

## THE GEOLOGICAL HERITAGE IN THE PROVINCE OF SEGOVIA (SPAIN); PROPOSALS FOR ITS MANAGEMENT AND CONSERVATION

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### ABSTRACT

We present the actions proposed in the framework of the Plan for Management of the Geological Heritage of the province of Segovia (Spain), a mixed private and public initiative which has been under way since 1991 and comprises three main phases: (i) The compilation of an inventory and catalogue of sites of geological interest (Geosites), and evaluation of their state of conservation; (ii) The conservation of the heritage by administrative and legal means and by promoting knowledge and raising awareness; (iii) The use of this heritage for different ends. These actions, constitute a global plan for the balanced conservation and management of the geological heritage as we approach the new millennium.

**Key words:** *Geosites-cataloguing, Geosites-management, Segovia.*

### Introduction

Due to the privileged situation of the province of Segovia, in which the three main geological sets in the Iberian Peninsula are represented, the physical environment is very varied, with a great diversity and wealth of unusual geological elements. These range from the oldest materials dating from the Palaeozoic, mainly represented by igneous and metamorphic rocks, to the detrital-carbonate lithologies of Mesozoic age which rest discordantly on them, and the continental materials of Cenozoic age in the Duero Basin.

### Knowledge of the geological heritage of Segovia

#### *Inventory and cataloguing of the heritage*

In Segovia, further to the work done in the last century by Casiano del Prado (1854, 1855) and Cortázar (1890), compilation of an inventory of the places of geological interest commenced in 1991. 94 geosites were catalogued, grouped into 11 classes, and the results were presented at the Second Earth Conference (Díez, 1991 unpublished), subsequently published in LITOS, the journal of the Amateur Mineralogy Association (Díez, 1991).

The cataloguing of the sites still continues, since it is not intended to be a closed list but open to modifications and new additions. To date a total of 142 geosites have

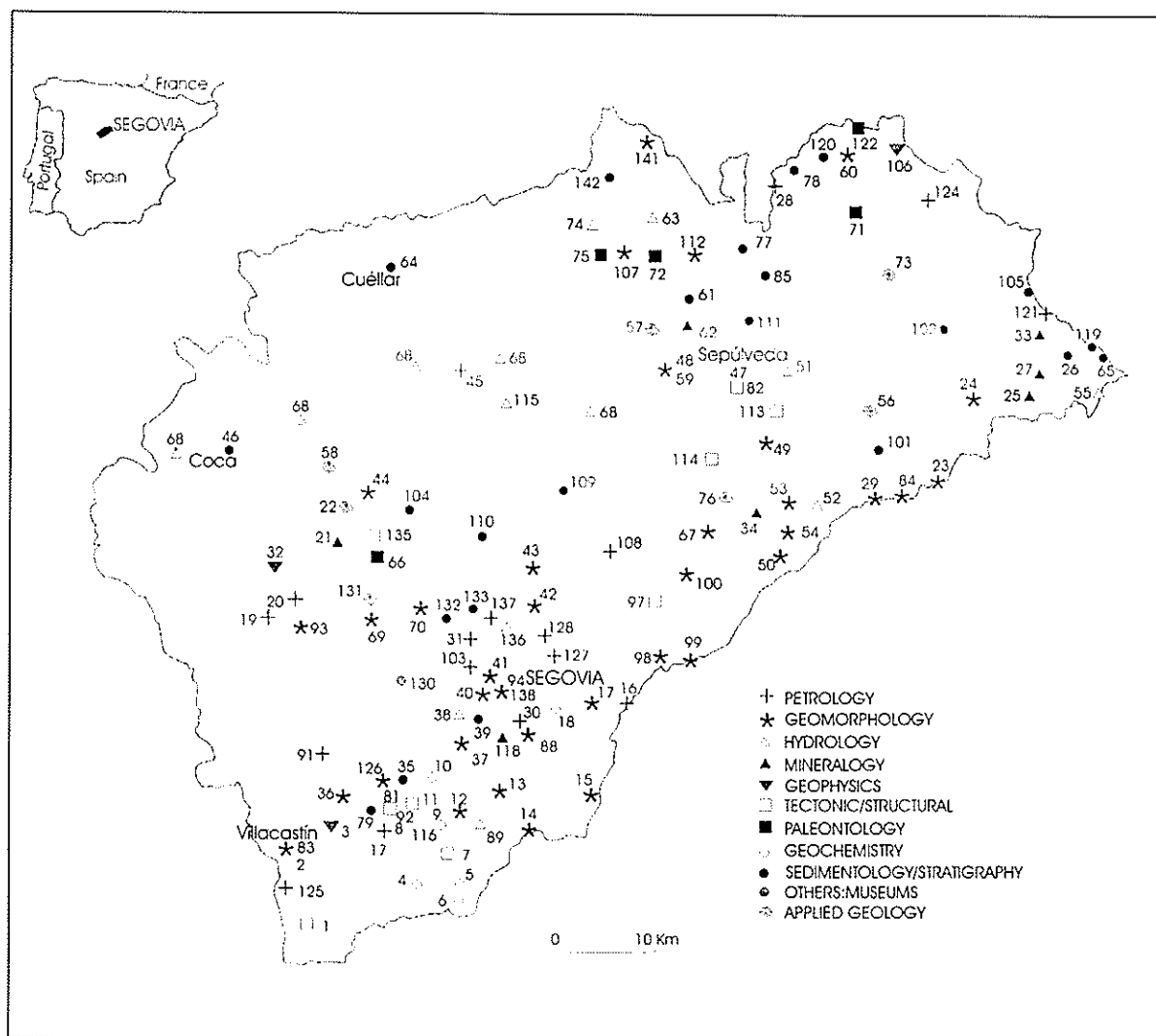
been compiled (Fig. 1). In addition, some geosites in the province included in the MAGNA maps (in the Cuéllar, Olombrada, Maderuelo, Navas de Oro, Cantalejo, Sepúlveda, Riaza and Peñafiel sheets; ITGE, in press) have been added.

### Evaluation of the state of conservation

The province of Segovia does not boast any geosites included in the national inventory in the "Proposed Spanish Natural Sites of Geological Interest" (Elizaga, 1988). Only the Duratón Gorge was included in former catalogues (Duque *et al.*, 1978; Durán, *et al.*, 1997). However, the province has sufficient formations of unquestionable geological value, which must at least be taken into account for the specific needs of Segovia and Castilla y León.

In addition to the compilation of the inventory, the scope of interest of the sites (regional, provincial, district) was evaluated in terms of their representativeness, uniqueness, etc., and an evaluation was also made of their state of conservation which are the following: urban development projects, e.g. building plans, location of landfills and tips, as in the municipal districts of Prados and Arcones (geosites 7 and 50); infrastructure works, specifically the Madrid-Valladolid high-speed train (TVA), the

Figure 1. Geosites map of the province of Segovia (Spain).



Segovia-San Rafael motorway, the provincial road plan, and the flooding for reservoirs envisaged in the National Water Plan (Torreiglesias, Lastras, Bernardos and Valdeprados); primary activities (mining, farming, stock breeding), ploughing (Castrojimeno, geosite 61) or collecting or sale of minerals and fossils (La Cacara cassiterite, geosite 5).

The following heritage sites have been partially deteriorated or destroyed: the metamorphic outcrop of the Juarrillos hermitage in Hontoria; the inverted fault on the Villacastín road in Segovia; the Palaeogene sedimentological column in Encinillas; the craggy ground at Los Ángeles de San Rafael; the cretaceous outcrop at Prados; the Ituero and Lama palaeontological deposit; and the secondary school's collection of Segovian minerals, rocks and fossils (19thC and 20thC) (Alonso *et al.*, 1998).

## Conservation of the geological heritage of Segovia

### *Administrative, legal and particular actions*

- *Castilla y León regional legislation:* Law 8/91 on Natural Areas of the region of Castilla y León lays down the requirements for the declaration of Natural Areas. Under this Law, Geosite 59 (the Duratón Gorge) has been declared a Natural Park and Geosite 60 (the Rianza Gorge) is in the process of being declared one.
- *District and supramunicipal:* administrative control over projects financed with European cohesion funds and FEDER, managed by three associations of municipalities. In addition, the preparation of subregional Land Planning Guidelines as the DOS project on Segovia and its surroundings.
- *Municipal:* appeals against proposed projects during the planning stage, specifically the Segovia-San Rafael dual carriageway where it passes through Otero de Herreros, and the Torreiglesias dam.
- *Particular initiatives:* letters were written to the following town councils: to Segovia City Council requesting preservation of the fault on the Villacastín road; to Otero de Herreros Council requesting the discontinuation of slag extraction from the Roman mines; to Prádena Council asking for an end to indiscriminate visiting of the Jaspe cave. Letters were also sent to companies and individuals, e.g. to the Cardiel property developers requesting the preservation of the fault on the Villacastín road and to the company CONALBER which owns the Las Suertes (Vegas de Matute) quarry, requesting the preservation of the folding structures.

### *Actions to promote knowledge and raise awareness*

- *Items in the communication media:* The discovery of the Buho deposit (*El Adelantado de Segovia*); fossil remains in Armuña (*El Norte de Castilla*); and the compilation of the catalogue of natural sites of interest in the Eresma area (*El Norte de Castilla*).

- *Educational publications on the heritage*: Ecological and landscape guide of Segovia and its surroundings (Abella *et al.*, 1993); Guide to the natural surroundings in the Eresma area (Checa *et al.*, 1995); Guide to the Duratón (Díez *et al.*, 1996b); Guide to the geological history of Basardilla (Díez, 1994); Guide to excursions of the Permanent Seminar of the Universidad Autónoma de Madrid; the brochures “The Clamores Valley” (Segovia City Council) and “Sources of Life” (Alegría, 1992).
- *Temporary exhibitions*: “Segovia before man”, within the exhibition “The Cities of the City” organised by Caja de Segovia; “Minerals, rocks and fossils of Segovia”, a travelling exhibition organised by the company Dicco; the natural history section of the exhibition of secondary education in Segovia (Díez *et al.*, 1996a); and “The Collection of Casimiro Gómez Ortega” to mark the bicentenary of the Casa de la Química.
- *Permanent exhibitions*: The Valseca mineralogical museum (the future provincial natural history museum) and the collection of Casimiro Gómez Ortega in “100 years of the Segovia School of Artillery” in the Alcázar, Segovia.
- *Creation of and report on activities of the Amateur Mineralogy Association (ASAM)*: organisation of over 60 geological excursions and publication of 15 editions of ASAM’s journal, LITOS. Organisation of geological photography competitions and selection of geosites.

## Use of the geological heritage of Segovia

### *Scientific uses*

- *Research projects by university faculties*: The science faculties of the universities of Alcalá de Henares and Salamanca; the Geology, Geography and History faculties of the Complutense University, Madrid; the Geography Faculty of the University of Valladolid and the Biology Faculty of the SEK International University in Segovia.
- *Scientific publications on the heritage*: on the collection of minerals, rocks and fossils of the Segovia School of Artillery (Díez, 1997) and on the collection of the secondary school in Segovia (catalogue of the commemorative exhibition and proceedings of the Congress of the SEHCYT).
- *Scientific excursions and congresses*: 1<sup>st</sup> Geological Meeting of the Duero Basin; 1<sup>st</sup> Spanish Geological Congress (Segovia, 1986); 2<sup>nd</sup> Spanish Geological Congress (Salamanca, 1992); 125th Anniversary of the RSEHN (Díez *et al.*, 1996b); and Geomorphological Problems of Central and Western Spain.

### *Educational uses*

- *Nature information centres*: CENEAM (Ministry of the Environment) in Valsaín, where the room dedicated to geology has currently been discontinued, and the

abortive project to create the Daniel de Cortázar information centre in Otero de Herreros in collaboration with the town council.

- *Excursions*: by primary and secondary schools; courses at teacher training centres and teacher resources centres in Cuéllar and Segovia; universities (SEK, the Complutense and the European University in Madrid); teacher training-institutions and similar, such as the Permanent Natural Sciences Seminar of the Universidad Autónoma in Madrid.

### *Culture, tourism and other uses*

The Duratón Gorge Natural Park Information Centre (Castilla y León Regional Government), in the church of Santiago (Sepúlveda) contains explanations on the geological processes which can be observed in the park.

Economic (traditional mining activities). Noteworthy are siliceous sand mines (Espirido, Orejana, Carabias, etc), feldspathic sand mines (Carrascal del Río and Navas de Oro), and ornamental rock mines (Villacastín, Bernuy, Villar de Sobrepeña, Bernardos, etc).

### **Conclusions**

The catalogue of geosites in the province of Segovia should be regarded as a dynamic tool, which must be continued through a series of measures aimed at the protection and management of the sites. An attempt must be made to establish close links with each and all of the organisations involved in conserving nature and the cultural heritage, particularly at the lower echelons of the administrative hierarchy. This task of conservation falls mainly to the Castilla y León Regional Government and the councils of the municipal districts in which the sites are located, which must decide whether to include them in their urban planning and ensure they are conserved and used for educational and cultural purposes. It is also important to raise individuals' awareness of their natural surroundings, since this is the only way to ensure that the measures implemented by the public authorities will be effective.

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