

# THE PROTECTION AND VALORIZATION OF CULTURAL AND ENVIRONMENTAL HERITAGE IN THE DEVELOPMENT PROCESS OF THE TERRITORY

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## **1. Introduction: art and science, art is science**

Firstly, it can be said that “art and science are two different ways of interpreting reality”.

The concept of “reading reality” is extremely important in the study of cultural heritage. In fact, “reading” is a synonym for: knowledge, interpretation, evaluation of art. This sequence of steps forms the basis of the subjective evaluation carried out by historians and the objective evaluation carried out by technicians.

Art and science have developed over time in an apparently independent manner, but using quite different approaches in dealing with their selective experience of the world, in pursuing objectives and interpreting achieved results [1].

Furthermore, in comparing art and science, it can be said that despite modifying the ways and means with which it is expressed, art is always capable of arousing different sensations in the observer of the art object: it is therefore evident that the conservation state of the art object, with the consequent possibility of its “readability”, is of great importance. For Leonardo da Vinci “Wisdom comes from experience... and experience never fails, only our judgments do”.

Science, on the other hand, is a practical extension of technology, which due to its constant changing, leads to a feeling of incompleteness. For Galileo Galilei “the Universe is written in a mathematical language, in which the characters are triangles, circles and other geometrical figures, without which it is impossible to understand”.

In relation to art, Leonardo states that experience determines wisdom, which, in turn, determines judgment.

In relation to science, Galileo claims that the language of mathematics and geometric shapes enables us to know the world, in other words, to understand it and thus, make judgments.

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It can therefore be said that art and science are ultimately two ways of narrating the history of the world, not two subjects in contrast with each other, but two complementary ways of “reading reality”: art itself is technology (from “*técne*”, equivalent to the Latin “*ars*” which, as well as meaning “art”, also means “technique”) and technology can become art and poetry (from “*poiesis*”, production, in which many diverse means are used to achieve specific goals).

## 2. The holistic value of cultural heritage

If, as Leonardo claimed, “Art is science, the culmination of observing and studying the natural world”, it follows that the holistic value of a work of art is characterized by a set of values concerning different areas of investigation:

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------|
| <ul style="list-style-type: none"> <li>• <i>cultural value</i></li> <li>• <i>historical value</i></li> <li>• <i>aesthetic value</i></li> <li>• <i>artistic value</i></li> </ul>                                                                                          | } | <b>Historical-humanistic area</b>             |
| <hr/>                                                                                                                                                                                                                                                                    |   |                                               |
| <ul style="list-style-type: none"> <li>• <i>spiritual value (in the event of works with religious significance)</i></li> <li>• <i>symbolic value</i></li> <li>• <i>social value (the work of art gives a sense of identity)</i></li> </ul>                               | } | <b>Philological-philosophical social area</b> |
| <hr/>                                                                                                                                                                                                                                                                    |   |                                               |
| <ul style="list-style-type: none"> <li>• <i>technical value</i></li> <li>• <i>economic value</i></li> <li>• <i>financial value</i></li> <li>• <i>mercantile value</i></li> <li>• <i>marketable value</i></li> </ul>                                                      | } | <b>Technical-economic-management area</b>     |
| <hr/>                                                                                                                                                                                                                                                                    |   |                                               |
| <ul style="list-style-type: none"> <li>• value of authenticity (if the work is authentic, it is a value in itself which is added to the others)</li> <li>• value of identity</li> <li>• value of interdisciplinarity</li> <li>• value of internationalization</li> </ul> | } | <b>Legal-identity area</b>                    |

As such, the holistic value should help determine the specific economic, financial, mercantile and marketable value.

## 3. Cultural heritage as material heritage and economic heritage

### 3.1. Cultural heritage as material heritage

As a link confirming the meeting point between “art and science”, a statement made by Giulio Carlo Argan in the 1980s can be taken into consideration, which derives from his significant experience as an art critic, manager of public affairs, politician, professor: “All works of art are artifacts but not all artifacts are works of art. What recognizes

their artistic value is judgment. However, this is formed on the basis of given parameters and is not the expression of the aesthetic pleasure or emotion the work arouses in the observer. The legality of the judgment depends on the mental process through which the method is reached" [2].

But to speak of "method" and thus "methodology", as "the study of methods", means to speak of a sequence of operational stages, as part of the intervention on the work of art. This can be linked to Art. 9, which appears at the beginning of the Italian Constitution: "The Republic promotes the development of culture and of scientific and technical research. It safeguards the natural landscape and the historical and artistic heritage of the Nation", and to what was established in 2004 by the Legislative Decree of the Ministry of Heritage and Culture, thus establishing the Code of Cultural Heritage and Landscape.

In particular, reference is to:

- Art. 3 "Protection of cultural heritage": "Protection consists in the exercise of the functions and in the regulation of the activities, aimed at identifying on the basis of adequate investigative procedures the properties constituting the cultural heritage and at ensuring the protection and conservation of the aforesaid heritage for purposes of public enjoyment";
- Art. 6 "Valorization of cultural heritage": "Enhancement consists in the exercise of the functions and in the regulation of the activities aimed at promoting knowledge of the cultural heritage and at ensuring the best conditions for the utilization and public enjoyment of the same heritage. Enhancement also includes the promotion and the support of conservation work on the cultural heritage".

More specifically, in relation to any kind of historical artifact that can be: painting, statue, book, codex, archival document, architectural-monumental complex, etc., the complete and correct methodological approach includes the following sequence of steps:

#### PROTECTION

- preliminary inspection and subjective evaluation of the artifact and its site;
- documentary research relating to historical aspects and previous conservation interventions: historical anamnesis;
- diagnostic and analytical investigations for the characterization of materials and assessment of their conservation state;
- if necessary, subsequent restoration using appropriate materials, products and techniques;
- parallel control of the location site, in reference to the container, structure and environmental conditions,
- monitoring of these conditions to prevent any possible interaction with the environment.

#### VALORIZATION

- promotion, use and management of the building and site through artistic and cultural events.

This confirms the need to know and understand the material typology of the artwork, on which the intervention is consequently based: history, diagnosis, restoration, conservation, preservation, prevention, valorization.

Having recognized the close relationship between "art and science", between "cultural values and scientific research", it is possible to protect and enhance the cultural heritage which the community has created and is the heir to, as it is not just the "habi-

“tat” and “historical memory” of which man has been and how he has learned to interact with the material, it is also “witness” across the centuries to the evolution of the spirit and culture of people and, therefore, a message for the future (Figure 1).

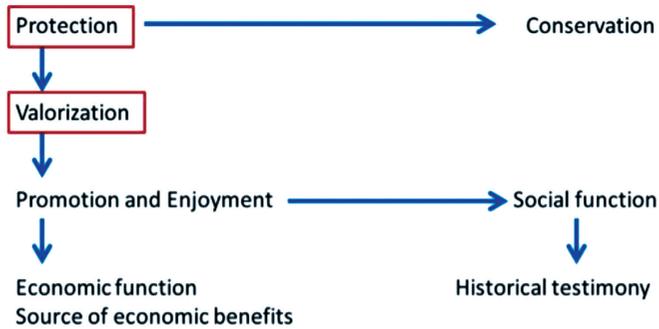


Figure 1. Protection and valorization of cultural heritage

### 3.2. Cultural heritage as economic heritage

Precisely because it is made of material, cultural heritage should be considered “economic heritage”. But it is equally true that, as was said earlier, there are a series of intangible values which cannot be defined in economic terms and are difficult to quantify, such as intellectual enrichment and aesthetic emotion. Hence, it is correct to define the artifact of historical-artistic interest as heritage that is:

- scarce, because each individual object constituting the cultural heritage is characterized by its uniqueness, its non-reproducibility, non-renewability and deteriorability;
- useful not only because it satisfies an individual’s desire for enjoyment, it also satisfies the community need to enjoy culture, a need arising from the necessity to recreate a sense of identity;
- durable, since its existence spans centuries and millennia, accompanying entire generations eager for knowledge and culture, and needing to find something to identify themselves with;
- meritorious, as it is capable of satisfying such high expectations as to warrant the support of the public and private financing of culture;
- a refuge (store of value), in other words a form of protection against inflation, an alternative investment, especially in economically difficult times, such as the present-day global crisis.

### 4. Art and Environment as a means of sustainability, ethics and aesthetics

Even if man is part of the natural world and follows its biological laws, he aspires to a different world, a perfect world where there is also justice, love, happiness, beauty, and, based on this ideal world, judges both himself and nature. Of course, many scholars argue that the world today is dominated by nihilism (the skeptic, an advocate of the gnoseological, the ethical into which converges moral relativism), that values, and the idea that life has a purpose, have lost their significance, that concepts like order,

duty, will, effort, guilt, merit, responsibility are meaningless. Man, therefore, is part of nature, but at the same time, not part of it: as an object of science he is inside nature, as a being possessing a conscience he is outside it, living in a world of culture, values and freedom, whose principles can, however, be reconciled with those of science [3].

In life, people take action and exert themselves by establishing goals, by nurturing dreams and aspirations. In this respect, science can explain them through biological and chemical processes, as well as manipulating and modifying them. Nevertheless, decisions are always taken by people driven by desires, dreams, values and ideals.

This is what the World Wide Fund for Nature (WWF) highlights, when stating that: “Nature does not support the human footprint”. This means that in the international arena, there are over one billion new consumers, whose human needs are greater than the regenerative and receptive capacity of the Earth’s natural systems.

This is especially true if one refers to:

- the Italian Code of the Cultural Heritage and Landscape, which states that cultural heritage is made up, not only of cultural heritage, but also landscape heritage, i.e. all properties and areas that express the cultural, historical, aesthetic, social, natural, morphological and technical values of the territory;
- and the current situation of environmental degradation and present-day international crisis relating to economics, finance and values.

It follows that the above-mentioned Code, when underlining the importance of overcoming the “dichotomy between the economic and the socio-cultural sphere” through ethics, emphasizes that this involves the action of a person who, individually, makes a decision based on “socio-cultural assessments”, and, therefore, respects others and the environment as a whole: this is eco-sustainability.

However, this is not what has happened in the case of the current international crisis, as the desire to increase personal capital has overridden any positive ethical reference in all contexts, including the protection and valorization of cultural heritage.

The antidote is, therefore, that “silent” network which, according to some scholars, continues to work in compliance with ethical principles to defend not only human values, but the cultural and environmental testimonies that have constituted history and moral identity through the centuries.

Behaviour in observance of these principles and values, rejects situations that lead to conflict of interest, basing itself on sobriety; consequently, when making a decision, questions are posed about whether there are any consequences that might regard others and the entire environment.

At this point – and here it is necessary to stress its significance – the importance of considering the artistic product arises and, therefore, art beyond the beautiful: from the aesthetic to the ethical.

Is art synonymous with beauty? In other words, is beauty attributable only to aesthetics? And is the idea of art only a matter of aesthetics? This may be considered an outdated, decadent idea held by those who dislike or distrust it or who believe they can banish it to the outskirts of the cultural world.

On the contrary, art is never solely or forcedly beautiful, its vocation is not decorative, but metaphysical. Indeed, what remains of art when it escapes the *diktat* of beauty? What remains is its intelligence, knowledge and wisdom related to the great alchemies, giving a sense and meaning to what has none, or demonstrating why sense and meaning are impossible to grasp at times.

It can, therefore be said, that in our perception, a sense of ethics accompanies a

sense of aesthetics. It is not easy, however, and will never be entirely explainable, to what extent the enjoyment of a work of art is or is not bound to affinity, i.e. to ethical and not simply aesthetic participation. It is also true that, in the contemplation of an art work, affective participation undoubtedly intervenes, together with expression or intimistic and participatory elements, although for many these elements are often replaced by economic or political ones. This means one has to refer to old standards of taste, of a native sensitivity for art things and an innate empathy for the same.

### 5. The importance of studying the “system: artifact-environment-biota”

The study of the “system: artifact-environment-biota”, is of great consequence in the field of cultural heritage training and research, also in relation to the above-mentioned importance of the method and the resulting judgment.

For this, it is considered significant to mention what the authors of this paper have achieved in the context of their teaching and research activities.

In the field of training and, in particular, interdisciplinary training, reference is to the volumes in the book series “*I beni culturali e l'ambiente*” (Cultural heritage and environment) and “*La formazione e la ricerca nel settore dei beni culturali e ambientali*” (Training and research in the field of cultural and environmental heritage).

The 11 volumes in the series on cultural heritage and the environment (Pitagora Editrice - Bologna), a number of them also available in French, deal with various issues related to the protection and valorization of artifacts of historical-artistic interest and of different material typologies.

In the second series (Mimesis Edizioni, Milan-Udine), the first volume “*I beni culturali e ambientali: formazione e ricerca, interdisciplinarietà e internazionalizzazione*” (Cultural and environmental heritage: education and research, interdisciplinarity and internationalization), brings together the presentations of personalities with different skills, who participated in several of the Study Days held on issues that suitably represent the educational grounding for this area of interest.

The second volume “*La gestione del rischio nel settore dei beni culturali: musei, biblioteche, archivi*”, also in English, “Risk management in the cultural heritage sector: museums, libraries, archives”, takes an interdisciplinary approach towards dealing with issues of management and control of the possible risks that trigger deterioration processes in heritage collections. This means that problems can be resolved at the outset, avoiding the need for restoration and / or curative treatments on the works of art.

In the field of research, an essential reference point is the historical-technical journal “*Conservation Science in Cultural Heritage*”, founded in 2001 at the University of Bologna.

The Journal, published annually in English and Italian, describes studies and experimental research of a technical-conservative, economic, social, legal, and management nature in the environmental and cultural heritage sector. It has formed significant partnerships with universities, institutes and research centers, both nationally and internationally. The Journal is accessible online and in print and appears on numerous international platforms and websites, having attained various acknowledgements and certification.

## 6. Case studies

The following section summarizes two case studies concerning artifacts of historical-artistic interest, which highlight the processes aimed at protecting living conditions and historical-artistic heritage and, therefore, related to the protection and enhancement of the “system: artifact of historical-artistic interest – conservation environment – biota” [4-7]:

- air pollution, degradation of monuments and historical-artistic environments, protection and consequent benefits;
- conservation and monitoring in confined spaces.

Below are discussed the objectives that led to these investigations.

### 6.1. Air pollution and degradation of artistic-historic monuments and environments

The research was carried out at the following sites in Italy (Figure 2):

- Basilica of Santa Maria Maggiore, Rome
- Theatre of Marcellus, Rome
- Cloister of the Villa d'Este, Tivoli
- Villa Adriana, Tivoli



Figure 2. a) Basilica of Santa Maria Maggiore; b) Theatre of Marcellus; c) Cloister of Villa d'Este; d) Villa Adriana.

The factors that influenced the choice of these sites are attributable not only to the different periods of construction of the monuments and the particular logistic situations (different percentages relating to the distribution of methane gas and / or traditional fuel, diversified traffic), but also to the type of material constituting the artifacts under examination (same material for the selected artifacts, i.e. travertine), in addition to the most suitable locations for taking the non-destructive measurements.

The situations relating to the Basilica of Santa Maria Maggiore, the Theatre of Marcellus in Rome and Villa d'Este, where there are different traffic flow conditions and levels of natural gas, were compared with that of an uncontaminated environment – Villa Adriana with no traffic and 100% level of methane distribution.

The results of the experiment were presented at the Accademia Nazionale dei Lincei in Rome and focused on:

- determination of airborne pollutants;
- quali-quantification of alteration-degradation of artifact surfaces using an index of graying-blackening-fouling;
- characterization of atmospheric aerosol.

For this purpose, various analytical instruments were employed:

- Spectrophotometric-colorimeter
- Prototype device (EIS: Electron Industry Support) to automatically measure the level of graying (brightness) on exposed surfaces
- Video microscope for determination of tristimulus color components (R-G-B for red, green, blue)
- Scanning Electron Microscope for quali-quantification of total suspended particulate.

A mobile laboratory was also used, equipped with automatic analyzers for airborne pollutants such as: sulfur oxides, nitrogen oxides, total suspended particulate (Figure 3).



Figure 3. Mobile laboratory equipped with automatic analyzers in compliance with EPA standards.

The sophisticated equipment complying with EPA standards (Environmental Protection Agency) is installed in a Fiat Iveco Daily vehicle. By appropriately programming

experiments, this instrumentation is able to address the serious problems resulting from pollution when related to the degradation of artifacts, as well as to the safeguard of human health:

Instruments in the mobile laboratory for the continuous monitoring of air quality include:

- $\text{SO}_2$  analyzer: *measures fluorescence emitted after absorption of UV energy;*
- $\text{NO}_x$  analyzer: *measures light intensity (chemiluminescence) emitted as a result of reaction with  $\text{O}_3$ ;*
- TSP analyzer (TEOM 1400): *microbalance that weighs particles with a diameter <10 microns (microgravimetry), constituted by a lamina that vibrates with a frequency proportional to the amount of deposited particulate.*

From the results of the campaigns carried out over 4 seasons in the 4 sites in Rome and Tivoli, it was found that:

- **$\text{NO}_x$**  and **TSP**: average recorded values are high in both Santa Maria Maggiore ( $\text{NO}_x$ : 122 ppb and TSP: 99  $\mu\text{g}/\text{m}^3$ ) and the Theatre of Marcellus ( $\text{NO}_x$ : 133 ppb and TSP: 91  $\mu\text{g}/\text{m}^3$ ) with peaks at practically the same time periods: early morning (8.00-9.00) and late evening (respectively between 20.30 and 23.00 and until 0.30 am).
- Lower concentrations of  $\text{NO}_x$  (ranging between 10 - 40 ppb) and TSP (50 - 110  $\mu\text{g}/\text{m}^3$ ) were found in the two sites in Tivoli.
- **$\text{SO}_2$** : concentrations for all sites were minimal and practically equal to instrumental zero during night-time hours.

Trends in traffic flow were found to significantly affect concentrations of  $\text{NO}_x$  and TSP throughout the day. The limited concentration of sulfur dioxide, on the other hand, is to be related to the lower sulfur content in conventional fuels and the gradual re-conversion of heating systems to residential use, the effects of which are obviously felt not only in areas of almost total methanisation, but also in those with partial methanisation.

The danger threshold for  $\text{NO}_x$  and TSP was amply confirmed.

High values in the Roman sites suggest that pedestrian areas should be adopted in order to minimize any inconvenience caused by vehicle pollution.

TSP depositions in cities increase the need for the frequent cleaning and restoration of monuments in historic centers. This is because the suspended particulate matter, as is well known, "dirties" and attacks stone materials, particularly limestone monuments, that are exposed to outdoor atmospheric conditions, on a massive scale.

In order to detect damage using simple non-destructive methods, that are rapid, repetitive and inexpensive, in the course of this research, two devices were developed. One is a prototype and the other a video microscope for image analysis, used to automatically measure the graying of exposed surfaces.

The results achieved provide concrete answers on issues related to the "system: artifact-environment-biota", in reference to the knowledge gained regarding the trends of the various pollutants during daytime and nighttime hours, and the different seasons. This also refers to emission sources, to interaction with artifacts and biota, and to exceeding levels established for the wellbeing of artifacts and human safeguard. In this regard, alternative methods were proposed for the quali-quantification of the alteration-degradation of the surfaces of cultural heritage exposed to atmospheric pollution.

## 6.2. Preservation and monitoring in confined environments: “Diagnostic investigations, microclimate control and virtual use of the paintings in the City Art Museum of Ravenna - Loggetta Lombardesca”

In collaboration with the City Art Museum of Ravenna (*Museo d’Arte della Città di Ravenna – MAR*) (Figure 4), the study addressed:

- characterization of the artifacts;
- evaluation of the conservation state of some of the paintings and attribution;
- environmental monitoring;
- the creation of virtual systems for public enjoyment of the paintings.

In connection with the above, in this particularly complex museum situation, it is necessary to consider:

- the wide-ranging but significant variety of the artifacts housed there, which can be traced back to historical periods ranging from antiquity to contemporary times and, therefore, to different concepts, techniques and modes of execution;
- the corresponding different attributions of the numerous works of art under examination;
- the different environments in which the works of art are placed;
- the equally different conditions in the visitor and work environments.

To this end, portable apparatus was employed belonging to the Diagnostic Laboratory for Cultural Heritage of the Department of Cultural Heritage of the University of Bologna, based in Ravenna. The instruments use innovative technologies and advanced systems to respond, in an objective and reliable manner, to the previously mentioned issues relating to the study of the “system-artifact-conservation environment-biota”.

With regard to the characterization of the artifacts and assessment of the conservation state of several paintings and their attribution, Figure 5 shows an application of Reflectography in IR: under the wooden panel can be seen, the parchment support representing the preparatory drawing of the cartouche and, therefore, a *pentimento* of the artist.



Figure 4. City Art Museum of Ravenna (MAR).



Figure 5. "Deposition of Christ from the Cross", tempera on wood, Carrari Baldassarre (1460-1516): detail of the cartouche.

The environmental monitoring carried out involved:

- thermo-hygrometric monitoring with electronic thermo-hygrometers, model ESCORT Junior, temperature and temperature / humidity data loggers: Systems LTD, in order to check, by means of measurements taken every thirty minutes, the bands of well-being for the paintings (T 19-24°C,  $\Delta T$  1.5°C) (RH 40-55% ,  $\Delta RH$  6%);
- illuminance evaluation with a Lux meter HD 9221, in order to bring values below the limit established by legislation: 50 lx ;
- quantification of Total Suspended Particulate (TSP) and fine particles (PM10) by portable spectrometer (Grimm model 1101), which uses the Laser Scattering detection system [8], for testing limit values established by standards in force (TSP for the artifact and PM10 for the biota): 50  $\mu g/m^3$ .

The research produced conflicting data regarding compliance with the set limit values, in particular with regard to illuminance: redesigning the lighting system is recommended.

The research furthermore includes the development of a system for virtual enjoyment of the paintings, i.e. the interactive digital representation of the City Art Museum of Ravenna in its entirety and complexity. Browsing the MAR exhibition halls also enables vision of works not on exhibition, in addition to works stored in deposit (Figure 6).

The aim is to refer to the virtual as a strategy for communication, research and training or for the representation of conformative and configurative spatial disciplines. Its technological application has therefore been directed toward creating a "multi-channel interactive museum", with the aim of performing territorial cultural marketing.

It should be noted that the research was particularly complex from both a scientific and operational point of view, as the works of art and their environments were many and varied. It was nevertheless interesting, as it involved a wide range of logistic and conservative situations.



Figure 6. Virtual exhibition of a painting not on display, but stored in the museum depository: "Madonna and Child with Angels, St. Thomas Aquinas, Mary Magdalene, Catherine and John the Baptist", tempera on wood, Niccolò Rondinelli.

### 6.3. Objectives pursued by the research

The following is a brief outline of the objectives that led to this research. The first is linked to problems related to human well-being, through a comparison of the data obtained experimentally with established limit values for the welfare of the biota. The other important aspect relates to the management of cultural heritage as a result of the above experimental framework and to interventions for the protection of said heritage. This is also connected to the scientific content of the Master in "Planning and promotion of artistic and cultural events", held at the University of Bologna for six editions, the aims of which are summarized below:

1. the importance of disseminating and communicating research programs involving the study of the "system: artifact-environment-biota", not only to experts and politicians but also to the public;
2. the importance of business in culture which is at the basis of its valorization, and is a direct continuation of protection;
3. knowledge of the territorial forces, i.e. Cultural Units (museums, libraries, archives, art galleries, etc.) and Productive Units (industries, companies, hotel complexes, etc.);
4. training human resources for culture.

It follows that by intervening in the protection, promotion and valorization of cultural heritage, the territorial forces generate value not only for the heritage, but benefits for the same territory too.

## 7. Conclusion

In conclusion, it is important to note that nevertheless, there are evils that afflict cultural heritage, in particular archaeological heritage, that are due to neglect, lack of funding, vandalism, looting, theft and currently, the iconoclastic fury of ISIS, unregulated urbanization in sites and ancient necropolises, and illicit trading.

This alarm has led to a heated debate involving two points of view:

- according to the first, the heritage of the past is safer in Western museums, in fact, they have a great responsibility: we are referring to illegal excavations resulting from the embargo;
- the second, on the other hand, says that all heritage property must be protected where it was found. However, it is also true that while some nations have no awareness of their heritage, others are proud of it.

Hence, viewed from a rational and balanced position, it is believed that the protection and valorization of the cultural artifact and site, in compliance with the specific logistic case (e.g. regulated or unregulated), urbanization, the specific geographic situation and the availability of resources and capabilities, must be conducted in relation to the history, identity and willingness of the country where the heritage and cultural site are found, in order for “memory to become the future”.

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## Biographical notes

**Salvatore Lorusso**, former full Professor in “Chemistry of the Environment and Cultural Heritage” in the Department of Cultural Heritage at the University of Bologna (Ravenna Campus), continues his academic and scientific activities in various fields. He is a member on the Scientific Committee of the project “Joint Research Laboratory for Cultural Heritage Diagnosis and Conservation”, an Agreement of Cooperation between the University of Bologna, Italy, and Zhejiang University, China. He is the founder and Director of two book series: the first “I beni culturali e l’ambiente” consisting of 11 volumes (Pitagora Editrice, Bologna), and the second “La formazione e la ricerca nel settore dei beni culturali e ambientali” of three volumes (Mimesis Edizioni, Milano-Udine). He is the author of more than 420 publications in national and international scientific journals and congress proceedings and of 22 volumes covering subjects such as commodity science and the system: artifact-environment-biota. He is a Foreign Member of the Russian Academy of Natural Sciences; the former Vice-president, he is now a Councillor of the Presidency of the Società Italiana per il Progresso delle Scienze (SIPS – founded in 1839); Director General of the Academy of Food and Wine Culture; member of the Scientific Committee of the network “Gardens of Babylon – Green Hub”; Emeritus Professor and Visiting Professor of the Cultural Heritage Institute of Zhejiang University (China); President of the Academic Committee of National Cultural Heritage Preservation (Cultural Relics Bureau of Zhejiang Province). Visiting Professor of the Faculty of Arts, Lomonosov Moscow State University, Russia. His biography appears in the 2016 Marquis Edition of “Who’s Who in the World”.

**Giampaolo Maria Cogo**, former tenured professor of Administrative Law (1994-2010) at the Faculty of Economics “Federico Caffè”, now the Department of Business and Economic-Legal Science-University Roma Tre. He taught Economic Law (1982-1991) at the Faculty of Economics of the University of Cagliari, Legislation on cultural and environmental heritage (1992-1995) at the Faculty of Conservation of Cultural Heritage of the University of Tuscia. Up to 31/12/2007, he was a member of the Scientific Board for the PhD in Public Economic Law at the Faculty of Economics, University of Rome “La Sapienza” and the PhD in Administrative Law at the University of Roma Tre (until 30/11/2009); a member of the Scientific Committee and Board of Directors of the Masters degree in Engineering and Environmental Economics at the Faculty of Economics “Federico Caffè” at the University of Roma Tre. Assessor at the Ministry of Education for the review of research projects in the areas of scientific interest. From 1992-1993, Councilor of the Minister for Universities and Scientific and Technological Research; Legal Adviser (1992-2000) of the Conference of Italian University Rectors; Councilor of the Minister for Infrastructures and Transport (2009-2011). Author of over 40 publications. He is a lawyer in administrative matters; founder and member of the Governing Council of Multilex & Economics, multidisciplinary consulting and assistance in Rome.

**Andrea Natali** carries out scientific and didactic activities, and consulting in the field of cultural heritage conservation. He has carried out scientific and didactic work in the Department of Cultural Heritage and in the Department of Architecture and Urban Planning at the University of Bologna, and at the Institute for the Conservation and Valorization of Cultural Heritage at the National Research Council of Italy (ICVBC-CNR). His didactic activities include teaching on University courses and Masters in the

sector relating to conservation environment, restoration, art diagnostics and authentication of art works, including the management and valorization of cultural heritage and landscape, and planning and promotion of artistic and cultural events. He owns and runs *Andrea Natali - Conservazione dei Beni Culturali*. He is a mediator/conciliator (Ministerial Decree n.180 18th October 2010); part of the Scientific Committee and the Coordination of the Journal "*Scienze e Ricerche*"; Editorial Coordinator of the Journal "*Conservation Science in Cultural Heritage*". He is author and co-author of over 40 publications covering the preservation and valorization of cultural heritage, which include monographs and scientific treatises used as university text books. He has been a speaker in over 30 national and international conferences. He is the President of the Committee for the Protection of the Ornamental Decoration of the Municipality of Vetralla: council for the conservation and valorization of the architectural heritage. He is an honorary member of the Academy of Food and Wine Culture.