

# Inventory of Important Karst Geological Monuments as Part of the Census of Geosites Deserving Protection in the Region of Abruzzo

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## Abstract

The Region of Abruzzo has often recognized, in its planning reports, the importance of karst areas and caves, and a specific Regional Law concerning speleology has been in effect since 1972. Nevertheless, effective and direct environmental protection of the karst areas and caves must be still achieved. A first concrete attempt to protect a cave, and its external environmental context, was made by means of Regional Law no. 32, which established the Regional Natural Reserve of the Pietrasecca Caves. A new opportunity is offered by the Census of Geological Monuments (Geosites) requested by the Region of Abruzzo. Within this context, all the natural cavities worthy of interest (morphological, hydrological, archaeological) will be censused, by means of a special form to be illustrated in this contribution. On the basis of this survey, a global legislative decree will subsequently be issued that will provide for their integral and specific protection.

## 1.0 - Introduction

In the legislative decrees establishing the National Parks, Regional Reserves and many of the protected areas of Italy, particular emphasis has always been placed on the biological importance that motivated their creation. Thus the lists of “environmental elements” of the territories included mostly animal or plant species while there was little or nothing about the geomorphological aspect or the elements contained in it. Moreover, it was generally considered merely as a landscape containing the ecosystem to be protected.

However, this attitude has rapidly and radically changed in recent times. For example, in Italy, particular attention has also been given to the morphological context even in mainly biological censuses (BioItaly, Sites of Community Interest). Following indications of the IUCN, increasing attention has been devoted to “environmental elements of morphological interest”, a phrase later summarized by the term “geosites”, at both the international and national level<sup>1</sup>. In this regard, a number of censuses have already been conducted: Geomorphological outcrops of the Marche Region (Nanni, 1991); Lazio Region (Casto & Zarlenga, 1992, 1996, 1997); Province of Cagliari (Barca & Di Gregorio, 1999); Province of Modena (Panizza et Al., 1999).

## 2.0 - Abruzzo Region Geosites Inventory

In the past, the Region of Abruzzo has issued decrees of environmental protection (in fact it is the Italian Region with the largest extension of protected areas) and has performed censuses of its biological and monumental patrimony. It also established the Cadastre of Natural Caves (the second region in Italy to do so) and has subdivided mountain areas with carbonate outcrops into Karst Morphology Units. Now it has also instituted the Abruzzo Region Geosites Inventory<sup>2</sup>. Previous international and national experience, including completed censuses, proposed forms for censusing and discussions of the elements to consider, has been analyzed in order to formulate a model-form for the census of geological monuments of Abruzzo. This census has led to the identification and classification of more than 250 sites of varying interest, morphology and extension.

<sup>1</sup> For the specific reference bibliography: AA.VV, 1999. Geositi Testimoni del Tempo. Regione Emilia Romagna, 258 p.

<sup>2</sup> The census was performed by Ezio Burri, Raniero Massoli-Novelli and Marco Petitta, Department of Environmental Sciences, University of L'Aquila, with the collaboration of the Italian Speleological Society and the Abruzzo Speleology Federation.

## 2.1 - The model-form used for Abruzzo

As mentioned, the form<sup>3</sup> is based on national and international analyses of relevant material. Moreover, similar experience in the biological sector was taken into account (Bioitaly, Nature 2000, etc.), as well as the experience of the Abruzzo Region in the conservation and protection of the territory and its cultural and environmental patrimony (Propedeutic Analysis for the Regional Land Plan). The inclusion of some items and information were agreed upon with the offices of regional planning, so as to render the model-form not only consistent with previous inventories but also with the types of recording of environmentally important sites conducted by the Abruzzo Region in the past.

The form has 4 sections, marked A, B, C, D:

Section A contains the data identifying the geosite, i.e. that characterize the locality and magnitude of the geological monument.

Section B concerns the geological data justifying inclusion in the census, including information about the conservation status and risk of deterioration. A numerical value summarizes the degree of importance of the geosite.

Section C refers to the supporting data, i.e. information about relationships with other environmental-cultural contexts, protected areas and territorial jurisdictions, as well as proposals for the protection and public use of the site, as a guide to future interventions in the territory.

Section D includes the appendices, i.e. the bibliography, maps, geological scheme and photographic documentation; the maps are considered essential, while the other appendices are strongly recommended.

Section A: identifying data.

The geosite is identified mainly by a code (A1), represented by the monogram of the province in which it is located, a progressive three-figure number and the monogram of the geological typology.

Supplementary information is given by the class of importance (A1.1), a code that separates all the censused geosites into large groups of increasing importance.

The name of the geosite (A2) is expressed by a generally known place name (e.g. based on the topography) which allows immediate recognition of the area and the type of geosite (e.g. Sorgenti del Vera, Grotta del Cervo, etc.).

The A3 codes identify the province, municipality (with relative code) and the locality where the geosite is situated.

The subsequent information (A4) concerns the exact location, with an indication of the IGM table (more than one if the geosite extends over a broad territory), the latitude and longitude (reported at the center of the geosite if it extends over a broad area), the altitude (with an indication of the maximum and minimum values in the case of an extensive geosite) and the size (in m<sup>2</sup> or even km<sup>2</sup>) or length (in m or km) if it is a linear element (e.g. a fault or a river).

A last observation concerns the possible continuation of the geosite outside the region (A5).

Section B: geological data.

This is the most important section, since it contains the elements that justify inclusion in the catalog.

First, the category of the site (B1) is indicated by a reference monogram, according to the type of geological monument (geomorphological, geological, mineralogical-petrographic, hydrogeological or hydrological, paleontological, pedological), and the subtype (B1.1) is specified according to the phenomenon involved (e.g. the geomorphological type includes erosion phenomena, canyons, karst, glacial morphologies and landslides).

Next, the lithology of the rock associated with the geosite is indicated, along with its stratigraphic age (B2).

The following information (B3) identifies the type of geological interest of the area, i.e. it briefly illustrates the reasons why the area is considered a geosite. Among the numerous types of interest described in the literature, seven items were selected, covering all facets of the geosite: its representativeness, scientific value, rarity, landscape, educational value, public usability, possible economic value. The presence of any of these items is recorded.

<sup>3</sup> The model-forms is reproduced as enclosed document.

The geological situation is described in detail in the subsequent field (B4), concerning the description of the geological characteristics of the site.

However, the single geosite could be directly related to another geosite; this possibility is indicated in field B5, with a list of the related geosites.

Field B6 expresses a qualitative judgment about the current conservation status of the geosite.

A similar judgment is given for the risk of deterioration of the site (field B7), with a description of the possible type of risk (B7.1).

Next there is a semiquantitative judgment (expressed in terms of weighting) of the geological data in the preceding fields. This allows one to summarize (by means of a number) the judgment of the importance of the geosite in the regional context, albeit not in a totally objective manner since the weight assigned to the single elements could vary according to the operator.

Section C: supporting data.

This section includes some supplementary information about the site. It reports on the degree of knowledge about the site (C1), the presence of other possible geological interests (C2), but especially non-geological interests (C3), distinguishing between historical-cultural, architectural-archeological, vegetational and faunal values.

Field C4 expresses the possible relationship with other nature conservation programs, obviously based on the presence of non-geological values.

It also indicates if the site is already within a protected area (C5) and, if so, which agency manages it (C5.1), as well as the possible presence of territorial jurisdiction (C6). If not, it provides a judgment about the need to establish specific protection of the site (C7), along with indications of the proposal for its protection (C8) and its use by the public (C9).

The last field is reserved for various annotations that might be made (C10).

Section D: appendices.

The following types of auxiliary documentation should be appended to the form: bibliography (D1), including bibliographical references concerning the site, with mainly geological information; a topographical map (scale 1/25,000) (D2), which is essential for identification of the site; a geological reference scheme (D3), both a map and profile, to better illustrate the geological characteristics of the site, where this is considered useful and possible; photographic documentation (D4), specifying the type of material (prints, slides, files).

### 3.0 - Census of the geosites and environmental protection of caves and karst areas

In Abruzzo, more than one-third of the territory is composed of lithological outcrops with karst morphology. Thus about half the geosites that have been identified and censused are constituted by karst-related typologies: caves, dolines, polje and springs. A high percentage of these geosites are located in protected areas; indeed, as mentioned previously, much of the territory of Abruzzo is under protection in the form of National and Regional Natural Parks, Regional Nature Reserves, and Regional Protected Areas. Therefore, there is no risk of their deterioration, although their identification will reinforce any type of protection and will control their use. The other sites will be protected by specific legislation which, in the case of caves, pertains only to the entrance area. Under Italian law, this allows for protection of the entire cave environment without significantly increasing the "quota" of protected territory, which by law cannot exceed a certain percentage of the regional territory. As mentioned above, in Abruzzo this percentage has reached its upper limit<sup>4</sup>.

### Bibliography

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BURRI E., 1998, I beni naturali e la protezione ambientale nelle aree carsiche: il caso della Riserva Naturale Speciale delle Grotte di Pietrasecca. CARSA Ed., Pescara :219-225.

<sup>4</sup> This procedure has already been applied successfully in the establishment of the Special Nature Reserve of the Caves of Pietrasecca (L.R. no. 19/92) (BURRI, 1998).



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