

# The Monviso Massif and the Cottian Alps as Symbols of the Alpine Chain and Geological Heritage in Piemonte, Italy

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**Abstract** In order to promote geosite conservation in the project entitled ‘PROactive management of GEOlogical heritage in the PIEMONTE Region’, we propose a comprehensive study involving the Monviso Massif (MM) geothematic area, one of the most outstanding symbols of the Alps and particularly of the Cottian Alps. Specifically, at the MM, the inventory of a number of different geosites whose conservation and development require different geologic and some additional non-geological expertise is considered: (1) some of the best preserved ophiolites in the Alps and the associated Cu–Fe mineralizations; (2) the lithostructural units in the Germanasca Valley; (3) the first primary source of jade in the Alps at the MM and its importance in terms of Neolithic to Bronze Age-polished stone implements; (4) the world-famous minerals such as coesite and giant pyrope, as well as type localities for new minerals (including carlosturanite); (5) the area, now buried under a debris flow, where Hannibal is

thought to have regrouped his army while crossing the Alps; and (6) the biodiversity of lichens, microfungi and cyanobacteria colonizing the ophiolites, which can give additional value for the environmental assessment and evaluation of the MM outcrops. Following geodiversity identification, further stages will be devoted to develop appropriate plans for geodiversity conservation in this area.

**Keywords** Monviso Massif · Cottian Alps · Piemonte · Geological heritage · Geotourism

## Introduction

The ProGEO association was established in 1993 and devoted to diffusion activities on earth sciences and to the establishment of an international network for geosite inventory and conservation. A number of authors developed different methodologies and techniques for identifying, characterizing and managing geodiversity at the national, international and global scale (e.g. Brilha et al. 2005; Wimbledon 1996). It is of general agreement that the first and essential starting point for the geoconservation of geological heritage and geosites has to be an inventory of suitable resources and their detailed characterization and evaluation. Inventory and evaluation procedures play a decisive role on the implementation of subsequent conservation, valuing and monitoring of the geological heritage and may correspond to a sort of ‘basic geoconservation’ (Henriques et al. 2011).

In 2011, following the methodological approach of the ProGEO association (<http://www.progeo.se>), a multidisciplinary research group assembling various expertise in earth sciences, biology, economics, informatics, social sciences and engineering was created, involving 58 participants from 8

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