In: Parkes, M.A. (Ed.) 2004 *Natural and Cultural Landscapes - The Geological Foundation*, 235-238, Royal Irish Academy, Dublin

RAISING PUBLIC AWARENESS OF GEOLOGICAL HERITAGE: A SET OF INITIATIVES

Graciete Dias and José Brilha
Earth Sciences Department, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal Email: graciete@dct.uminho.pt, jbrilha@dct.uminho.pt

Abstract: Most people are unfamiliar with geological knowledge, a fact that hinders the implementation of geoconservation measures. Additionally, like in many other countries, the strategies of Portuguese Natural Parks are mainly concerned with bioconservation. The information available at these parks for visitors and students is mostly limited to biological issues, further increasing the geological illiteracy of the general public. Hence, putting people in contact with geological subjects is becoming very important for both geologists and policy makers. A project is being developed in Portugal in order to characterise, catalogue and make public the geological heritage of two Natural Parks from the NE region. This project is providing several products with the purpose of increasing public awareness towards geological subjects. Among these outputs we emphasise interpretative panels, geological guides and booklets on specific geosites or trails, and web pages. Two more initiatives are being developed in the scope of this project: the training of staff from the two Natural Parks who, in the future, will be guiding field trips; and the organisation of summer field trips in the region, addressed to the general public.

1. INTRODUCTION

Any nature conservation policy should integrate all aspects of nature: geological, biological, and social ones. Traditionally, international conservation institutions often forget the integration of geological concerns in their projects (Brilha 2002 and references herein). Geoconservation is still a word that causes great indifference among politicians, conservation professionals and park managers. In spite of the importance of geology in the definition of many protected areas, park managers failed to give proper treatment to these themes. In the USA park system, for example, almost 50% of all units have geological interest (Shaver and Wood 2001). These authors confirm that "the public and most park managers have largely viewed these physical features as scenic backdrops to the plants and animals that exist within them" and that "...the geosciences traditionally have not been well integrated into land management or ecosystem planning". Schelhas (2001) confirms that the USA parks are managed mainly for the conservation of representative ecosystems. Nevertheless, this panorama seems to be slowly changing in some countries. The last report of the Geologic Resources Division of the American National Park Service gives a bright perspective of the growing importance of geology in the management of parks (McCoy 2001). The same can be observed in some other places such as Scotland (Grant 1999), Canada (Cline et al. 1984; Varangu 1997) or England (Weighell 1999).

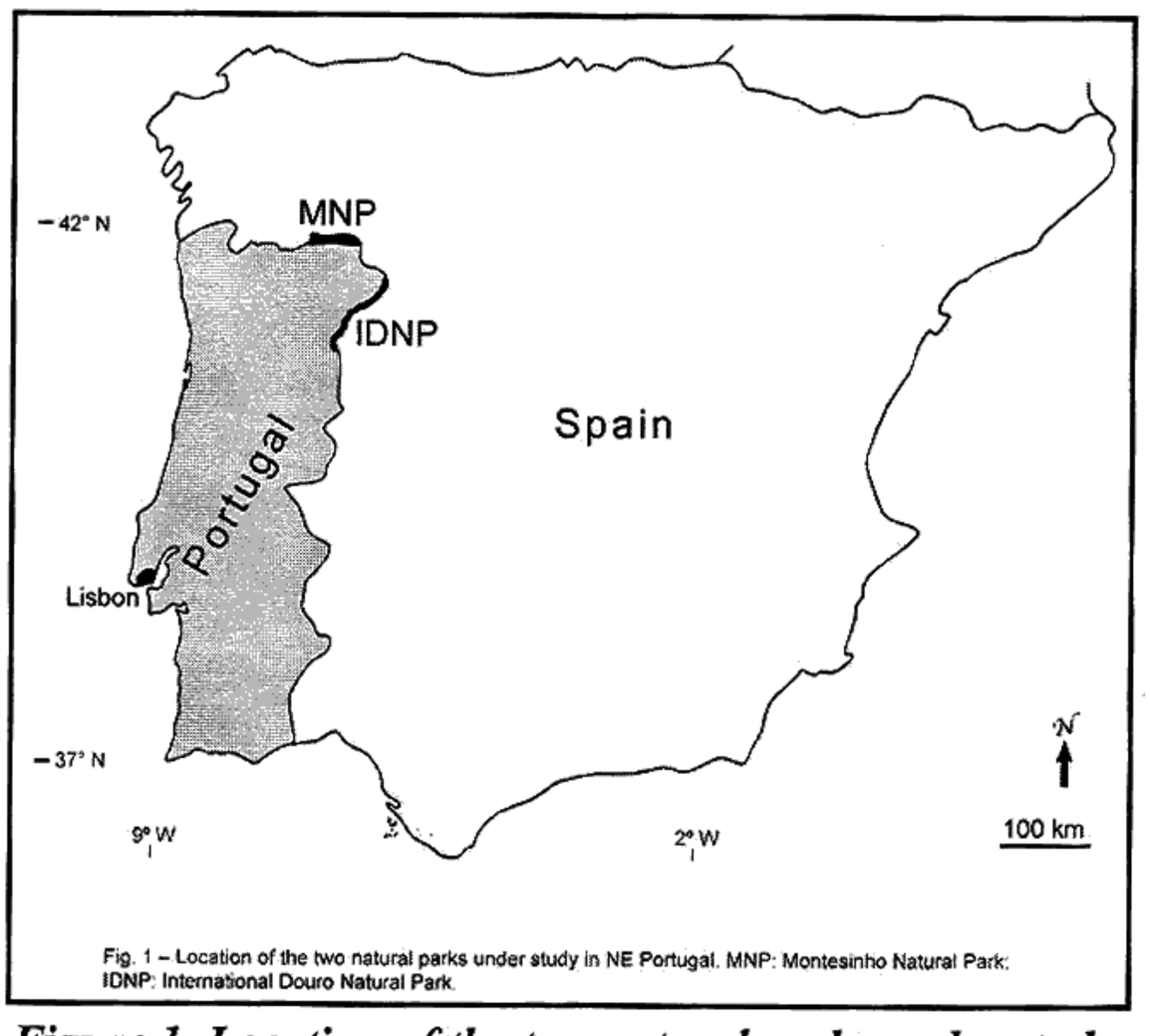

Fig. 1 – Location of the two natural parks under study in NE Portugal. MNP: Montesinho Natural Park; IDNP: International Douro Natural Park.

Figure 1. Location of the two natural parks under study in NE Portugal. MNP: Montesinho Natural Park; IDNP: International Douro Natural Park.

The Portuguese framework is not very different from many other countries. Protected areas were primarily defined regarding biological aspects. This paper shows how geologists are trying to increase the sensibility to geological features inside natural parks from NE Portugal and presents some of the initiatives proposed to raise public awareness of geological heritage.

2. GEOLOGICAL HERITAGE IN PROTECTED AREAS OF NE PORTUGAL: A PROJECT UNDER DEVELOPMENT

Two major protected areas are implanted in NE Portugal: Montesinho Natural Park (MNP) and International Douro Natural Park (IDNP), covering an extensive area of 1601 km² (MNP 750 km², IDNP 851 km²) (fig. 1). The first one is characterised by a remarkable geodiversity and by the occurrence of exotic terranes, presenting a complex geology. Due to this complexity, Pereira et al. (2002) highlight the difficulties in the development of an interpretational strategy for general public. The IDNP also presents an interesting geology with notable geomorphological features (Alves et al. 2002).

The geological relevance of these two parks, associated with the absence of geological information in park management plans, leads to the development of a multidisciplinary research project aiming to: (i) improve the geological

knowledge in the MNP and IDNP; (ii) create scientific instruments to support a sustainable management of the resources and territory; (iii) proceed with the inventory and characterisation of geosites; (iv) contribute to the increase of the public awareness of Earth heritage.

In order to achieve this last objective, a set of activities is being implemented as described below. Furthermore, some deliverables will be available for each park: (i) geological and geomorphological maps, as well as a geological resources map; (ii) a geosite map; (iii) a geological guidebook; (iv) web pages; (v) geological trails and interpretative panels contents.

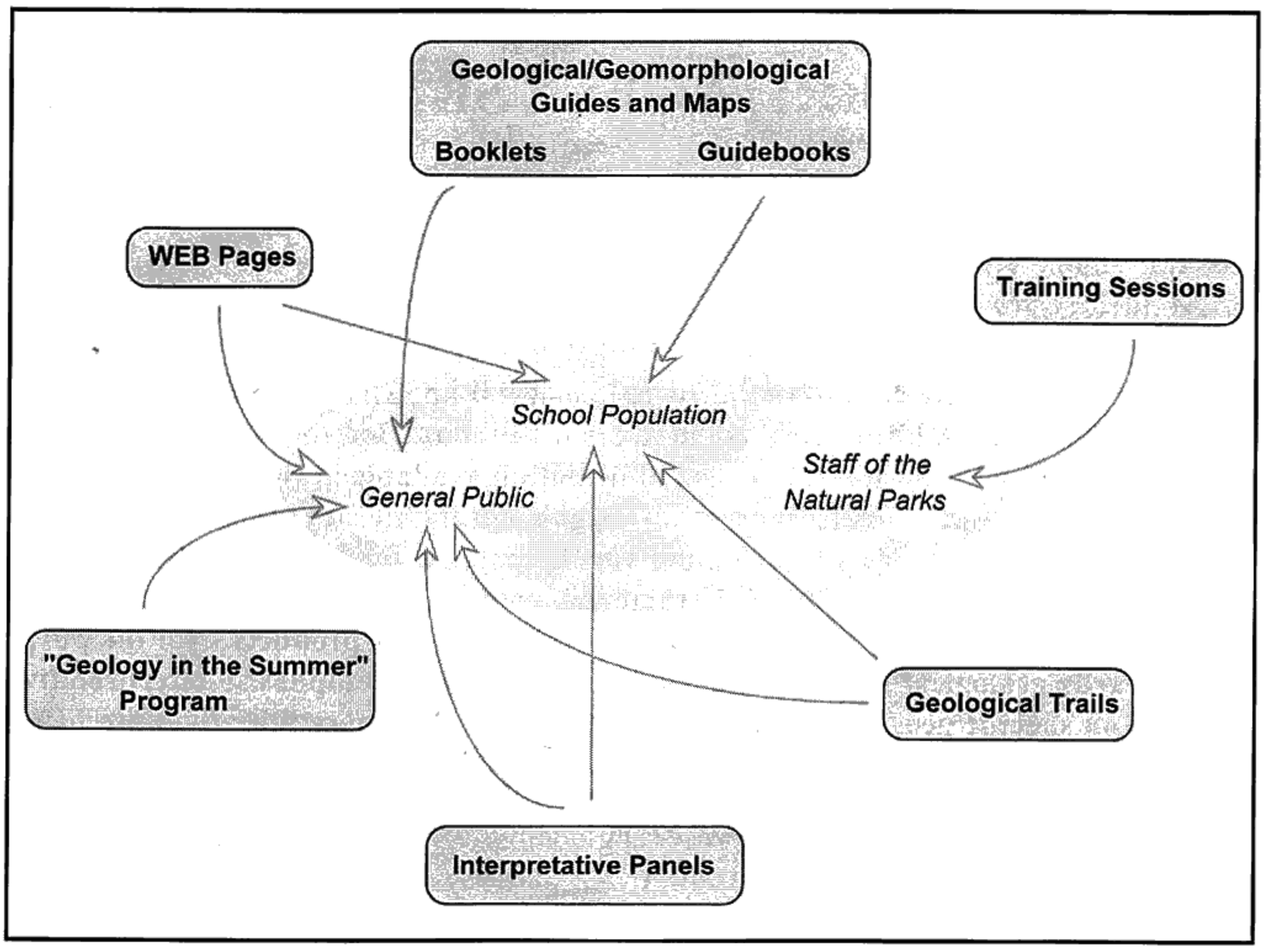

Figure 2. Proposed initiatives in order to increase public awareness of Geological Heritage.

3. RAISING PUBLIC AWARENESS OF GEOLOGICAL HERITAGE

As widely accepted, building awareness and education for various target groups is a big priority for a successful geological heritage conservation. However the challenge is considerable: (i) public understanding of geodiversity, geoconservation and geological heritage issues is poor; (ii) the audience must be well known and (iii) the message needs to be effectively communicated.

3.1. Target groups

In our project three target groups were considered: the general public, the school population and the technical staff of the two Natural Parks.

The general public includes tourists, day-visitors and local population. It must be emphasised that this audience is heterogeneous, including individuals who visit geological sites for intellectual improvement or just for leisure. Furthermore, it is well known that in any conservation project the involvement of local people is essential to the project success (Palmer et al. 1995).

Also heterogeneous is the school population group, of which three levels were taken into account: junior school students, senior school students and teachers.

The technical staff and guides of the Natural Parks frequently support environmental education activities. Therefore, this set of professionals was also considered as a target group with specific needs of training on geological heritage and geoconservation issues.

3.2. A set of initiatives

In the scope of the project various initiatives were proposed, addressed to the above target groups (fig. 2). These initiatives are being carried out in a joint effort with the MNP and the IDNP managers and technical staff.

The adopted strategy considered that, for any audience, rather than just offering *information*, interpretative provision is required. Site-specific geological *interpretation* is a complex process, defined by Hose (2000) as "the revealing of meaning and value of a site by translating geology's technical and scientific language, data and concepts into meaningful commonplace facts, terms and ideas, based upon the experiences, knowledge and understanding of non-specialist persons". It also attempts to develop the sense of *observation* and *discovery*.

Interpretative panels

Panels are a very common interpretative provision. In the last years some authors pointed out basic principles to make geological panels appropriate for users (Wilson 1994; Hose 1998, 2000). Several outdoor and on-site thematic panels will be set up in selected sites, addressed to the general public and school students. Sites were strictly selected among key-outcrops and viewpoints with relevant scientific/pedagogical and aesthetic values. Contents, design and presentation of these panels follow a set of guidelines (fig. 3).

Contents are interpretative rather than informative and based on observed features, with a clear distinction between observation and interpretation. They reflect user-friendly geological themes suggested by site observation, for example: unusual or unique features; internal geodynamics -

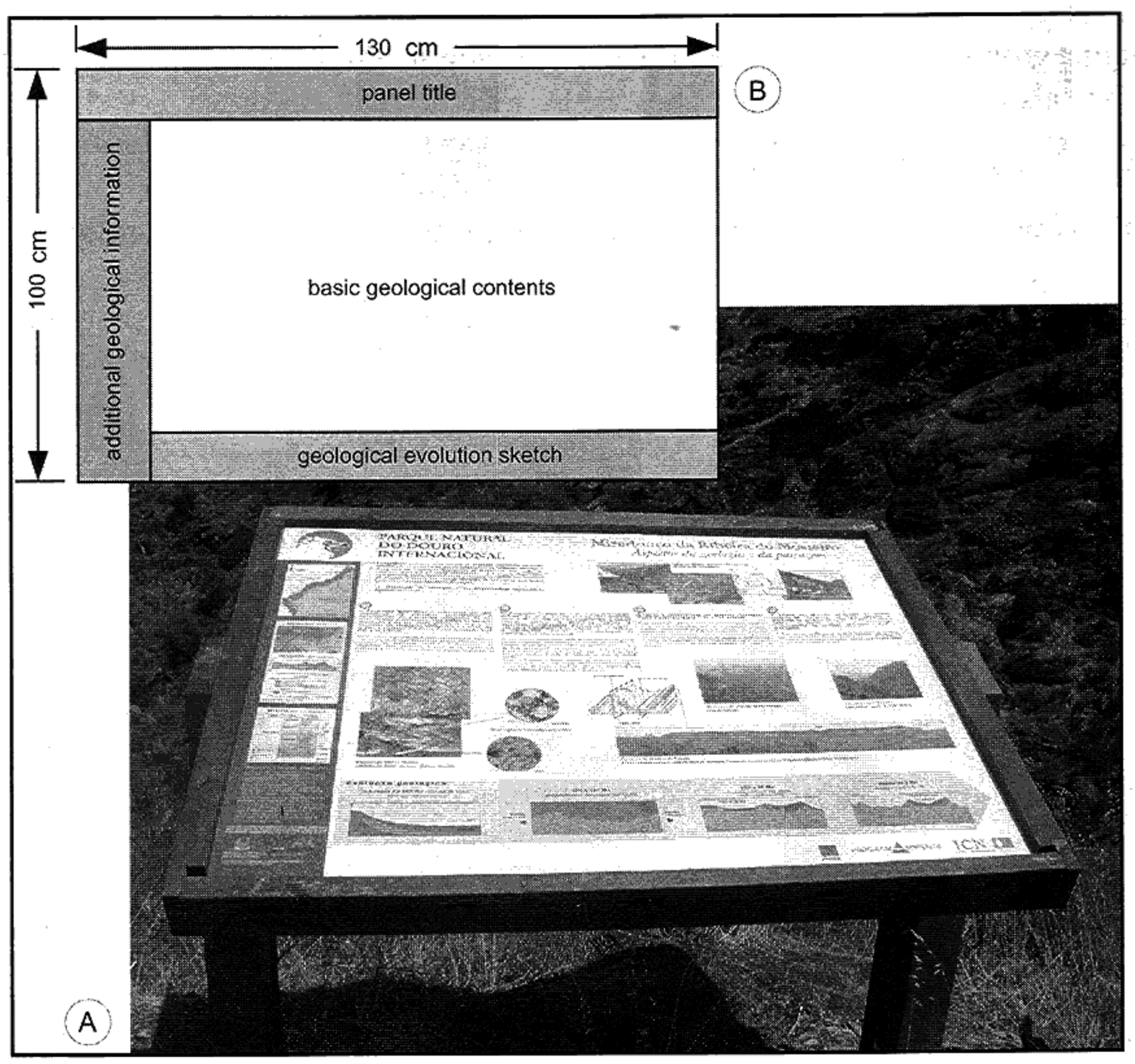

Figure 3. Proposed interpretative panels. (A): design and presentation of a lectern type panel; (B): contents organisation.

faulting, folding; land-shaping processes; environmental, economic, historical features. For some specific sites, traditional themes are also incorporated (lithology, mineralogy, tectonics, stratigraphy, palaeontology).

A lectern-type (130x100 cm) or banner-type (130x110 cm) presentation and a graphics-rich/text-poor layout are used. Basic contents are displayed at the centre of the panel, occupying the majority of the surface (fig. 3), and are addressed to the general public and junior school students. Additional information and/or interpretation is given in a left-side coloured strip and aimed at senior school students and "geo-dedicated" visitors/tourists. At the bottom schematic block-diagrams or cross-sections present the geological evolution of the region.

Trails and viewpoints

Park managers mainly for biological and cultural reasons already selected some trails and viewpoints, for which complementary geological interpretation addressed to the general public is being produced. Under the scope of this project, some new thematic trails will be proposed, mainly for the school population. The geodiversity of these parks constitutes a remarkable classroom that must be used by teachers and students. Several types of trails and bus circuits adapted to different student grades will be proposed.

Geological guides

The geological information will be available as guidebooks and booklets. Guidebooks will integrate geological and geomorphological maps, description of the geological features, suggested stops, trails, interpretative information and a glossary. They are mainly addressed to teachers preparing fieldtrips for students and to the public with some geological background. Booklets are designed to support the interpretation of selected viewpoints and trails. They will present simplified language in order to be understood by the general public.

Web pages

Environmental education must be supported either by traditional media (booklets, interpretative panels, guidebooks, etc.) and by electronic resources distributed on-line on the Internet and off-line on CD-ROMs and DVD-ROMs. Lent (2001) shows the advantages for National Parks in having a good web site, mainly in the preparation of a real visit to the park, and how to use the internet in visitor centres. The use of electronic media in the interpretation of a National Park geological heritage was exemplified in Brilha et al. (1999). Thematic web pages will provide assistance either for those who want to prepare a park visit or for those that cannot access it (travel impossibility, difficulties for disabled people, etc.).

"Geology in the Summer" programme

The Portuguese government (the former Ministry of Science and Technology) promotes, since 1998, a very successful programme called "Geology in the Summer" with the aim of raising public awareness of Geology. During the summer season geologists organise field trips and other activities all over the country, which constitute a good opportunity to talk about geodiversity, geological heritage and geoconservation, and the importance of geology in our society. Our project intends to organize several "Geology in the Summer" activities inside the two natural parks under study. Five distinct activities were developed during the summer of 2002. This experience, as well as previous experiences in the Peneda-Gerês National Park (NW Portugal), shows that the public is very interested in learning about the geological features, probably due to a general insufficiency of available geological information and to the fact that guided walks and personal interaction with geologists is greatly appreciated.

Natural parks staff training

Two-level workshops are designed for graduated (biologists, archaeologists, architects) and non-graduated technical staff. It should be noted that, at present, the technical staff of the two parks does not include geologists. The workshops are essentially based on fieldwork activities centred on the geosites and trails, followed by in-door training. A final workshop is previewed, focused on geoconservation principles and integrating the geology, geomorphology and geological heritage of the Natural Parks.

4. FINAL REMARKS

As stated by Hose (2000), there is still little real knowledge and understanding of the effects of these kinds of initiatives on cognition, informational exchange, emotive response

and behavioural modification of the different target groups. This is a great challenge for geoscientists, but also for Educational and Social Sciences researchers.

The overall perspective of the true impact of this project will only be possible after its conclusion by the end of 2003. Nevertheless, some positive feedback already received is very encouraging towards the success of the above initiatives. Park managers, local authorities and cultural associations are very cooperative and they are already asking for help due to the absence of geological experts in their staff. The public reaction to some interpretative panels already placed in-situ is very positive. In addition, the five field trips organised during the summer of 2002 were an excellent opportunity to talk about geological issues to very interested groups of people. In order to evaluate the impact of some initiatives, we are collecting information based on interviews, inquiries addressed to each target group, web pages access logging and e-mail feedback.

The Madrid Declaration, approved in 1999 during the III International Symposium ProGEO on the Conservation of the Geological Heritage, states: "A first step to achieve the integration of geoconservation into nature conservation would be an evaluation of the Geological Heritage in already protected areas, followed by the promotion of interpretative initiatives, in order to increase social awareness of Geoconservation". The project herein described intends to be a contribution to this first step inside natural parks of NE Portugal.

ACKNOWLEDGEMENTS

The PNAT/1999/CTE/15008 project is sponsored by FCT (Portuguese Science and Technology Foundation) and ICN (Portuguese Nature Conservation Institute).

REFERENCES

Alves, M.I.C, Monteiro, A., Ferreira, N., Dias, G., Brilha, J.B., Pereira, D.I. 2004. Landscape as a support for biodiversity: the Arribas do Douro case study (International Douro Natural Park, NE Portugal). This volume.

Brilha, J.B., Dias, G., Mendes, A.C., Henriques, R., Azevedo, I.C., Pereira, R. 1999. The geological heritage of the Peneda-Gerês National Park (NW Portugal) and its electronic divulgation. In: *Towards the Balanced Management and Conservation of the Geological Heritage in the New Millennium*. D. Barettino, M. Vallejo, E. Gallego (eds), Sociedad Geológica de España, Madrid, 315-318.

Brilha, J.B. 2002. Geoconservation and Protected Areas. *Environmental Conservation* 29(3), 273-276.

Cline, D., Erdman, K., Pearce, W. 1984. The dinosaur World Heritage Site: responsible management in Canada. In: *National Parks, Conservation and Development: the role of protected areas in sustaining society*. J.A. McNeely, K.R. Miller (eds), Smithsonian Institution Press, Washington, D.C., 741-743.

Grant, R. 1999. Evaluation of Success or Success of Evaluation? In: *Learning in Protected Areas - How to Assess Quality*. D. Elcome (ed), European Committee for Environmental Education ECEE, Commission on Education and Communication, International Union for the Conservation of Nature and Natural Resources, Gland, 42-51.

Hose, T.A. 1998. Mountains of fire from the present to the past - or effectively communicating the wonder of geology to tourists. *Geologica Balcania* 28(3-4), 77-85.

Hose, T.A. 2000. European 'Geotourism' - geological interpretation and geoconservation promotion for tourists. In: *Geological Heritage: its conservation and management*. D. Barettino, W.A.P. Wimbledon, E. Gallego (eds), Madrid, Spain, 127-146.

Lent, M-J. 2001. What is new media? In: *Challenge for Visitor Centres - Linking Local People, Visitors and Protected Areas*. M. Kyöstilä, A. Leivo, T. Loikkanen (eds), Nature Protection Publication of the Finnish Forest and Park Service, Series A, No 129, 56-59.

McCoy, C. (ed) 2001. *Geologic Resources Division: 1999-2000 Biennial Report*. National Park Service, Denver, CO, USA, 79p.

McNeely, J.A., Miller, K.R. (eds) 1984. *National Parks, Conservation and Development: the role of protected areas in sustaining society*. Smithsonian Institution Press, Washington, D.C., 825p.

Nelson, J.G., Serafin, R. (eds) 1997. *National Parks and Protected Areas: Keystones to Conservation and Sustainable Development*. NATO ASI Series, Ser. G, Ecological Sciences, Springer, Berlin, vol. 40, 292p.

Palmer, J., Golstein, W., Curnow, A. (eds) 1995. *Planning education to care for the Earth*. IUCN, Gland, Switzerland and Cambridge, UK, 169p.

Pereira, D.I, Meireles, C., Alves, M.I.C., Pereira, P., Brilha, J.B., Dias, G. 2004. The geological heritage on the Montesinho Natural Park (NE Portugal) - An interpretation strategy for an area with high geological complexity. This volume.

Schelhas, J. 2001. The USA national parks in international perspective: have we learned the wrong lesson? *Environmental Conservation* 28 (4), 300-304.

Shaver, D., Wood, J. 2001. Geology in the National Park Service. *Geotimes*, April 2001, AGI, 14-19.

Varangu, A. 1997. A clash of values: planning to protect. The Niagara escarpment in Ontario, Canada. In: *National Parks and Protected Areas: Keystones to Conservation and Sustainable Development*. J.G. Nelson, R. Serafin (eds), NATO ASI Series, Ser. G, Ecological Sciences, Springer, Berlin, vol. 40, 65-79.

Weighell, A.J. 1999. Earth Heritage Conservation in the United Kingdom, the World Heritage List and UNESCO Geoparks. In: *Towards the Balanced Management and Conservation of the Geological Heritage in the New Millennium*, D. Barettino, M. Vallejo, E. Gallego (eds), Sociedad Geológica de España, Madrid, 24-27.

Wilson, A. (ed.) 1994. Earth Heritage Conservation. The Open University, Milton Keynes, UK, 272pp.