A programmed maintenance project for the archaeological area of Paestum

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Abstract

The ancient city of Paestum, founded by the Greeks in the 6th century BC, stands as one of the foremost records of the Greek civilisation that took root throughout Southern Italy. Its grandiose temples, in an excellent state of conservation, have been a constant source of inspiration for artists ranging from Piranesi to Schinkel over the last three centuries. The restoration of the temples, now completed after fifteen years' painstaking work, was recently the subject of an international congress. However, as well as the temples, the archaeological area of Paestum, covering 25 hectares, features a number of other monuments, a series of Roman *insulae* and the ancient street layout. Moreover the ancient city walls, extending for 5 kilometres, have come down to us in excellent condition, with numerous towers and gates. This splendid archaeological park attracts some 800,000 visitors a year, and requires a determined effort for its upkeep. The adepts of the science of conservation are well aware that an efficient programmed maintenance is the key to conserving archaeological remains in the best possible state, for it reduces their vulnerability and postpones operations of restoration which are all too often invasive. It is thus of considerable importance to draw up a project of programmed maintenance for the whole area, in order to establish on a scientific basis the interventions to be carried out and a correct economic evaluation for the state of conservation. This research project will draw up guidelines for the process of programmed maintenance, establishing the type of inspection required for a proper diagnosis, any monitoring that may be needed for specific problems, the maintenance cycles for the various typologies of intervention, and the annual cost of all the various operations. This will ensure the best possible conservation of the archaeological area, the programming of the interventions on site, and definition of the precise cost of the types of maintenance. It will then also be possible to market a "maintenance package" which, in view of the prestige of the temples, is likely to find enthusiastic sponsors.

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1 Introduction

The ancient city of Paestum, situated about 80 km to the south of the Bay of Naples, was founded at the end of the 6th century BC by the Greeks on the Tyrrhenian coast in the northernmost reaches of Magna Graecia (fig. 1). It was a very flourishing city, enclosed by a massive circuit of defensive walls measuring 5 km in circumference. In the space of a century, between 550 and 450 BC, three of the most majestic temples in Magna Graecia were built, and still stand today in remarkably good condition. The city, conquered by first the Lucanians and then the Romans, continued to be very active until the 3rd century AD when, due to environmental contingencies which are still not clear, it was almost entirely abandoned, and all memory of it disappeared.

The first plan of the city we have dates from 1732 (fig. 2), and by the middle of the 18th century the city had become famous throughout Europe, as we know from studies, fascinating descriptions and breath-taking narratives left by travellers on the Grand Tour. It presented a classic cross-section of monuments dating back to the Ancient Greeks, the Lucanian domination and the powerful Roman presence, but it was undoubtedly the three great temples (fig. 3) whose beauty made the greatest impact, promoting a taste for Doric architecture which has left tangible marks in city centres throughout Europe [1].

Figure 1: Plan of the environment.

The first conservation work on the site dates back to 1805. As well as eliminating vegetation and heaps of earth, it also regrettably did away with the remains of a medieval settlement in the temple of Athena. However, it only carried out a few, well-judged constructive interventions, using bricks and some elements of ironwork left visible. The work was extended, but to no great extent, in 1828.

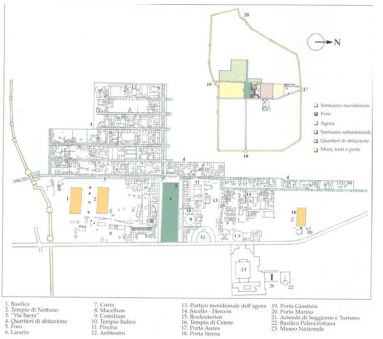


Figure 2: Map of the archeological site.

Figure 3: View of the temples.

About a century later, in 1926, this initial conservation work was renewed. On this occasion improvements to the ironwork were made, and regrettably some of the previous interventions, but fortunately only in a few cases, were replaced with a mixture of cement volcanic sand.

At the beginning of the 1960s two columns from the upper order of the colonnade round the temple of Neptune were put back in place. This was followed in 1962 by an ill-advised intervention of consolidation which involved perforating the architrave and columns in the eastern façade of the temple of Athena. It appears that at a certain point the intervention was curtailed, to judge from extra preparatory holes found in one of the capitals. In the following years small-scale interventions were carried out with no attention to methodological criteria.

For the first time in 1988 a large-scale restoration project was drawn up by the appropriate authority which treated the archaeological site as a whole, in the sense of a single monument rather than a collection of individual parts.

The restoration work affecting the temples, which is undoubtedly the most complex aspect, comes to serve as a paradigm for the development of methodologies to be applied to all the structures in the city.

2 Constructive restoration of archaeological monuments: the temples at Paestum.

Throughout the 19th century and into the first decades of the 20th, the restoration of architecture and in particular of ancient monuments could count on a unitarian conception of the art of building, involving natural materials and techniques which were a common heritage in the building culture. This heritage was available to archaeologists and architects involved in restoration, and they benefited from it quite naturally. In the specific case of the temples of Paestum, the interventions ranging from Bonucci to Maiuri were informed by this common culture.

With the advent and spread of industrial materials and the analytical and rational conception of construction sciences, the traditional art of building was

rapidly eclipsed, disrupting a cultural unity going back over the millennia and favouring an ever greater specialisation and compartmentalisation of knowledge. In the field of archaeological conservation, this gave rise to any number of specialised scientific and technological competences. While on one hand this has undeniably placed interventions on a more scientific footing, on the other the various scientific requisites have brought with them their own cultural strategies, all too often distorting the conservation principles governing historical remains. It has thus proved necessary to elaborate a new strategy based on both the historical culture and scientific expertise, a process which got under way in the 1980s and 1990s. To a large degree it developed alongside the cultural and scientific project established for the temples of Paestum by the relevant Soprintendenza from 1989 onwards. By 1993 this was already sufficiently advanced to feature in an exhibition of studies and research carried out on the Athenaion [2].

Turning more specifically to the constructive aspects, "Ingegneria per i Beni Culturali" [Engineering for the Cultural Heritage] has opposed the iniquitous practice of consolidation which, using perfunctory building-site technologies, has been applied without any heed to scientific probity, ignoring the ancient art of building and making invasive interventions which are seriously damaging to the integrity of the ancient monuments [3,4]. This practice has been contrasted by the concept of the Monument-Document, which views monuments as the prime source of historical and scientific knowledge, recognising in the historical building heritage, and in particular the archaeological heritage, the most extensive archive available to us of the material history of humanity. This gives rise to a strategy for conservation based on:

- Respect for the ancient art of building
- Respect for traditional materials and techniques
- Criteria of minimal intervention
- Criteria of improvement, as defined in article 34 of the Codice per i Beni Culturali [Code for the Cultural Heritage], recently introduced in Italy [5].

3 Interventions of improvement

The analysis of the degree of vulnerability, the safety of the original structure, the process of ruin-formation and the calculation of stability adopted for particularly severe conditions, which will not be met in the foreseeable future, enable us to affirm that the currrent state of static structural conservation of the three temples is excellent, and the global safety coefficient for an earthquake remains very high. Moreover, in the last ten years a scrupulous project of conservational restoration has been carried out for the first time, and is now nearing completion. The static restoration has adhered very strictly to the concept of improvement involving the elimination of structural deterioration without interfering with the material conception of the monument. Interventions consisted in a thorough controlled weeding and elimination of all parasites, whether animal or vegetal, as well as careful cleaning of the stonework and pointing. In particular any quoins found to be lesioned were made good with

cement-free mortar guaranteeing a high degree of mechanical resistance and durability. The few metal insertions, generally consisting in external supporting braces, were cleaned and made structurally sound and treated wherever necessary to limit future deterioration. In the areas most exposed to the action of rainwater a suitable system of waterproofing was introduced, leaving the ancient stonework extant. Finally it was decided to put a stop to uncontrolled access to the temple interiors, in order to avoid deterioration due to prolonged wear and tear and possible acts of vandalism.

Such a thorough conservation intervention on the stonework of the temples had never before been undertaken. The structure, which as we have seen already possessed high safety coefficients, is now in a state to face up confidently to the centuries to come and can be handed over, in its current integrity, to the up-coming generations, (fig. 4).

Figure 4: Temple of Neptune, detail of pediment.

4 Programmed maintenance as conservational prevention

Once the status of the archaeological site is affirmed as a monument-document in the interests of historical scientific research, entailing its conservation in the greatest possible integrity, it is essential to limit interventions of restoration and extraordinary maintenance as far as possible, for these inevitably induce deterioration in the monument's original entity.

In theory a substantial conservational intervention should only be necessary following an exceptional event such as a particularly violent earthquake, since, at least in theory, we should be able to rule out any serious violence on the part of human beings.

Thus following the current comprehensive intervention of conservational restoration, it is our belief that the great temples of Paestum can happily withstand many decades without needing any further significant treatment.

All this presupposes, however, not an endemic state of neglect, causing a relentless, widespread deterioration, but rather a project of programmed maintenance which in practice consists in prevention of degradation and hence is an activity of conservation. This is the challenge we have been championing for over a decade, but it encounters serious difficulties in everyday application, given the scarce resources available for maintenance [6]; in practice the upkeep of sites is sporadic, and all too often dictated by states of emergency.

5 A programmed maintenance project

Archaeological sites are assigned to a local heritage authority responsible for their conservation. Unfortunately the resources earmarked for maintenance are always insufficient, and distributed with considerable delays. This causes an endemic deterioration which in the long term produces serious damage in monuments and relics. Moreover a correct conservation of an archaeological site requires a range of skills which cannot be provided by the authority's staff. This is why it has proved advisable to draw up a general outline project, on the basis of our studies and analyses and of significant case studies involving the Port of Ostia Antica, the archaeological park of Elea and, more recently, the archaeological park of Appia Antica.

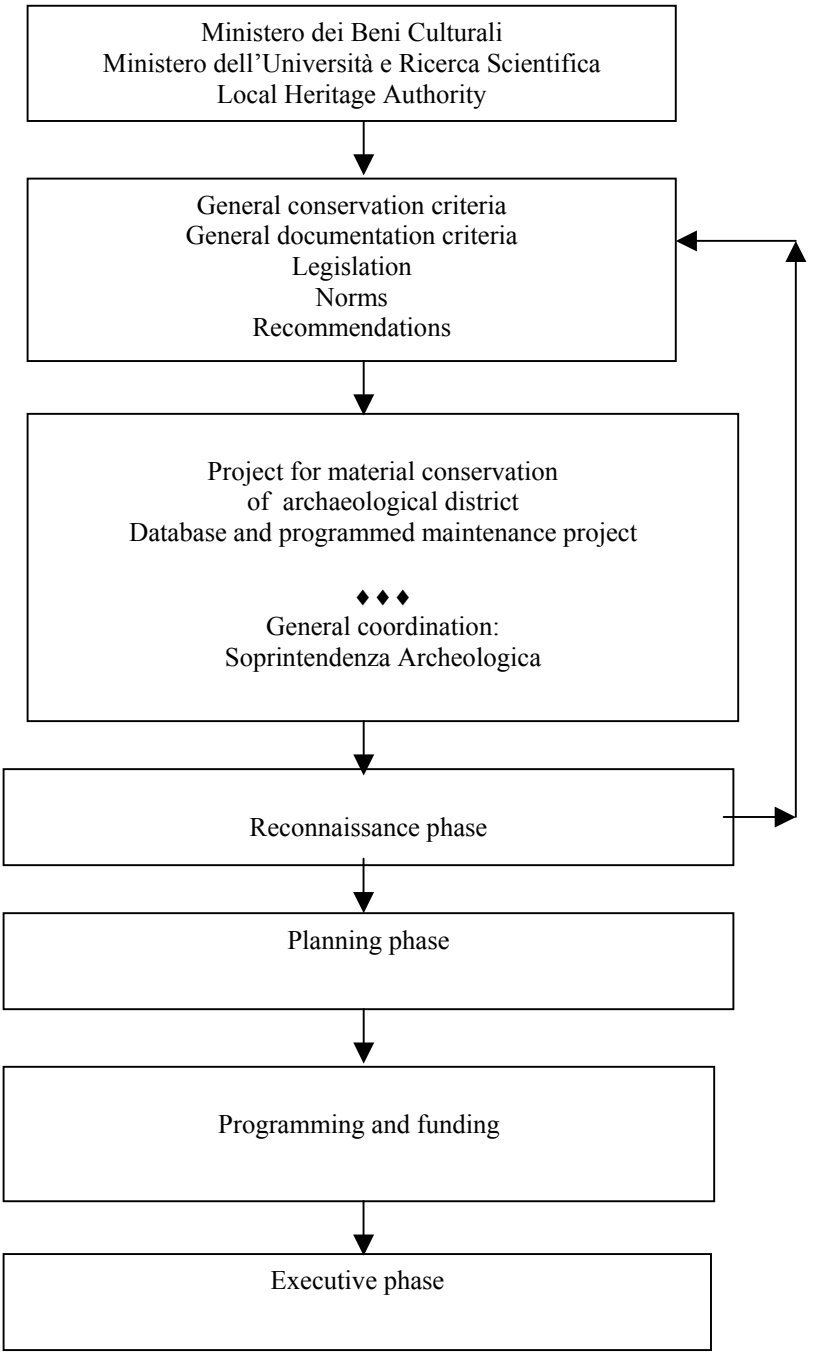
This outline project is illustrated in the flow diagram on the following pages with charts of the respective phases.

6 Current maintenance work at Paestum

The archaeological district of Paestum, covering about 2.5 hectares, is open to the public. The maintenance of the archaeological sites suffers seriously from lack of funds available to the authority responsible. In practice only the most essential tasks can be carried, with no on-going conservation work.

The maintenance of access points and essential services within the area, including cleaning, sanitation facilities, etc., is contracted out to a private firm. They visit the site every day during the peak visitor months, from March to October, and once a week in winter. There are no gutters or drains for rainwater to run off, but only naturally draining collecting sumps. The maintenance of the vegetation, also contracted out to a private firm, is carried out in the sector open to the public, but elsewhere, as for example on the ancient city walls, at present no maintenance is possible. The interventions are programmed with appropriate regularity to ensure that weeds are kept in check. The same firm sees to the maintenance of the terrain, removing loose stones, fallen masonry, standing water and so on.

No maintenance is done on the fabric of walls, decorative work or roofing. These are only subjected to proper restoration projects, programmed every few years. There is no system guarding against either lightning or fire. There is a small lighting system, maintained by an external firm.


Ministero dei Beni Culturali
Ministero dell'Università e Ricerca Scientifica
Local Heritage Authority
General conservation criteria
General documentation criteria
Legislation
Norms
Recommendations
Project for material conservation
of archaeological district
Database and programmed maintenance project
♦♦♦
General coordination:
Soprintendenza Archeologica
Reconnaissance phase
Planning phase
Programming and funding
Executive phase

RECONNAISSANCE PHASE

- History of excavations
- Historical profile of site and its evolution
- Investigation of graphic and photographic documentation of district
- Topographical and typological survey
- Identification of geological evolution
- Identification of processes of climatic, botanical and faunistic transformation
- Hydrological-geotechnic state of the district
- Material history of the building heritage (Investigation of the material history envisages the organic, coordinated participation of: *archaeologists*, *historians*, *architects*, *restorers*, *structural engineers*, *chemists*, *technologists*, *botanists* ....)
- Evaluation of types of vulnerability
- Identification of local vulnerability indicators
- Definition of local hazards map
- .....

PLANNING PHASE

- Programming of any excavation campaigns required
- Environmental congruence and compatibility
- State of the territory
- Botanical and, if appropriate, faunistic planning
- Planning of structural and geotechnical interventions
- Interventions of restoration, programmedmaintenance and access programming
- Identification and planning of service structures and facilities
- Presentation of and access to archaeological park
- Budgeting for interventionsof programmed maintenance and administration
- .....

PROGRAMMING AND FUNDING

- At present the Cultural Heritage is considered a resource to be exploited, but the State does not provide adequate funds to maintain it. Given the increasingly high profile of this heritage in our multimedia society, a programmed maintenance project would facilitate its marketing, whether wholly or in part. The ideal solution would be a single sponsor who could ensure the maintenance process according to the established guidelines.

EXECUTIVE PHASE

- In carrying out the maintenance project, the heritage authority must control and verify the various maintenance processes, leaving the sponsor freedom in practical management.
- The authority will be reponsible for deciding any interventions of extraordinary maintenance which may prove necessary.

7 The new programmed maintenance project for Paestum

This project can be formulated by applying the general flow diagram to the specific situation of the district of Paestum. It will then be possible to draw up an interdisciplinary study covering all aspects of the archaeological site, defining the requisites and necessities.

The project must be formulated in close collaboration with the heritage authority responsible for the choices to be made and the interventions to be carried out. As a first step we present some of the more immediate requisites, in no systematic order, which the project will have to cover.

The analyses carried out by the various disciplines will undoubtedly lead to an optimal execution of the current maintenance processes concerning the vegetation on site, where grass should be of a species ensuring the least damage and cost; in the same way the run-off system for rainwater must be rationalised. The problems concerning maintenance of the ancient fabric, the decorative work and the structures are of course more complex. In general we believe it is indispensable to carry out an on-site inspection of each monument every six months.

For the three great temples the roofing must be investigated, making good any local instability. It is also necessary to identify and monitor any cracks or falls of stonework and carry out the necessary conservation interventions.

The same topics require attention in the vast area of the Roman insulae, while in the case of the *ecclesiosterion*, which stands on the earth, monitoring must be carried out every two months.

Six-monthly inspections and thorough diagnosis must also be implemented for many monuments on which no major restoration work has been carried out, including the Italic temple, assembly hall (*comitio*), amphitheatre and the public swimming-pool, often subject to falls of plasterwork. In some cases, such as the Italic temple and the mosaics in the Roman insulae, conservational restoration must be carried out before the project of programmed maintenance can be drawn up.

The same procedure is indispensable to provide the archaeological district with a modern service system. Fortunately funding has been assigned for services, so that it will be possible to extend the project of programmed maintenance to this aspect too.

8 Conclusions and perspectives

The setting up of the "Centro di Competenza della Regione Campania", INNOVA, for the development and transfer of innovations applied to Cultural and Environmental Heritage, has given us the opportunity to re-elaborate the theoretical project of programmed maintenance of archaeological sites, extending it and applying it to the archaeological district of Paestum.

We hope that this will become a pilot project based on a technical and scientific culture of conservation which leads to a strategy for conservation based on the contributions of engineering and the natural sciences, with the archaeological fabric recognised as a document of material history.

Furthermore the introduction of a project of programmed maintenance extended to all conservational requisites, including the building fabric, decorative structures, services, etc., will ensure that interventions of extraordinary or restorative maintenance become few and far between, since they inevitably produce a trauma in the ancient document. Indeed, in theory interventions of restoration should be justified only by the scientific revision of a monument's structure, as has sometimes been the case in the recent restoration of the Acropolis in Athens [7].

Finally, a coherent project of maintenance can easily be marketed since, at a relatively low cost, it ensures a highly valuable return in terms of publicity. To make it more attractive, the project could be divided up into functional batches to be offered to potential sponsors, with the guarantee that the heritage authority shall retain technical and scientific control and final verification of every operation.

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