CONSERVATION PERSPECTIVES

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CONSERVATION OF EARTHEN ARCHITECTURE

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ON THE COVER

Kasbah Ait Hammou Ou Said in Morocco's Draa Valley. The valley is home to a large number of earthen architectural heritage sites. Photo: Scott S. Warren, for the GCI.

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FROM VISIONARY LEADERSHIP

Over Fifty Years of Earthen Architecture Conservation

More than five decades have passed since the first discussions between colleagues working on the conservation of earthen heritage sites took place internationally. This milestone is an opportunity to celebrate the field's achievements but also to reflect on its history.

BY CLAUDIA CANCINO

Earthen site conservation has grown into a complex field of study. Early efforts to design technical solutions to preserve the material for its cultural significance evolved into the development of more holistic conservation approaches, including the management of archaeological sites, historic environments, and cultural landscapes. Because earth is a universal and ubiquitous construction material, earthen site repair for and *by* communities has always been an important part of its preservation.

All of this was not addressed initially. It took—and still takes—visionary professionals who carry out exemplary implementation projects and groundbreaking research, and lead international, regional, and local organizations to broaden the field of earthen heritage conservation. It is impossible to mention all the organizations and individuals who have enriched this field and all the implementation projects and research conducted worldwide in the last fifty years. Those I have selected have had a major impact in moving the field forward by addressing its challenges.

ORIGINS

The establishment of UNESCO at the creation of the United Nations resulted from the need to repair sites damaged during and after the First and Second World Wars. In 1956 the UNESCO General Conference in New Delhi embraced a proposal to create an intergovernmental center to study and improve restoration methods; thus the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) was born.[1] This was followed in 1964 by the Second International Congress of Architects and Technicians of Historic Monuments, held in Venice, which adopted the International Charter for the Conservation and Restoration of Monuments and Sites, better known as the Venice Charter. A second resolution, proposed by UNESCO, to create the International Council on Monuments and Sites (ICOMOS) to implement its charter worldwide, was also adopted.

The first ICOMOS General Assembly was held in Cracow, Poland, in 1965, where Piero Gazzola was elected its first president. According to Raymond Lemaire, Gazzola was one of the main promoters of international collaboration and scientific training for conservation specialists;[2] according to Giorgio Torraca, vice-director of ICCROM at the time of the General Assembly, the first activities in the field of the conservation of mud-brick monuments should be credited to him.[3]

Another visionary of the significance of earthen architecture was Belgian architect Jean Dethier, author, curator, and stage designer of architectural exhibitions at the Centre Pompidou in Paris from 1975 to 2005. In 1965 Dethier began a one-year study trip in North Africa and ended up staying for four more years, in Morocco, working for the Ministry of Housing and Urbanism and UNESCO on different projects, including the rehabilitation of the earthen village of Tissergate in the Draa Valley.[4] In 1981 Dethier curated the exhibition *Down to Earth*, dedicated to earthen architecture, which included three segments: a world survey of "ancient and vernacular" heritage; a summary of effective but disregarded examples of best practice in the conservation of earthen sites; and finally an appeal to focus on contemporary ecological architecture by using earth as a building material. Dethier continued this plea with his 2020 publication, *The Art of Earthen Architecture*.

1. ICOMOS, *International Council on Monuments and Sites 1964–1984* (Naples, Italy: ICOMOS, 1984).
2. Raymond Lemaire, "Report of the President of ICOMOS, Piero Gazzola, 1965–1975: A Tribute to Piero Gazzola," in *Scientific Journal: Thirty Years of ICOMOS* (Paris: ICOMOS, 1995), 88.
3. Giorgio Torraca, "Introduction," in *Third International Symposium on Mud-Brick (Adobe) Preservation, 29 September–4 October, 1980* (Ankara, Turkey: ICOM, ICOMOS, and Turkish National Committees, 1980), vi.
4. Ulf Grønvold, "Architecture at the Pompidou: Jean Dethier Interview," *Om Arkitektur* (May 2012).

TO A FIELD OF STUDY

The annual community maintenance of the earthen Great Mosque of Djenné in Mali, in 2006. Photo: Jeanne Marie Teutonico, GCI.

CONFERENCES, COURSES, AND ORGANIZATIONS THAT SHAPED THE FIELD

Believing that the exchange of ideas at the international level would benefit the field, Piero Gazzola became a big supporter of the First International Symposium on the Conservation of Mud-Brick Monuments, held in 1972 in Yazd, Iran. At the conference, ten papers on the conservation of mud-brick sites in different countries and a section on Iranian mud-brick monuments were presented.

The same year, Hugo Houben—later founder of CRAterre—participated in the construction of several hundred houses for a village in Algeria. Through that experience he recognized earth as a significant and sustainable construction material and began his research on the topic, seeking to publicize what appeared to him an appropriate response to ecological problems.[5]

In 1975 Sylvio Mutal, regional coordinator of the PNUD/UNESCO Proyecto Regional de Patrimonio Cultural y Desarrollo, organized four courses on the conservation of monuments in Cusco, Peru,[6] and some of the instructors in the first course participated in the Second International Symposium on the Conservation of Mud-Brick Monuments in 1976, again in Yazd. This symposium included papers on the conservation of earthen sites in Peru by Giacomo Chiari and José Correa Orbegoso, wattle and daub conservation by John Warren, and conservation work at Lothal, India, by R. Sengupta, among others.

In 1979 the Center for the Research and Application of Earth Architecture (CRAterre-ENSAG) was born after a meeting between Hugo Houben and Patrice Doat, a student at the École Nationale Supérieure d'architecture de Grenoble (ENSAG).[7] Coincidentally, also in 1979, Alejandro Alva, a participant in the 1976 UNESCO/PNUD course in Cusco, Peru (his country of origin), was hired as a staff member of ICCROM and assistant coordinator of the Architectural Restoration Course (ARC).[8] That same year, the International Committee for the Conservation of Mud-Brick (later the International Scientific Committee on Earthen Architectural Heritage—ISCEAH) was created, and its first president was archaeologist Cevat Erder, later ICCROM General Director (1981–88).[9]

At the Third International Symposium on Mud-Brick (Adobe) Preservation, organized in 1980 in Ankara, Turkey, papers were presented by some previous symposium participants and new experts, including Alejandro Alva, Anthony Crosby, Constance Silver, and

5. UNESCO World Heritage Convention, "In Memoriam: Hugo Houben (Founder of CRAterrre)," UNESCO World Heritage Convention News (2021), https://whc.unesco.org/en/news/2255.
6. Proyecto Regional de Patrimonio Cultural UNESCO/PNUD, *Cursos de Restauración de Monumentos: Conservación de Centros-Sitios Históricos, Documento Sumario Cusco 1975–78* (Lima, Peru: UNESCO, 1979).
7. Terra 2022, "January 2022 Virtual Lead-Up Event, Earthen Architectural Heritage: CRAterre's Vision and Practices," https://www.terra2022.org/website/8033/eng/virtual-events-january/.
8. Jukka Jokilehto, *ICCROM and the Conservation of Cultural Heritage. A History of the Organization's First 50 Years, 1959–2009, ICCROM Conservation Studies* 11 (Rome: ICCROM, 2011), 84.
9. ICOMOS, 34.

Group photo of participants in the Terra 2008 Conference, held in Bamako, Mali. This was the first Terra Conference in Africa, and it convened over 450 specialists in fields linked to the conservation of earthen architecture. Photo: J. Paul Getty Trust.

Roberto Samanez. Some of these papers grew out of research conducted in response to a series of questionnaires prepared and delivered by Giorgio Torraca at the first and second symposia with the intention of identifying areas for further study, such as materials testing. In 1977 a regional meeting on adobe preservation was organized in Santa Fe, New Mexico, by US/ICOMOS, which was attended by several laboratory experts. A third questionnaire was circulated with the objective of promoting testing of the materials and standardization of testing procedures.

After the success of its courses in Cusco, the PNUD/UNESCO Proyecto Regional de Patrimonio Cultural y Desarrollo organized a fourth symposium in Peru in 1983, in collaboration with ICCROM, the Instituto Nacional de Cultura del Perú (INC), the UNESCO World Heritage Centre (WHC), the Ford Foundation, ICOMOS, and the Italo-Latin American Institute. This international symposium included a training workshop on the conservation of adobe and a traveling exhibition about adobe in the Americas and around the world. Jeanne Marie Teutonico, Franca Helg, Seymour Lewin, Ricardo Morales Gamarra, Gilberto Reyes, Sergio Rojo, Todd Rutenbeck, Paul Schwartzbaum, André Stevens, Jacques Vérité, and Julio Vargas (who introduced the topic of conservation of earthen sites in seismic regions) presented papers.

In 1984 CRAterre-ENSAG started its two-year Diplôme National de Spécialisation et d'Approfondissement en Architecture (DSA), and two years later it created its research laboratory. Alejandro Alva and Hugo Houben met during the mid-1980s, and in 1987 they coordinated the Fifth International Meeting of Experts on the Conservation of Earthen Heritage (no longer just mud-brick), which was held in Rome. The Getty Conservation Institute (GCI), represented by Frank Preusser and James R. Druzik, presented the GCI and Queensland Museum laboratory research program results on several techniques and materials for the preservation of archaeological and historic adobes. The Queensland Museum was represented by Neville Agnew (currently a GCI senior principal project specialist).

In 1989 ICCROM signed an agreement with CRAterre-ENSAG to develop a long-term program for the preservation of the earthen architectural heritage, known as the GAIA Project.[10] The agreement resulted in over five years of cooperation between the institutions for the development of postgraduate training courses on earthen conservation at ENSAG and as part of the Architectural Conservation Course (ARC) at ICCROM. Under the coordination of Alva and Houben, the First Pilot Course on the Preservation of Earthen Architecture took place in Grenoble in late 1989. Other instructors of the course included Patrice Doat, Hubert Guillaud, Thierry Joffroy, Pascal Odul, Jeanne Marie Teutonico, and Marina Trappeniers.

After participation in the Fifth International Meeting, the GCI, with New Mexico State Monuments and the US National Park Service—and joined by ICCROM and CRAterre-ENSAG—organized in 1990 the Sixth International Conference on the Conservation of Earthen Architecture in Las Cruces, New Mexico, known as Adobe 90. Adobe 90 helped develop what had been relatively small and specialized meetings of experts into truly international conferences, greatly expanding the number and geographic distribution of participants and papers and producing substantive publications that helped validate the work of the field. The next conference in 1993 in Portugal published over one hundred papers. Additionally, targeted symposia were organized to address specific issues. Two organized by GCI staff included the Conservation of

10. Jokilehto, 98.

Decorated Surfaces on Earthen Architecture (DSEAC) in 2004 at Mesa Verde National Park (under the leadership of Leslie Rainer) and the GSAP colloquium at the Getty Center in Los Angeles in 2006 (under the leadership of Mary Hardy). To date, twelve international conferences have strengthened collaboration, created regional networks, generated partnerships, and produced proceedings. The GCI has organized the Thirteenth Congress, to be held in Santa Fe, New Mexico, in June 2022 in collaboration with the Vanishing Treasures Program of the National Park Service and the University of Pennsylvania, Stuart Weitzman School of Design.

The second phase of the GAIA project (1989–95) included development of an international bibliography on the preservation and rehabilitation of earthen architecture.[11] In 1996 the GCI—under the initiative of Erica Avrami—joined GAIA, and the TERRA project was born. The three institutions then organized the 1996 and 1999 Pan-American Courses on the Conservation and Management of Earthen Architectural Heritage (PAT) in Trujillo, Peru, in collaboration with INC-La Libertad, led by its director, Ana María Hoyle.[12]

The international symposia, conferences, and congresses organized to date, as well as training courses like the PAT, have strengthened collaboration and created international, regional, and local networks, such as ISCEAH, Proterra, and Mediterra. In 1994 John Hurd and Pamela Jerome, each with international expertise on the conservation of earthen sites, were elected president and vice president of ISCEAH, respectively. During their tenure, they reshaped the committee and over nine years developed five themes to further advance research (in use, archaeology, technology, landscapes, and seismic). Julio Vargas (2015–17), Mariana Correia (2018–20), and Maddalena Achenza (2021–present) have followed in leading the committee, which has played an important role in sponsoring what are now called Terra World Congresses.

In 1998 UNESCO created the chair on Earthen Architecture, Constructive Cultures, and Sustainable Development, a network of more than forty institutions (including universities, research centers, and NGOs) in Africa, the Americas, Asia, and Europe, and managed by the Architecture, Environment & Constructive Cultures Research Unit at ENSAG. The main objective of the UNESCO chair is to promote within the international community the development and dissemination of scientific and technical knowledge for the conservation of earthen architecture.[13]

Participants at the 6th International Conference on the Conservation of Earthen Architecture, held in 1990 in Las Cruces, New Mexico, examining test panels. Known as Adobe 90, the conference marked the transition from relatively small, specialized meetings into truly international conferences, greatly expanding the number and geographic distribution of participants and papers. Photo: Neville Agnew, GCI.

11. CRAterre/EAG/ICCROM, *Bibliographie sur la préservation, la restauration et la réhabilitation des architectures de terre/Bibliography on the Preservation, Restoration, and Rehabilitation of Earthen Architecture* (Rome: ICCROM, 1993), https://www.iccrom.org/sites/default/files/2018-02/1993_bibliographie_terre_56802_light.pdf.
12. Jokilehto, 112–13.
13. https://terra.hypotheses.org/.

INTERNATIONAL PROJECTS AND WORLD HERITAGE EARTHEN SITES

The first implementation project to include international cooperation was carried out by ICCROM under the sponsorship of Piero Gazzola. In 1968 ICCROM launched a project for testing preservation techniques for mud-brick structures, which continued into the 1970s, in cooperation with the Institut royal du Patrimoine artistique in Belgium and the Institute of Mineralogy and Archaeology of the University of Turin. Laboratory testing took place in Brussels, and field tests were conducted at the Samarra and Choche archaeological sites, the ziggurats of Ur and Aqar Quf, and Tell Omar in Iraq, in collaboration with the department of antiquities. The first phase was concluded in 1972 at the time of the Yazd conference.[14]

With the success of the Iraqi project, the resolutions of the 1976 Second International Symposium encouraged further development of pilot projects. These were carried out between 1976 and 1980 at the archaeological site of Chan Chan in Peru, and at the Spanish Colonial Mission San José of Tumacácori in Arizona. There is little information about the work at Chan Chan during this period, but a paper about work done at Tumacácori was presented at the 1980 symposium.

The development of international projects focused on earthen heritage sites reflects the nomination of such sites to the World Heritage List, a process that normally involves study of the site and preparation of a management plan. Currently there are 89 earthen sites out of the 897 sites on the World Heritage List—10 percent. Of the 52 sites on the list considered endangered, 14 are made of earth—27 percent. The first earthen sites nominated and declared World Heritage Sites were the City of Quito in Ecuador and Mesa Verde National Park in Colorado, both inscribed in 1978. The year the greatest number of earthen sites were nominated was 1987 (probably in part because five international symposia had occurred by then) with a total of seven nominations, from Bolivia, China (two), Mexico (two), Morocco, and Oman. The earthen site most recently nominated was Babylon in Iraq in 2019.[15]

The Mogao Caves in Dunhuang, China, was one of the sites nominated in 1987. The GCI started working in the early 1990s on site stabilization at Mogao, where windbreak fences were installed to mitigate windblown sand, and monitoring of both environmental and color stability of the earthen wall paintings was carried out. During the 1990s, the GCI also conducted the Getty Seismic Adobe Project to develop and test minimally invasive and easily implemented techniques to avoid the collapse of historic earthen structures during seismic events. These techniques were later implemented at Rancho Camulos and Casa de la Torre in California.

The Elamite holy city of Tchogha Zanbil in Iran was nominated in 1979. In 1995 the Cultural Heritage Division at UNESCO sent a team of experts to the site, launching the conservation of Tchogha Zanbil in collaboration with the Iranian Cultural Heritage Organization (ICHO) and with the participation of CRAterre, led by Hubert Guillaud. Conservation work and regional training courses were carried out until 2002, resulting in a comprehensive action plan for the site.[16]

Two early leaders in the conservation of earthen architecture: Alejandro Alva (top), who spent more than twenty-five years at ICCROM, and Hugo Houben (bottom), a founder of CRAterre; both are seen here speaking at Adobe 90. Photos: Neville Agnew, GCI.

Also in 1995, the Center for Architectural Conservation (CAC) at the University of Pennsylvania, Stuart Weitzman School of Design—founded in 1991—initiated its long-term involvement with the US National Park Service, working at Mug House at Mesa Verde National Park in Colorado. The CAC, under Frank G. Matero, has worked at the archaeological sites of Casa Grande, Arizona; Bandelier and Fort Union, New Mexico; Catalhoyuk, Turkey; Cliff Palace, Long House, Farview House, and Spruce Tree House, Mesa Verde National Park, Colorado; and the historic Mission San José of Tumacácori, Arizona. Over twenty-five years, the CAC has developed model projects on earthen finishes, conservation praxis, laboratory testing, and management plans.[17]

The development of the Chan Chan management plan in 1996 is an early example of a holistic and comprehensive approach for the conservation of earthen archaeological sites. Led by Carolina Castellanos and Ana María Hoyle, it became a model for other earthen archaeological sites. This approach was implemented at Joya de Cerén in El Salvador by Françoise Descamps of the GCI, and at Tel Dan in Israel by Erica Avrami, also with the GCI. In 2006 Mohamed Boussalh from the Centre de Conservation et de Réhabilitation du Patrimoine Architectural Atlasique et Subatlasique—in partnership with CRAterre-ENSAG and with financial and technical support from the WHC—began developing an action plan for the Ksar of Ait-Ben-Haddou in Morocco,[18] followed by conservation interventions from 2016 to 2019.

In 2009 ICCROM, the WHC, and CRAterre-ENSAG launched an initiative in Africa. The Africa 2009 project—led by Lazare Eloundou Assomo, current WHC Director and ENSAG

14. Jokilehto, 49; Giorgio Torraca, "An International Project for the Study of Mud-Brick Preservation," in *Conservation of Stone and Wooden Objects: Contributions to the 1970 IIC Congress, New York* (London: IIC, 1971), 47–58.
15. https://whc.unesco.org/pg_friendly_print.cfm?cid=31&order=year.
16. Hubert Guillaud, Yasuyoshi Okada, and Abdolrasool Vatandoust, *Chogha Zanbil* (Paris: UNESCO, 2003); Junko Taniguchi and Farzin Fardanesh, "Tchogha Zanbil: Conservation Challenges of an Earthen Ziggurat Monument," in *World Heritage* 48 (Paris: UNESCO, January 2008), 36–41.
17. http://www.conlab.org/.
18. Mohamed Boussalh, "Ksar of Ait-Ben-Haddou: Hopes and Perils," in *World Heritage* 48 (Paris: UNESCO, January 2008), 19–25.

Participants in the 2004 Conservation of Decorated Surfaces on Earthen Architecture colloquium visiting Cliff Palace at Mesa Verde National Park in Colorado. Photo: Claudia Cancino, GCI.

alumnus—sought to improve conditions for the conservation of immovable cultural heritage in sub-Saharan Africa by integrating it into a sustainable development process. It aimed to create better policies and legal frameworks for conservation, increase professional capacity, and improve communication among African institutions working in the field. The project stimulated the development of a cross-continent network and produced several publications and conference papers.[19] A similar Central Asian Earth initiative was led by CRAterre-ENSAG from 2002 to 2012.[20]

After successful international collaboration in conservation projects, institutional endeavors have been carried out by CRAterre, the WHC World Heritage Earthen Architecture Programme (WHEAP), and the GCI's Earthen Architecture Initiative in Abu Dhabi, China, Iran, Mali, Morocco, Oman, Peru, Saudi Arabia, South Korea, Turkmenistan, and the United States, among others. The results of some of these projects have been published in scientific journals and international conferences.

WHAT IS NEEDED

Unquestionably, earthen built heritage conservation has advanced in the last fifty years. Research and field projects have demonstrated the importance of management planning, materials characterization, understanding of construction techniques, in situ and laboratory testing, and compatible materials for the conservation of earthen sites.

However, conservation approaches to address the preservation of vernacular earthen heritage, the impact of climate change on earthen sites, and conservation engineering or long-term maintenance and monitoring plans have not been fully developed. These topics are only now being addressed by the conservation field as a whole and by professionals working on earthen sites. Furthermore, few projects try to tackle earthen site conservation holistically.

International institutional collaboration has demonstrated that more can be achieved by working together. There are a great many national organizations that if united could initiate programs to take on challenges regionally. While individual projects can solve specific problems, it is important that the field first identifies what is needed to advance earthen site conservation and then promote projects to address those needs through research, implementation, training, and capacity building, as well as through the dissemination of relevant information. The Terra World Congresses are an opportunity to connect institutions internationally and to identify areas for further research.

It is important for ISCEAH to collaborate further with other international scientific committees, given that conservation of earthen sites doesn't occur in isolation and is normally combined with risk preparedness, wood conservation, vernacular architecture, or historic cities. ICOMOS is trying to facilitate collaboration between its scientific committees, and ISCEAH should seek to identify areas of common interest.

Although conservation projects generally have a process for implementation, there is a need to internationally adopt a specific process for earthen site conservation. Members of ISCEAH have been discussing the development of a charter that would contain such a methodology.

The role that visionaries played in the development of the field of earthen conservation has been extremely significant. Besides acknowledging their contribution, it is important to recognize that leadership is an attribute that needs to be passed along by each generation and that will continue to play an important role in the advancement of the field. Piero Gazzola, Jean Dethier, Hugo Houben, Alejandro Alva, Jeanne Marie Teutonico, and John Hurd, among others, were not accidentally at the right place at the right time. They *made* it the right place and time. They all had a vision that turned into projects, which then turned into work that institutions have carried out for decades. It is up to us to build on their legacy.

Claudia Cancino is a senior project specialist in the GCI's department of Buildings and Sites.

Kasbah Taourirt, headquarters of Centre de Conservation et de Réhabilitation du Patrimoine Architectural Atlasique et Subatlasique (CERKAS) in Morocco. CERKAS is a member of the UNESCO chair on Earthen Architecture, Constructive Cultures, and Sustainable Development—a worldwide network of more than forty institutions. Photo: Scott S. Warren, for the GCI.

19. Jokilehto, 132.
20. Hubert Guillaud, "A Global Challenge: Preserving Earthen Architecture," in *World Heritage* 48 (Paris: UNESCO, January 2008), 4–15.