

ARCHITECTURAL STRUCTURES – HERITAGE @ RISK!

Architectural Heritage is spread all over the world and it is difficult to protect all of it to the same degree and at the same time. Some monuments and historic buildings are however at much greater risk than others, and these situations have therefore to be identified, and a “scale of priorities” has to be established if we want to optimise resources in order to achieve the maximum benefit.

The focus is therefore on defining criteria in order to establish those priorities, taking into account physical risks, cultural values, social consequences and economic aspects.

A strategic plan for the safekeeping of Architectural Heritage @ Risk should include the following steps:

- a) A “*preliminary list*” (or inventory) of Architectural Heritage – a survey and data collection to establish an inventory of cultural sites, historic towns, monuments and historic buildings – should be set up in each country.
- b) This inventory should be ranked highlighting the physical conditions, the legal framework, etc, obtaining a sort of “*intelligence list*”.
- c) Architectural Heritage is threatened by two categories of risks:
- d) unpredictable risks such as wars, massive earthquakes, etc.
- e) predictable risks related to the intrinsic characteristics of the buildings (typology etc), the present situation of damage and decay and environmental conditions (pollution, earthquakes, etc).

Little or nothing can be done to prevent damage and collapse from unpredictable risks and in this case Risk Preparedness appears to be the most rational possible strategy.

As regards predictable risks, it is possible instead to create a *Map of Physical Risks*, which links any asset on the “intelligence list” and establishes a conventional risk index, that prioritises probabilities that serious damage, collapse or irreversible decay might occur in the future.

- e) The *Map of Physical Risks*, although it represents a very important point of reference for the protection of Architectural Heritage, is not sufficient to categorise the priorities, because there are other values that must be considered in regard to three categories: cultural values, social values and economic values.
- f) The *Map of Priorities* is the result of putting together “physical risks” and “values”, also taking into account aspects of management (the legal framework, financial and human ownership, policies, etc). The organisation of such a map requires a very specific kind of cost-benefit analysis, because the assessment is a very difficult task, and the costs and benefits can only partly be measured in monetary terms.
- g) The *Operational Plan* is the final step of a general strategic plan and refers to the measures to be undertaken, which include three levels: emergency actions, preventive measures, and restoration work.
- h) The enforcement of the *Operational Plan* requires appropriate Recommendations and Guidelines, and the ICOMOS International Scientific Committee for the Analysis and Restoration of Structures of Architectural Heritage is working on this.

Case Study 1 – Preventive measures to mitigate the risk to the heritage of Petra

The site of Petra, Jordan, apart from risks because of uncontrolled tourism, suffers considerable deterioration processes to the natural stone, which form the bearing structure of the carved temples.

A lack of maintenance and of a general survey to identify the most serious occurrences of decay and damage (map of risk), have allowed threats and decay to increase everywhere.

The Qasr-al-Bint building, one of the most important of the site, was heavily damaged and partly destroyed by earthquakes, and the surviving structural elements are in a very precarious situation.

In the Urn Tomb, the rock on the left side of the façade is affected by large cracks, and the situation appears to be potentially very dangerous because the rock structure is thin and deteriorated, as is very clear from looking at the external side of the structure.

Instances of deterioration also affect the main columns of the façade, which show large cracks and whose bases have been completely eroded, and urgent measures have to be undertaken here as well.

In the Palace Tomb, the situation is dramatic, as a huge portion of the façade is becoming detached from the body of the rock. The area has been closed to the public. Consolidation works and anchorage of the structure are urgent.

All the temples suffer in different ways from stability problems, mainly concentrated on the pillars or walls, which are of-

ten affected by vertical or inclined cracks that, when they completely extend into the rock's mass, may become very dangerous. The ceiling, which often appears as a rock slab, made up of strata of rock separated by thin softer horizontal layers, may become unstable when the dimension of the slab is too large or a pillar collapses (see also p. 123/124).

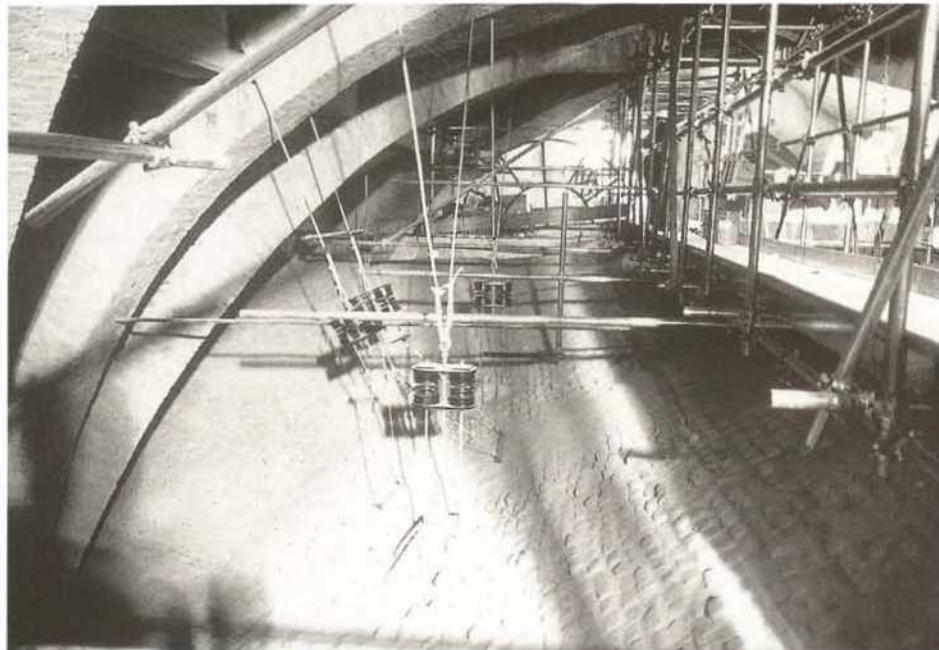
Case Study 2 – Urgent measures to counteract the risk of collapse of the Basilica of St. Francis of Assisi after the earthquake of 26 September 1997

During the earthquake of 26 September 1997, two vaults of the Basilica of St. Francis of Assisi collapsed and the others were in such a precarious situation that all of them could have collapsed at any moment.

Urgent measures were then required to prevent the destruction of the Basilica and the precious frescoes by Giotto and Cimabue: bands of composite material (with synthetic fibres) were applied over the cracks, on the *extrados* of the vaults, which were then suspended from the roof with a system of tie bars, having first inserted two springs to maintain force at the value of the structural design, independent of thermal effects and vibration.

These urgent and provisional measures allowed resistance to the further earthquakes that hit the Basilica after the main quake of 26 September, until final definitive reinforcements have been put in place (see also p. 116).

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Assisi, Basilica of St. Francis, securing of the vault endangered by collapse