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## COASTAL CAVES IN THE PHLAEGREAN AREA



### Introduction

The Neapolitan area has a great wealth of scientific and cultural values. From the **geological** point of view, volcanic phenomena from Vesuvius and the Phlaegrean Fields characterize the fertile hills, with fumaroles, hot springs and the slow variation of the ground level, the so called *bradiseism*.

Marine **biology** and **ecology** consider the Gulf on Naples as an area with a very high grade of biodiversity.

**Archaeology** and **history** investigate important remnants of Greek and Roman settlements. Among them, the most attention is paid to villas of the Roman emperors or wealthy families and to large Navy structures. Many such remnants are now under the sea, due to the bradiseism.

Many studies and researches are a consequence of this wealth. Thanks to these studies, Naples has earned a wide ranging reputation as a scientific and cultural center in the past centuries. Unfortunately, such wealth of multidisciplinary resources and research is presently partly neglected. This situation causes the following problems:

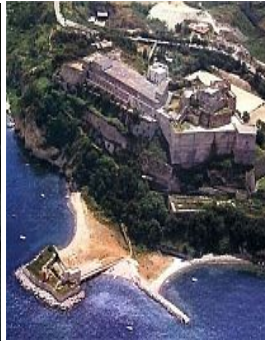
- little exploitation of cultural and environmental resources, with regards to tourism;
- little contribution to the cultural progress of local population;

- increased chance of resource misuse or spoliation, with the related public danger of possible collapse of natural or artificial structures.

Among the many interest points in the Neapolitan area, the phlaegrean coastal caves are an outstanding example and a model of the aforementioned concerns. They are quite evident but little known. From the environmental and scientific point of view, their relevance is quite high. They show useful indicators of environmental quality. Often, they can be easily exploited for the benefit of cultural studies and tourism, provided the relevant conservation criteria are respected.



The University of Naples "Federico II"



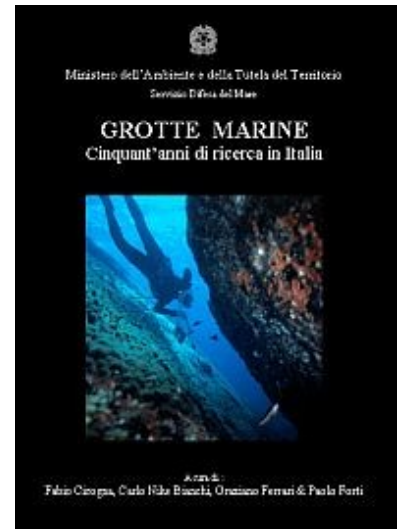
Baia Castle



Naples Aquarium in an old postcard

## Coastal caves

Coastal caves (submerged, littoral or dry) have a large wealth of environmental and scientific values, over a large part of the Italian coastline. However, such wealth is still little known; this means Governmental Agencies and Park Services have little chances to enforce the proper protection and to apply a sustainable exploitation. In order to start corrective actions, on 2001 the Italian Ministry of the Environment commissioned a census of Italian submerged and littoral caves (Cicogna *et al.*, 2003, at right). This work tried to collect the known information about sea caves, based on explorations and research from several different sources (speleology, professional diving, cave diving, marine biology, geology, environmental associations). However, the census also pointed out the large amount of explorations and research still to be performed.



## Phlaegrean coastal caves

The Phlaegrean Fields have a large number of coastal caves. They have been places of important biological research since the XVIII century (Cavolini, 1785). In comparison with other coastal cave areas, the Phlaegrean Fields have a special quality: many caves are not natural, but they were dug in the soft tuffs by the Romans to be used as part of the emperors' and the wealthy families villas or as service structures for the Navy harbours. Due to the bradiseism, several caves are now half filled with sea water and they are an example of a very specialized and vulnerable habitat, useful as environmental quality indicators.

Generally speaking, caves are very conservative environments, as they preserve for a long time traces of past eras and climates, quickly lost on the surface. In particular,

artificial coastal caves can provide critical information about the relationship between submerged ancient structures under investigation, and land structures, now obliterated by the recent urbanization.

**To summarize, phlaegrean coastal caves are very important because they are part of a landscape with a high environmental-cultural value and a strong proclivity towards tourism. Furthermore, they add specific historical, cultural, archaeological, biological, ecological, geological values which deserve immediate study, conservation and sustainable exploitation plans.**

However, phlaegrean coastal caves have not been well studied in the past fifty years. The Atlas of natural caves in Campania (Federazione Speleologica Campana, 2005), detailed census and description of the regional natural speleology, reports about a single cave: the famous Sulphur Cave in the Miseno Harbour. The census of Italian sea caves (Cicogna *et al.*, 2003) reports about seven natural or artificial caves. Actually, preliminary surveys by the authors from 2002 to the present day have collected information about more than 200 coastal cave phenomena of different origin and size, between Torregaveta and Mergellina.



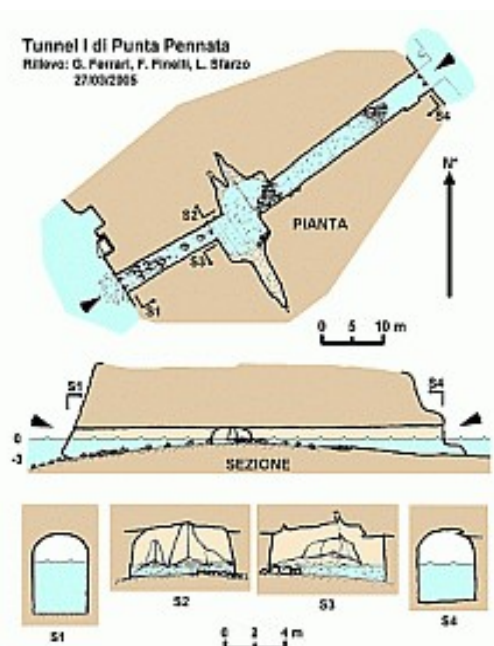
Thunder Cave at Gaiola: one of the side entrances (left) and the main entrance (right)

## Census plan

The lack of a general understanding of the environmental-scientific values of the phlaegrean coastal caves puts these sensitive habitats in danger of spoliation and misuse. In order to avoid these risks and to put the land management local governmental agencies in a position to protect the actual ascertained values, the Province of Naples, Department of Agriculture, Parks and Civil Defense and the Phlaegrean Fields Regional Park have defined a plan of census of the phlaegrean coastal caves.

The plan is divided into the following tasks:

- Collection of a specific bibliography.
- Collection of historical documentation (photographs, surveys).
- Identification and map positioning of coastal caves.



- Photographic documentation of the cliff condition at present, where caves are present.
- Comparison between the present situation and the historical one.
- Detailed study of most relevant caves. Inner places will be photographed; a detailed survey will be produced in case the historical one is missing, incomplete or different from the present situation. A fact sheet will be produced with geographical information, geological, biological, ecological notes and an emphasis on the reasons for particular relevance.
- Development of a detailed report with a discussion of the information collected in the project and notes on situations of special high value and/or vulnerability.

Should the planned exploration reveal archaeological findings, the researchers will behave in concordance with the laws in force, with the documentation of the findings and the prompt delivery of the documentation to the relevant Authority, without the least modification of the findings.

To conclude, a coastal caves research plan can easily fit into a strategic framework aimed at employing the cultural-environmental-scientific values to exploit the area and, as a result, the scientific research itself.



Roman water tank in Miseno



Sunset on Capo Miseno from Gaiola caves

## Bibliographic references

Cavolini Filippo, 1785. *Memorie per servire alla storia de' Polipi marini*. Napoli. 1-279.

Cicogna Fabio, Carlo Nike Bianchi, Graziano Ferrari & Paolo Forti (Eds.), 2003. *Grotte marine: cinquant'anni di ricerca in Italia*. Ministero dell'Ambiente e della Tutela del Territorio: 1-505.

Federazione Speleologica Campana, 2005. *Grotte e speleologia della Campania. Atlante delle cavità naturali*. Elio Sellino Editore, Avellino. 1-623.