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GEOMORPHOLOGY AND CULTURAL HERITAGE IN COASTAL ENVIRONMENTS

ABSTRACT: PANIZZA M & PIACENTE S., *Geomorphology and cultural heritage in coastal environments*. (IT ISSN 0391-9838, 2008).

Cultural Geomorphology is the discipline that studies the geomorphological component of a territory, which embodies both a cultural feature of the landscape and its interactions with cultural heritage (archaeological, historical, architectonic etc.). The relationships between Geomorphology and the cultural elements can be considered schematically according to two reciprocally-integrated viewpoints:

1. Geomorphology meant as a component of a territory's cultural heritage (geomorphosites);
2. the relationships between some cultural components (in a strict sense) of a territory (archaeological, historical, architectonic assets etc.) and the geomorphological context in which they are inserted.

These viewpoints are illustrated by selected examples in coastal regions. These concepts can be extended to all the fields of Earth Sciences (Cultural Geology), based on Geodiversity and Geohistory. In conclusion, an effort should be made to give an answer to the ever-felt need for «neo-humanistic» culture, that is for the integration of various fields of culture.

KEY WORDS: Geomorphology, Culture, Geomorphosites, Coastal environment.

INTRODUCTION

The notion of *culture* can have innumerable definitions. It can be a synonym of civilisation - i.e. the historical, philosophical, literary, artistic and scientific context of a given society. It can also be considered the social meaning of human history and behaviour or a more personal interpretation referring to intellectual knowledge as a whole, acquired by means of study and experience. It can finally be viewed as an anthropological meaning regarding distinct groups and characteristics of specific societies and many more (Panizza, 1988). Here culture is intended on the one hand with the classical meaning of

humanitas, what the ancient Romans defined as «the knowledge and behaviour through which Man achieves true human nature», and on the other hand as the integration of humanistic and scientific values, in the terms proposed in the 1970s and 1980s by the UNESCO International Programme «Man and the biosphere».

All relationships between «natural» aspects and history of mankind should also be included in the concept of culture. In this sense, the various interactions between «natural» and man-made elements should be taken into account. One could refer to reciprocal conditioning, such as the Roman Empire and the «Mare nostrum» (Mediterranean sea), or the Nile and the ancient Egyptians. Reference should be made also to risks and related environmental impacts, such as Vesuvius with the destruction of ancient Pompeii, or Venice with its tourist pressure. Finally, also the perspectives of land conservation and appraisal – in terms of development and sustainability – should be properly assessed. For example, resource exploitation in relation to the prospects of future generations, i.e. in terms of sustainable development.

GEOMORPHOLOGY AND CULTURE

According to these definitions of culture, the relationships between geomorphology and the cultural elements of a specific territory can be considered schematically according to two reciprocally-integrated viewpoints (Panizza & Piacente, 2003):

- geomorphology is meant as a component of a territory's cultural heritage (in a broad sense), like works of art, historical monuments, scientific assets etc.
- the relationships between some cultural components (in a strict sense) of a territory (archaeological, historical, architectonic heritage etc.) and the geomorphological context in which they are inserted.

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As a result of these statements, a need was felt to propose a definition of *Cultural Geomorphology* (Panizza & Piacente, 2003): «the discipline that studies the geomorphological component of a territory which embodies both a cultural feature of the landscape and its interactions with cultural heritage of the archaeological, historical, architectural etc. type».

The concept of Cultural Geomorphology can be extended to all the fields of Earth Sciences and can therefore introduce the concept of Cultural Geology, that is related to the concept of Geohistory (Panizza & Piacente, 2003; Pralong, 2004): Geology is considered in its spatial-temporal relationships with other cultural components and is a conditioning factor in the history of human society.

A landscape is therefore a cultural component of a territory with all the «natural» and «anthropogenic» factors it contains. In addition, it is a cultural element which has been perceived also through specific artistic expressions such as painting, music, poetry etc. Various meanings have been attributed to it: from aesthetic-literary ones to scientific-ecological ones, with a nearly constant ambiguity between the designation of an object and its image. It is not our intention to present a retrospective and comparative analysis of the manifold definitions of landscape, since this subject lies outside the goals of this paper. Rather, the concept that also culture, in all its forms and displays, including spiritual manifestations, is one of the elements that may condition the look of a landscape, has been introduced.

Today the concept of landscape is related to the various fields and aspects of cultural assets. It is, in fact, a sort of fundamental notion, which confers new value and character on the relationships between nature and history, Man and territory. In these terms a landscape can be considered as the most complex and morphologically most extended and continuous cultural asset, since it contains and communicates messages and values with which everybody can identify.

Finally, it can be stated that a landscape does not possess a meaning in itself but it receives it from the beholder (Panizza & Piacente, 2003).

Therefore, if a landscape in all its physical, biological, historical, architectural etc. components is to be considered as a primary cultural asset, it should be better understood, safeguarded and appraised (Wimbledon & alii, 1996). Only an in-depth understanding of all the environmental components of a territory and their history can ensure that the right protection and management initiatives are chosen. Naturally, the first source of knowledge of a given territory is the territory itself, with its geological structures, morphology, interventions carried out by man on natural elements and so on, including all other archaeological, historical, socioeconomic etc. components.

Indeed, geomorphological features are among the most widespread and spectacular physical aspects of a landscape: a gorge, a mountain peak, a sea cliff and many more have always exerted high interest and appeal on account of their scenic component. Nevertheless, these are not the only attributes which should confer value on landscape elements,

but also other less subjective and more lasting merits linked to the more general meaning of cultural heritage.

THE ASSESSMENT OF GEOMORPHOLOGICAL HERITAGE

During the past ten years these landscape aspects have been differently described and defined (Reynard, 2004). The definition of *geomorphosite* here adopted is as follows (Panizza, 2001; Panizza & Piacente, 2003, first reprint, page 221): «A geomorphosite is a landform with particular and significant geomorphological attributions, which qualify it as a component of a territory's cultural heritage (in a broad sense)».

The attributes that can confer value on a landform, making it an actual geomorphological asset, are: scientific, cultural, socioeconomic, scenic. Their characteristics are better defined below.

From a scientific standpoint, in the geomorphological field a natural asset can have a certain amount of importance, conferred by various scientific values (Panizza & Piacente, 1989): as a model of geomorphological evolution, e.g., a marine arche cut by waves (fig. 1); as an object of educational exemplarity, such as a littoral *tombole*; as paleogeomorphological evidence, such as a Pleistocene relict coastal cliff. A landform can also possess an ecological value, e.g., an exclusive habitat of certain vegetal or animal species such as a lagoon or a tidal marsh. In other cases, Prehistory can provide a particular morphological feature with scientific value, such as a cave or a marine terrace, which were the site of ancient human settlements.

From a cultural standpoint, a geomorphological asset can be part of or bear witness to an artistic event or a cultural tradition, as some landscapes depicted by painters, as a littoral perspective by Monet (e.g., *La plage et la porte d'Amont*). Others were described by poets, such as the Italian rocky cliff of Pietra di Bismantova or the Lavini di Marco rockslide by Dante Alighieri (Gregori & Cattuto Ciarfuglia, 2004). Others are part of religious iconography, such as Mount Olympus, considered as the abode of the Greek Gods.

A geomorphological asset can also have a socioeconomic value if it can be used for tourism or sport purposes, as, for example, the coastline of Montecarlo (fig. 2), or a littoral cliff equipped for rock climbing.

Finally, geomorphological assets are evaluated also on the basis of their scenic component, both for their intrinsic spectacularity and as a source of appeal and interest, thus favouring environmental awareness and sensitivity.

METHODS OF ASSESSMENT

The duties of Geomorphology in assessing the various attributes previously mentioned should be connected mainly to the scientific aspects.

Within the framework of a correct of knowledge and management policy for the landscape that surrounds us, a

FIG. 1 - The Diablo Bridge near Santander (Spain) from a historical postcard. This is an example of *risk* and/or *impact* (Panizza, 1996). If we consider this natural bridge as a source of *hazard* and the man with the oxen as *vulnerable elements*, the eventual collapse of the bridge represents a *risk*. If, on the contrary, we consider the natural bridge as a *geomorphosite* and the man with his oxen as an *activity*, that in the long run can cause the collapse of the bridge, then we are in the case of *impact*.



FIG. 2 - The coastline of Monte-carlo intensely modified by Man (Photo M. Panizza).

need is felt to provide all people involved with criteria and tools for assessing landforms in the most objective way possible. Indeed, a quantitative assessment of geomorphological assets is necessary both for comparing the various sites investigated and other environmental and non-environmental assets, in order to rank and select them according to their level of importance and, above all, within the field of Territorial Planning or Environmental Impact Assessment (EIA) procedures. In these particular applications adequate strategies should be chosen and evaluation priorities decided.

As regards a more general research methodology, five operative phases (fig. 3) may be identified (Panizza & Piacente, 2000).

The first phase consists of the physical setting of the territory where the cultural asset (in a strict sense) is located (i.e., archaeological, historical or architectonic site) and the description of its geological and geomorphological evolution: the starting research is a geomorphological survey and mapping.

Secondly, the geomorphological causes, which conditioned the location of a given cultural asset, should be con-

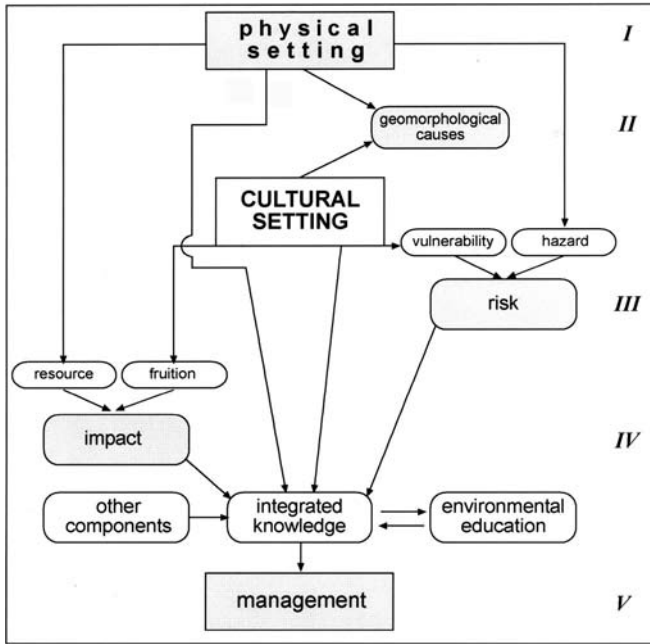


FIG. 3 - Scheme of the five operative phases for a research methodology, concerning the relationships between Geomorphology and cultural heritage.

sidered. This choice is affected by the socioeconomic needs of a given community in a given territory. Such needs can be of various types: housing, religion, defence etc. On the other hand the portion of territory where the asset itself is

placed is chosen also on the basis of its environmental characteristics, e.g., lithological, owing to the availability of building materials; hydrological, owing to the presence of a watercourse; geomorphological, owing to the presence of human settlements in sheltered conditions. Examples are the Cliff of Moher, in Ireland, or the island of Mont Saint Michel, in France.

In the third phase, the possibility should be assessed if a given cultural site is affected by natural hazards (in our case geomorphological hazards) and consequently subject to *risk*. The risk should therefore be identified and remedial and mitigation measures be applied. An example can be a coastal tower (NW Malta) at risk due to the retreating cliff (fig. 4).

In the fourth phase, the fruition of cultural assets will have to be considered, in particular for social or tourism initiatives which might have a negative effect on the natural environment and environmental impact, especially for geomorphological features, must be taken into account. A well-known example is offered by the situation of Venice: a strong tourist pressure and related activities cause a considerable impact on the physical and biological characteristics of the Venetian lagoon.

In the fifth phase one should consider that the correct management of a cultural asset cannot be separated from the knowledge of its integration with the surrounding environment (Panizza & Piacente, 1991, 2003). In this way the right fruition can be promoted, with positive spin-offs in socioeconomic terms, also for what concerns conservation and improvement. Such an operation, together with all initiatives and activities aiming to promote and protect assets, must necessarily be implemented by means of inter-



FIG. 4 - The 1637 coastal tower at Ghajan Tuffieha Bay (NW Malta) at *risk* due to the retreating cliff (Magri & *alii*, 2007) (Photo M. Soldati).

disciplinary knowledge and multiple management of environmental education initiatives.

AN EXAMPLE: VILLEFRANCHE SUR MER

An example is the Villefranche sur Mer wet dock, on the Côte d'Azur (fig. 5), one of the jewels of harbour architecture in the Mediterranean, included among the European historical monuments of UNESCO. It is located in an inlet at the centre of calcareous reliefs. Villefranche, which was founded by Charles II d'Anjou in the 13th century, owes its architectonic setting mainly to the Savoy, who turned it into their main port in the mid-16th century. At present its wet dock hosts a very lively seafaring community, with sailors, shipyards and a tourist harbour. In addition, there is also an oceanographic laboratory. It has a rich cultural heritage also thanks to the presence of artists such as Jean Cocteau, who frescoed the medieval chapel of St. Pierre. As for geomorphological hazards, there are some situations linked mainly to sea erosion processes and to a large ancient landslide in proximity to infrastructures and developed areas, which still present a risk and cause instability problems. Other hazardous situations result from rough seas or intense precipitation. Recently (25-26 August 2002) a part of the Citadel's walls collapsed. There are large numbers of tourists, especially during summer, but effective measures have limited their impact on the environment. Nevertheless, a recent development project on the wet dock has threatened the conservation of this fine example of naval archaeology. So far, only strong opposition from the public has stopped its implementation. At

the same time, a project of restoration has been presented which respects the environment and local traditions. It is based on the appraisal of traditional shipping activities with a school for carpenters and the creation of a European centre of Sea Sciences. At last it is an example of integrated knowledge and environmental education and management.

CONCLUSIONS

This cultural approach of Geomorphology (in a broad sense) concerns the dialogue and cultural integration between humanistic and scientific disciplines. Generally speaking, an effort should be made to give an answer to the ever-felt need for «neo-humanistic» culture, that is for the integration of culture (Panizza, 1989). For example, one could refer to an integrated research over a given territory with the purpose of analysing the various relationships concerning environmental context, evolution of anthropic activities, technological and socioeconomic problems and sustainable development. Another example can be related to the problems concerning the building, deterioration and restoration of an architectonic site and provenance, characteristics and durability of the materials used for its construction, also in terms of upgrading cultural policies.

In conclusion, what should be emphasized, since it summarises the spirit leading investigations in this field, is the fact that research approaches of an integrated, systemic type can become a very important opportunity for Geomorphology. Indeed, this Earth discipline can find in these new topics further possibilities of development with new cultural and social vocations.



FIG. 5 - Historical map of Villefranche sur Mer (Côte d'Azur, France) (after Vigne, 1998).

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