

GUIDELINES AND RECOMMENDATIONS FOR THE CONSERVATION AND MAINTENANCE OF MURAL PAINTINGS IN SUBTERRANEAN ENVIRONMENTS

Adopted at the UNESCO Expert Workshop on Conservation of Mural Paintings: Access, Research, Conservation, jointly organized by the World Heritage Centre and Rathgen Forschungslabor in close co-operation with the Museum für Asiatische Kunst Berlin and ICOMOS Germany (Museum für Asiatische Kunst, Berlin, 2-4 June 2015).

1. INTRODUCTION

Mural paintings executed in subterranean environments constitute an important part of humanity's cultural heritage on a global plan. Such sites are increasingly threatened by damage or destruction, not only due to harmful environmental conditions, but also due to human activity. The protection of such heritage ensuring its preservation for future generations is urgent and requires specialized professional skills and scientific knowledge.

The following guidelines reiterate the ethos of the **'ICOMOS Principles for the Preservation and Conservation-Restoration of Wall Paintings'** (2003), ratified by the ICOMOS 14th General Assembly in Victoria Falls, Zimbabwe in 2003, and expand on issues specific to these sites. They include paintings executed on the walls of natural caves or grottoes, as well as cut, excavated or constructed structures that subsequently were covered with earth, such as tombs, catacombs, temples, halls, monasteries, etc. and other buildings that originally were intended to be above the ground, but at present are underground.

The mural paintings contained in subterranean environments exhibit characteristic problems of conservation caused by natural deteriorating agents. Therefore, their preservation is a complex subject intimately linked to the safeguarding of the entire structure and its immediate surroundings. The complexity of this challenge requires the co-operation of various fields of specialized knowledge, in particular, geology. The inaccessibility of many subterranean murals, some of which are only partially excavated or exposed, poses additional problems in the organization and execution of professional recording, monitoring procedures, interventions, and general site management.

The implementation of best conservation methodologies and adoption of optimal maintenance programmes sometimes can only retard deterioration processes that cannot be stopped. Therefore, monitoring of the condition is an essential component of the conservation process to ensure the long-term preservation of such sites.

Compounding the challenges confronted by in situ preservation of murals in subterranean environments, are the additional problems of anthropogenic nature. These include inappropriate treatments from previous conservation campaigns, damages caused by visitors, as well as destruction caused by exploitation of the terrain. In addition, urban expansion constitutes a very serious threat disrupting on-site preservation, often necessitating the hurried removal of the murals prior to the eminent destruction of the site. The ICOMOS International Cultural Tourism Charter (1999) and the ICOMOS Charter for the Protection and Management of the Archaeological Heritage (1990) are important documents addressing the general needs of murals in subterranean environments with respect to these concerns.

2. EXAMINATION AND DIAGNOSIS

The establishment of correct and efficient treatment methodologies and techniques is dependent on a thorough, scientific examination, which must precede the interventions, and requires the interdisciplinary cooperation between different disciplines and fields of research, including archaeologists, conservators, geologists and historians. It is necessary to identify which processes – inactive or ongoing – have initiated deterioration. For murals in subterranean environments, a careful assessment and documentation of their location in relation to its hydro-geographic setting is essential. As the subterranean site adapts to the characteristics of the sub-soil, such disciplines as geology, geomorphology, geophysical exploration, geotechnics, and hydrogeology related to the water-table setting are of primary importance for understanding the causes of deterioration. Furthermore, underground structures can be subject to pressure and load exerted by the mass of geologic material. Consequently, static assessment is fundamental to establish whether deformation of the support has occurred or is a threat.

The environment in a subterranean structure in which mural paintings are located is extremely fragile and difficult to control. Fluctuations in the external environment can contribute to alterations in a stable internal microclimate and can initiate processes of decay leading to further deterioration. The study of the macro-environmental activity is, in fact, fundamental for the control of the internal climate. A subterranean site is an ecosystem, the equilibrium of which must be respected, as every change in the balance can trigger litho-chemical and biological processes that are detrimental to the murals. This pertains to not only relative humidity and temperature levels, but also to air circulation, and the amount and type of lighting.

As with all conservation endeavours, the identification of materials and characterization of their physical and chemical properties are essential for drawing up a plan for treatments. This study should include the original materials, those added in previous treatments, and possible alteration products. The subterranean environment often causes chemical modifications, which are irreversible, affecting the original colours and obscuring the pictorial content (for example, in the case of lime-based murals). Scientific analyses should follow a methodological approach that encompasses a proper combination of non-invasive and micro-invasive techniques.

3. MONITORING

Regular monitoring through the installation of various devices for the study and assessment of environmental parameters is an essential step in the diagnostic process as well as subsequent maintenance. Such devices include data-loggers, piezometers, luxmeters, and air-borne particle sensors. Sources of humidity can be found in the environment and the internal microclimate, the movement of water by rising damp or infiltration due to water-table fluctuations or rainfall. All of these sources can mobilise soluble salts or contribute to the formation of insoluble salts. Equally important is the monitoring of lighting conditions with regard to bio-deterioration, as well as monitoring of plant and animal proliferation.

Monitoring is a key aspect of providing minimal intervention and essential for the safeguarding of murals in subterranean sites. It requires long-term planning, commitment and funding.

4. PREVENTIVE CONSERVATION, MANAGEMENT AND MAINTENANCE

Regular inspection and timely installation of monitoring devices for assessing the conditions of the structure and the mural paintings therein are the key components for preventive conservation measures and for planning and carrying out punctual and minimal maintenance interventions that best ensure long-term preservation of this heritage.

The management of many subterranean sites is a delicate balance between preservation and use. The potential negative and positive impacts of opening structures to the public must be carefully considered. Public access to sites of heritage significance can be a positive instrument fostering the understanding and appreciation of historic development and formation of universal values. The essence of conservation lies in providing a service that enables these collective sentiments. However, excessive or poorly managed tourism can pose serious threats. In site management, prioritization must always be given to conservation issues over measures facilitating or improving tourist access. Equally important is the implementation of protective measures preventing vandalism and robbery.

One of the most important influences of human presence is on the microclimate. Of particular concern is the introduction of airborne particle contaminants causing the proliferation of microorganisms. Another concern is the need to provide correct lighting that will not contribute to biodeterioration or alteration of the light-sensitive materials. For open sites, the sensitive environment will often require controlling the flux of visitors, either by limiting the number of visitors or visitation periods, and their length. Providing access to sites can cause drastic fluctuations in the climate. This should be avoided by installing appropriate buffers.

Sometimes permanent closing or reburial is the only option for safeguarding a site. Communicating the need for such a drastic preventive measure to the local community and tourists is important. Networking with tourist organisations can improve awareness of the vulnerability of subterranean sites. Such information can be disseminated in tourist guides, books and on the homepages of the archaeological sites. At sites where physical access is detrimental to the preservation of the murals, intellectual and/or emotive access can be facilitated by providing replicas and graphic documentation, or by enabling virtual contact utilizing digital technology.

5. CONSERVATION TREATMENTS

The conservation of mural paintings in subterranean environments, as with all wall paintings, requires a solid and secure support, and that the microclimate and humidity sources must be under control. This may necessitate interventions in the geological structure prior to treatment of the painting or the implementation of other emergency measures. Conservation interventions must act on the causes rather than on the effects of deterioration. Furthermore, the impact of interventions should be evaluated before proceeding with full treatment.

Due to the rapid deterioration of organic materials and formation of by-products in subterranean environments, it is advisable and preferable to use, as far as possible, tested inorganic materials for treatments. The conservation methodologies and techniques adopted in subterranean environments must respect the principles of retreatability, physical and chemical compatibility, and must be implemented with the minimum of necessary modifications focusing on preventing the triggering of damaging factors. Energy-conscious and passive intervention measures should be prioritized.

Mural paintings are intrinsically linked to the support and the surroundings they were created in. However, in certain cases, such as natural disasters, structural instability, encroaching urbanisation or other contingent reasons, their removal can be an option only if no other solution can be found. The irreversible and potentially damaging character of such interventions must be stressed; detachment and transfer must be treated as an emergency treatment of last resort and avoided as much as possible. Appropriate measures should be taken to perform the necessary archaeological and geological examinations prior to removal of the paintings. Furthermore, detachment and transfer should preserve as much of the original characteristics as possible, and the murals should be ensured the best possible storage/exhibition conditions.

Throughout the world, there exist numerous detached wall paintings originating from subterranean sites, now preserved in museum stores and other locations. Detachment of these

paintings was undertaken in previous decades with the intent to save them from complete destruction because of extremely challenging conservation problems. The vast majority of these fragments are in very poor condition today, and can be described as neglected cultural heritage. When undertaking conservation treatments on these detached fragments, it is important to include a study of the old records to expand our understanding of the site from which the paintings originate. The linking of these homeless paintings to their provenance strengthens the identity of the site as well as the paintings, and can increase the interest in study and preservation of these murals, both by specialists and the general public.

6. INTERACTION WITH LOCAL COMMUNITIES AND AUTHORITIES

Improved communication with the local population and dissemination of knowledge about the sites and their vulnerability can heighten awareness about their inherent cultural values, and can often have a positive influence ensuring their long-term preservation. Such measures are important for stopping inappropriate use of sites for storage of livestock and foodstuffs.

Similarly, improved communication between heritage preservation authorities and urban planning authorities will help avoid the destruction and damage of sites discovered during the construction of buildings and roads. Adoption of legal protection policies will further ensure responsible use of the terrain and its resources and the preservation of endangered sites.

The preservation of many subterranean mural paintings and their surroundings depends not only on the participation of the responsible state conservation authorities, non-governmental organisations and research institutions offering qualified professional expertise, but also on the political goodwill of local and national governments. A dynamic and collective effort will best ensure the preservation of these important sites, which constitute the shared cultural heritage of all people.