1 THE HUMAN FACTOR IN THE PRESERVATION OF THE MONUMENTAL HERITAGE OF EASTER ISLAND

A.E. CHAROLA
World Monuments Fund, New York, NY, USA
M. BAHAMONDEZ PRIETO and M.E. VAN DE MAELE SILVA
Centro Nacional de Restauración, DIBAM, Santiago, Chile
C.A. WEBER and A.E. CABEZA
National Parks Division, CONAF, Santiago, Chile
R.J. KOESTLER
The Metropolitan Museum of Art, New York, NY, USA

Abstract
The preservation of the monumental heritage of Easter Island concerns both monuments and their setting in the characteristic landscape of the island. Both suffer from various deterioration processes of which the single most critical factor is arguably the impact of human activities. The long-term preservation of this heritage in its natural context requires the development of a comprehensive conservation policy. Authorities in charge need to be fully informed to provide the appropriate legislation for such a policy. But it can only be effective if public awareness of the problems motivates government to enact and enforce this legislation.
Keywords: Easter Island, Archaeological Heritage, Deterioration, Site Preservation, Conservation Policy.

1 Introduction

The rich archaeological heritage of Easter Island is best known for its monumental statues—the world famous moai, ranged upon ceremonial platforms, ahu, or standing at the base of the quarry. Nonetheless, other monumental features are also to be found in this "open air museum": housing structures; petroglyphs decorating boulders at the ceremonial center of Orongo or on lava flows; papa, found in many sites; and rock paintings in various caves and structures.

This numerous heritage—about one thousand statues, three hundred ahu, five thousand petroglyphs—is distributed over the 166 km^2 of the island predominantly concentrated along the coastline. The island has a very characteristic rolling landscape with the outline of one or more volcanoes always visible. The sense of open space is a key in the setting of these monuments which can be seen from afar, their size being only appreciated when standing nearby.

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The presence of man can affect both the monuments and the sites, either directly or indirectly. It has been recognized that man's actions can have far more damaging consequences in a short period of time than the cumulative effects of natural causes over a much longer time span.

2 Deterioration problems

2.1 Environmental causes of monument deterioration

The monuments are all made from local volcanic stones: lava, tuff, and/or scoria. Each of these materials has its own deterioration problems and patterns. Each monument may bring together several of these materials. For example, most of the moai are carved out of the Rano Raraku tuff. The pukao (head-dresses) that some of the moai have are cut from the Puna Pau red scoria. The ahu on which the moai are ranged, are constructed with basaltic lava blocks. Petroglyphs have been carved on the back of moai, basalt boulders or lava flows. Rock paintings are found mostly on layered basalt slabs.

The stones are, except for the basalts, fairly susceptible to rapid weathering. This can be attributed to the nature of these pyroclastic rocks, their heterogeneity even within the quarry, and the ever increasing contents of zeolites and clays with on-going alteration.

The main factor in their natural weathering are the frequent short rains, Hyvert (1973). These can act through various mechanisms, Charola and Lazzarini (1987/88), Rossi-Manaresi and Tucci (1990). The growth of bio-organisms contributes, in some instances significantly, to the weathering of the stone, Hyvert (1973), Domaslowski (1981), Bahamondez (1985). Lichens are particularly noxious for petroglyphs, Lee (1990).

The presence of soluble salts from sea spray affects mainly those monuments close to the shore, producing alveolar deterioration, Moreno (1990), Pauly et al. (1990), Vouvé et al. (1990a).

2.2 Human action on the monuments

Human beings can cause damage to the stone material of the monuments in several ways. Vandalism is the most obvious. Examples of this can be found in the removal of decorated slabs in the Ana Kai Tangata cave, Bahamondez and Van de Maele (1990), Vouve et al. (1990b), or in the damage done recently to the rock art on Motu Nui, Lee (1991).

Damage to the statues is resulting from the non-porous cement mortar that was used during the restorations carried out in the late sixties, Bahamondez (1985).

Damage can also be inflicted through ignorance of the susceptibility of the material, as tourists walking over petroglyphs, or standing on the half-carved moai in the

quarry. The repeated recarving of the petroglyphs by the native population acting as guides for tourists is yet another example, Lee (1990). Excuses for this practice are always found in the fact that these guides receive no instruction as to proper behaviour with regard to the sites. This justification cannot be made for scientists. When casts were taken from moai at the Rano Raraku quarry and from the back wall of the ahu Vinapu, Hänig and Sauer (1990), irreversible damage was induced to the fragile surfaces, especially those of the moai, Vargas (1988), Van Tilburg (1990). Other examples of damage induced by scientists can also be found and have already been discussed elsewhere, Lee (1990), Rauch and Weber (n.d.).

Damage is also caused by free-ranging cattle kept on the island. These roam over petroglyphs or the fragile housing structures and by their weight can erode the stones or cause the collapse of the structures. The presence of cattle encourages the burning of grassland to promote young growth. The fires can cover large areas, including those where monuments are found. The thermal shock produced in the stone causes microfracturation which will contribute significantly to their deterioration, Charola and Weber (n.d.).

2.3 Environmental causes of site deterioration

The sites around these monuments are also subject to natural deterioration. Erosion, caused by the wind, or by the heavy rains which wash away the top soil, is a problem especially on hilly areas. This is illustrated by the steep walks up the Rano Raraku quarry, or down to the Ana Kai Tangata cave with the rock art. During downpours these walks turn into torrents which gouge out the trails.

Areas with a thin soil covering can only support the growth of sparse vegetation which cannot prevent erosion. As erosion occurs the stability of boulders and larger blocks is undermined, as exemplified by the dome of the Ana Kai Tangata cave, Vouvé et al. (1990b).

The growth of unwanted vegetation can also be a problem. As an example, the introduction of guava (*Psidium guajava*) on the island has turned into a problem for these sites as it propagates easily and grows practically anywhere on the island, Ziska (1990). These bushes threaten to change the landscape of the sites.

Horses, cows and sheep were introduced to the island in the nineteenth century. The problems they cause will be discussed in the next section as they can be considered an indirect human factor. Another factor, also mainly due to human activity, is fire.

2.4 Human action on the sites

The sites are also affected by the last two causes mentioned: free-ranging cattle and grassland fires. But the

single most damaging cause is people themselves. The damage we can cause ranges from littering of the sites to construction of new structures, hotels, roads, etc. and extends to the reconstruction of a site without adequate precautions, Rauch and Weber (n.d.).

The restoration of a site will diminish vandalism, especially from the local population, Patricios (1987), Vargas (1991), yet it can induce damage from the greater number of visitors who will stop at the site, Rauch and Weber (n.d.), Charola (1992).

At present the Rapa Nui National Park has only seven rangers to monitor the 66.6 km^2 of the park, Rauch and Weber (n.d.). They are at a disadvantage under normal tourism flow (about 8,000 yearly) but totally overwhelmed when a tourist ship lands about 800 persons in one day!

The fact that tourism is a significant economic source of support for the island can lead to site destruction if it is not carefully controlled and actions are not taken to prevent and repair damages, Morales (1991), Mitchell (1990).

3 Preservation measures

3.1 Conservation of the monuments

Conservation of the stone material can take two approaches, passive or preventive conservation, which ideally, implies removing all deteriorating factors so that the stone is preserved, or active conservation which implies an actual intervention, one or more treatments, to slow down the deterioration rate. In most cases, a combination of both approaches can be carried out.

To date, only one test intervention has been carried out. This was performed by the Centro Nacional de Restauración and consisted of a consolidation treatment followed by hydrophobization applied to the Hanga Kio'e moai in 1986/87, Bahamondez (1990), Roth (1990a, 1990b).

The key to preventive conservation and to the evaluation of treatments lies in regular monitoring of the stone objects and periodic maintenance, such as the re-application of the hydrophobization agent. At present, there is no conservator resident on the island to perform even the absolute minimum monitoring necessary. To begin a preventive conservation program, at least one full-time conservator, with a modest mobile laboratory, is required.

3.2 Site preservation

The preservation of sites and the natural landscape surrounding the monuments falls under the management mandate of the Rapa Nui National Park. Actions at the field level cover visitor management, maintenance and monitoring. The required actions are defined in the nine programs of the

Rapa Nui National Park Management Plan, Rauch and Weber (n.d.), Weber et al. (n.d.). Visitor management includes, among many other things, safety, interpretation, information and park rules' enforcement. Maintenance includes the regular upkeep of the sites, such as cleaning, grass mowing, and erosion control. The monitoring task implies the regular control and surveillance of the sites to take immediate action upon the appearance of any damaging factor such as fires, soil erosion or vandalism.

Many other actions are not site-specific, such as cultural identity courses at the local school, planning and design of facilities, and research. These are exceedingly important for the overall success of site and monuments conservation, Cabeza (1991).

3.3 Monuments in their natural sites

In addition to the preservation measures mentioned, there are currently three key elements related to the human factor in archaeological resource conservation: the local inhabitants, the site visitors, and the resident professionals which includes the park staff. The appropriate interaction of these three elements requires a greater appreciation by local inhabitants of the close linkages between site protection and their own economic well being. Tourists and the general public must be informed and guided in order to achieve positive attitudes and behaviours consistent with object and site integrity. Professionals should be sensitized to and informed of conservation issues while the training of park staff at the professional, ranger and maintenance levels is needed to improve the operational capabilities of park management.

The resident conservator, yet to be appointed, has to take the critical role of sensitizing other professionals, while actively collaborating with the park staff in the information and education of the local inhabitants and visitors.

The combination of the above will make it possible to prevent and solve problems at the field level and to provide at the same time a favourable public opinion that should influence positively government decisions and actions regarding the preservation of this heritage. The long-term political commitment needed for this can only be generated through public pressure, Beaty (1989).

The preservation of these monuments in their natural sites should follow the UNESCO Recommendations concerning the protection of cultural heritage (1972), the Resolutions and Recommendations formulated at the First World Conference on Cultural Parks, US National Park Service (1989), the ICOMOS Charter (1990), as well as the Recommendations given during the International Meeting on Lavas and Volcanic Tuffs held on Easter Island, DIBAM (1991).

4 Conclusions

Individual conservation efforts can only address some of the problems described. The long-term preservation of the monumental heritage of Easter Island in its natural context depends on the development of a comprehensive conservation program. This requires appropriate legislation and development decisions that can only be adopted by informed government officials. In order to have that legislation enacted and enforced, public awareness of the problem has to be raised to such a level that it prompts government action.

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