The Venice Charter and the European Quality Principles for Cultural Heritage Interventions on Heritage Science: some reflections from ICOMOS CIF

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Abstract
The 1964 Venice Charter highlighted the need of science and technology for the study and conservation of built heritage. This was followed and expanded by the 1993 ICOMOS CIF Guidelines for Education and Training. In 2020, the European Quality Principles for Cultural Heritage Interventions continued to reinforce the Venice Charter principles. Despite these developments, there are currently not clear career paths and enough provision of education and training to become conservation specialists. This should be addressed to ensure competence for the professionals involved in the conservation of built heritage, such as architects, engineers, archaeologists, geologists and scientists. This paper reviews the main developments so far, underlining that the quality of education and training programmes has a direct effect on the conservation of built heritage. Taken the professional competence of conservation scientist as example, it outlines a possible international curriculum for further discussion and validation.

Keywords
Conservation scientist, Education and Training, ICOMOS CIF.

Principles and Definitions

The Venice Charter was written in 1964 by a group of experts in the conservation of built heritage and chaired by Piero Gazzola. It was the outcome of a conference addressed to architects and technicians, but with contributors from multiple disciplines, including conservation scientists such as Harold James Plenderleith[1]. This very concise Charter is a key reference for conservation theory and praxis, recognizing also the importance of science and technology, in particular in the articles 2 and 10[2]. It highlights their vital contribution to the study and conservation of historic buildings, as «It is our duty to hand them on in the full richness of their authenticity»[2].

Following the European Year of Cultural Heritage in 2018, and under the mandate of the European Commission, ICOMOS developed the European Quality Principles for EU-funded Interventions with Potential Impact upon Cultural Heritage[3]. The document reinforces the principles set in the Venice Charter, asking for the use of compatible materials and tested techniques, proven to be sustainable and appropriate for the specific building, site and environment. It also refers to the Guidelines for Education and Training in the Conservation of Monuments, Ensembles and Sites, produced in 1993 by ICOMOS CIF (the International Scientific Committee of ICOMOS on Education and Training)[4]. These Guidelines are the internationally-recognized set of criteria to assess the quality of conservation courses and the conservation accreditation of professionals, used, for example, by the Royal

Institute of British Architects (RIBA) [5]. They establish the meaning and scope of conservation:

The object of conservation is to prolong the life of cultural heritage and, if possible, to clarify the artistic and historical messages therein without the loss of authenticity and meaning. Conservation is a cultural, artistic, technical and craft activity based on humanistic and scientific studies and systematic research[4].

Conservation Science and Conservation Scientists

The ICOMOS CIF Guidelines highlight the importance to «diagnose intrinsic and extrinsic causes of decay as a basis for appropriate action»[4]. Conservation scientists have a central role in this and their professional profile has been subsequently defined in the 1999 Bologna Document.

A Conservation Scientist today can be defined as a scientist with a degree in one of the natural, physical and/or applied scientific disciplines and with further knowledge in conservation (ethics, history, cultural values, historical technologies, past and present conservation technologies and practice, specific scientific aspects, etc.) which enables him/her to contribute to the study and conservation of cultural heritage within an interdisciplinary team[6].

The document was produced at an international conference convened by ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property), with the participation of experts from Greece, Italy, Switzerland, France, UK, Algeria, US, Netherlands, Canada and Portugal. Since, we have seen a rapid development of methods, instruments and techniques, as well as the ongoing digital transformation and climate emergency. Although the basic competences of the profession are the same, tools have changed and scope has extended, moving sometimes the focus to the new tools rather than the ultimate conservation scope. A conservation scientist, independently from the different definitions, must know the diagnostic needs even before the diagnostic technique, the best suitable principles and methods for the intervention, the solutions for preventing future decay and the monitoring methodologies in specific environmental contexts and uses.

The 2013 ICCROM Forum on Conservation Science had contributors from Belgium, Brazil, Canada, China, France, Italy, Republic of Korea, the Netherlands, Portugal, UK, Qatar, USA, Switzerland[7] and Sweden. They identified two key areas to progress: strategy development and demonstrating benefit. Following-up from this, ICCROM initiated research in evaluation methods[7].

Conservation scientists (sometimes also called heritage scientists), are generally graduates in hard sciences with experience in diagnostic or materials for the preservation of cultural heritage. Although that guarantees a good scientific education, it does not cover important aspects such as the role of cultural heritage in society and the theoretical aspects of conservation. The real needs in specific environmental and climatic conditions are also kept as marginal.

Competence and Capacity in Conservation Science: some examples

The development of international standards and the provision of international professional mobility, within an understanding and protection of cultural diversity, are vital for the advancement of the cultural heritage sector. ICOMOS CIF identified at its 2022 Symposium in Florence the key priorities for the advancement of architectural conservation education and training, resulting in the Decalogue for Education in Architectural Conservation ICOMOS CIF 2023[8]. Two projects have been set up in accordance to the identified priorities: the Global Architectural Conservation Education and Training Survey (GACETS) and the Dynamic and Multilingual Glossary.

In February 2024, the 194 Member States of UNESCO unanimously adopted the global Framework for Culture and Arts Education. One of its five strategic goals is the «Skills to shape resilient, just and sustainable futures»[9], in order to – between other purposes –, develop educational environments to provide specialist education and training to deal with the complexities of sustainability challenges. This includes a STEAM (Science, Technology, Engineering, the Arts, and Mathematics) approach. UNESCO will support the implementation into public policy. ICOMOS CIF contributed to the development of the Framework and continues to promote and enable the sharing of experiences and best practices towards the more detailed implementation stage.

The Venice Charter also recognized that each country is responsible for its implementation, in accordance with their own culture and traditions. ICOMOS CIF Guidelines encouraged every country or regional group to develop at least one comprehensively organized institute delivering education and training:

> It may take decades to establish a fully competent conservation service. Special short-term measures may therefore be required, including the grafting of new initiatives onto existing programmes in order to lead to fully developed new programmes. National, regional and international exchange of teachers, experts and students should be encouraged. Regular evaluation of conservation training programmes by peers is a necessity[4].

National centers are vital for the training of conservators and conservation scientists. It is also very important to avoid the "wipe out" of excellent existing education and training programmers and experiences. Instead, we need to learn from them and allow them to develop, involving also more conservation scientists in education and training. It is impossible to include here a complete survey of existing provisions, but we will give some examples. Italy has specific higher education programmes in sciences applied to the conservation of cultural heritage: the bachelor's degree in Diagnostics for Cultural Heritage' and the master's degree in Sciences for the Conservation of Cultural Heritage. Graduates of these two courses may operate as experts in diagnostics and conservation of cultural heritage within institutions in charge of cultural heritage management and conservation, local bodies, companies and organizations operating in these fields. These degrees are characterized by a strong interdisciplinary scientific knowledge (chemistry, physics, biology, computer science, geology), conservation technologies, and humanities related to the conservation processes.

Once the initial competence is acquired, there is still need for Continuous Professional Development (CPD) to maintain competence. The IPCE (Spanish Institute of Cultural Heritage) provides a series of specialist short courses in collaboration with partners. There is however the need to coordinate the education and training provision and to make it more visible and accessible. In UK, the National Heritage Science Forum, which defines Heritage science as «the application of science and technology to cultural heritage to improve understanding, management and engagement»[10], have working groups for research but not for education and training. The

Modules	Learning Outcomes	Mode of Delivery
International cultural property legislation and European cultural convention	Knowledge of the value of CH for Society, Legal issues concerning the protection of cultural heritage at the international and at the EU level and the main international conventions on cultural heritage.	Lectures and seminars
Theory and History of Conservation	Knowledge of international overview on the different theories and approaches to the conservation of cultural heritage.	Lectures, seminars and site visits
Materials Science	Familiarity with the various materials characteristics and deterioration	Lectures, seminars, laboratory and fieldwork
The impact of climate change on built heritage and archaeological areas	Knowledge of tasic notions on climate change, the global aspects, the categories of hazards and elements of solutions.	Lectures, seminars and workshops
Risk assessment for tangible cultural heritage in different environmental conditions	Ability to analyse and identify risks, the definition of mitigation measures, risk control techniques, risk management principles, International Standards for Risk Management. Emergency management system in crisis areas	Lectures, seminars, workshops and fieldwork
Preventive conservation: meaning and applications	Knowledge of sustainable and durable conservation techniques, costs, benefits and collateral risks of implementing mitigation measures	Lectures, seminars, laboratory and fieldwork
Materials and methods for a sustainable conservation	Knowledge of circular economy principles, Compatible solutions for the conservation of built heritage and archaeological areas, eco-sustainable materials, Life Cycle Assessment on materials and methods	Lectures, seminars, Laboratory, workshops and fieldwork
Tools for indoor and outdoor cultural heritage monitoring	Knowledge and ability to work with non-invasive and micro-invasive techniques and methods, monitoring of the efficiency in conservation, monitoring indexes, international standards	Lectures, seminars, Laboratory, workshops and fieldwork
The conservation project: form the diagnosis to the conservation monitoring	Ability to structure of a conservation project, Scientific Support on Decision-Making for built heritage preservation. Different disciplines involved	Lectures, seminars, workshops and fieldwork
Digital tools for documentation, analysis and conservation	Ability to capture and analyse Spatial Data (GIS), Photogrammetry and image-based 3D modelling, thermography, radar and other NDT, space data for cultural heritage, Artificial Intelligence, etc	Lectures, seminars, Laboratory, workshops and fieldwork

Table 1: Outline of a possible international two-year course in Conservation Science.

American Institute for Conservation (AIC), Historic Preservation courses at US universities, and ACCU in Japan, provide education and training oriented to conservators rather than conservation scientists, although they include conservation science within their curricula. They, together with many other organisations, universities and laboratories around the world could provide the basis for specific education and training for conservation scientists.

An International Programme for Conservation Scientists

Although much is being invested in the training of conservation scientists, it is not conducted in a coordinated, efficient and international way. Based on the above discussion, and subject to more detailed design, we could attempt to outline what a conservation scientist international programme could involve (Table 1).

The programme should start by looking at the meaning of cultural heritage, in an international, regional, and national levels, and including the understanding of legislation, history, social sciences and theory of conservation and art history. This would need to be followed by a specific education and training on local materials and immaterial cultures and practices, in order to conserve built heritage within the wider cultural heritage and landscape. Once this more general cultural heritage education is completed, the focus should be on the specialist knowledge and skills necessary for the professional competence, such as materials characterization, decay processes, materials and techniques for conservation.

All activities should also have a particular focus on sustainable materials and approaches, providing knowledge on environmental impact, indoors (museums, historical buildings) and outdoors, including climate change. This will prepare the students to be able to carry out other important work in the preservation and conservation of cultural heritage, such as risk assessments and preventive conservation plans. The careful design of curricula, learning outcomes, mode of delivery and practical activities will not only allow to acquire the required comprehensive understanding of conservation, but also, as ICOMOS CIF Guidelines promote, to learn to effective collaborate and work as part of multidisciplinary teams using sound methods.

ICOMOS CIF Decalogue noted the importance of the sequence of learning, so that the order and duration of the contents to be delivered are in accordance to the level and ability of the participants. Because the complexity of the curriculum we have outlined above (Table 1), a minimum of one or two-years master's degree would be necessary; previous relevant learning could also be taken in account to reduce this time. It is encouraged to create small cohorts of students that work for longer periods together, so to enhance peer learning and collaboration. Small groups are also more suitable for practical laboratory and fieldwork. This requires a lower student-teacher ratio and thereafter more resources and governmental support, as the conservation of Cultural Heritage is a legal obligation, nationally and internationally.

Conclusions and recommendations

Conservation scientists have a key role in the study and conservation of built heritage and archaeological sites but there is not adequate and sufficient education and training provision for that competence. Principles and definitions have been clearly established since 1964, but there is still necessity to create national provisions, and thereafter government funding is required. This will allow for sufficient and competent educators and trainers, as well as the creation of programmes based on robust competence criteria and assessment processes. These require appropriate education organizations, responsible for curriculum creation, development, delivery and assessment, and national agencies to control quality. The quality of education and training directly impact on the attainment of quality outcomes in the conservation of built heritage and out environment, and thereafter it should be ensured that the curricula, trainers and delivery of formal, non-formal and informal education and training are appropriate and regularly reviewed, so that they keep their competence and are abreast of new research, developments and innovation.

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