

Guidelines for decisions concerning monuments in Italy

A. Corsanego
University of Genoa, Italy

S. D'Agostino
University of Naples, Italy

ABSTRACT: Some general concepts are asserted concerning the restoration of monuments in seismic areas, being those at the basis of the Guidelines issued in Italy by the National Committee for the Seismic Protection of Monumental Buildings and Cultural Heritage.

1 INTRODUCTION

The vastness of the Italian monumental heritage considerably increases all the problems surrounding it.

This heritage holds cultural values that belong to all mankind and which must be preserved for posterity. This means that strategies are to be defined and used to control degradation, for protection from the aggressive forces arising from natural phenomena, from the environment and from man, for restoration when it becomes necessary.

That part of the monumental heritage that is situated in seismic areas creates further problems which considerably increase the complexity of decisional processes. In fact seismic upgrading interventions can clearly diminish the damage caused by any future earthquakes and the consequent loss of cultural values but can also in themselves cause the loss of these values if they modify some intrinsic character of the ancient entities. Moreover the need to save human lives exposed to earthquakes in ancient monuments, which obviously has a pre-eminent role, implies structural safety requirements which are different from the requirements relative to the preservation of cultural values and can enter into conflict with them when a strategy has to be chosen.

An integrated vision of the restoration of monuments must find the right place for the seismic component as for other specialized components in the context of the numerous demands to be balanced. This necessity has been expressed several times by these authors and by other Italian researchers (e.g. Gullini et al. 1984, D'Agostino 1985, Benvenuto et al. 1986, Giuffrè 1987, Augusti & D'Agostino 1988, Baratta & Belli 1989, Corsanego & D'Agostino 1990, 1991).

The Italian National Committee for the Seismic Protection of Monumental Buildings and Cultural Heritage (CNPPCRS) of which the

present authors are members, has issued Guidelines for restoration operations on monuments (CNPPCRS 1989) which give great importance to the multidisciplinary approach. These express orientations substantially similar to those contained in recent reports by the Working Group 7 of EAEE (Syrmakezis 1986, Syrmakezis et al. 1990) and shape a protection philosophy which, even though set out with reference to Italy, can be considered as applicable also to the monumental heritage of other countries.

In this work some general principles will be asserted which can be considered a conceptual basis of the Guidelines.

2 RISK ESTIMATE

Apart from the earthquake numerous other hazard sources, by nature environmental or anthropical, have important repercussions on the monument heritage of countries such as Italy (Baldi et al. 1987).

The actions suffered by monuments are, according to the type of hazard, of short duration as in earthquakes and other violent events or of long duration. Unfortunately the long duration actions such as vibrations caused by traffic, atmospheric pollution, wear caused by users, which often are highly harmful, have, up to now, provoked insufficient attention. To remedy these situations it would be necessary to plan out integrated risk estimates; to this end it is right to remind a general schema that these estimates should follow.

The overall hazard can be considered as a set of n particular hazards, one for every type of source. Each of them combines with a vulnerability of the monumental building which expresses a predisposition to damage. As a result, from the combination one has an overall structural risk which is a set of n particular structural risks; seismic

structural risk is one of these. The damage can cause losses to the values exposed of which the human lives and the cultural values of the building are two important examples; one has therefore m particular exposures constituting the set of the overall exposure, if m are the significant types of value. The characterization of the exposure becomes fundamentally important in the case of monuments because the risks to be examined in order to define the intervention strategies are not the structural ones which only give mechanistic information, but those referring to the possible loss of exposed values. For every value put in touch with a hazard there is thus a particular risk to consider, corresponding to the combination of the exposure of that value with the structural risk deriving from the existence of that hazard; the overall risk is the set of the $(n \cdot m)$ particular risks thus defined. In this context the seismic risk can be considered as the subset of the m particular risks caused by the combination of the exposure of a value with the seismic structural risk.

The requirement that the seismic risk analysis aimed at decisions concerning the monuments fit into the general schema which has been now summarized can be expressed by the following proposition which reflects a relevant aspect of of the philosophy of the Guidelines.

The estimate of seismic risk concerning values exposed in the monuments should be part of an overall risk estimate that examines all the important hazards.

The principal sources of knowledge for the estimate of risk are three in number: the theoretical modelling of the phenomena and behaviour, the elaboration of the information given by the history of the events and of their consequences, the pooling of expert judgements (Baldi & Corsanego 1987). The examination of the present picture of research into risk shows that often only one source is used and this is a considerable limitation in the case of ancient buildings; in particular the analysis of their seismic vulnerability by means of the current procedures of the structural mechanics gives results which in many cases reveal great uncertainties. The reading of the seismic history of the monuments in written tests and through the marks it has left on those monuments is a precious reservoir of further information, used very partially up till now. The following line of conduct inserted in the Guidelines seems therefore justified.

The estimate of risk should take into account, rationally, all the available sources of knowledge about the monuments and their environmental and sociocultural context with special reference to the historical source.

3. RISK MITIGATION

The delicate question of the balancing of risk is discussed here with specific reference to seismic risk but the significance of the discourse can be more general.

It may be remembered that on numerous occasions seismic upgrading operations have been carried out on monuments and have been criticized by historians, archaeologists, architects and restorers. In effect it seems just to ask whether in some cases it would not have been possible to better conciliate protection from earthquakes with respect for the traces of the material culture of the past.

The necessity for an organic, non sectional, vision is repeatedly stated by the Guidelines and can be expressed by the following principle.

The balancing of the seismic risk concerning cultural values, as that of other risks, should be considered not as an isolated objective but as one of the exigencies to satisfy in the multidisciplinary context of monument restoration.

Many contrast situations have arisen also because the interventions have often been occasional and traumatic episodes in the life of the ancient construction, which instead needs continuous attention. But this attention is only possible in the frame of a global policy of management of the cultural heritage which in some countries is not yet fully in force. The hope for a greater awareness is contained in the following principle.

The restoration of monuments should be inserted in a continuous temporal process of programmed monitoring and maintenance.

To go on with the discourse it is essential to introduce the concept of "intrinsic vulnerability". We define the intrinsic vulnerability of an ancient monument as that which it would have if its degradation was substantially absent, which depends therefore on intrinsic characteristics such as its morphology, geometric dimensions, materials, construction technique. The present vulnerability is in general different from the intrinsic one because there is a vulnerability added by degradation, which can reach very high levels.

The intrinsic vulnerability of monuments expresses the conception of safety of the societies and the men who built them or made those transformations which by now are part of their nature; this conception seems one of the cultural values to respect and to pass on to posterity. The vulnerability added by degradation expresses substantially the heedlessness of the societies and the men towards the ancient architectural heritage.

It should also be said that the interventions aimed at modifying intrinsic vulnerability often imply upgrading techniques in radical contrast to the concepts of present restoration theories.

A further consideration concerns the fact that the ancient monuments that have come down to us have, for the most part, stood the test of earthquakes and in general can be considered earthquake resistant if they are not degraded (Syrmakezis et al. 1990). Degradation has been recognized as having the greatest responsibility for numerous collapses.

What has been said above was aimed at introducing a proposition that reflects a basic orientation of the Guidelines.

Interventions on monuments should tend, in principle, to abate vulnerability added by degradation.

There are particular situations in which only eliminating degradation can seem insufficient. This happens when there are ruin phenomena or when the hypothesis of effective shortcomings in the intrinsic vulnerability is confirmed by more than one source of knowledge and denied by none. These situations must be examined with a great caution which is present in the Guidelines and which can be expressed by the following statement.

Decisions concerning interventions which modify the intrinsic vulnerability of monuments must emerge from a very strict interdisciplinary confrontation.

The concepts stated in this paper refer in substance to cultural values. Of course other elements at risk such as human lives must be considered. As a matter of fact very complicated situations that can involve modifications of intrinsic vulnerability arise from the necessity to protect human life from seismic risk. The exposure of human life is very variable in the monumental complexes. It is usually very low in archaeological sites (Corsanego & D'Agostino 1990) while it can reach high levels in buildings with a great flow of visitors in enclosed spaces. A general line to resolve the contrast that can arise when, in order to offer the current standards of protection of human lives through the abatement of vulnerability, too heavy upgrading would be inevitable, is indicated by the Guidelines in those alternative provisions that are based on the potential of occupation and can be expressed as follows.

If the diminution of risk to human lives through the reduction of the vulnerability of a monument involves interventions detrimental to the cultural values, this diminution is to be instead found through uses of the monument which reduce the exposure of those lives.

Clearly the generalization of this formulation implies well-considered and responsible policies in planning the various socioeconomic activities tied to the monumental heritage which in countries like Italy have important weight.

4 TECHNICAL WAYS TO INTERVENE

There is wide debate in progress on how to realize in practice interventions on monuments.

It has been, in particular, brought out (Benvenuto et al. 1986) that some modern procedures which profoundly alter the material nature of ancient structures and also are irreversible and mummify, in fact, the buildings prejudicing future changes of mind, can be led back to an implicit philosophy of restoration which considers the intervention carried out today on a monument as the "last intervention" in its life which claims to give a definitive answer to its problems and to take it out of history. This philosophy which is a modern arrogance towards the times yet to come is rejected by the Guidelines whose approach can be synthesized in the following principle.

Interventions on monuments should allow our successors to express restoration and preservation cultures different from ours.

Two further essential requirements for positively qualifying intervention techniques are the long-term durability of the materials used and their compatibility with the existing ones. Both needs are answered by traditional techniques which have been tested for centuries while considerable doubts are stirred by some innovative techniques both for their durability and for their compatibility (CNPPCRS 1986, D'Agostino & Marconi 1987, Glizzi 1989).

Awaiting more precise scientific knowledge that can be offered by further research a prudent approach seems appropriate in a problem situation as difficult as that of monument restoration. This prudence and the conviction that it is wrong to create discontinuity in the history of the relations between man and his monuments are expressed in the following statement.

Ways to intervene implying a wide use of traditional techniques are firmly counselled for monuments.

Detailed indications on the most adapted techniques to the various situations, concerning foundations, walls, columns, arches, vaults, floors, roofing, are given by the Guidelines. Some examples of interventions in good agreement with these indications have been illustrated by Augusti & D'Agostino (1988).

5 CONCLUSIONS

The Guidelines that have been presented do not contain rigid prescriptions but indicate, to the specialists who work in Italy in different discipline fields, a unitary approach in respect to the monuments.

Further elements for reflection should be given by a systematic application of the general concepts formulated by the Guidelines and the ways to intervene they counsel, which has been begun and sponsored by the Italian Ministry of Cultural and Environmental Heritage.

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