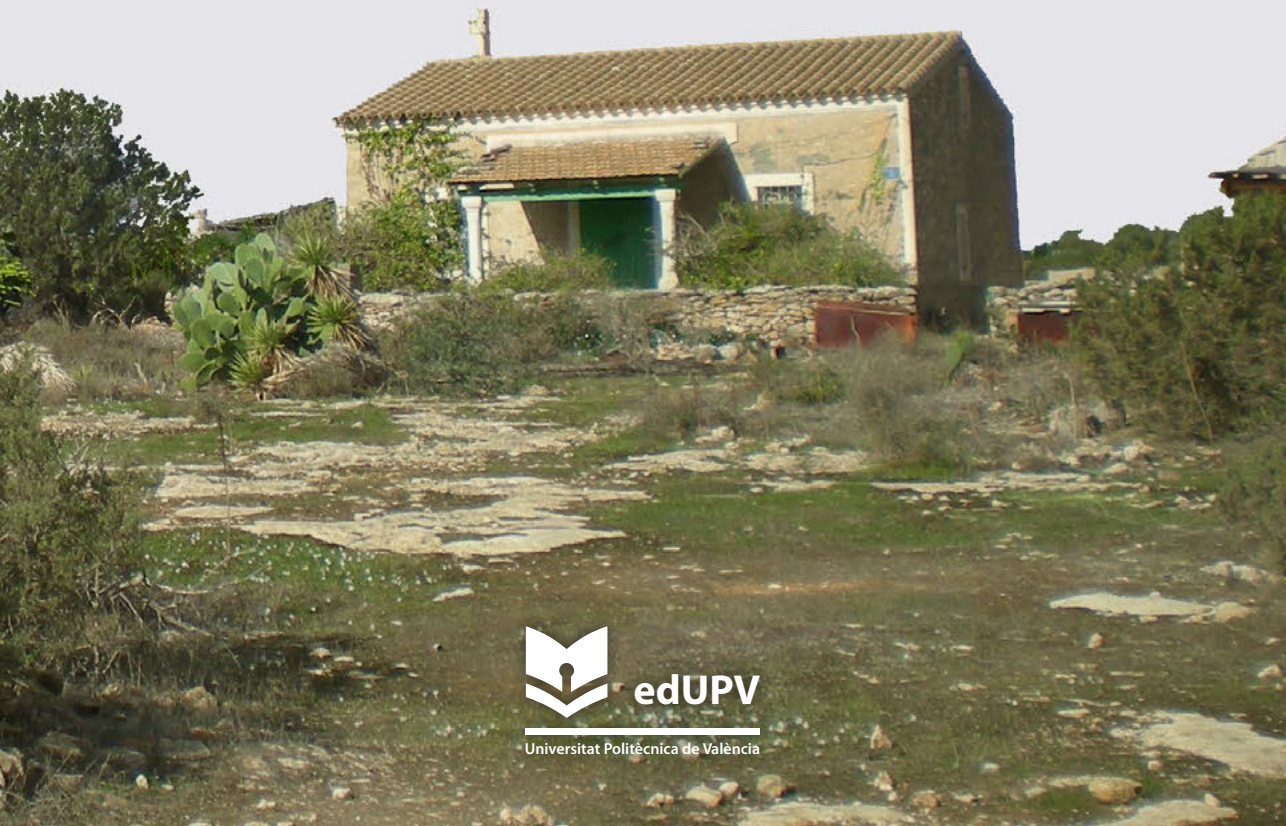
# HERITAGE 2022 INTERNATIONAL CONFERENCE

# VERNACULAR HERITAGE: CULTURE, PEOPLE AND SUSTAINABILITY

Eds. C. Mileto, F. Vegas, V. Cristini, L. García-Soriano



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**HERITAGE 2022**
**International Conference on Vernacular Heritage: Culture, People and Sustainability**

# Preface

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"HERITAGE2022, International Conference on Vernacular Heritage: Culture, People and Sustainability" is organized in the framework of the "VerSus+ | Heritage for PEOPLE" project, co-funded by the Creative Europe Program of the European Union (grant 607593-CREA-1-2019-1-ES-CULT-COOP1) and led by Universitat Politècnica de València (Spain) in partnership with Università degli Studi di Firenze and Università degli Studi di Cagliari (Italy), CRAterre – ENSAG (France) and Universidade Portucalense - Departamento de Arquitetura e Multimédia Gallaecia (Portugal). The "VerSus+ | Heritage for PEOPLE" project focuses on the transmission of knowledge to communities and the general public. It pays special attention to the society of the future (children and young people), as well as local, regional and national authorities in charge of heritage management, and includes specialists and experts in the field of architecture (architects, engineers, cultural managers, historians, ethnographers, university students, etc.) together with craftsmen and companies in the construction and tourism sectors, cultural and social associations, and educational institutions.

Vernacular heritage is a tangible and intangible heritage of great importance to European and global culture. This architecture, born from the practical experience of local inhabitants, makes use of local materials to erect buildings taking into consideration the climate and geography, developing cultural, social and constructive traditions based on the conditions of the surrounding nature and habitat. Above all, it plays an essential role in contemporary society as it is able to teach us important principles and lessons for a respectful sustainable architecture. These lessons from vernacular heritage for contemporary architecture have been extensively studied in the "VerSus: Lessons from Vernacular Heritage in Sustainable Architecture (grant 2012-2792/001-001 CU7 COOP7)" project, co-funded by the European Union between 2012 and 2014, and the "VerSus+ | Heritage for PEOPLE" (2019-2023) project, which follows on from the previous project, focusing on the transmission of this knowledge to society, as seen earlier. The wisdom of vernacular architecture in the field of environmental, sociocultural and socioeconomic sustainability is increasing both in interest and significance in the world today. Climate change, depopulation and the pressure of tourism all pose major challenges, as do the increasingly rapid social changes and loss of traditional trades resulting from the industrialization of the construction process. These challenges alert us to the pressing and growing need for education and increased awareness in society and for the documentation and conservation of architecture within a framework of up-to-date integration into contemporary life, managing territory and heritage assets for the sustainable development of society in the future.

The second project involved in this conference is "RISK-Terra. Earthen architecture in the Iberian Peninsula: study of natural, social and anthropic risks and strategies to improve resilience" (RTI2018-095302-B-I00) (2019-2022), funded by MCIU (Ministerio de Ciencia, Innovación y Universidades), AEI (Agencia Estatal de Investigación), FEDER - UE (Fondo Europeo de Desarrollo Regional, Unión Europea). This project is geared towards the conservation of earthen architecture in the Iberian Peninsula, both monumental and vernacular, which continues to be undervalued and barely recognized. The RISK-Terra project aims to provide scientific coverage of the study of natural threats (floods, earthquakes, climate change), social threats (abandonment, social discredit, demographic pressure, tourist development), and anthropic threats (neglect, lack of protection and maintenance), as well as the mechanisms for deterioration

and dynamics and transformation (replacement, use of incompatible techniques and materials, etc.) to which architecture is exposed. The objective of the project is to establish strategies for conservation, intervention and rehabilitation which allow the prevention and mitigation of possible damage through compatible actions and/or actions to increase resilience.

As these two projects have major points of contact, particularly in relation to the challenges mentioned above, with potential for common reflection, their main themes have been combined in this Heritage2022 conference. The topics established for the conference are: 1. vernacular architecture: matter, culture and sustainability (study and cataloging of vernacular architecture; urban studies of vernacular architecture; studies of traditional techniques and materials; sustainability of vernacular architecture); 2. heritage education (research in heritage education; heritage education and social inclusion; heritage communities; creativity and heritage education); 3. artisans and crafts of traditional construction (intangible heritage: the management of know-how and local construction culture; training in traditional construction crafts; tradition and innovation in traditional construction crafts; plans and experiences for the recovery and maintenance of construction crafts); 4. conservation, restoration and enhancement of vernacular architecture (conservation and restoration projects of vernacular architecture; materials and intervention techniques for vernacular architecture; difficulties and possibilities of using traditional crafts in conservation; management and maintenance of vernacular architecture).

The scientific committee was made up of 102 outstanding researchers from 24 countries from the five continents, specialists in the subjects proposed. All the contributions to the conference, both the abstracts and the final texts, were subjected to a strict peer-review evaluation system by the members of the scientific committee. Out of the 200 proposals submitted, 134 papers by 254 authors from 25 countries from the four continents were chosen for publication. All the articles have been published in print and online in the two-volume book “Vernacular Heritage: Culture, People and Sustainability”.

“HERITAGE2022 (Versus+ | RISK-Terra), International Conference on Vernacular Heritage: Culture, People and Sustainability” was held from 15 to 17 September 2022 in in-person and online modality at the Universitat Politècnica de València. The conference was under the aegis of: ICOMOS-CIAV (International Scientific Committee of Vernacular Architecture); ICOMOS-ICICH (International Scientific Committee on Intangible Cultural Heritage); IEB (Instituto Español de la Baubiologie). The organization, publication and implementation of the conference have been made possible thanks to co-funding of the Creative Europe Programme of the European Union for the project “VerSus+ | Heritage for PEOPLE” (grant 607593-CREA-1-2019-1-ES-CULT-COOP1); and the MCIU, AEI and FEDER - UE for the research project “Risk-Terra. Earthen architecture in the Iberian Peninsula: study of natural, social and anthropic risks and strategies to improve resilience” (ref.: RTI2018-095302-B-I00). Furthermore, Escuela Técnica Superior de Arquitectura and PEGASO - Research Centre for Architecture, Heritage and Management for Sustainable Development of Universitat Politècnica de València have also contributed to the whole project.

Finally, we would like to thank all the authors who contributed to the quality, range, diversity and richness of these publications with their articles. We give special thanks to all the partners of the European project “VerSus+ | Heritage for PEOPLE” and the national research project “Risk-Terra” for participating in the conference and helping to spreading the word about it worldwide. We are grateful for the aid of all the members of the advisory committee and the scientific committee for their work throughout the process of revising the abstracts and papers. And, above all, we thank the organizing committee for the complex setting up of the whole conference, the style and language reviewers for their corrections, and all the collaborators for their invaluable work in the management and organization of all stages of the process.

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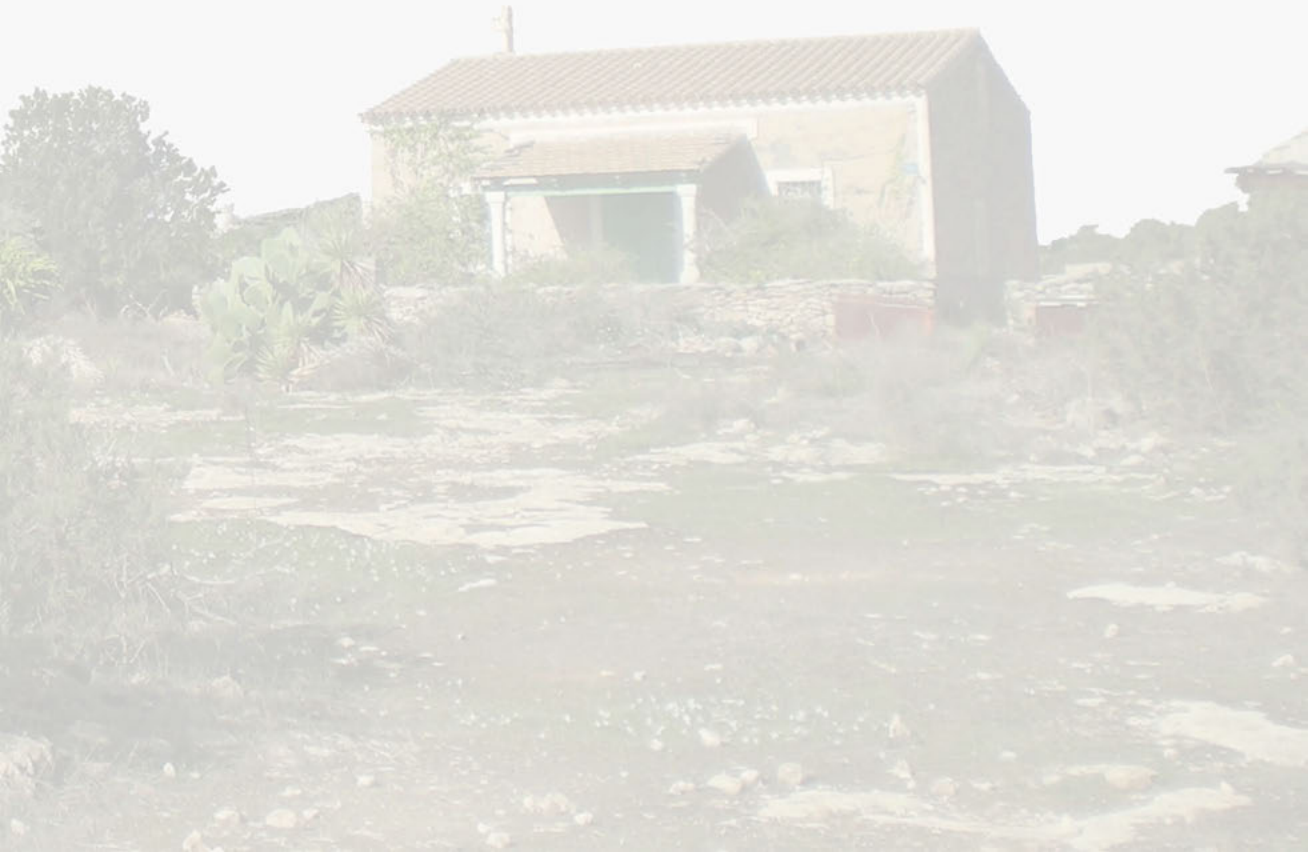

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# A Vision for CIAV. Addressing the challenges facing the ICOMOS International Scientific Committee on Vernacular Architecture

**Hossam Mahdy**
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**Topic:** T.4. Conservation, restoration and enhancement of vernacular architecture

***Abstract***
*While the debate continues on what exactly is vernacular architecture, what are its values and significance, how could it be conserved and revitalized, some pressing questions must be addressed without delay. Sustainable Development Goals (SDGs), climate change, the pandemic, armed conflicts, displacements and other disasters such as fires, floods and earthquackes are some of the main challenges that have been recently escalating and must be addressed collectively by all humanity without any delay. These challenges that do impact the cultural heritage greatly. On the other hand, cultural heritage should play a key role in addressing these challenges. ICOMOS, as the leading international organization in the field has an important role to play. The ICOMOS International Scientific Committee on Vernacular Architecture (CIAV) endeavours to fulfil its duty in addressing these pressing issues and their impact on the protection, conservation and management of the built vernacular heritage. The specificity of vernacular architecture raises particular challenges as well as offers opportunities that are particular to CIAV. This paper proposes a vision for CIAV that aims to include its new duties, which were not as urgent in the initial vision at the time of its foundation and during the drafting of the Charter on the Built Vernacular Heritage, 1999 in Mexico. The ideas expressed in the paper aim to raise discussions not only among the members of CIAV and ICOMOS but also for all those who are interested in the built vernacular heritage. As a result, CIAV may need to revisit its charter or issue a declaration to include the proposed new vision in its activities and discourse through its newsletter, conferences, publicaitons, webinars and other events.*

***Keywords:*** *vernacular built heritage; conservation of built heritage; ICOMOS; CIAV.*

## 1. Introduction

CIAV's objective is to promote the identification, evaluation, protection, conservation and revitalization of vernacular architecture, in keeping with ICOMOS' objective to foster international co-operation. CIAV forms an international network that defines, improves and promotes conservation principles, standards, research, responsible practice, innovation and knowledge about the built vernacular heritage. According to its strategy established in the year 2000, CIAV's aims are: to offer a global view on the conservation of the vernacular tangible and intangible heritage, to provide a forum for the examination of the built vernacular heritage and to provide specialists with advice on its conservation.The current CIAV Strategic Plan 2021/23 states the following "Vision":

"As an ICOMOS Scientific Committee, CIAV aims to bridge the gap between academic research and professional practices in the field of

built vernacular heritage study, conservation and management. The 'new normal' during and after the corona virus pandemic opened a new window of opportunity for CIAV by the normalization of virtual meetings, webinars, and conferences, which permitted more members to participate and brought to the fore impressive contributions from emerging professionals, promising a more dynamic future for CIAV."

Today, cultural heritage throughout the world is facing challenges that are not new but have become pressing. ICOMOS endevours to bring them into the focus and so is CIAV. These are:

- United Nations Sustainable Development Goals (SDGs)
- Climate change
- Natural disasters
- The Covid-19 pandemic
- Wars and displacements
- Fires
- Human rights

In addition, special attention should be paid to working to reach a balanced representation of different regions of the world in CIAV's membership as well as the subject of its work.

In it's declaration of Climate and Ecological Emergency, ICOMOS 20th General Asembley opened the declaration by stating that "The planet is at a crossroads where business as usual is no longer an option." This could be said for all the above issues. It is therefore, the author's suggestion that CIAV has to specifically aim to address these issues in the Committee's work and include them in the Charter on the Built Vernacular Heritage (1999), which CIAV sets as the guidelines for international best practices for the study and conservation of built vernacular heritage. The paper addresses each of the identificd issues and concludes by the proposal to integrate them in CIAV's vision, work and activities, which may require an update to its Charter.

One common characteristics of the issues identified by this paper is that they are a common challenge to all humanity. They, therefore, should be addressed collectively. This is why this is a paper addressed to the field of vernacular built heritage and not as an internal document for CIAV members. There is a pressing need for collaboration and coordinating efforts by all institutions, groups and individuals who work in the field.

## 2. Sustainable Development Goals

Culture is the absent presence in sustainable development endeavours. Sustainability is often measured by three indicators: social, economic and environment. Culture is not included. Nonetheless, it is a crucial indicator for sustainability. The United Nations Agenda 2030 focus on the five Ps: People, Planet, Prosperity, Peace and Partnership. Once more, culture is not mentioned even if it is present. None of the seventeen UN Sustainable Development Goals is on culture, even if culture is present directly or indirectly in all of them. In 2020 the British Council issued its important report *The Missing Pillar. Culture's Contribution to the UN Sustainable Development Goals.* As for cultural heritage, the only mention of its protection is *Target 11.4 "strengthen efforts to protect and safeguard the world's cultural and natural heritage to make our cities inclusive, safe, resilient and sustainable"*, under Goal 11 'sustainable cities and communities'. In 2021 ICOMOS issued the important report *Heritage and the Sustainable Development Goals: Policy Guidance for Heritage and Development Actors.* The report is based on the conviction that the role of cultural heritage in achieving the SDGs is crucial. The report proposes the slogan 'heritage: driver and enabler of sustainability' with an accompanying promotional graphic similar to the graphics for the seventeen SDGs, featuring elements representing culture, nature and people (Fig. 1).

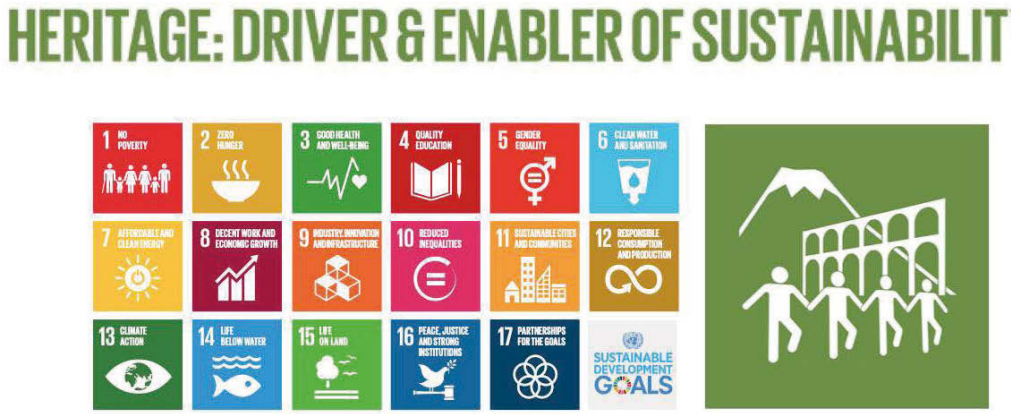


Fig. 1. The promotional graphic for the role of heritage in achieving the SDGs (ICOMOS, 2021)

The SDGs should be in the heart of CIAV's work. Not only because the vernacular built heritage contributes directly and indirectly to most of the SDGs. But also because the SDGs offer a great opportunity for championing the conservation and revitalization of vernacular built heritage as living heritage that is closely connected to people and to the nature as well as the carrier of age old wisdom in responsible relationship with the environment.

## 3. Climate change

The declaration by the 20th ICOMOS General Assembly of Climate and Ecological Emergency brought climate action to the heart of all the work and actions of ICOMOS. The theme for ICOMOS International Day for Monuments and Sites for both 2022 and 2023 is "heritage and climate". This is very important for CIAV. The vernacular built heritage is a living heritage that connects people with their environment and manifests their traditional wisdom in adapting to climatic and other environmental conditions. Traditional communities understood and observed sustainability well before the notion was highlighted and the term was coined in recent times.

Professionals of heritage conservation and sustainable development could learn lessons on sustainability and mitigating the impact of climate change from the built vernacular heritage. On the other hand, professionals could assist local communities and traditional master builders in sustaining livelihood for the future and mitigating climate change adverse impact by introducing innovative methods and tools that enhance the efficiency of the vernacular built environment. The role of CIAV is to offer the platform and guidance for climate action for the conservation and management of vernacular built heritage and to facilitate cooperation and exchange of ideas and expertise on regional and international levels.

## 4. Natural disasters

Earthquakes, floods, droughts, heatwaves, storms and cyclon winds have left their marks on many historic buildings and settlements over time. The different historic layers and patinas of historic buildings may tell stories about natural disasters and in some cases they show evidence of traditional strategies and methods for post-disaster reconstructions. The built vernacular heritage in different parts of the world manifest techniques, materials, architectural typologies and collective communal traditions that prevent or mitigate the impact of predicted natural disasters

of the specific regions. We see, for example, tie beams applied to arches, ring beams to domes, buttresses to values and wooden cushions to columns in the vernacular built heritage of earthquake-prone regions. And we see elevated ground floors in regions that witness recurrent floods. These and many other methods and techniques offer useful resources for resilient new architecture.

On the other hand, modern scientific research, analysis and methods could enhance the resilience of vernacular buildings and settlements. For example, earthquake shaking table tests and seismic performance analysis could inform the implementation of protective retrofitting of vernacular buildings in earthquake-prone regions.

Today emergency preparedness, risk reduction and disaster management are most pertinent to the protection and conservation of the built vernacular heritage as climate change has caused and is expected to cause a rise in the number and intensity of natural disasters. The work of CIAV should therefore include special attention to natural disasters and their impact on the vernacular built heritage.

## 5. The pandemic

The Corona Virus (COVID-19) pandemic is another challenge that threatened the whole humanity and hit hard the culture sector, particularly the cultural heritage as most museums, sites and historic buildings had to close their doors for months. In some cases closure lasted more than a year. In other cases closure became permanent, with many jobs lost and development plans cancelled.

In 2020 ICOMOS issued a study on "the impact of COVID-19 on heritage", which was the result of a survey of ICOMOS national committees reporting on the impact of the pandemic on the cultural heritage in their countries as well as their views on ideas for achieving resilience and recovery. The topic was also covered by many webinars, the "new normal" during the high waves of the pandemic, total lockdowns and the ban on big gatherings and meetings.

Despite its negative impact, the pandemic was a wake up call for all humanity to rethink our mode of work, study, shopping, travel and almost all aspects of modern life in the globalized world of today. The concept of "living locally" became a necessity and not a luxury during the lockdowns. We all had to live the concept of "20-minute neighborhood", meaning a walkable neighborhood or settlement, where all basic needs of the community should be available. No travelling long distances for work, scools, shopping or any other activity was possible. The positive impact on the environment during the lockdowns was evident as the air, seas and rivers became cleaner and cities became greener and heltheir.

Many lessons could be learned from the built vernacular heritage not only on how to live locally but also on how to build a home, manage a settlement locally and lead a full life locally. This is a role that CIAV should play by introducing to architects, planners and decision makers case studies, the philosophy, materials, techniques and approaches from built vernacular heritage around the world. Also, this is an opportunity for CIAV to raise awareness and pride of the guardians and local communities who live, maintain and keep alive the built vernacular heritage.

## 6. Wars

ICOMOS, UNESCO and many other international organizations as well as conventions, declarations and initiatives were established as a reaction to the destruction and loss caused by the two world wars of the twentieth century. Unfortunately, today and after a few decades we find ourselves in no better situation. Wars and displacements of millions of innocent civilians and the destruction of whole cities, villages and countless historic buildings and sites have become an everyday reality of our world. For some it is an unpleasant item on the news headlines. For others, it is their very lives being totally shattered.

Wars and displacements create great challenges and also opportunities for the built vernacular heritage. While the restoration or reconstruction of a historic monument may help in curing the damage caused by war, vernacular buildings are only the tip of the iceberg. A vernacular building could be restored or reconstructed, but what about the traditions of living in and maintaining such a building? Would a family who grew up in exile or a refugee camp return to their family earthen house and know how to live in it? How to maintain it? How to make their own bread using their traditional oven? What about the local culture and social structure and traditions within the village and the city? Would the local oral history, stories, songs, dances and handicrafts survive the war?

These are great challenges that are facing the built vernacular heritage not in one or two countries but unfortunately many more. It is therefore the duty and role of CIAV to address these challenges and also to identify opportunities that may arise from wars and displacements. For example, certain vernacular settlements that were deserted by the youth who have migrated to big cities in search for opportunities could be adapted for receiving displaced people from other regions. Such an opportunity would come of course with its own challenges. Which traditions and identity would prevail? That of the place or of its new community?

## 7. Fires

It was heart-breaking to see live on tv very important historic buildings destroyed by fire. This included the roof of Notre-Dame Cathedral in Paris in 2019, Shuri Castle in Japan in 2019, the National Museum of Brazil in 2018, the Glasgow School of Art in Glasgow twice in 2014 and 2018, the New Delhi National Museum of Natural History in 2016, the Duchess Anna Amalia Library in Germany in 2004 and Windsor Castle in the UK in 1992. Many other historic buildings were destroyed by fire but did not make it to the international news headlines.

All these buildings were covered by the highest level of protection and enjoyed the best care that was available on national level, and for some on international level by being designated World Heritage Sites. Nevertheless, the protection was not enough to predict, prevent, mitigate or reduce the damage by fire. Actually both Notre-Dame Cathedral and Glasgow School of Art were under restoration at the time of the fire with all conservation personnel, equipment and accessibility scaffolding in place. Yet, the fire was not put down before it caused huge irreversible losses.

For such damage to occure to these high profile historic buildings in our day and age tells us that we are not prepared enough to protect our built heritage from the threat of fire. The threat to built vernacular heritage is even much greater. As most vernacular buildings and settlements are built with flammable materials and in remote locations with poor accessibility to emergency services. CIAV should therefore address this threat by research and guidance for best practices. Traditional methods for mitigating and fighting fires should be studied and modern methods should be adapted and included in the conservation and management plans for built vernacular heritage.

## 8. Human rights

In 2007 ICOMOS started an initiative with the aim of "building awareness of rights issue in World Heritage and heritage management in general", which led in 2011 to the establishing of "Our Common Dignity" Rights-Based Approaches Working Group (OCD-RBA). This is an important milestone in the decolonization and the freeing of the international conservation movement from its Eurocentric attitudes. Earlier milestones include Burra Charter that was initially issued by ICOMOS Australia in 1979 acknowledging the value system and worldview of the indigenous peoples in the field of cultural heritage and its conservation. Another milestone is the Nara Document on Authenticity in 1994, acknowledging that the European notion of authenticity is not universally valid and that authenticity is a

culture-specific concept. There is still a long way to go as the establishment of the OCD-RBA indicates.

More recently the Black Lives Matter movement and Rhodes Must Fall movement highlighted the centuries-long oppression of people based on the colour of their skin and the insensitivity of the current views on cultural heritage with regards to racism, slavery and their legacy that continue to undermine black people and the people of color implicitly and explicitly. The anger and the violence that these movements showed towards the establishment and towards monuments, some of which, were listed as national heritage indicate that there is a lot of work to be done regarding human rights and human dignity.

The built vernacular heritage is produced, maintained and lived in by local communities many of whose dignity and rights are not always respected. In many cases, the conservation, interpretation and presentation of their own cultural heritage are imposed by outsiders without their full participation and collaboration. Human rights must therefore be explicitly in the heart of CIAV's work.

## 9. Integration and synergy

The above mentioned issues, challenges and opportunities should be integrated into CIAV's work. CIAV members should discuss a possible update that could be made to the "Charter on the Built Vernacular Heritage (1999)". The Charter is organized under four headings: "Introduction", "General Issues", "Principles of Conservation" and "Guidelines of Practice".

The "Introduction" states that "Due to the homogenization of culture and of global socio-economic transformation, vernacular structures all around the world are extremely vulnerable, facing serious problems of obsolescence, internal equilibrium and integration." A paragraph could be added on the escalating challenges of wars, fires and natural disasters. And another paragraph on the challenges and opportunities by the SDGs, climate change and the pandemic. The issue of human rights is well covered under "General Issues", article 3:

"Governments and responsible authorities must recognize the right of all communities to maintain their living traditions, to protect these through all available legislative, administrative and financial means and to hand them down to future generations."

Separate articles could be added under both "Principles of Conservation" and "Guidelines in Practice" on SDGs and climate change as well as the mitigation and management of the threats of wars, fires and natural disasters. What is more important than including these issues in the Charter is to effectively include them in CIAV's work.

Another level of integration and synergy should be aimed at bridging the gaps created by institutional structures and mandates, such as:

- Cultural and natural heritage
- Tangible and intangible heritage
- Movable and immovable heritage

CIAV should endeavor to collaborate with the relevant institutions and other ICOMOS international scientific committees and working groups to bridge these gaps and to ensure a holistic and balanced approach to the built vernacular heritage.

## 10. Balanced representation

A balanced representation of members and also topics of research and discussions on the cultural heritage from different regions of the world is a difficult objective that ICOMOS aims to reach. The majority of members and thus studies and discussions are from Europe, North America and Australia.

For CIAV, the importance of a balanced representation cannot be overemphasized. Some of the most significant built vernacular heritage sites in the world are located in the least represented regions by CIAV members, such as Africa and also Asia and Latin America. This is the reason that the present CIAV Bureau endeavors to hold 2024 CIAV conference and annual meeting in

Africa, hoping to create opportunities of collaboration with African colleagues and relevant institutions.

## 11. Conclusion

As the ICOMOS International Scientific Committee on Vernacular Architecture, CIAV is in a position to address the escalating challenges that face the protection and conservation of the built vernacular heritage and to capture the opportunities to influence the design and building of new more resilient buildings and settlements. However, in order for CIAV to assume such a role, there is a need to develop an articulate vision that identifies the following priorities and integrates them into its work:

- United Nations Sustainable Development Goals (SDGs)
- Climate change
- Natural disasters
- The Covid-19 pandemic
- Wars and displacements
- Fires
- Human rights

To do so, there is a need to work towards a balanced representation in CIAV's membership, to collaborate with the relevant entities within ICOMOS and beyond and to revisit the "Charter on the Built Vernacular Heritage (1999)".

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# Vernacular earthen architecture. Construction techniques and restoration. From the international setting to some specific Italian regional cases

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**Topic:** T4.1. Conservation and restoration projects of vernacular architecture

***Abstract***
*The research focuses on vernacular architecture, in particular earth buildings, highlighting the different geographic areas involved, building types and construction techniques. In Italy, despite theoretical progress, some cultural and technical problems are still evident in earth architecture conservation. This is also due to the prevalence, among earth buildings, of vernacular architecture, that, in general, has no artistic value and with historical value yet to be fully appreciated. The characteristics of some regional areas are also considered, with particular attention to the Marche and Sardinia Regions, where earthen constructions have existed since ancient times. Knowledge of construction techniques that are the result of age-old experience is the basis for a good conservation and for the design of new ones. Today, some public administrations, on the regional and local levels, have developed operating manuals for the conservation of earth constructions, but there is still no real legislative protection for earth buildings and their material authenticity.*

***Keywords:*** *vernacular architecture; earth building; conservation; sustainability.*

## 1. Introduction

The issue of earth building is becoming increasingly urgent within the discipline of architectural restoration, both due to the perishability of the material when it is not properly maintained, and because conservation efforts either result in the simple reconstruction of entire portions of buildings or are transformed into operations that completely alter their structure. Within an international framework of reference, the intention is to update the state of Italian reflection on the subject through the review of the existing literature, with reference to Sardinia and Marche Region.

## 2. The international landscape

For several years, scant durability in the absence of maintenance has brought earthen constructions to the centre of reflections, in an international setting, within the discipline of restoration. The specialist literature on the subject has consisted mainly of frequent international conferences, which have the merit of regularly assessing the current state of thought. ICOMOS spearheaded these meetings, organizing two important international conferences in Yazd, Iran, in 1972 and 1976, aimed at defining and sharing the value of earth architectures. These were followed by a host of

others: in Turkey (1980), Perù (1983), Italy (1987), the United States (1990), Portugal (1993), the United Kingdom (2000), Iran (2003), Mali (2008), Peru (2012), and in France (2016). TERRA 2022, to be held in the United States (Santa Fe) is already being planned, to be followed by TERRA 2024 in Ecuador (Cuenca). In 2021, a collaboration between the National Research Council of Italy (CNR) and the Chinese Academy of Cultural Heritage (CACH) saw the publication of the results of certain studies carried out on earthen constructions and on the different possibilities for conserving them, in various parts of the world[1]. In general, reflections on the conservation of buildings of this kind vary according to the geographic location where they are made. While there is great interest in the decay owing to weathering, in the more seismically active areas attention focuses mainly on low resistance to earthquakes and on experimenting with possible interventions to improve their structural response[2]. Recently, interest in these constructions has also related to their eco-sustainability.

### 2.1 Earthquake resistance

The 1998 European Macroseismic Scale lists adobe structures among those most vulnerable to earthquakes. Walls made in *pisé* are generally more resistant than those in *adobe* (by up to 40%). The parameters that influence the seismic vulnerability of *adobe* are the granulometry of the earth used, the moisture content, the level of compaction, the use of natural additives, and the treatment of the joints (which is to say the introduction of materials other than earth between the layers)[3]. On the seismic vulnerability of *adobe* structures, the studies begun in California in 1990 by the Getty Foundation with the *Getty Seismic Adobe Project* (GSAP) remain fundamental[4]. The GSAP's final report noted the inadequacy of the consolidation techniques used to that time, since they were the cause of irreparable damage unacceptable in buildings of historic and artistic value. In some of the interventions studied by the GSAP, the central part of earthen walls had been replaced with elements in reinforced concrete[5], or cages of beams and pillars in reinforced concrete had been employed[6]. The objective of the research was to find reinforcement techniques to keep the walls from toppling during a quake. The indicated solution was the use of slabs, whose beams function as chains if appropriately connected to the exterior walls as in common masonry buildings. Researchers also verified the effects of introducing vertical steel bars in the walls, steel tie rods in the masonry units, and nylon straps applied horizontally and vertically to increase the connection between the partitions, thereby improving the structures' monolithic behaviour. The various systems have yielded good results and can be employed on a "case-by-case" basis depending on whether the intention is to preserve the integrity of the surfaces and of the exterior decorations (internal bars) or to facilitate the reversibility of the intervention (straps)[7]. Reinforcement techniques using natural,

Rossana Mancini wrote paragraph 2, Maria Giovanna Putzu paragraphs 3 and 5, and Enrica Petrucci paragraph 4.

[1] The project was financed by the National Research Council of Italy (CNR) and the Chinese Academy of Cultural Heritage (CACH); Luvidi, Fratini, Rescic, Zhang 2021.

[2] Meli, Hernandez, Padilla 1980.

[3] The available literature on the seismic resistance of cob (rammed earth) constructions is quite limited. Interesting results are in Bu, Wang, Han, Li 2011.

[4] The *Getty Seismic Adobe Project* was discussed for the first time at the Sixth International Conference on Earthen Architecture, *Adobe 90* (Oct. 1990 a Las Cruces - New Mexico), after the Loma Prieta earthquake (1989) in California, which destroyed many historic buildings in *adobe* (Tolles, Kimbro, Webster, Ginell 2000).

[5] An example of this kind of intervention are the Sonoma Barracks in Sonoma State Historic Park, California.

[6] The Plaza Hotel in San Juan Bautista State Historic Park, and the Cooper-Molera Adobe in Monterey, both in California.

[7] This kind of reinforcement is appreciated for its ability to go into action only if necessary, to avoid stiffening the structure, and to guarantee structural continuity between the walls and the partitions and the bearing walls' containment. Interest in these studies is still lively and references to the obtained results are found even in the most recent international meetings (Webster 2016). A system of traditional consolidation, carried out during the building's construction phase, was discovered in Bam, in southeast Iran, after the 2003 earthquake. This involved supporting the roofs, to keep them from collapsing, not only with exterior walls, but also with wooden columns placed in the thickness of the wall sections.

environmentally friendly materials have been tested in Peru since 1972, after the long series of earthquakes coming in succession since 1940[8]. It has been shown, for example, that the insertion of bamboo canes into the adobe wall sections was able to increase their deformation capacity. Between 1990 and 2000, the Regional Centre of Seismology for South America (CERESIS), the German Agency for International Development (GTZ) and the Pontifical Catholic University of Lima (PUCP) tested the use of natural fibre ropes, wood, and steel mesh in the critical points of the constructions. In 2004, a joint project between the Pontifical Catholic University of Lima and the Getty Conservation Institute assessed the effects of external reinforcements made using natural and industrial mesh on both sides of the adobe walls, demonstrating that, in the event of severe earthquakes, flexible materials offer better performance than stiff ones.

### 2.2 Resistance to weathering

Earth architecture requires regular maintenance in order to keep the external protection systems (plaster and roofs) efficient. Therefore, preventive conservation is highly important in order to avoid the continuous renewal of these external elements, and the consequent loss of the building's authenticity. The constant reconstruction activity has shifted attention from conserving the work to safeguarding traditional techniques, so as to restore "in keeping with tradition"[9]. This is theorized, for example, in Central America, by the *Chilean LSC Atlas project*, which offers a critical vision of the use of non-local techniques and of industrial materials in "vernacular" architecture, for the purpose of conserving the original construction logic more than the authenticity of the material[10]. Meanwhile, a positive evolution from reconstruction/recovery to conservation and protection is found in the Chan Chan site on the northern coast of Peru. Between 1964 and 1969, major reconstructions were done, largely oriented towards formal recovery; however, at a second moment, work began to stabilize the existing structures by creating large wear surfaces. Some wall tops were covered by capping made using a clay mortar with the addition of an acrylic emulsion and other substances like wood glue, but the results were poor, due likely to the high rate of humidity at the site. Better results were attained using ethyl silicate[11]. A new phase of interventions was embarked on after 1998, following the atmospheric phenomenon known as *El Niño*, when prevention efforts were carried out by screening the ancient walls with bamboo and thatch barriers to protect them from the weather. Plant fencing has also been proposed in some sites in Saudi Arabia to defend the remains from sandstorms[12]. Only in some rare cases have restoration materials been made distinguishable from the pre-existing elements. The cases that have been tried out include the insertion, between the surface wear layers and the original wall, of layers of geotextile material, or of earth and small coloured beads.

## 3. The national situation

In Italy, earth construction tradition is very ancient, as witnessed by numerous archaeological finds and by classical sources that describe the employed techniques with an abundance of detail. The use of earth has thus gone on since antiquity, with variations and alternations, but always with continuity over the course of the centuries, until the early 1950s. In Italy, like other European countries, earthen buildings are present, with different intended uses and different typological characteristics (house, small building, villa, school, church, etc.), in both rural and urban settings. An examination of the data provided by earlier

[8] Vargas-Neumann, Otazzi 1986.
[9] Bartolomucci 2013.
[10] Suilan Hau Espinosa, Jarpa 2016.
[11] On the use of ethyl silicates to consolidate *adobe* structures in the late 1980s, see Chiari 1988. On the Chan Chan site, see Morales Gamarra 1983.
[12] Mancini, Putzu 2019, p. 735.

studies[13] shows that all Italian regions, with the exception (based on the knowledge acquired to date) of Valle d'Aosta, traditionally saw the use of earth construction techniques, with technical and formal solutions often differing from one another[14]. Moreover, as in the other non-Italian settings affected by the phenomenon, there is a strong link between the presence of large river or lake areas, which promote the deposit of clays, and the consolidation of an earth construction tradition (Po plain; subcoastal zones of Marche and Abruzzo; area of the Agri and Sinni River basin in Basilicata; Tirso valley in Sardinia)[15]. It is also noted that beyond the presence of clay in the subsoil, a fundamental role in spreading earth constructions is also played by climate conditions (temperature, rainfall, latitude and elevation) that condition appearance and persistence. Although Italy is home to all the construction techniques typical of the vernacular tradition of other European countries, particularly widespread among those involving the use of earth are *adobe*, *pisé*, and, to a lesser degree, *torchis*. In spite of the process of neglect that began in the second post-War period, and although, until the second half of the twentieth century, quite little was known about earth construction techniques and there was a widely-held conviction that they had fallen entirely into disuse, some studies have actually demonstrated that in the 1960s, in certain regions of Italy, earth was still used following traditional procedures[16]. Starting from the 1980s, the new approach towards a way of building that presented features of sustainability and respect for the environment saw in earth construction all the technical characteristics that suit it for the building of healthy, pollution-free environments[17]. Although the earth sector now has numerous results of international research and studies at its disposal, there is still no national-level legislation that recognizes earth as a construction material and that provides technical rules of reference to regulate and define the types of intervention suitable both for historic construction and for constructing parts or entire buildings *ex novo*[18].

## 4. Earthen houses in the Marche

In the Marche region, the earth construction technique was used until the nineteenth century. As late as 1934, *Indagine sulle case rurali in Italia* found about 1,401 dwellings in the Marche built in earth and thatch using the technique called *a massone* or *maltone*. In Pesaro, 14 houses were censused, 95 houses in Ancona, 931 in Macerata, and 361 in Ascoli Piceno[19]. The first to raise doubts as to the truthfulness of these data was Clarice Santoponte Emiliani, who several years later was to perform her own fact-finding survey aimed exclusively at earth constructions, discovering a reality that was quite different[20]. According to Santoponte, the number reported in the 1934 was to be considered erroneously low due to significant errors made in gathering information and due to the desire to conceal or at least to reduce the presence of these buildings.

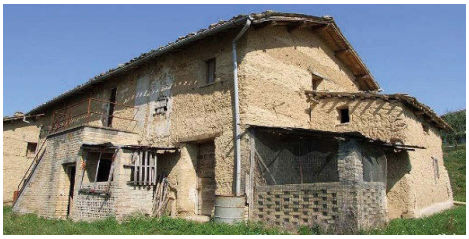

Fig. 1. House in the Macerata area, in accordance with the typical construction technology, 2020.

[13] Bertagnin 1999; Baldacci 1958; Lasalandra 2008; Manca, Cossu, Loche 2005; Mancini, Putzu 2019.

[14] In particular, according to the data provided by CeDTerra (documentation centre on earthen houses; see also the rich bibliography provided there), on national territory, earthen houses, widespread above all in Sardinia and Abruzzo, are also present in Emilia Romagna, part of Veneto, Lombardy, Piedmont, Tuscany, Marche, Molise, Basilicata, and Calabria. Other construction types were noted for example in the Marengo plain (Alessandria), where we find buildings like the Pasturana church and the Spinetta Marengo school, and in Quartu Sant'Elena (Cagliari), where there are numerous small urban buildings (Bertagnin 1999, pp. 24, 25).

[15] Lasalandra 2008, p. 256; Galdieri 1987.

[16] Lasalandra 2008, p. 258.

[17] Bertagnin 1999, p. 285.

[18] Currently, Law no. 378 of 24 December 2003, *Provisions for the protection and valorization of rural architecture*, is the only regulation that also relates, albeit marginally, to earth constructions, for which, for now, only proposed and draft laws have been developed.

[19] Istituto centrale di statistica del Regno d'Italia 1934.

[20] Santoponte Emiliani 1941, pp. 245-258.

Santoponte's research shows that most of the earth constructions were distributed in hilly areas with concentrations exceeding 20% in the Macerata area. These were the houses of day labourers, poor people, those who made do to eke out a living in the peasant economy; during the post-War period, with the exodus from the countryside, these houses underwent dramatic phenomena of abandonment. In those that survived, their earthen nature was concealed as much as possible, almost as if it were a mark of poverty and infamy for those who continued living in them. The construction technique consisted of mashing a mixture of clay and straw to obtain a dense, plastic compound, which was then divided into clumps weighing 5-10 kilogrammes each, coarsely shaped into cylinders tapered at the ends, averaging 15 cm wide and 20-30 cm long. To make the construction, these *massoni* were laid in layers from 50 to 70 high and 40 to 80 cm wide, to form a monolithic wall structure. Each layer was allowed to dry for several days, during which the wall was trimmed and squared.

Fig. 2. The construction process involves the entire family, photograph of 1919 from a private archive

Particular attention was devoted to site selection, both to avoid the problem of humidity, and because suitable earth had to be available in the vicinity, since transporting the raw material from a distance was not cost-effective. Foundations were shallow if not absent altogether. Once the building's perimeter was established, the area was dug out to a depth of between 50 and 100 centimetres; the earth was then placed back in the hole in 30/40-centimetre layers, adding water and straw and mashing it to blend together, and then allowed to dry. Once ground level was reached, the bearing walls began to be raised. The craftsman laid *massone* along the house's perimeter in one layer after the other, in alternating courses, or more rarely in herringbone courses inclined at 45°. Once a layer was completed, the craftsman crushed it down with his feet to fill in the cracks; he then smoothed it inside and out with his spade, sometimes working the earth with water again. As the layers progressed, the *massone* grew smaller, to allow them to be put them in place more easily; the walls thus tapered in, measuring about 80 cm at the base and 50 cm at the top. Given the nature of the material, the intersections of the walls represented the most delicate points in the construction; to solve the problem, the junctions between walls were often reinforced with horizontal connections of olive branches sunken into the structure. For two-storey houses, the floor slab was made at a height of about 220 centimetres, by anchoring poplar, elm, or oak beams to the wall, placed in parallel one metre apart, and topped by a second, denser, orthogonal frame of slats, upon which was placed a layer of mud-daubed reeds woven or twined together, which served as the base supporting the burnt brick floor. The same technique was used to build the roof, whose covering was made with bricks (*penci*) resting upon a mixture of soft earth atop a layer of woven reeds. The roof was rather overhanging – usually by more than 50 centimetres – to protect the walls near the ground. In general, only the north-exposed exterior wall was plastered; far more frequently, the use of plaster was limited to the outlines of doors and windows. For the base, the protection was made using burnt brick or stone, up to the height of about one metre. The analysis shows the great historic and cultural value of these constructions, as productive and life forms, that express the region's identity. Over the past decades, great interest in architectures of this kind has developed, thanks also to the numerous research efforts carried out by universities, the Region, and local institutions that have devoted themselves to studying the most significant

examples present in the Marche[21]. The analyses were brought together in a cataloguing data sheet, grouped into provincial settings in accordance with the density of earth construction.

### 4.1. A virtuous example. Recovery of the Village of Villa Ficana in Macerata

The heightened sensitivity to safeguarding this "minor" building heritage led, as in the case of the Ficana quarter in Macerata[22], to identifying multidisciplinary procedures aimed at recovering earth construction.

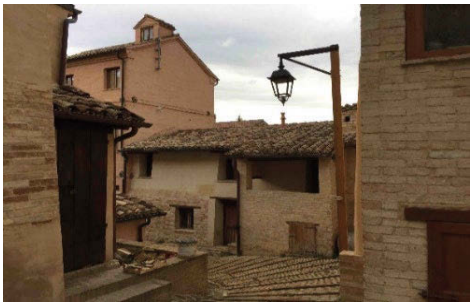

Fig. 3. The village of Villa Finacana in Macerata, after the restoration interventions, 2022.

To prevent the abandonment of this construction technique, an articulated programme was initiated in 2000. In 2014, the Municipality of Macerata held a competition for submissions of design proposals for museum interventions and the recovery of the buildings. The *Recovery Guidelines* defined the field of possible interventions, in such a way as to represent a binding basis for future recovery work, and to harmoniously and sustainably reconcile possible changes with the conservation of all the historical and cultural values that the village possesses. The *Guidelines* provide a working tool able to guarantee a high qualitative standard for future designs; at the same time, intended uses deemed compatible with the typological and size characteristics of earthen houses were identified. In recent years, this allowed the village to be restored to its original configuration, while also fostering the creation of a "museum of the earthen houses of the Marche."

## 5. In depth: Sardinia

In Sardinia, this technique has been attested since antiquity. Clayey earth, in fact, has been found in some early Iron Age nuragic sites, in private buildings from the Phoenician/Punic Age, and in Roman and Medieval sites[23]. The technique in mudbricks (*ladiri*), now more well-known, saw additional impetus during Spanish domination and was employed in subsequent centuries along with other materials (iron, brick, and reinforced concrete). Until the 1950s, *ladiri*, along with stone, was the building material most used in private construction (fig. 4).

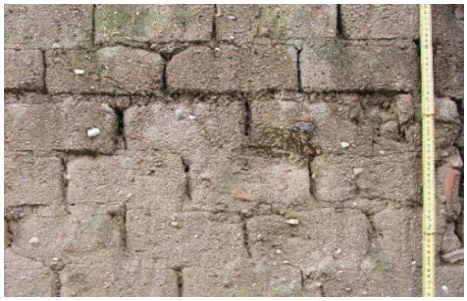

Fig. 4. Earthen wall of a house in the town of Donigala Fenughedu (Oristano) (Source: Putzu, 2015).

The 1980s saw a revival of the technique, which appears widespread with certain variants in much of the regional territory; however, the historic and geographical regions where it is most prevalent are the areas of Campidano Maggiore and Campidano Meridionale, the Trexenta area, and the area of the Ogliastra plain. It is used mainly for residential construction: the courtyard house, the residential building, and the villa, but also for some industrial buildings. Absent an appropriate protocol, univocal and shared by the entire scientific world, a useful tool for

[21] Architetture di terra nelle Marche 2005. The volume collects the results of a research work on the building techniques and conservation methods of earth architecture constructions.

[22] The Village is in the northern zone of Macerata. Its origins date to about the nineteenth century, as witnessed by contemporary cadastres, and it covers an area of about 7,000 $m^2$. The demographic increase recorded in the nineteenth century saw houses proliferate exponentially in response to housing needs rising during those years within the poor class of farmers.

[23] Sanna, Atzeni 2009, p. 3; Putzu 2015, pp. 131-135.

construction practice may be seen in the manuals for the recovery of the historic centres of Sardinia, done at the initiative of the Region and the Urban Planning Councillorship[24]. Among the "good practices," useful reference data are provided both for structural interventions and for the technological characteristics of the individual component materials. In particular, in the case of possible reconstructions following collapse of entire walls, the use of similar and compatible materials and technologies is recommended; however, especially in buildings of particular testimonial significance, a distinction between the original and the reconstructed part (e.g: interposition of a shutter, working with undercut) ought to be made. The reconstruction of partition walls using "non-traditional" materials and techniques is not ruled out a priori, but "is deemed at any rate inadmissible, due to the incompatibility in thermohygrometric mechanical behaviour, and the use of concrete, whether or not reinforced"[25]. As concerns the interventions on the floor slabs, which in historic Campidano-area earthen construction always have a wooden structure, the support junction to the wall should advisably be well aerated, to guarantee good transpiration for the wood. In addition to the use of metal straps bound to the ends of the beams and anchored to key beams on the wall, an additional structure stiffening the masonry structure, which supplements the installation of chains and tie rods, may be made by introducing ring beams or hoops. Considering that the existing ring beams are usually made with rubble-core filling material, contained where needed by brick or stone cornices, these elements should advisably be "emptied, while still maintaining on the outer edge of the masonry a containment, to prepare the housing of the ring beam"[26]. Upon careful evaluation, it is considered admissible to use ring beams in appropriately reinforced concrete, while it is held that ring beams in cement must be excluded. Lastly, an essential component for conserving earth architectures is the plaster, based on common lime, better if in the form of slaked lime (grassello), or earth based. An excellent compromise may be found by making an earth-based mortar, adding lime in small amounts[27].

## 6. Conclusions

To date, the studies on earth structures, however abundant, are based on extremely heterogeneous survey material relating to existing structures, using no "univocal" criteria for interpretation. Moreover, there is still no thorough survey of existing structures that would be such as to provide a comprehensive picture of the current situation. Although some sensitive public administrations have developed targeted operating manuals and specific guidelines for restoration, there is still no legislative recognition protecting earth construction in its material authenticity and as a constituent element of historic fabrics.

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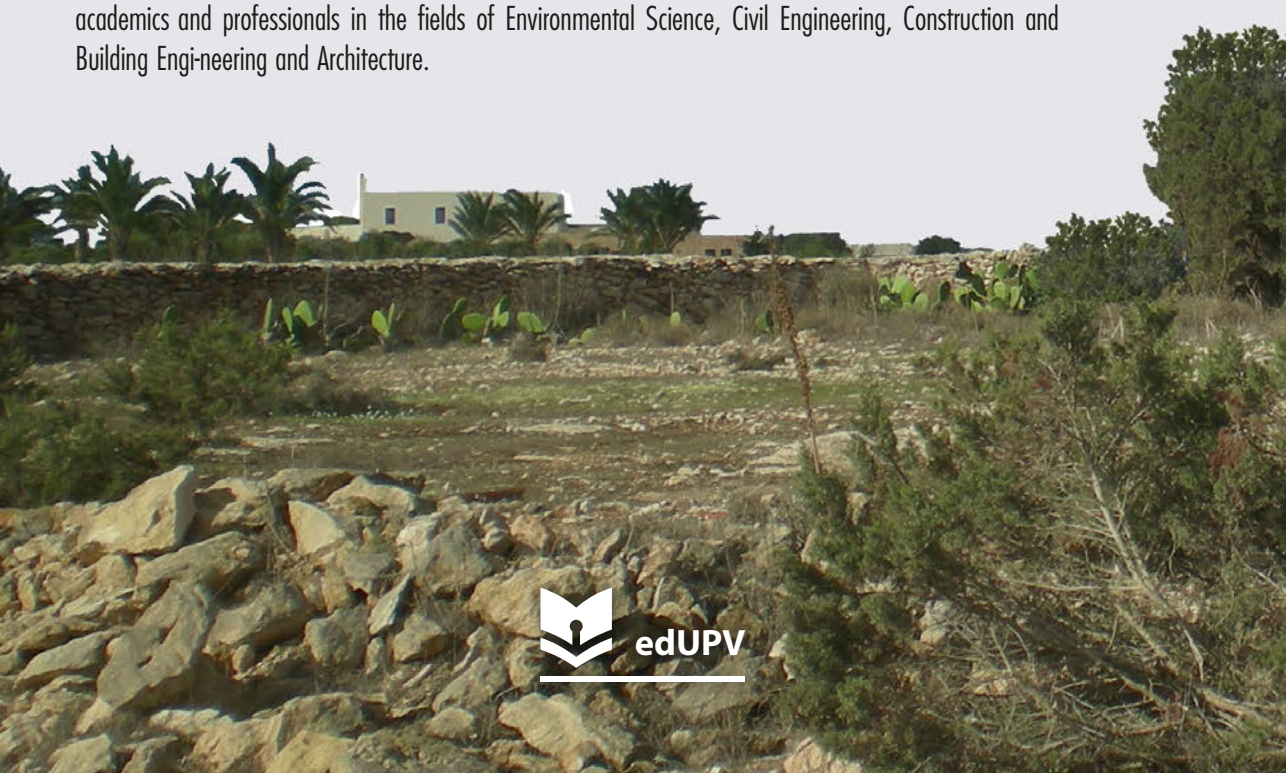
HERITAGE 2022 INTERNATIONAL CONFERENCE

# VERNACULAR HERITAGE: CULTURE, PEOPLE AND SUSTAINABILITY

Eds. C. Mileto, F. Vegas, V. Cristini, L. García-Soriano

Vernacular architecture, tangible and intangible heritage of great importance to European and global culture, represents the response of a society culturally linked to its territory, in terms of climate and landscape. Its construction features are born from the practical experience of the inhabitants, making use of local materials, taking into consideration geographical conditions and cultural, social and constructive traditions, based on the conditions of the surrounding nature and habitat. Above all, it plays an essential role in contemporary society as it is able to teach us important principles and lessons for a respectful sustainable architecture.

Vernacular Heritage: Culture, People and Sustainability will be a valuable source of information for academics and professionals in the fields of Environmental Science, Civil Engineering, Construction and Building Engi-neering and Architecture.



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