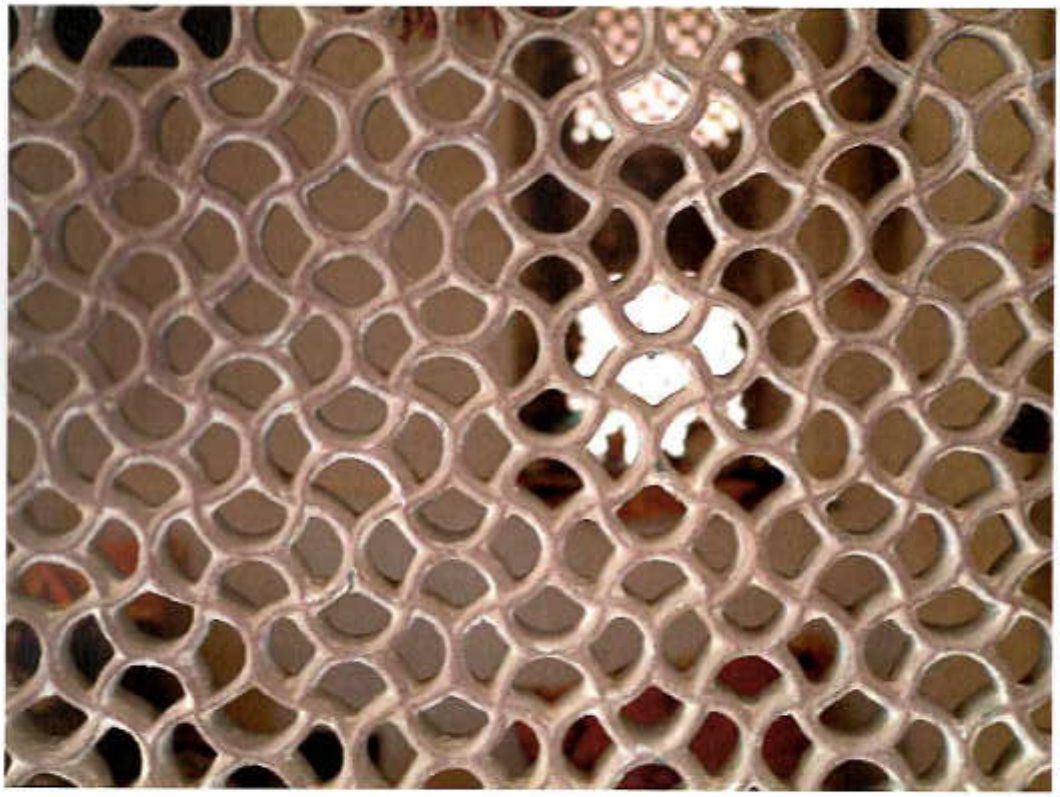

Figure 1. Jallis preserved in a dwelling at Pokaran, Rajastan, India.

Getting to know traditional architecture

The first fundamental stage of restoration consists in getting to know all the constructive, structural, functional, cultural and other factors involved in the building or group of buildings (Vegas & Mileto 2011). Without this knowledge, it is not possible to begin to restore it. The materiality of the object built with traditional techniques, due to its preindustrial character, contains a series of values that constitute the reason for the restoration. However, this materiality must be understood in order to identify clearly the specific values of each building and, above all, the steps to be taken to conserve it. The methodology that permits gleaning in-depth knowledge of the building is an intrinsic part of the discipline and has developed over the two long centuries of reflection. This methodology for approaching the building is applied to both monumental and more modest buildings, since it fills the cultural need for knowledge and is based on the scientific method of data collection and conclusions. The different phases comprising it are: a historic and cultural study, the drawing up of a metric and descriptive survey, a photographic survey, a material and constructive study, a stratigraphic study, a study of material pathologies, a study of structural damage, a functional study and possible complementary studies.

Figure 2. Old pavement restored at Oppède le Vieux, France.

Historic and cultural study

The historic study of a building is customarily performed through bibliography and archives. The historic study is easier to draw up in the case of monumental buildings, because there is usually a certain amount of documentation available. Nevertheless, this study can present more difficulties in the case of non monumental buildings and especially for rural buildings. Although it seems difficult at first sight, at least a simple historic study of the traditional building or, in any case, of the surrounding area, town or city must always be carried out. This historic study may comprise a simple collection of old photographs of the architectonic object, documentation from oral sources gathered with all due precaution because it may be partial or subjective, the study of buildings with a similar morphology, having recourse to previous restoration works on them... In non monumental architectures located in larger cities or towns, information and documentation may be found in the relevant archives, while such findings are less likely in smaller towns or rural buildings, where detailed documentation of each building does not usually exist. However, sometimes historic documents of important buildings like mills, olive presses, kilns, etc. can be found. Where more trustworthy documents do not exist, for less important buildings and in smaller towns, a cultural study of the building acquires greater importance, that is, cultural, social, economic, productive, etc. aspects connected to the building.

Metric and descriptive survey

This comprises the most exact graphic reproduction of the building that it is possible to obtain. It is essential that it faithfully reflects the object represented, since these plans are the basis on which the rest of the studies required to get to know the building and draw up the project depend. Discontinuities, irregularities and deformations must be drawn with precision and not be simplified or sketchily geometrised, for on most occasions they contain clues to help understand the building's

growth, its historic evolution and pathologies. There are many ways of preparing a metric descriptive survey, from a manual system with the aid of a linear ruler and triangulation to recent three-dimensional laser scanning systems, not forgetting the handheld distance measuring laser, the theodolite and photogrammetry. The most likely method in the case of traditional architecture is a manual or semi-manual survey which, properly carried out, is just as precise as more technological means.

It is useful to make a floor plan for each floor of the building and a transversal and longitudinal section for each different situation that exists in the layout. The projection of the interior elevations in these sections will help situate the project inside each room. In drawing up all these plans, it is wise not to take any vertical relationship for granted, because walls often lose width in each floor or may even be at a slant. For that reason, at least three points of external or internal connection between the different floors are recommended so as to be able to situate the floors later with regard to these points. In the same way, it is not a good idea to take the existence of horizontal planes for granted, because both ground floors and upper floors are often intentionally built with a slope or have pathological slants or structural deflections that can be very useful to help understand the building and draw up the restoration project. The survey of vaults, arches, and domes should clearly reproduce their trajectory in space, with at least one section for each curvature and a series of cuts in the case of longer vaults. These curves in section compared to the theoretical pressure line permit us to analyse the state of repair of the constructive element.

Photographic survey

This survey is useful particularly for the external and internal façades of the building. It consists in a series of orthogonally rectified photographs, also known as photoplans, laid out as a mosaic. It requires informatics support in the form of digital photographs, rectifying them with the aid of one of the many software applications available in the market today, composing them in the computer, editing and printing them at a certain scale. The photographic survey of the façades of a building or the creation of photoplans has an expressive and communicative capacity that far outstrips the information given in a metric descriptive survey. In fact a photoplan contains the object with its exact measurements, but also provides information regarding the colour, the material, the texture, the state of conservation, etc. Thus, photoplans made to scale provide the same information as a metric descriptive survey plus a large amount of additional data that cannot be reflected in a drawing, to such an extent that they could replace the first survey. Indeed, a photographic survey can take the place of the metric descriptive survey by copying the information provided by the photoplan in the form of lines. At first sight, it seems to be a useless task. However, this manual exercise makes it possible to discover details not visible to the naked eye. Should it not be feasible to draw up a photographic survey, mere photographic documentation accompanying the metric descriptive survey provides the same sort of real approach to the architectonic object and the same amount of information as a photoplan, although the measurements can only be gleaned from the metric descriptive survey.

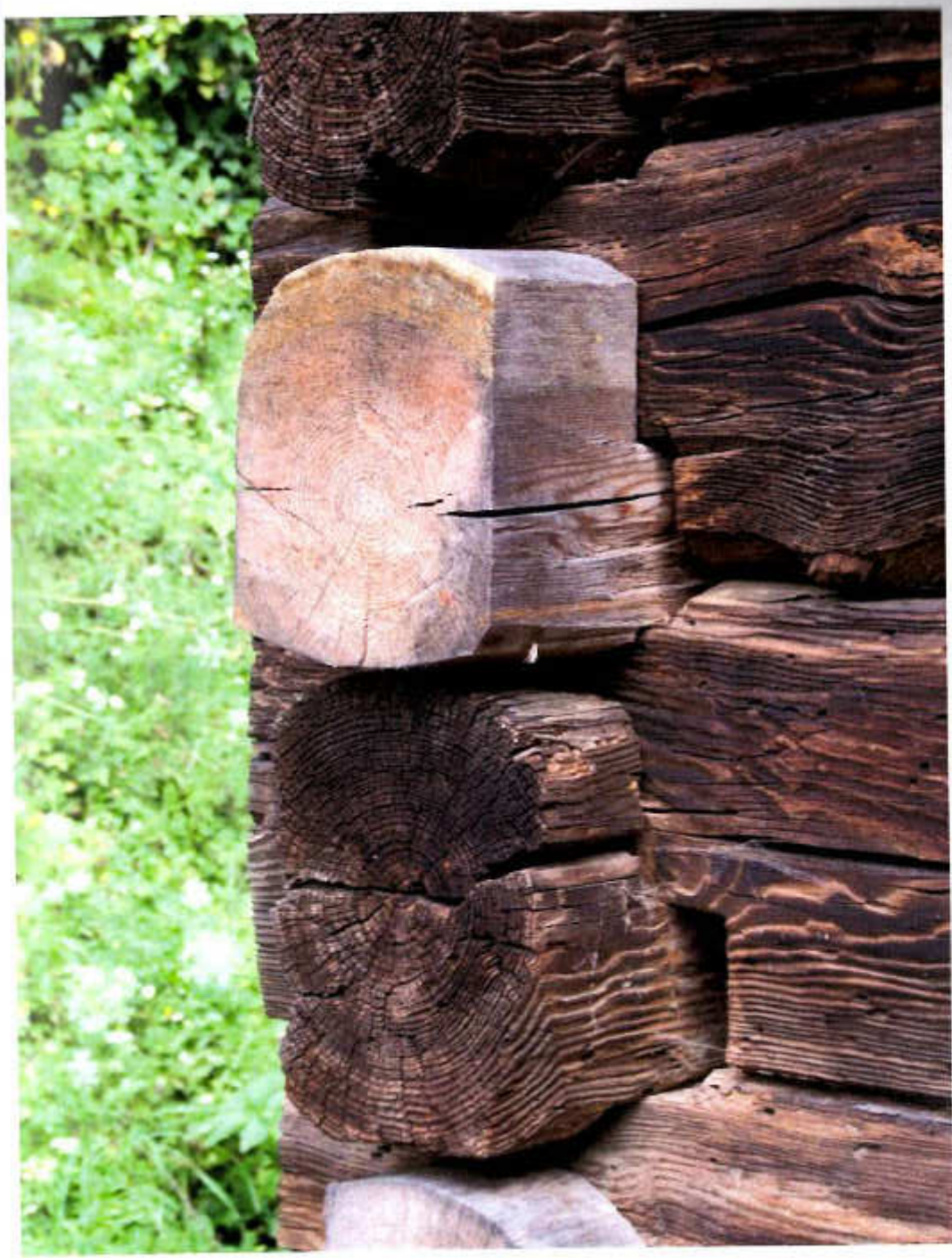

Figure 3. Detail of the corner of a loghouse. Stubbing. Austria.

Constructive and material survey

This study is carried out on the physical support of the metric descriptive survey or the photographic survey. Its aim is to identify and name all the types of materials and constructive techniques used: the type of masonry fabrics and their respective bonding, the bricks, rammed earth walls and mortars used, the interior and exterior renderings, the timber used in beams, joists, woodwork, partitions and

transoms, glass, types of floors, roofs, tiles, pavements... And not only these materials, but the way they are laid out and combined to form the constructive details of the building, which possess a double response that takes into account their function and the physical compatibility between them. By means of this new increase in knowledge of the built object, this detailed, meticulous study facilitates the choice and design of the best processes for the consolidation, treatment and repair of the individual elements that form the whole. For example, a bonded wall or a rendering made with mud, gypsum or lime mortar is not the same, and each must be handled in a different manner. Each type of wood has a different reaction to damp and the attack of insects and xylophagous fungus. A precise knowledge of a constructive section can offer numerous explanations that help understand the pathologies of a building. And so on. The precise identification of the materials and constructive techniques is essential. Nevertheless, it is often impossible to discover exactly the traditional constructive techniques in order to identify, study and consequently restore them. For that reason, an important part of this book is illustrated with texts, photographs and constructive details of these old traditional techniques that have now become at least partly unknown.

Stratigraphic study

This is a study of the evolution of the growth, extension and modifications practised on the building under examination (Doglioni 1997; Mileto 2000). No written historic documentation is needed, nor data to be found in a library or archive. Of course, should such documentation exist, it provides a basis on which to make chronological hypotheses, but this is rarely the case with traditional architecture. On the contrary, the stratigraphic study is performed by reading directly the signs found in the constructed fabrics of the building. The aim of the stratigraphic study is to elaborate a chronological sequence of the different stages in the life of the building, with its extensions, transformations and demolitions. This reading requires a certain amount of practice and the adoption of a method that will permit the information obtained to be recorded in the plans. In this case, a photographic survey or simple non-scale photographs are preferable to a metric descriptive survey because of the importance of all the additional documentation the photographs provide. If a constructive material survey has been carried out previously, it will be easier to draw up a stratigraphic study, since the different changes in the fabrics of the building which, on occasion, correspond to different building stages have already been examined. Similarly, the irregularities and discontinuities found in the walls during the preparation of the floors plans may provide information for the stratigraphy. The comparison of the information obtained in the stratigraphic study with the pathologies of the building is also very interesting, as the lesions treated at some point in the life of the building ordered within its chronological sequence offer data about the active or inactive presence of the factor triggering the pathologies. For example, a thin fissure in a plastered wall might have been a large crack repeatedly repaired throughout the life of the building, covered up over and over again by many layers of renderings at different times.

Figure 4. 17th century rendering of a façade restored by the authors, Calig, Spain.

Study of material pathologies

The detection, identification and study of the building's pathologies constitute a fundamental means of knowing the state of conservation, necessary also to draw up the restoration project. The pathologies usually appear on the surface of the constructed elements, although there are also cases, such as a possible termite attack, in which the material affected, timber in this case, shows no signs on

the surface and it is necessary to find parallel clues of their existence. Two types of phenomena can be distinguished: alterations and degradations. Alterations comprise modifications of the material that do not necessarily imply a detriment to their characteristics from a conservation point of view. On the other hand, degradations are transformations undergone by the material that do imply damage that endangers the integrity and permanence of the building. Alterations do not compromise the existence of the building to be restored and therefore are no cause for worry and/or do not require any intervention. On the other hand, alterations show the effects of the passage of time on the building and, respecting its decorum, constitute a valuable patina that permits the observer to identify its antiquity. Degradations do require attention because neglect can compromise the future of the building in the short, medium or long term depending on how serious each case is. It is a good idea to reflect in the plans all degradation phenomena present on the surface of the materials in the fabrics in order to identify possible complex mechanisms of cause and effect connected with them until the current situation came about. Given the importance that understanding these degradation mechanisms represents in order to adopt decisions for the restoration of the building, a large part of this book addresses this section of the study of traditional buildings.

Study of structural damages

The combination of the cracks and deformations in traditional construction as a whole provides valuable data about the structural damage that particular building has suffered. The mere observation of an isolated crack outside the context of cracking and deformation of the whole building may lead to misinterpretation. Furthermore, at times the convergence of different phenomena of various types can confuse a hasty initial scrutiny when not sufficiently analysed. The number of cracks must be recorded in the metric descriptive or photographic survey. It is worth establishing a set of signs that will make it possible to distinguish and identify clearly the type of lesion being documented. Each of these lesions must be carefully observed to find out its direction, rotation and movement. The list of deformations, that is, the geometric deviations from an ideal geometry (leaning, bulging, deflections, etc.), will already be included in the metric descriptive survey if it has been properly drawn up. At this point, the combination of the data of these deformations with the cracks documented in the plans permits a diagnosis of the structural movements in the fabrics. By comparing these data with the information obtained in the stratigraphic study, some cases of inactivity or, on the contrary, continuous activity present in an old lesion can be detected.

Functional study

Before proceeding to draw up a restoration project it is advisable to carry out a study of the historic function of the building to be restored and its compatibility with the future use to be assigned to it. This preliminary analysis can discover possible incongruence of concept or unsuitable layout that may be taking place undetected in the building in time to correct the inappropriate course of a functional programme or a preliminary draft that had not taken sufficiently into account the pre-existence of the traditional building and the necessary prevalence of its configuration and character in the restoration project.

Complementary studies

There are many more specific complementary studies that are usually restricted to more important and expensive restoration works, as is the case of a public monument. In any case, some of these are mentioned below in case the concrete case of restoration of a traditional building should require one of them and the technical means and funding are available.

a. Historic and chronological studies:
- Archaeology: excavation of the subsoil of the building or the surrounding area to investigate that material traces of its past and discover more details about its history. Besides, it is an opportunity to examine its foundations.

- Dating techniques: dendrochronology, which permits the determination of the age of the timber used in a construction based on the observation of the growth rings; thermoluminescence, which reveals the age of ceramics based on the radiation dose; carbon 14, which detects the age of organic elements present in the structures and materials of the building, etc.

b. Characterisation of materials and structures:
- Chemical and petrographic characterisation: analysis of samples of stone, mortars or plasters to discover their nature and material composition.

- Geotechnics: reading of the subsoil from the surface by means of the emission of magnetic, electric and ultrasound waves.

- Thermography: a study of thermal differences on the surfaces of the building so as to detect materials, degradation, damp, leaks, etc.

c. Study of pathologies and agents:
- Biological studies: research into insect infestation, the presence of inferior and superior vegetation and their effect on the matter of the building.

- Climatological studies: analysis of the effect of rainfall, hailstones, wind, sunlight, frost and thaw cycles and annual droughts on the state of conservation of the building.

- Petrography: study of the state of conservation of stone and ceramic materials.

- Seismic vulnerability: the weak points of a building in the event of a telluric current in the vicinity.

Restoration of traditional architecture

Any kind of study, however in-depth and multidisciplinary, or any methodology, however serious and rigorous, does not in the least guarantee a correct intervention in an architectonic restoration process, whether monumental or otherwise. Extremely detailed studies of a building on occasions end up with interventions that completely ruin its essence or distort its character. Examples of this well-meaning attitude are myriad in the discipline of restoration. This is so because the discipline of restoration is not a science. The studies performed on the building to achieve the greatest possible amount of knowledge belong to the most advanced branches of science, and day by day provide us with a deeper knowledge of the matter and its history. But that is as far as science goes. From here on, the restoration project belongs within another disciplinary ambit that lacks the credibility and impartiality of science. The success of the restoration work often constitutes a leap in the dark that is not consistent with the studies carried out. Proof of the lack of scientific causality in the project is the fact that one same study, performed with all the means available, can give rise to a large range of different intervention projects with no relationship between them other than the fact that they are all to be carried out on the same building.

It is at this point that the idea of intervention criteria appears, which, in any case, must come before the project and guide the steps of the project manager. These intervention criteria make it possible to bridge the gap between the knowledge and the concrete recuperation of the building with a certain guarantee of success. The criteria exist beforehand and are autonomous as regards the process of getting to know the building and, in a sense, the building itself. In fact, the architect always embarks

upon a project and restoration works according to these criteria, which are not the fruit of the architect's mental or emotional state but of a collective reflection that goes beyond personal wishes. The criteria thus understood are not arbitrary, nor subject to chance, whim, circumstances or the free will of the project designer. These intervention criteria do not constitute the options of the project, do not correspond to predetermined images or typologies, nor do they correspond to the techniques to be used in the intervention process. They come from the knowledge of the concrete case of the building to be restored and depend on the particular circumstances of each case.

Some parameters within the discipline of restoration constitute guidelines for these criteria, such as the values identified in architectonic heritage, prior experience in other buildings with their errors and successes, the debates held during the process, the theoretical and practical reflections of the masters of the discipline... This reflection about the need for intervention criteria as an essential factor in the restoration process, even more than preliminary studies of any kind and the most rigorous and advanced methodologies is useful for monuments and other buildings. What is more, precisely in the restoration of non monumental architecture they acquire greater importance, for, on many occasions, the lack of means to perform studies or the geographic and cultural distance from the strict methodologies sanctioned by the theoreticians of the discipline prevents them from being literally applied in the most ordinary cases. At this point, the clarity of criteria for the intervention is more indispensable than an infrastructure of knowledge or a manual of steps to take.

Therefore, in order to understand well the guidelines for interventions in the discipline of restoration, in the first place, it must be taken into account that there is a series of general values identified in monumental and non monumental historic architecture. Among these values, we can mention particularly the *historic value*, according to which the building constitutes a built historic document with different possible constructive, social, cultural, artistic, political and other components. But there are other values too: in the first place, the *value of authenticity*, strictly linked to the historic value insofar as it is, in this case, a built historic document, is only worthwhile if it is authentic and thus trustworthy in the history that can be read about it; the *cultural value*, according to which society feels identified with its own architectonic heritage as a symbol of its local or, in a broader sense, national or global identity; the *artistic value*, according to which the building holds some aesthetic and expressive features linked to the more or less refined artistic culture that generated it; the *antiquity value*, by means of which the historic building is seen as a legacy from the past, through its materials aged by time and covered by the Ruskinian "golden patina of time", its wrinkled skin and white hair, and it is different from new architecture in an olden style or the fictional reconstruction as a theme park and stands firm and dignified in its old age; the *functional, social and political values* linked to the role the building has played and continues to play in society or that it can acquire by means of restoration; the *economic value*, not only linked to the value of the object as such but the economy it can generate around it, etc.

There is also a series of values that, although they can be identified in all architectures, take on greater importance in non monumental traditional and rural architecture. This architecture especially is closely linked to the landscape, the result of the sensible immediate combination of the matter available in the neighbourhood, according to constructive systems and artisanal techniques created by the hand of the residents for generations, which respond to strict functionality. Similar atmospheric conditions generate solutions of traditional architecture with similar logic, but even so there could be said to be as many families of traditional architecture as there are climatic, material and socio-functional environments. The dawn of industrialisation completely changed the production conditions of popular architecture, which became less and less linked to the raw material available in the surrounding area and more and more to commercial construction materials. In many corners of the globe, traditional architecture has survived in isolation and despite a lack of means, but it is prone to disappear entirely as an alternative in the short or medium term, so that steps must be taken to conserve it now. Thanks to these specific values, both regarding its *integration and symbiosis in the environment* and as *a historic document of a sustainable constructive culture* in its own cultural and

dynamic milieu, traditional architecture is even more valuable at a moment when sustainability is seen as a crucial asset.

The intervention criteria necessary to respect, conserve and enhance the values of the building arose as a consequence of the values identified in traditional historic architecture, apart from the reflections and preliminary experience of the discipline. In this sense, the restoration of a historic building should ensure that the basic criteria defined by Giovanni Carbonara (1997) be fulfilled:

- *conservation of authenticity* is the first basic essential criterion that clearly stems from considering a building an authentic historic document, although there is a broad range of possibilities in attempting to define authenticity, which can be seen as material, spatial, characterial, symbolic, etc.
- *minimum intervention*, which guarantees the conservation of the building without having to perform any intervention that is not strictly necessary and, less still, any intervention that might harm the conservation of the values of the building.

- *reversibility*, to guarantee the maximum conservation of the building as far as possible, in such a way that the act of *adding* could always be seen as preferable to that of *removing*, because in general lines what is added would be able to be taken away, and would therefore be reversible (although there are myriad examples of the opposite), whereas what is removed cannot be replaced (except for some rare exceptions).

- *compatibility* of the intervention with the old building is usually understood to be material or physico-chemical compatibility that ensures there will be no negative interaction between the new and already existing materials. However, it is worth remembering that there also exists structural compatibility, related with the structural behaviour of the new and old elements, and respect for the structural conception of the historic building. There also exists functional compatibility, according to which the function chosen should be studied in detail so as not to affect the building, or compatibility with the character of the building, where each intervention on the existing parts or addition of new elements can have a negative effect on the character and expressiveness of the building, etc.

- *expressive contemporaneity*, which the newly-added elements must guarantee as objects of today so as not to present a historic falsehood, but, we might add, without creating a conflict with the building itself by affecting its character.

- *durability* of the intervention, which not only means that the parts worked on or new are more or less guaranteed to last (a matter that has to do with professional ethics), but that there should be a certain amount of homogeneity between the durability of the old materials and the newly-added ones in order to ensure a homogeneous ageing process.

There are also intervention criteria of great importance and relevance for traditional architecture, insofar as it is often more fragile than monumental architecture. These criteria are the same as those contemplated for monumental architecture but they acquire a series of peculiarities that are ineluctable in non monumental architecture, since any intervention that does not value the intrinsic qualities and characteristics to be treated can inexorably transform their direct, spontaneous and, at the same time, wise and sensible nature as the result of a secular decantation of constructive knowhow.

Figure 5. Characteristic header and stretch bonding of the 19th century townhouses at Philadelphia, United States.

Conservation of the materiality

The issue of traditional architecture must be conserved to the greatest possible extent. Matter must be doubly protected, since it reflects two factors of traditional architecture: its configuration or the mass that forms it, and its character, expressed by means of its external surface. Stone that is slightly eroded or has lichen scattered about, timber with veins on its surface, interior and exterior renderings, woven wattles, rammed earth walls, etc. make up the outer and inner wrapping of the building and their transformation takes away a large amount of the character of traditional architecture.

Traditional architecture has a chance of surviving a restoration process if great care and delicacy are used in replacing its matter and concealing its surfaces. Obviously, the rehabilitation of a dwelling according to contemporary standards must seek a compromise between the needs of habitability and the conservation of matter. The matter was manufactured by its builders and, although one may not be familiar with vernacular techniques, it is necessary to conserve it for its naturalness, spontaneity and the traces of the building methods of the past. The surfaces of traditional architecture can be affected in many ways, among others the addition of thermal insulation inside the walls, the creation of recesses to embed installations and posterior opaque plasters, the change of layout in the building... These are no doubt necessary changes, but if they are indiscriminately accepted as common practice they end up transforming the appearance of traditional architecture entirely. It is necessary to find a compromise between the conservation of these surfaces that endow the building with character and the inclusion of new installations by seeking solutions that wreak the least possible damage on the materiality of traditional architecture. The authenticity of this architecture resides in its matter not only as a historic document but as actual architecture inherited from the past; the authenticity of a preindustrial society in its naturalness and spontaneity; the authenticity of the passage of time and antiquity on its wrinkled surfaces.

Compatibility of materials

The new materials to be introduced in the rehabilitation must be compatible with the existing construction, not only at a physical, but also at a chemical and, above all, a conceptual level. Thus, for example, in the event of adding a watertight or an extra insulating layer beneath the vegetable, ceramic, clay or stone protective coat of a roof, this layer must be transpirable to avoid the appearance of condensation in the interior or possibly allow steam to escape through different sorts of louvers. The materials used in the restoration of traditional architecture must also be compatible with the health of its residents. The sustainable and ecological character typical of traditional architecture by definition must not be annulled or overshadowed by including new materials that would enter into conflict with the natural philosophy and salubrity of the existing materials.

Structural compatibility

Matter is to the flesh as structure is to the bones of architecture. The skeleton of traditional architecture stems from the optimisation of local resources and usually responds to the secular characteristics derived from the constituent material, the subsoil on which it stands and the possible incidence of meteors or telluric currents.

According to John Warren (2012), there are three possibilities for the rehabilitation of the structure in traditional architecture: repair, reinforcement or replacement. The structural elements can be timber girders, joists or purlins, piers, masonry, adobe or rammed earth fabric.
Let us examine the significance of these three options by taking a timber girder as an example. Repair would involve cutting off a rotten area from a timber girder and replacing it with a prosthesis of new timber. The transcendence of the concept of repairing the structure resides in the fact that not only is the materiality conserved but the original structural system is also kept operative. In this case, the newly added material must fit in with the existing ones and be distinguishable from them if needs be. The reinforcement of a girder would consist in inserting elements to help it, as has occurred traditionally with iron. It is used when it is necessary to increase the resistance or the performance of the architecture. Repair maintains the building's original resistance, whereas reinforcement increases it. In this case, care must be taken to avoid the reinforcement from taking predominance over the original. Unlike repair and reinforcement, the replacement of a girder or another constructive element, even if it is a copy of the previous one, would not conserve the materiality of the original fabric. The fewer the elements replaced, the more compatible the option will be with traditional architecture. In this case, it is crucial to conserve at least the building's structural principle, which is just as important as its materiality.

Figure 6. Adobe housewall at Edfu, Egypt.

Functional compatibility

The fundamental criterion mentioned at the early stages of the restoration discipline is as follows: traditional architecture must have a function to guarantee its future, just as monumental architecture must. To that end, the building will have to be adapted to today's living standards. Beforehand, it is important both to check the compatibility of the old and new functions and to make sure the floor area of the building is not stretched beyond its natural capacity. In either of these cases, the restoration is very unlikely to be successful even though every precaution is taken and great sensibility is shown.

If it is a dwelling, it must have the same living conditions as a newly built house. That is, acoustic and thermal insulation should be in keeping with the regulations in force, as should ventilation and illumination, through the glass of the windows should it not already exist, the roof should be made watertight, and there should be a kitchen, a bathroom and possibly a heating system if necessary. In all these requirements, a compromise may be necessary to permit a certain amount of flexibility in the interpretation of the regulations, depending on the preexisting conditions of the house. For example, as in the case of the structure, the improvement of the living conditions of the building may be contemplated without neglecting the necessary respect for its materiality, structure, layout, configuration, character, etc.

That a traditional building should be used as a museum only makes sense in very special cases, such as, for example, if the function for which it was created has disappeared and the building constitutes the built memory of a culture, a custom or a production system. It is a possible and plausible option if there are no more suitable alternatives for its use. But this turning buildings into museums cannot be applied to a whole traditional group of houses. A whole town must not be turned into a museum because it would end up becoming a sort of artificial theme park or stage scenery even though the buildings are real and not made of gypsum board, as often occurs in both cases. Some traditional buildings in a town can be made into museums, often as monuments to a rural preindustrial society, while the rest of the houses can maintain their usual function as dwellings.

Figure 7. Typical medieval bonding at Verone, Italy.

Conservation of symbiosis with the environment

As we have seen above, one of the characteristics of traditional architecture and especially of rural architecture or small villages is their integration in the landscape because of their materials and adaptation to the climate. The restoration project must respect and conserve this relationship, which is biunivocal in the case of rural architecture. The external image of this architecture is closely related to the landscape surrounding it, since its scale, its matter, its colour and its texture have come from it directly. Traditional architecture requires the conservation of the surroundings to justify its constitution and presence, and the surroundings demand the conservation of the only architecture completely guaranteed to be compatible with them, that is, the architecture that they have produced from their loins.

The criterion concerning the conservation of the image does not stem from a bucolic or nostalgic sentiment regarding the atmosphere of rural architecture, which would like to freeze the world in the state it was in at a given moment or period. The image of this architecture, and, by extension, of traditional villages, has values connected to their dimension and human scale, their integration with nature and their unconscious application *ante diem* of principles of ecological architecture, which should be recognised and appreciated. For that reason, the restoration of this architecture must respect the criterion of conservation of its habitual image, since it is the fruit of the secular decantation of an optimal use of the constructive materials and techniques of the vicinity. In the event of needing to incorporate an annex or new building in an environment of this nature with a great deal of traditional architecture, it is important to seek the integration of volumetry, colour and texture so that this new presence will not stand out from the rest of the village.

Similarly, the criterion concerning the conservation of the surroundings does not stem from a reactionary, utopian or romantic attitude towards the natural landscape but from a desire to preserve

the landscape in which the traditional architecture to be restored was created. This conservation of the surroundings should be compatible with a reasoned exploitation of the natural media and resources that will not only take into account the net economic profit, but also economy understood in a broader and more global sense of the term, considering other factors like culture, history, sustainability, ecology or identity. The restoration of traditional architecture cannot be approached by ignoring the surroundings or the landscape where it originated. The exquisite preservation of an architectonic object disregarding its historic and cultural context by excessive transformation is insufficient from the standpoint of the integral conservation of traditional architecture.

Figure 8. Thatched roofs at Porotokotan, Hokkaido Island, Japan.

Economic sustainability and development

It is easy to show that the conservation and restoration of traditional architecture boosts and develops local trades and industry not only because it gives work to the craftsmen and small businesses of the area but because a large percentage of the profits from this activity in the form of labour stays in the local territory, unlike new houses, a large part of whose cost goes in materials and machinery not locally produced but coming from big cities. In most cases, with the right technician and builder, the overall cost of restoring an existing house is cheaper than that of building a new one (Mileto & Vegas 2006).

But the conservation of traditional architecture has, above all, a purely economic aspect, since the maintenance of walls, floors, roofs and other elements of the construction involves taking the best possible advantage of the resources inherited, which are simply conserved or reinforced, rather than resorting to more expensive solutions such as the generalised replacement of these elements. Indeed, a careful restoration of all this ensemble of buildings uses up much fewer resources and power, apart from generating much less carbon dioxide in the atmosphere during the process. This by definition

sustainable character of conservation and traditional architecture, with its ecological virtues and bioconstructive intentions, addresses cutting edge aspects involving the new sensibility towards the environment of many technicians and future house owners.

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Note: All photos by the authors.

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