UNIL | Université de Lausanne
Institut de géographie

GEOMORPHOLOGY GEOMORPHOLOGIE

GEOMORPHO SITES
IAG WORKING GROUP

Thematic Bibliography on Geomorphosites

Georgia Fontana, Kim Pieracci, Céline Fuchs,
Géraldine Bissig, Emmanuel Reynard

Institute of Geography, University of Lausanne (IGUL),
Dorigny - Anthropole, CH - 1015 Lausanne, Switzerland

Thematic bibliography on geomorphosites

Under the auspices of the IAG Working group “Geomorphosites”, the Institute of Geography of the University of Lausanne proposes a thematic bibliography on geomorphosites. The aim of this bibliography is to collect the existing literature on geomorphosites in order to furnish a data base concerning different domains like geomorphosite protection, assessment and promotion; many references also deal with the presentation of regional inventories of geomorphosites. The bibliography contains several types of documents and focuses on European literature. Such a bibliography could not be exhaustive; even so, we hope that it could be useful to people dealing with geoconservation, geosites, geoparks or geotourism.

The bibliography is also available in form of CD-rom containing the list of references in three different formats:

- **Bibliography_Endnote** is a file in Endnote format. Endnote is a software of bibliographical references database. To read this file, one needs the software Endnote 9.0 to be installed on your computer.
- **Bibliography_Word** is a file in .doc format.
- **Bibliography_pdf** is a file in .pdf format.

The CD-ROM is available for 5 € at the following adress :

Géraldine Bissig
Institute of Geography
University of Lausanne
Anthropole
CH – 1015 Lausanne
geraldine.bissg@unil.ch

Thematic bibliography on geomorphosites

Aigotti, D., De Renzo, G., Giardino, M., Pellegrino, P. (2004). I geositi nella provincia di Torino - Una esperienza concreta di divulgazione, *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 75-77.

This paper presents the promotion project of the geosites of the Torino region (Italy).

Aloia, A., Guida, D., Ianuzzi, A., Lazzari, M., Siervo, V. (2007). Il patrimonio geoambientale del Monte Gelbison nell'ambito del "Geoparco del Cilento", *Geologia e turismo. Beni geologici e geodiversità, Terzo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 1-3.03.2007*, Bologna, Associazione Italiana Geologia e Turismo.

This paper presents the geoheritage of the "Parco Nazionale del Cilento" (Italy), its geosites and its geotourist promotion. A geopark project is also proposed.

Amt für Raumplanung des Kantons Thurgau (2000). *Das Geotop-Inventar im Kanton Thurgau. Kurzfassung*, Frauenfeld, Amt für Raumplanung des Kantons Thurgau.

This report presents the geosite inventory of the Canton of Thurgau (Switzerland).

Andersen, S., Black, G. P., Duff, K. L., Erikstad, L., Gonggrijp, G. P., Kontturi, O., Schönlaub, H. P., Wimbledon, W. A. (1990). Earth-Science Conservation. An absolute need for science and education, *Jb. Geol. B.-A.,* Band 133, Heft 4, 653-669.

This contribution contains some short articles about geoconservation, european heritage sites and sites inventory, management and educational use of Earth-science sites and geological sites and raw material exploitation. It contains some examples from Britain, Austria, Norway and Finland.

Antonini, B. (1999). La valorizzazione e la tutela dei geotopi, in teoria e nella pratica, *Geologia Insubrica,* 4/1, 83.

This paper focus on the protection and promotion of geosites in the Canton of Ticino (Switzerland).

Arfelli, M., Tomidei, S. (2007). I rifugi di Castiglione: un geosito tra storia e geologia, *Geologia e turismo. Beni geologici e geodiversità, Terzo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 1-3.03.2007*, Bologna, Associazione Italiana Geologia e Turismo.

This paper presents the cultural value of the caves of Castiglione (Italy) and a project of geotourist promotion.

Armiero, V., Petrosino, P., Lirer, L. (2007). La Solfatara: una proposta di geosito nei Campi Flegrei, *Geologia e turismo. Beni geologici e geodiversità, Terzo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 1-3.03.2007*, Bologna, Associazione Italiana Geologia e Turismo.

This paper presents the volcan of Solfatara, its assessment as a geosite and its geotourist promotion.

Arnoldus-Huyzendveld, A., Gisotti, G., Massoli-Novelli, R., Zarlenga, F. (1995). I beni culturali a carattere geologico : i geotopi. Un approcio culturale al problema, *Geologia tecnica & ambientale,* 4, 35-47.

The protection of geosites is important because of its scientific and cultural values. This paper presents some legal aspects of their protection in Italy, some criteria to establish a national inventory, and the situation in European lands and in Italian regions. Finally, it proposes some prospects to improve promotion and assessment of geoheritage.

ASSN / SANW (1999). Inventaire des géotopes d'importance nationale, *Geologia Insubrica,* 4/1, 25-48.

This paper presents the Swiss "Inventory of geotopes of national significance". This inventory doesn't constitute a constraining element for the authorities; it aims to increase public awareness of the concepts of geosite, geoheritage and geoconservation, to provide a grounding for the realisation of other inventories of geosites in Switzerland and to propose a reference for the discussion of a systematic and official inventory at the national level.

ASSN / SANW (1999). Sentieri geologici e naturalistici della Svizzera e percorsi didattici a contenuto geologico, *Geologia Insubrica,* 4/1, 49-53.

This contribution contains a list of geological and geomorphological didactic paths in Switzerland.

Aubert, D. (1989). La protection des blocs erratiques dans le canton de Vaud, *Bull. Soc. vaud. Sc. nat.,* 79/3, 185-207.

Around 1850, it was at last understood that blocks of alpine origin scattered on the Swiss plateau and of the flanks of the Jura Mountains had been brought there by glaciers. Now, at the same time, these blocks were systematically exploited, hence the reaction of some naturalists to try to save a few of them. In the canton of Vaud, this operation was conducted by the Société vaudoise des Sciences naturelles, which created therefore, as early 1868, a commission for erratics, replaced in 1906 by a commission for the protection of Nature. Their activity, encouraged by the canton's government resulted in the classification of 28 particularly large blocks, of which half actually belong to the society. It was also the prelude of the long lasting Nature's protection movement in Switzerland.

Auf der Maur, F., Auf der Maur, B. (1997). Ein Dutzend Schweizer Geotope zum Anfassen / Une douzaine de géotopes suisses à la carte, *Schweiz,* 2/1997, 18-22.

This paper proposes some excursions to discover some geosites in Switzerland.

Auf der Maur, F., Auf der Maur, B., Imber, W. (1997). Wie die Schweiz zu ihren Geotopen Kam / Comment sont nés les géotopes suisses, *Schweiz,* 2/1997, 4-16.

This paper aims to explain the concept of geosite and haw it it is imposed in Switzerland to a large public of readers. It contains some exemples of geosites like erratic blocks and speleological objects and explains the situation of their protection in Switzerland.

Auf der Maur, F., Jordan, P. (2002). *Geotope – Fenster in die Urzeit*, Thun, Otto Verlag.

This book deals with the concept of geosite and its development in Switzerland. The second part of the book presents a set of field trips on several Swiss geosites.

Avanzini, M., Carton, A., Seppi, R., Tomasoni, R. (2005). Geomorphosites in Trentino : a first census, *Il Quaternario*, 18 (1), 63-78.

This paper presents a first inventory of geomorphosites in the Trentino region (Italy). A total of 110 geosites of geomorphological interest were identified thanks to the identification criteria established at a national and international level. The paper contains a list of the selcted geosites, their description and their possibilities of exploitation.

Badman, T. (1994). Interpreting Earth science sites for the public, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and landscape conservation*, London, Geological Society, 429-432.

Environmental interpretation is the art of explaining the meaning of places of natural or historic importance to the people who visit them and it has become an important part of conservation in the UK. This paper outlines a set of principles for the successful interpretation of Earth science, covering the selection of appropriate sites, identification of audiences, selection of themes, use of interpretative techniques and development of partnerships.

Barba, F.J., Diaz De Teran, J.R., Gonzalez, A., Remondo, J. (1996). La gestion y conservacion del Patrimonio geologico : una panoramica de las aproximaciones y estrategias en el norte de Espana, *Geogaceta,* 20 (5), 1172-1174.

The conservation of the geological heritage is considered in this paper as a problem to be solved not only with legislative and preservationist measures but also with educative use. The first tool to determine the correct management of this kind of public heritage is to inventory and to catalogue the mean geological aspects to constitute a part of it.

Barba, F.J., Remondo, J., Rivas, V. (1997). Propuesta de un procedimiento para armonizar la valoracion de elementos del patrimonio geologico, *Zubia,* 15, 11-20.

This article proposes a valuation procedure of the geological heritage to define sites of geological interest. It is based on the identification of indicators, calculated according to previously established values by consensus, and combined in an index. The application of the methodology proposed to some sites of Cantabria allow to verify the validity of the method.

Barker, G.M. (1996). Earth science sites in urban areas : the lessons from wildlife conservation, in: Bennett, M. (ed.) *Geology on your doorstep : the role of urban geology in Earth heritage conservation*, London, The Geological Society, 181-193.

Earth heritage conservation has long lagged behind developments in wildlife conservation. Some salutary lessons for the promotion of Earth heritage conservation may be learnt from past attempts to promote wildlife conservation in urban areas. The key to success has been found to be local community involvement. If a site is valued and becomes part of the community, then it will be defended and conserved as part of that community.

Benvenuti, M., Boni, M., Brancucci, G., Bortolami, G., Burlando, M., Costantini, E., D'Andrea, M., Gisotti, G., Guado, G., Marchetti, M., Massoli-Novelli, R., Panizza, M., Pavia, G., Poli, G., Zarlenga, F. (1998). The conservation of geological heritage in Italy: state of the art and future perspectives of the "GEOSITES" project, *Geologica Balcanica,* 28, 3-4, 117-123.

This report represents a general summary of the knowledges, as well as of the research and promotion activities carried out during the last years in Italy and aimed to the conservation of Geological Heritage. Further scope of this work is

to illustrate a range of possible initiatives aimed to include the Italian contribution in the broader international "Geosites" project, promoted by UNESCO and IUGS.

Bertacchini, M. (2004). Alla ricerca di geositi sotterranei urbani "sottosopra" il paesaggio urbani della città di Modena, *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 12-14.

This paper presents the promotion project of the Modena (Italy) urban geoheritage.

Bertacchini, M. (2005). In search of "Underground urban geosites". The city of Modena "Upside-Down", *Il Quaternario*, 18 (1), 163-166.

A rich cultural heritage is hidden in the subsoil of many italian cities. Underground geosites are the historical and territorial memory of the evolution of the urban environment. The aim of the "Sottosopra" Project is to promote the cultural heritage burried beneath the city of Modena thanks to a network of cultural itineraries.

Bini, M. (2005). An itinerary around the Apuan Alps (Tuscany, Italy): an example of landscape modelled by different agents, *Il Quaternario*, 18 (1), 197-201.

The landscape of the Apuan Alps (Tuscany, Italy) is characterized by numerous geosites, among which the most important is the "Antro del Corchia". The exceptional drawing power of this cave could therefore be used to better divulge information relative to those other lesser known nearby sites thanks to a didactic path.

Bini, M. (2005). Glacial landforms in the Apuan Alps (Tuscany - Italy): features in danger of extinction, *Il Quaternario*, 18 (1), 175-178.

The remaining glacial landforms of the Apuan Alps (Tuscany, Italy) are of great scientific interest, but they are not adequately exploited, and even their conservation is in peril. This paper describes some sites which are worthy of special attention.

Bissig, G., Reynard, E. (2007). Du sauvetage des blocs erratiques à la protection des géotopes dans le canton de Vaud, *Documents de l'Association pour le patrimoine naturel et culturel du canton de Vaud*, 9, 7-14.

This article focuses on the role played by the canton of Vaud (Switzerland) in geoheritage protection from the middle of the XIX century to the XXI century.

Bitterli, T. (1999). Speläologische Geotope : Konsequenzen und Problematik am Beispiel des Nidlenlochs (Kt. Solothurn, Schweiz), *Geologia Insubrica,* 4/1, 95.

This paper focus on the challenges of tourism affecting speleological sites.

Black, G. P. (1988). Geological conservation: a review of past problems and future promise, *Paleontology,* 40, 105-111.

This paper focus on geological conservation, more specifically on its past and present problems and on its future promises. Geoconservation has been retarded by a failure to resolve several important issues wich arise from the interplay of conservation policy and geological fiels studies and it is to be hoped that the present deficiencies will be made good.

Boyer, L., Fierz, S. (1995). Evaluation multicritère du patrimoine géomorphologique et

géologique (PGG). Un essai de formalisation, *Colloque commun de la Société Suisse de Géomorphologie (SSGm) et de l'Association Française de Karstologie (AFK), Sornetan, 5-8.10.1995*, Université de Fribourg, Institut de Géographie, 155-179.

This paper focus on the evaluation of karstic geosites. It proposes some criteria for an objective and transparent evaluation.

Boyer, L., Fierz, S., Monbaron, M. (1998). Geomorphological heritage evaluation in karstic terrains : a methodological approach based on multicriteria analysis, *Supplementi di Geografia Fisica e Dinamica Quaternaria,* III/4, 103-113.

Confronted with the problem of geomorphological heritage evaluation for applied research, the authors have developed an evaluation process based on the principles of systemic approach and multicriteria analysis. They establish several procedures in order to standardize both the observation and the evaluation of geomorphological heritage. Lastly, the authors test the method in a concrete case: sink-hole evaluation at the Froidevaux site in the Swiss Jura Mountains.

Brancucci, G., Maniglio Calcagno, A.E., Mazzino, F. (2002). The geosites' role and the landscape European convention, *Geomorphological Sites: research, assessment and improvement, Modena (Italy), 19-22.06.2002*, Università degli Studi di Modena e Reggio Emilia, Dipartimento di scienze della Terra, 1-8.

This paper focus on the links that should be established between the European Landscape Convention and geomorphosites.

Brilha, J. (2005). *Patrimonio Geologico e Geoconservaçao, a conservaçao da naureza na sua vertente geologica*, Braga, Palimage Editores.

This book presents the concepts of geoheritage and geodiversity and the reasons of geoconservation. It also presents the geoheritage of Portugal and the strategies to conserve and promote it.

Broso, D., Gregori, L. (2004). I geositi del bacino del fiume Angintola e della provincia di Vibo Valentia: la conoscenza scientifica è l'unico presupposto per la tutela?, *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 21-23.

This paper presents the geoheritage of the Angitola drainage area (Italy) and proposes a thought about the way to better conserve it (education, promotion, creation of a geopark,...).

Brückner, H. (1999). Küsten – sensible Geo- und Ökosysteme unter zunehmendem Stress, *Petermanns Geographische Mitteilungen,* 143, 6-21.

Coasts are of importance to humankind as zones of living, economy and recreation. The paper shows the growing trend to use coasts for settlements and recreation, plus the rising sea level are major factors of stress on coastal ecosystems. Coasts are also geo-systems and geo-archives. Finally, scenarios of the future sea-level rise and its impact on coastal ecosystem are discussed.

Bruschi, V. M., Cendrero, A. (2005). Geosite evaluation; can we measure intangible values?, *Il Quaternario*, 18 (1), 293-306.

A discussion on issues to be adressed in the process of cataloguing and assessing geosites is presented. Different stages of the process are considered: identification, classification, inventory, evaluation, protection and

use. An approach is presented based on the definition of three groups of criteria, related to intrinsic quality of sites, potential threats and protection needs and potential for use. Two Spanish applications to case studies for cataloguing and assessing are then presented.

Cachao, M., Terrinha, P. (2005). The Meso-Cenozoic of Algarve (Southern Portugal). A raw geo-heritage diamond incrusted in a tourist vocationed region, *IV International Symposium ProGEO on the Conservation of the Geological Heritage,Braga, 8-12.09.2005*, University of Minho, 1-48.

This paper presents the geoheritage of the Algarve region (Portugal). This region is tourist-vocationed but it is also particulary relevant by still pristine landfroms and outstanding geological features. Several examples with potential for geoconservation and geotourist development are discussed.

Cannillo, C., Di Gregorio, F., Eltrudis, A. (2005). Map of the geological and geomorphological sites of the Malfatano coast in SW Sardinia: a contribution to the knowledge of the island's geodiversity, *Il Quaternario*, 18 (1), 257-266.

This paper presents the geoheritage of the Malfatano coast (Sardinia, Italy). The geosites inventory of the region is also described and a map of them is proposed.

Carton, A., Cavallin, A., Francavilla, F., Mantovani, F., Panizza, M., Pellegrini, G.B., Tellini, C. (1993). Ricerche ambientali per l'individuazione e la valutazione dei beni geomorfologici. Metodi ed esempi, *Il Quaternario,* 7, 1, 99-107.

This paper presents a method for the elaboration of geomorphological asset maps. Manual and computer techniques to elaborate thematic maps are reported as applied to different test sites in the Alps, Apennins and Po Plain.

Carton, A., Coratza, P., Marchetti, M. (2005). Guidelines for geomorphological sites mapping: examples from Italy, *Géomorphologie: relief, processus, environnement,* 3/2005, 209-218.

This paper deals with mapping of geomorphosites on the basis of studies carried out in Italy in order to develop geomorphological maps useful for the identification, selection and assessment of geomorphosites, and to create archive maps which can give the public access to information on these subjects.

Carton, A., Seppi, A., Zucca, F., Pellgrini, L., Boni, P. (2005). "Pre-geosite" bibliography: a proposal of exploitation, *Il Quaternario,* 18/1, 15-21.

This paper is a proposal for a reasoned cataloguing of the published bibliography before the existence of the concepts of geosite and geoconservation. The aim of this type of bibliographical collection is to provide a detailed bibliography to whoever requires information on a particular geographical area. This information can also be popularized in form and accompany the excursionists during a visit to the areas.

Castaldini, D., Chiriac, C., Illies, D. C., Valdati, J. (2003). Geomorphological sensitivity: the case study of the Natural Reserve of "Salse di Nirano" (Modena Appennines), *Geomorphological sensitivity and system response, Camerino (Italy), 4-9.06.2003*, Università di Camerino, Dipartimento di Scienze della Terra, 57-66.

This article focus on the geomorphological characteristics of the Salse di Nirano area (Italy) and on the changes in the landscape induced by the establishment of a Natural Reserve in this area.

Castaldini, D., Valdati, J., Ilies, D. C., Chiriac, C. (2005). Geo-tourist map of the natural reserve of Salse di Nirano (Modena apennins, northern Italy), *Il Quaternario*, 18 (1), 245-255.

This article illustrates the criteria and methods applied for implementing a Geotourist map of the Natural Reserve of "Salse di Nirano" (Italy), wich combines the most evident geomorphologic features with foundamental tourist information.

Cavallin, A., Marchetti, M., Panizza, M., Soldati, M. (1994). The role of geomorphology in environmental impact assessment, *Geomorphology,* 9, 143-153.

This paper aims to define the role of Geomorphology in the assessment of the impact of human activities on the environment. Environmental impact assessment (EIA) should be carried out for specific projects, in order to evaluate their suitability for the quality of the environment. The natural component must be examined in terms of geomorphological hazards, which may endanger a project, and of geomorphological assets, which may be damaged to various extents by human activities.

Cavallin, A., Marchetti, M. (1995). Geomorpholgy and environmental impact assessment : a practical approach, *Quaderni di Geodinamica Alpina e Quaternaria,* 3, 99-107.

In this paper the geomorphological components of Environmental Impact Assessment (EIA) are discussed using a practical and schematic approach. Firstly the relations between the project and geomorphology (in terms of landforms) are treated and Impact (direct and indirect) is defined. To evaluate the impact of a project on geomorphological assets and the risk for the project and/or the surrounding settlements related to natural hazard (induced or not), the aspects that have to be studied are presented.

Cazzoli, M.A., Centineo, M.C., Montaguti, M. (2004). La valorizzazione del patrimonio geologico della regione Emilia Romagna attraverso il progetto di censimento e schedatura, *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 24-27.

This paper presents the strategy of the Emilia Romagna region (Italy) to better protect its geoheritage thanks to promotion activities.

Cendrero, A., Panizza, M. (1999). Geomorphology and environmental impact assessment : an introduction, *Suppl. Geogr. Fis. Dinam. Quat.,* III, 3, 167-172.

A few considerations concerning the state and contribution of geomorphology to the process of Environmental Impact Assessment are presented. The following issues are commented briefly: actual presence of geomorphology in the existing norms and regulations as well as in the current practice; general conceptual framework; the problem of quantifying the assessment; impact prediction and audits.

Cendrero Uceda, A. (1999). *Patrimonio geologico: diagnostico, clasificacion y valoracion*, Patrimonio geologico y desarrollo sostenible, "Centro cultural Gaya Nuno", Soria, PONENCIAS.

This paper presents some reflexions about the way to inventory, promote and use geological heritage.

Coli, M., Livi, E., Tanini, C. (2004). La coltivazione della Pietra Serena di Fiesole, *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo,119-121.

This paper presents the cultural value and promotion of the stone extraction activities in the region of Fiesole (Italy).

COLLECTIF (1978). Protection de sites géologiques, *Protection de la nature,* 4, 4-23.

This paper contains a short presentation of some geosites in Switzerland (erratic blocks, landscapes, minerals, fossils) and of the legislation concerning their protection.

COLLECTIF (1997). Les Parcs Nationaux et régionaux. Un objectif commun: Valoriser et protéger notre espace, *Géochronique,* 62, 12-35.

This paper presents legal acts and objectives of French National and Regional natural parks. It contains also a geological description and a list of interesting geological sites of each park.

COLLECTIF (1998). The conservation of geological heritage in Italy: state of the art and future perspectives of the "GEOSITES" project, *Geologia Balcanica,* 28, 3-4, 117-123.

This report presents a general summary of the knowledges, as well as of the reasearch and promotion activities carriedt ou in Italy and aimed to the conservation of Geological Heritage.

COLLECTIF (1999). *Geologie erleben und entdecken im Kanton Thurgau*, Frauenfeld, Departement für Bau und Umwelt une Departement für Erziehung und Kultur des Kantons Thurgau.

This paper presents the concept of geosite, the geoheritage of the Canton of Thurgau (Switzerland) and some examples of geological and geomorphological sites in this region.

COLLECTIF (1999). *I Beni Geologici della Provincia di Modena*, Modena, Articoli Editore.

This book presents the results of the geosite inventory in the Modena region (Italy).

COLLECTIF (2002). I geositi : conservazione del patrimonio geologico, *Geologia dell'Ambiente*, 2/2002.

This journal special issue focuses on the concept of geosite; it summarizes the state of the art of Italian research in this domain and presents some examples of geosite conservation and management.

COLLECTIF (2003). *Regional Geomorphology Conference Mexico 2003. Geomorphic hazards: Towards the prevention of disasters*, Mexico City, IAG.

This abstract book focus on geomorphic hazards, but it also includes a section about the vulnerability and the assessment of geomorphological sites.

COLLECTIF (2004). *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Relazioni, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo.

Proceedings of the 2nd Italian National Conference on geology and tourism. The following themes are discussed: tourism and territory, mapping and geotourism, promotion of geology by tourism.

COLLECTIF (2004). *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Sessione*

poster, Bologna, 3-4.11.2004, Bologna, Associazione Italiana Geologia e Turismo.

Proceedings of the 2nd Italian National Conference on geology and tourism. The following themes are discussed: islands, geosites, caves, ophiolites, dolomites, glacialism in Italy, touristic mapping, geology of parks.

COLLECTIF (2007). *Geologia e turismo. Beni geologici e geodiversità, Terzo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Relazioni, Bologna, 1-3.03.2007*, Bologna, Associazione Italiana Geologia e Turismo.

Proceedings of the 3th Italian National Conference on geology and tourism. The following themes are discussed: geotourist maps and guidebooks, geology and enogastronmic tourism, popularisation and education, geology for everybody, tourism and territory.

COLLECTIF (2007). *Geologia e turismo. Beni geologici e geodiversità, Terzo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Poster, Bologna, 1-3.03.2007*, Bologna, Associazione Italiana Geologia e Turismo.

Proceedings of the 3th Italian National Conference on Geology and Tourism.

Coratza, P. (2004). Géomorphologie et culture. Exemples de valorisation en Emilie Romagne (Italie), *Paysages géomorphologiques, Séminaire de 3ème cycle CUSO 2003*, Université de Lausanne, Institut de Géographie (Travaux et recherches n°27), 209-223.

This paper focuses on the need to find new ways and strategies to increase the awareness to geosciences not only of the scientific world and institutions but also of society in general. From this viewpoint, a project of inventory and assessment of geosites and of development of didactic paths is presented. Finally, some examples from the Emilia-Romagna Region are proposed.

Coratza, P., Giusti, C. (2002). A method for the evaluation of impacts on scientific quality of geomorphosites: preliminary researches, *Geomorphological Sites : research, assessment and improvement, Modena (Italy), 19-22.06.2003*, Università degli Studi di Modena e Reggio emilia, Dipartimento di scienze della Terra.

This paper presents a method for the evaluation of impacts on scientific quality of geomorphosites. The proposed method could be a useful tool in order to optimize the decisional process in the frame of the territorial planning, the environmental impact assessment and the protection of the natural heritage.

Coratza, P., Marchetti, M. (eds.) (2002). *Geomorphological Sites: research, assessment and improvement, Modena (Italy), 19-22.06.2002*, Università degli Studi di Modena e Reggio Emilia, Dipartimento di scienze della Terra.

This volume constitute the abstract book of the international workshop "Geomorphological Sites: research, assessment and improvement" (Modena, Italy, 19-22.06.2002), that focus on the research, the assessment and the improvement of geomorphosites.

Coratza, P., Giusti, C. (2005). Methodological proposal for the assessment of the scientific quality of geomorphosites, *Il Quaternario*, 18 (1), 307-313.

This paper proposes a method for assessing the scientific quality of geomorphosites. This method is quantitative, but a series of qualitative guidelines have been elaborated, in order to give a support for the attribution of values.

Costamagna, A. (2005). A Geomorphosites inventory in central Piemonte (NW Italy), *Il Quaternario*, 18 (1), 23-37.

This paper presents the first results of a geomorphosites inventory of the central Piemonte (Italy).

Costantini, A., Stanghellini, G. (2004). I geositi delle riserve naturali della provincia di Siena: un'opportunità per la valorizzazione del territorio, *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 29-35.

This paper focus on the promotion of the geosites included in the natural reserves of the region of Siena (Italy).

Crescenti, U., Rusi, S. (2004). La sorgente "sulfurea" del Lavini nella Majella settentrionale (Abruzzo): aspetti idrogeologici di interesse turistico, *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 92-95.

This paper presents the sulfuric source of Lavino (Italy).

Cresta, S., Fattori, C., Mancinella, D. (2004). Geologia e parchi: la geodiversità del Lazio, *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 83-84.

This paper presents the geoheritage and geosite inventory of the Lazio region (Italy).

Cucchi, F., Mereu, A., Oberti, S., Piano, C., Rossi, A., Zini, L. (2005). Geology and geomorphology of the "Rosandra" Valley for a cultural enhancement, *Il Quaternario*, 18 (1), 185-196.

This paper presents the geoheritage of the "Rosandra" Valley, its value and some propositions to promote it.

D'Andrea, M. (2004). Geologia e turismo: reporting dal mondo al 32° International Geological Congress (Firenze 2004), *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 42-44.

This paper summarizes the contributions resulting from the 32° International Geological Congress about geotourism.

Daly, D., Erikstad, L. Stevens, C. (1994). Fundamentals in Earth science conservation, *Mém. Soc. géol. France,* 165, 209-212.

Approaches to conservation of the geological heritage vary across northern Europe. The paper develops the concept of an integrated approach to the conservation of Earth science features, and analyses these variations as sub-sets of such an integrated approach. It is shown that there is a broad distinction between the geographical approach adopted in densely populated, low relief areas and that in less populated, high relief areas. An analysis of the relative merits of both approaches is attempted and they are presented as end members of a continuum.

Decrouez, D., Jordan, P., Auf der Maur, F. (2003). *Géotopes. Un voyage dans le temps*, Chavannes, Editions MPA.

This book proposes some itineraries to discover the Swiss geoheritage, especially in the frenchspeaking regions. It aims to increase awareness towards the concept of geosite among the wider public.

De Waele, J., Paolo, F., Galli, E., Naseddu, A., Rossi, A. (2004). Le grotte di miniera del Monte San Giovanni (Iglesiane, Sardegna sud-occidentale): una risorsa scientifica e turistica di inestimabile valore, *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 106-108.

This paper presents the mining and speleological heritage of the Monte San Giovanni (Italy) and proposes a thought about the challenges of the geotourism in Sardegna.

De Waele, J., Di Gregorio, F., Gasmi, N., Melis, M. T., Talbi, M. (2005). Geomorphosites of Tozeur region (south-west Tunisia), *Il Quaternario*, 18 (1), 223-232.

This paper presents a project for the study of the geosites of the Tozeur region (Tunisia), with the purpose of constituing a network of geosites in these arid and semi-arid areas. The linking of these geomorphposites thanks to a dodactic path is an interesting opportunity to promote earth sciences to the local people and to the visitors.

De Waele, J., Di Gregorio, F., Follesa, R., Piras, G. (2005). Geosites and landscape evolution of the Tacchi: an example from central-east Sardinia, *Il Quaternario*, 18 (1), 213-222.

The aim of the presented project is to conserve the geodiversity and the multiple valences of the Tacchi region (Sardinia, Italy) and comprises the promotion of the geosites in line with principles of sustainable development. This promotion foresees the realisation of a local network of geosites and the arrangement of didactic paths.

De Waele, J., Di Gregorio, F., Pala, A. (2005). Karst Geomorphosites of Monte Albo (north-east Sardinia), *Il Quaternario*, 18 (1), 145-153.

In this paper the authors present the results of a study performed on the geomorphosites of the Monte Albo chain (Sardinia, Italy). Within the context of a tourist promotion of the geoheritage, the selected geomorphosites should be connected in a local network through the realisation of didactic paths and of a website.

Di Gregorio, F., Ulzega, A. (2002). The state of the knowledge in the conservation and the valorisation of Geomorphological Sites in Sardinia, *Geomorphological Sites: research, assessment and improvement, Modena (Italy), 19-22.06.2002*, Università degli Studi di Modena e Reggio Emilia, Dipartimento di scienze della Terra, 9-14.

This paper summerizes the state of knowledge of the conservation and promotion of the geoheritage of the Sardegna (Italy).

Di Gregorio, F., Piras, G. (2005). Map of the landscape unites and geomorphosites of Monte Arci (Sardinia), *Il Quaternario*, 18 (1), 267-273.

In this paper a geomorphosites map of the Monte Arci (Sardinia, Italy) is presented in which these sites are inserted in Landscape Units. This kind of map constitutes a valid basic information for territorial and landscape planning and in Environmental Impact Assessment studies.

Di Gregorio, F. (2007). Le cave romane di marmo giallo antico di Chemtou (Tunisia) come geosito di raro interesse culturale, *Geologia e turismo. Beni geologici e geodiversità, Terzo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 1-3.03.2007*, Bologna, Associazione Italiana Geologia e Turismo.

This paper presents the cultural value of the caves of Chemtou (Tunisia).

Dias, G., Caetano Alves, M.I. (2005). Geological Heritage of the International Duoro Natural Park (NE Portugal), *IV International Symposium ProGEO on the Conservation of the Geological Heritage, Braga (Portugal), 8-12.09.2005*, University of Minho, 81-83.

This paper presents the geoconservation strategies adopted in the Duoro Natural Park (Portugal).

Diligenti, A., Nesci, O., Savelli, D. (2005). Geomorphosites in the landscape of Monti del Furlo (northern Marche Appennines), *Il Quaternario*, 18 (1), 203-211.

This paper presents the geoheritage and some geomorphosites of the Monti del Furlo region (Marche, Italy).

Diolaiuti, G., Smiraglia, C., Pelfini, M., D'Agata, C., Caccianiga, M. (2005). Natural assets in glacialized areas and the use of GIS for the valorization of high-mountain regions, *Il Quaternario*, 18 (1), 275-283.

The paper presents the preliminary results obtained through an experimental project focused on the use of GIS software to manage environmenatal data surveyed in a sample area in the high italian Alps. The processing of the data made it possible to obtain gomorphological and vegetational maps. Geosites has also been identified. The identification of the environmental assets represent the first phase of a tourist promotion of the area.

Downs, P.W., Gregory, K.J. (1994). Evaluation of river conservation sites: the context for a drainage basin approach, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, Geological Society, 139-143.

This paper focus on assessement of river conservation sites with an exemple from a survey in UK. It is concluded that the site evaluation needs to be seen in the context of the drainage basin and that sensitivity can be developed to provide a series of scale values that will further assist in landscape conservation techniques.

Duff, K. (1985). Geological conservation - yes please!, *Geology Today,* Jul-Aug 1985, 103-104.

The article focus on the utility of geological conservation in Britain, especially for paleontological sites.

Duff, K.L. (1994). Natural Areas: an holistic approach to conservation based on geology, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, Geological Society, 121-126.

England has been reviewing in the 1990sthe approach to wildlife and geological conservation with the goal of bringing these areas much closer together. Natural Areas allow the development of this new approach that recognizes the bond between geodiversity and biodiversity and provides an opportunity to an holistic approach to conservation.

Düster, H. (1999). Landschaften im geomorphologischen Inventar des Kantons Aargau (Schweiz), *Geologia Insubrica,* 4/1, 85.

This paper presents the inventory of geosites of the Canton of Aargau (Switzerland).

Eder, W. (1999). "UNESCO GEOPARKS" - A new initiative for protection and sustainable developement of Earth's heritage, *N. Jb. Geol. Paläont.,* 214, 353-358.

Trough the creation of a world network of natural parks with significant geological features, labelled UNESCO Geopark, UNESCO promotes the twin goals of conserving a healthy environment and enhancing sustainable economic development. Geoparks are designed to become a tool for a better understanding of the geological heritage. Geoparks are territories where the geological heritage of the Earth is safeguarded and sustainably managed.

Emery, E., Becker, D., Berger, J.-P. (2004). Geotope and Biotope: conflicts or synergies? The case of Rickenbach locality (canton Solothurn), *Swiss Geoscience Meeting 2004, Lausanne, 19-20.11.2004*, Lausanne, Académie Suisse deas Sciences Naturelles (SCNAT), 131-132.

This paper focus on the challenges on a site that is both a geosite and a biotope in the Canton of Solothurn (Switzerland).

Esposito, C., Marsico, A., Santangelo, N., Scala, P.(2007). I Campi Flegrei: un laboratorio per la divulgazione scientifica, *Geologia e turismo. Beni geologici e geodiversità, Terzo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 1-3.03.2007*, Bologna, Associazione Italiana Geologia e Turismo.

This paper presents the volcanic heritage of the region of Campi Flegrei (Italy) and the didactic instruments to promote it.

Faber K., Gasser J., Hantke R., Kuriger E., Lienert S., Scheidegger A. E., Stirnimann J., Winterberg H. (2003). Geologie und Geotope im Kanton Schwyz, *Berichte der Schweizerischen Naturforschenden Gesellschaft*, 40.

This paper presents the geology and geomorphology of the Canton of Schwyz (Switzerland) and its geosite inventory.

Fantoni, R., Bini, A., Cerri, R., Decarlis, A., Dellarole, E., Festa Larel, M., Manini Calderini, O., Santi, G., Testa, P., Zanoletti, E. (2007). Il Monte Fenera e le sue collezioni museali. La valorizzazione di un unicum delle Alpi centro-occidentali, *Beni geologici e geodiversità, Terzo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 1-3.03.2007*, Bologna, Associazione Italiana Geologia e Turismo.

This paper presents the geoheritage of the Monte Fenera (Italy) and the projects to promote it.

Farabollini, P., Scalella, G. (2004). Itinerari geologici come risorsa turistica: l'esempio del comprensorio del Monte dell'Ascensione (Marche meridionali), *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 96-99.

This paper presents a project of geotourist promotion of the Monte dell'Ascensione (Italy).

Farabollini, P., Materazzi, M., Scalella, G. (2005). Proposal for preservation and protection of the Marche region mud volcanoes (central Italy), *Il Quaternario*, 18 (1), 179-184.

The paper proposes several strategies for the preservation and protection of mud volcanoes in the Marche region (Italy). The procedure for safeguarding

them should start from an analysis of the territory and of its resources; it should also formulate proposals for their use and enhancement.

Felber, M. (1999). Il gruppo di lavoro per la protezione dei geotopi in Svizzera: dal rapporto strategico all'inventario nazionale, *Geologia Insubrica,* 4/1, 19-23.

This paper presents the activities of the Working Group for the protection of Geotopes in Switzerland.

Felber, M., Heitzmann, P., Furrer, H., Maggiori, M., Weissert, H. (1999). Escursione geotopi nel Ticino in occasione dell'Assemblea dell'Accademia Svizzera di Scienze Naturali ad Airolo (23-26 settembre 1998), *Geologia Insubrica,* 4/1, 99-124.

This paper presents some geological and geomorphological sites in the Canton of Ticino (Switzerland).

Felber, M., Grandgirard, V. (1999). Miniere e giacimenti minerari nell'inventario dei geotopi d'importanza nazionale, *Minaria Helvetica,* 19b.

The swiss inventory of geosites includes 33 mining geosites as mines and mining layers. These sites are special because of their historical, archeological and socio-economic value; a tourist and didactic promotion is often already done.

Ferreira, N., Castro, P., Pereira, Z. (2005). The Alto Douro Wine Region and the Port Wine Vineyards, *IV International Symposium ProGEO on the Conservation of the Geological Heritage, Braga (Portugal), 8-12.09.2005*, University of Minho, 59-72.

This paper presents the cultural and economic value of the geoheritage of the Alto Douro region (Portugal). In particular, the links between geology, geomorphology and vineyards are discussed.

Fierz-Dayer, E. (2004). Les gorges du Trient (VS, Suisse): une expérience de valorisation du patrimoine géologique et géomorphlogique, *Swiss Geoscience Meeting 2004, Lausanne, 19-20.11.2004*, Lausanne, Académie Suisse deas Sciences Naturelles (SCNAT), 137-138.

This paper presents the promotion of the geoheritage of the Gorges du Trient (Switzerland).

Fischer, H. (1997). "Wanderweg" oder "Lehrpfad" - vom Plan zur Realisierung Bericht über ein Experiment, *Zbl. Geol. Paläont.,* Teil 1, 1995, H. 7/8, 681-691.

Dense settlement and human-initiated changes within the large city of Koblenz obstruct the discovery of visible marks of the geological past. A "geological walking tour " was finally installed in 1992.

Frattini, N. (2004). Exemple d'inventaire de géotopes géomorphologiques : le cas du Parc Naturel Régional du Doubs, *Paysages géomorphologiques, Séminaire de 3ème cycle CUSO 2003*, Université de Lausanne, Institut de Géographie (Travaux et recherches n°27),175-192.

This article presents the inventory of the geomorphosites of the future Regional Natural Park of Doubs, situated in the Jura range. The procedure that has led to the realisation of the inventory is based on th works of V. Grandgirard.

Geremia, F., Massoli-Novelli, R. (2005). Coastal geomorphosites of the Isles of Lipari and Stromboli (Aeolian Islands, Italy): new potential for geo-tourism, *Il Quaternario*, 18 (1), 233-244.

This paper presents the coastal geomorphosites of the Aeolian Islands (Italy) and the project of two didactic paths to promote geotourism.

Geyer, M. (2004). Comment faire parler les roches : exemples de valorisation géotouristique du patrimoine géologique et géomorphologique dans le Sud de l'Allemagne et en Alsace (France), *Paysages géomorphologiques, Séminaire de 3ème cycle CUSO 2003*, Université de Lausanne, Institut de Géographie (Travaux et recherches n°27), 243-253.

This paper focuses on the way to develop a sustainable geotourism. Because of the varied nature of geological and geomorphological regional histories, it is recommended to develop a suitable concept for optimal tourist exploitation according to local needs. However, consideration must be given to environmentally sensitive areas, as well as geosites that need to be protected.

Gimigliano, D., Ferraro, E. (2007). La foresta fossile del torrente Stura di Lanzo (Piemonte): un geosito esemplare per uuna esperienza di educazione ambientale/ di educazione naturalistica integrata, *Geologia e turismo. Beni geologici e geodiversità, Terzo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 1-3.03.2007*, Bologna, Associazione Italiana Geologia e Turismo.

This paper presents the projects of didactic promotion of the fossil forest of the Stura di Lanzo torrent (Italy).

Giusti, C., Gonzalez-Diez, A. (2000). A methodological approach for the evaluation of impacts on sites of geomorphological interest (SGI), using GIS techniques, *International Archives of Photogrammetry and Remote Sensing,* XXXIII, Supplement B7, 47-53.

This paper proposes a methodological approach for the study of one component of the geomorphological asset: the intrinsic quality. The new methodology is based on the classification of the geomorphological asset on the basis of digital geomorphological maps.

Gmür, P. (2007). Quel avenir pour l'inventaire des géotopes dans la législation vaudoise, *Documents de l'Association pour le patrimoine naturel et culturel du canton de Vaud*, 9, 5.

This paper summarizes the situation of geosite protection in the canton of Vaud (Switzerland).

Gonggrijp, G.P. (1999). Geology does not stop at boarders! Neither does conservation!, *Geol. Insubrica,* 4/1, 11-15.

The importance of geoconservation has been underestimated by the nature conservation organisations and the Earth science community for quite a long time. This article presents the concept of geoconservation and its situation in Europe.

Gordon, J.E., Brazier, V., Lees, R.G. (1994). Geomorphological systems : developing fundamental principles for sustainable landscape management, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, The Geological Society, 185-189.

This paper examines the application of geomorphology to sustainable land management and outlines an approach that addresses the requirements of both Earth science conservation in its narrow sense and also aspects of wider landscape conservation.

Goven, F. (2004). Pierres du patrimoine, *Géochronique,* 89, 17-57.

This paper presents a large overview of rocks as important building material and geoheritage in France.

Grandgirard, V. (1995). Méthode pour la réalisation d'un inventaire de géotopes géomorphologiques, *Ukpik, Cahiers de l'institut de géographie de Fribourg,* 10, 121-137.

The author proposes a method to make an inventory and an assessment of geosites. This method is developed within the framework of the inventory of geosites of the Canton of Fribourg (Switzerland).

Grandgirard, V. (1996). Géotopes, in: Hertig, J.-A. (ed.) *Etudes d'impact sur l'environnement*, Lausanne, Presses polytechniques et universitaires romandes, 333-342.

This paper focus on the relation between geology, geomorphology and environment impact assessement. It presents a definition of geosites and of legal acts concerning them. It clarifies also the way to consider them during an environmental impact assessement to minimize impacts of projects.

Grandgirard, V. (1996). Gestion du patrimoine naturel. L'inventaire des géotopes géomorphologiques du canton de Fribourg, *Colloque commun de la Société Suisse de Géomorphologie (SSGm) et de l'Association Française de Karstologie (AFK), Sornetan, 5-8.10.1995*, Université de Fribourg, Institut de Géographie, 181-195.

This paper focus on the management of geoheritage in Switzerland and presents a method to make an inventory and an assessment of geosites developed within the framework of the inventory of geosites of the Canton of Fribourg (Switzerland).

Grandgirard, V. (1997). Géomorphologie et études de l'impact sur l'environnement, *Bull. Soc. Frib. Sc. Nat,* 86, 65-98.

For many years, the researchers of the RGiG (Research Group in Geomorphology, Institute of Geography, University of Fribourg) have often been called upon to contribute to environmental impact studies (EIS), especially to those related to the building of the A16 highway in the Jura mountains of western Switzerland (Transjurane). On the basis of these experiences, the author presents the tasks which should be entrusted to geomorphologists in an EIS, in the feasibility study as well as in both the preliminary survey and the main survey.

Grandgirard, V. (1997). Géomorphologie et gestion du patrimoine naturel. La mémoire de la Terre est notre mémoire, *Geographica Helvetica,* 2, 47-56.

In the 1990s, the government of the canton of Fribourg (Switzerland) has decided to establish a sector plan that includes directives specific to nature conservation: the Sector Plan for Landscapes and Sites. The integration of geomorphological characteristics in this land-use plan has promoted further reflection on geomorphology's contributions to this field, as well as on the modalities necessary for its integration in management of the natural environment. This article evokes challenges to be met in the following domains: fundamental research, applied research, legislation and information.

Grandgirard, V. (1997). *Géomorphologie, protection de la nature et gestion du paysage*. Fribourg, Institut de géographie (Thèse de doctorat).

This thesis focus on the protection and management of geoheritage, geosites and landscapes; it contains the following sections: "Landscapes, Interfaces between a Society and its Environment"; "Géomorphologie et gestion du

patrimoine naturel. La mémoire de la Terre est notre mémoire"; "An Inventory of Geomorphological Geotopes in the Canton of Fribourg (Switzerland)"; "Les géotopes karstiques du canton de Fribourg (Suisse)"; "Auswahl und Schutz bedeutender Findlinge im Kanton Freiburg (Schweiz)"; "L'inventaire des géotopes d'importance nationale".

Grandgirard, V. (1999). An inventory of geomorphological geotopes in the canton of Fribourg (Switzerland), *Mem. Descr. Carta Geol. d'It.,* LIV, 273-278.

This article constitutes a plea for the management of the geomorphological heritage. The Author presents the reflections carried out in the context of an inventory of geomorphological sites in the Canton of Fribourg. The different stages of the inventory, especially categorisation and evaluation, are discussed.

Grandgirard, V. (1999). L'évaluation des géotopes, *Geologia Insubrica,* 4/1, 59-66.

Methodological problems linked to the evaluation of geosites are generally insufficently considered. This contribution proposes a foundamental reflection about geosites evaluation; it focus on the choice of objects and on the objectives and different methods of evaluation. This paper serves as a kind of check-list for scientists in charge of geosites evaluation.

Grandgirard, V., Schneuwly, D. (1997). Auswahl und Schutz bedeutender Findlinge im Kanton Freibourg (Schweiz), *Geowissenschaften,* 15, 402-407.

Within the context of the inventory of geomorphological sites in the Canton of Fribourg (Switzerland), two different methods have been used to assess the value of about 400 erratic blocks. Some blocks were then selected as geotopes of cantonal value. Some management measures are proposed to avoid the irreparable loss of this heritage.

Grandgirard, V., Spicher, M. (1997). Les géotopes karstiques du canton de Fribourg (Suisse), *Proceedings of the 12th International Conference of Speleology, La Chaux-de-Fonds*, La Chaux-de-Fonds, Sociétét Suisse de Spéléologie, 331-336.

This paper presents the inventory of geomorphosites of the Canton of Fribourg (Switzerland) and focus on the karstic geomorphosites. It also contains a thought about their management.

Gray, M. J. (1997). Planning and landform: geomorphological authenticity or incongruity in the countryside?, *Area,* 29.4, 312-324.

The conservation movement has recently extended its attention on geosites. However, it has yet to embrace the need for a wider perspective on landform conservation: too many changes in the countryside show little respect for geomorphology. In spite of some changes in policy and practice, a greater understanding of geomorphology amongst landscape architects, planners and the wider public is still necessary.

Gray, M. (2004). *Geodiversity. Valuing and conserving abiotic nature*, Chichester, Wiley.

This book focus specifically on the geodiversity of the planet and on the threats to this diversity, to explain the value of inanimate nature and to assess the approaches that should be taken to conserve it.

Gray, M. (2004). "Land form" rather than "landforms": geomorphological conservation outside protected areas, in: Parkes, M.A. (ed.) *Natural and Cultural Landscapes - The Geological Foundation*, Dublin, Royal Irish Academy, 171-174.

The diversity of land forms is the most important element in producing landscape variations and in influencing biodiversity and has intrinsic, cultural, aesthetic, functional and research and education value. People often forget that not only biological world is vulnerable, but geological and geomorphological objects too. The paper shows that it would be necessary to protect geodiversity outside protected areas and to have a greater understanding of geomorphological heritage amongst landscape architects, planners and the wider public.

Gray, M. (2005). Geodiversity and Geoconservation: What, Why, and How?, *The George Wright Forum*, 6-12.

The concept of geodiversity provides a foundamental basis for geoconservation. Geodiversity would need a better protection because of its intrinsic, cultural, aesthetic, economic, functional and scientific value and the real and potential threats to it. Too many nature conservation organisations and objectives are riddled with institutional biocentrism: it is often forgotten that without geodiversity there would be little biodiversity.

Gregori, L., Melelli, L. (2005). Geotourism & Geomorphosites: the G.I.S. solution, *Il Quaternario*, 18 (1), 285-292.

The paper proposes to enhance the tourist attention towards geomorphosite, through the use of more traditional and better known interests and of GIS. Some examples of the Umbria region (Italy) are also proposed.

Gregori, L., Melelli, L., Rapicetta, S., Taramelli, A. (2005). The main Geomorphosites in Umbria, *Il Quaternario*, 18 (1), 93-101.

This work proposes an inventory of the main geomorphosites of the Umbria region (Italy), based on their historical, geomorphological and landscape characteristics.

Grube, A., Wiedenbein, F.-W. (1992). Geotopschutz – eine wichtige Aufgabe der Geowissenschaften, *Die Geowissenschaften,* 10/8, 215-219.

Geotopes can be endangered in their existence by anthropogenic measures and natural processes; can be worthy of preservation and protection owing to their natural characteristics and for their beauty or rarity. Geotope protection includes all kinds of measures of preservation, development and management of geotopes in their natural diversity and characteristics. Geotope protection is an inherent part of the geosciences and land use planning.

Grube, A. (1993). Die "World Heritage List" der UNESCO, *Materialien - Naturschutzzentr. Wasserschloß Mitwitz e.V.,* 1, 25-31.

This paper presents the World Heritage Geological Sites of UNESCO.

Harley, M.J. (1994). RIGS. A nationwide site conservation initiative based in local voluntary groups, *Mém. Soc. géol. France,* 165, 259-260.

In England, important Earth science sites are protected within one or two nationwide site networks. There are differents kinds of network: Sites of Special Scientific Interst (SSSIs) at national level and Regionally Important Geological/Geomorphological Sites (RIGS) at local level. Sites are selected for their educational, research, historical and aesthetic importance, and are conserved through local authority planning policies, the involvement of landowners, and through management by RIGS group members.

Heitzmann, P., Reynard, E., Stürm, B. (2006). Geotopschutz in der Schweiz – quo vadis ?, *Geotope - Bausteine der Regionalentwicklung, 10. Internationale Jahrestagung der Deutschen Gesellschaft für Geowissenschaften*, *Ulm, 23-26.05.2006*, Schriftenreihe der Deutschen Gesellschaft für Geowissenschaften, 44, 48-54.

This article summarizes the situation of geosite protection in Switzerland. The legal framework of nature protection and territorial planning is presented and the creation of new types of protected areas is discussed. The existing geoparks and the projected ones are also presented. In spite of the efforts made by the Swiss geosite working group, no national inventory of geosites has been realised and these assets are still protected thanks to other indirect measures.

Hinze, C., Look, E.R. (1999). Moderne Methoden des Geotopschutzes, *N. Jb. Geol. Paläont.,* 214, 359-373.

The state geological surveys of Germany have developed a system for the protection of geosites. The necessary information is collected and evaluated in a standardised way in order to submit comprehensive applications for legal protection to the authorities.

Hipp, R. (2004). Beispiele zur Umsetzung des Geotopschutzes im Kanton Thurgau, *Paysages géomorphologiques, Séminaire de 3ème cycle CUSO 2003*, Université de Lausanne, Institut de Géographie (Travaux et recherches n°27), 161-173.

This article presents the situation concerning the protection of geotopes in the Thurgau canton. It shows how data obtained from the cantonal survey of geotopes can be used by the cantonal and local authorities and how individual and flexible solutions must be often established in collaboration with land owners and concerned parties.

Holfmann, T. (1999). Geotope in Osterreich: Heutige Situation und Chancen für die Zukunft, *Geologia Insubrica,* 4/1, 87-90.

This paper presents the situation of geoheritage protection in Austria. In 1999, 639 geosites were already protected. One of the most important results of Geotop-research in Austria is the affinity of geotopes and biotopes. According to a holistic point of view, Geotop-research offers a new chance especially for geotourism.

Hofmann, T., Schönlaub, H.P. (1994). Geotourismus als Bewusstseinserweiterung, *Geowissenschaften,* 12, 5-6, 174-177.

Modern geotourism shows to the user, in a simplified way, the interactive network of geology in its widest sense, ranging from stratigraphy to geomorphology and natural resources. The greatest success in transmitting information to a wide audience has been achieved with weatherproof poster boards in the open air which outline a "geotrail", together with an accompanying handbook. As well as a better understanding of the Earth sciences in general, the need arises for the protection of geotopes as unique geological sites for the future.

Hooke, J.M. (1994). Strategies for conserving and sustaining dynamic geomorphological sites, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, The Geological Society, 191-195.

Geomorphosites are important from scientific value, from understanding the provide of processes and development of landforms and from scenic and amenity value. Dynamic sites present particluar problems through their activeness. There are two major strands for conserving and sustaining such

areas: understanding of sites and possible management techniques through scientific analysis. The present paper also present possible strategies of management and education.

Hose, T.A. (1996). Geotourism, or can tourists become casual rock hounds?, in: Bennett, M.R. (ed.) *Geology on your doorstep : the role of urban geology in Earth Heritage Conservation*, London, Geological Society, 207-228.

Site interpretation plays an important part in raising interest in the conservation of geological sites. Geotourism is the provision of interpretative and service facilities which enable visitors to gain some knowledge and understanding of geology. Increasing the impact of geotourism will increase the awareness of the need for the conservation of geological sites. The results of several surveys of the visitors to geological sites are presented and the implications for site interpretation considered.

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

In Europe, much has been achieved in site recording, conservation and latterly, focused on the scientifically important interpretation and preservation. Some sites and collections are tourist attraction and some others still await geotourism development. Interpretative media and visitors typology are presented and a geotourism development strategy is proposed.

Jimenez Espinosa, R., Nieto, L.M., Alfaro Garcia, P., Jimenez Millan, J., Ruiz-Ortiz P.A. (2002). La Cerrada de Utrero-Lanchar de Linarejos: punto de interes geomorfologico en el Parque Natural de Cazorla, Segura y Las Villas (Provincia de Jaen), in: *Estudios recientes (2000-2002) en Geomorfologia. Patrimonio, montana y dinamica territorial*, Valladolid, Dpto. Geografia-UVA, 415-422.

In this work the geomorphosite of Cerrada of Utrero-Lanchar of Linarejos, located in the Natural Park of Cazorla, is presented. In this geosite three short itineraries have been established; along of these ones, a variety of constructive and destructive exokarstic forms can be observed, at different scales.

Jonin, M. (2006). *Mémoire de la Terre. Patrimoine géologique français*, Paris, Delachaux et Niestlé.

This book presents the geoheritage and some interesting geosites of France and of its natural reserves to popularize Earth sciences.

Jordan, P. (1999). Geotopschutz - die rechtliche Situation in der Schweiz, *Geologia Insubrica,* 4, 55-58.

In Switzerland, the legal base for the protection of single geological monuments seams to be sufficient. However, neither the federal nor the cantonal administrations are obliged to make a systematic survey and to preserve geotopes. The today Federal Inventory of Landscapes and Natural monuments (BLN) includes rather picturesque landscapes and biotopes than geotopes. Additionally, the status of the inventory is relatively low and it has no legal significance to land-owners or authorities except the federal administration. Actually, there are some attempts to improve the actual situation. On the other hand, there are some cantonal inventories of various legal significance and technical standard.

Jordan, P. (2002). Geotope, Geotopschutz und Geoparks in der Schweiz, *Natur und Mensch,* 2/2002, 6-7.

This paper presents the concept of geosite and explains the reasons to protect them. It also presents didactic paths and geoparks in Switzerland as means of sensibilisation.

Joyce, E.B. (1994). Assessing the signifiance of geological heritage sites : from the local level to world heritage, *Mém. Soc. géol. France,* 165, 37-43.

Geological features and sites must be assessed to determine their significance in terms of geological type, uniqueness or representativeness, scientific or educational value, management and accessibility. They can be classed as important at local, regional, national, international or World heritage level. Assessment of significance must be in part subjective, but a working procedure carried out by an export group will provide an assessment which can be justified and defended. Such a working procedure is outlined.

Joyce, B. (2001). Volcanic heritage of southeastern Australia, and its value in increasing awareness of volcanic risk, *VICMIN2001: The Third Conference on Development in Victorian Geology and Mineralisation, AIG Bulletin,* 34, 81.

Western Victoria and Southeastern South Australia have a volcanic history extending over the past five million years. The cultural heritage of the volcanic features is also high. Volcanic heritage information can be used to raise awareness in the local community of past activity, and so allow the study of volcanic risk to be promoted in the future.

Joyce, E.B. (1994). Assessing the signifiance of geological heritage sites : from the local level to World heritage, *Mém. Soc. géol. France,* 165, 37-43.

Geological features and sites must be assessed to determine their significance in terms of geological type, uniqueness or representativeness, scientific or educational value, management, and accessibility. They can be classed as important at local, regional, national, international or World heritage level.

Joyce, E.B. (1994). Identifying geological features of international significance : the Pacific Way, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, The Geological Society, 507-513.

There is a need for an international convention to care for important geological sites and features. To do this, experience developed in Australia could be applied at the international level. Geological and geomorphological sites, modern processes, and the landscape itself, should all be part of this effort at looking after our Earth heritage.

Joyce, B., Ollier, C. (2003). The Pilbara region of western Australia: landscape and heritege, *The Australian Geologist,* 127, 27-30.

With the increasing tourist interest in the Pilbara region (Western Australia) there is a need for clear and simple geological and geomorphological information on this region. This paper is a start in the direction of a better knowledge of the landscape story of the Pilbara region.

Kreutzer, L.H., Perez Postigo, V., Wiedenbein, F.-W. (1994). Geotopschutz – eine neue Aufgabe der Erdwissenschaften, in: Matschullat, J., Müller, G. (eds.) *Geowissenschaften und Umwelt*, Berlin-Heidelberg, 245-252.

This paper focus on geosite definitions, inventories, policies and protection in Germany. It also deals with bonds between geosites and biotopes, education, vulgarisation and geotourism.

Kreutzer, L.H. (1995). Geotope und Image-Pflege oder Mache Geologie und trage es in die

Welt, *Zbl. Geol. Paläont. Teil 1,* 7/8, 753-761.

The image of geologists comes not up to modern professional requirements every young geologist has to face up. Geosites can help to rise geology and the profession of geologists into public interest being important for a necessary change of geologists' image.

Krieg, W. (1994). Conditions of protection of geo-sites in Austria, *Mém. Soc. géol. France,* 165, 81-82.

Protection of geosites in Austria is the matter of the 9 counties. A first provisional list contains about 700 sites; 630 of them are somehow protected. Only few fossils sites and mineral sites are protected. Up to now there are only few efforts to unify the system of classification and only few beginning of geotop-inventories, and nearly no management or information to the public.

Krieg, W. (1996). Progress in management for Conservation of Geotopes in Europe, *Geologica Balcanica,* 26/1, 13-14.

This paper summarizes the situation of geosites conservation in Europe.

Kruhl, J.H. (2006). *Rahmenbedingungen einer Geotop- und Geopark-bezogenen Didaktik*, Geopark- und Geotourismusforschung, Karlsruhe, Regionalwissenschaftlicher Fachverlag (RWFV).

This paper focus on the didactic activities that can be developed thanks to a geosite or a geopark. It demonstrates that guidelines for an ideal design of information panels, brochures etc. still should be developed.

Küttel, M. (1999). Geotop- und Biotopschutz - Zentrale Elemente des Naturschutzes, *Geologia Insubrica,* 4/1, 67-69.

This paper focus on the need of integration of biotope and geosite protection to a global nature protection. It also analyzes the potential conflicts which could emerge between these two domains.

Lagally, U. (1994). Grundlagenforschung zum Geotopschutz- eine Aufgabe der Geologischen Dienste am Beispiel Bayerns, in: Matschullat, J., Müller, G. (ed.) *Geowissenschaften und Umwelt*, Berlin-Heidelberg, 253-259.

This paper focuses on geosite definitions, objectives, inventories, assessment and protection in Bayern (Germany).

Lugon, R., Reynard, E. (2003). Pour un inventaire des géotopes du canton du Valais, *Bull. Murithienne,* 121, 83-97.

This paper focuses ont the need to drow up an official inventory of geosites in the Canton of Valais (Switzerland) for a better protection, conservation and promotion of geosites.

Madeira, J. (2005). The volcanoes of Azores Islands: a World-class heritage. Examples from Terceira, Pico, and Faial Islands, *IV International symposium ProGEO on the Conservation of the Geological Heritage, Lisbon (Portugal), 16-21.09.2005*, University of Lisbon, Faculty of Sciences.

This paper presents the volcanic heritage of the Azores Islands.

Marchetti, M., Vezzani, A. (1999). Un esempio di valutazione dei beni geomorfologici nelle Dolomiti di Fànes (Italia), *Mem. Descr. Carta Geol. d'It.,* LIV, 425-432.

An example of a procedure to evaluate the geomorphological assets in the Fànes Dolomites (Italy) is presented. The studies in progress for the assessment of the geomorphological asset imply the attribution of a specific level of interest to those forms that have a significant scientific character.

Martini, G. (1994). Bilan général de la protection du patrimoine géologique en France, *Mém. Soc. géol. France,* 165, 111-118.

A French law on the protection of nature covers geological sites of national importance. According to this law dated July 1976, geological sites are considered as geological reserves belonging to the 100 French natural reserves created by the Ministry of Environment. The eight French geological reserves are organized within a national network. Besides the natural reserves that cover a small area only, the French geological heritage has no legal existence. Therefore, the Research Department of the Ministry of the Environment is preparing a global review of the geological heritage. This review should lead in the middle term to national regulations that should be more appropriate than the present ones.

Massoli-Novelli, R. (2005). The main geomorphosites of the Egadi Islands (Sicily, Italy), *Il Quaternario*, 18 (1), 137-143.

This article describes the main geological and geomorphological features of the three main Egadi Islands (Sicily, Italy). It also identifies the main geomorphosites of these three islands for the first time.

Massoli-Novelli, R., Cauli, A. (2004). Aspetti del geoturismo nell'area marina protetta "Penisola di Sinis - Isola di Mal di Ventre" (Oristano, Italy), *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 68-71.

This paper presents the geoheritage and some geosites of the region "Penisola di Sinis - Isola di Mal di Ventre" (Italy).

McEwen, L. (1994). The challenges of geomorphological river system conservation for the 1990s, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, The Geological Society, 133-138.

The effective conservation of geomorphological site and landforms heritage for research, education and aesthetic reasons is an important area of Earth science conservation in the United Kingdom. This paper addresses the key issues and challenges facing geomorphological conservation of river systems in the 1990s at a national, regional and local level.

McKenzie, G. (1994). International support for conservation of geological, landscape and historical sites : the homeland initiative, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, The Geological Society, 403-406.

Many organizations have developed creative ways to conserve areas with natural, historical, cultural and industrial heritage value. The "homeland initiative" is proposed as a model for educating the international public about the need for building an international network for collaboration on development of heritage sites.

McKirdy, A., Threadgould, R. (1994). Reading the landscape, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, Geological Society, 459-462.

This article develops the Scottish Natural Heritage (SNH) initiatives on how to use the landscape as a basis for interpretation to raise public awareness of the Earth sciences.

Messina, A., Somma, R., Macaione, E., Di Stefano, A., Marino, M., Careri, G., Bonanno, R. (2004). L'evoluzione geologica dei Monti Peloritani (Italia meridionale) attraverso i geositi: una prospettiva di geoconservazione per la regione Sicilia, *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 52-57.

This paper presents the geosite inventory of the region of Monti Peloritani (Italy).

Meyer, D. E. (1996). Geologische Aufschlüsse, Naturdenkmale und Lehrpfade – ihre Bedeutung für die Gesellschaft, *Geol. Jb,* A 1444, 5-34.

This article is about the importance of protection of significant geological structures for improving society's awareness of the geosciences. The concepts of conservation and the practical requirements for the establishment of geo-trails are discussed.

Monbaron, M. (1993). La géomorphologie, élément indispensable dans toute étude d'impact sur l'environnement, *Ukpik, Cahiers de l'Institut de Géographie de l'Université de Fribourg,* 9, 113-130.

Up to the present, environmental impact studies in Switzerland have applied very little geomorphology in their considerations. The importance of considering geomorphology in environmental impact studies is underlined in this article. The basic role of the professional geomorphologist in the evaluation process is also examined.

Monbaron, M. (2004). Inventaire des géotopes géomorphologiques du Canton du Jura, *Swiss Geoscience Meeting 2004, Lausanne, 19-20.11.2004*, Lausanne, Académie Suisse deas Sciences Naturelles (SCNAT), 253.

This paper presents the geomorphosite inventory of the Canton of Jura (Switzerland).

Nesci, O., Savrlli, D., Diligenti, A., Marinangeli, D. (2005). Geomorphological sites in the northern Marche (Italy). Examples from autochton anticline ridges and from Val Marechhia allochton, *Il Quaternario*, 18 (1), 79-91.

Two areas are proposed as representative of as many quite different geological and structural domains of the Marche region (Italy). Although similar morphoclimatic conditions, many landforms are quite different from one area to the other. Thus, the two areas are suitable for highlighting interrelationships between geology and landforms both from scientific and educational standpoint.

O'Halloran, D. (1994). Earth science conservation in Great Britain. The national picture, *Mém. Soc. géol. France,* 165, 159-161.

The Geological Conservation Review (GCR) has provided protection to sites which are of national research importance, while the locally based RIGS (Regionally Important GeoSites) schemes employ a wider range of criteria, including aesthetic and heritage value in selecting and protecting local and regionally important sites. Specially commissioned research studies are now providing solutions of practical problems in protecting sites from threats such as coastal protection, infill of quarries and afforestation, and are making a very

real contribution to effective conservation.

Orrù, P., Panizza, V., Ulzega, A. (2005). Submerged Geomorphosites in the marine protected areas of Sardinia (Italy): assessment and improvement, *Il Quaternario*, 18 (1), 167-174.

This work wants to experiment and to verify the applicability of the methodologies of assessment and census of geosites in submerged areas. The aim of the project is to gather the data on the characteristics of submerged resources, both for scientific purpose and for a possible geotourist promotion.

Page, K.N. (1994). Informations signs for geological and geomorphological sites : basic principles, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, The Geological Society, 433-437.

The understanding of geology by the public is generally very low. Once on a site, conservationists and Earth scientists have a golden opportunity to grasp the general public's attention and introduce them to Earth science and Earth science conservation. The philosophy and principles behind the process of design and installation of site information signs at Earth science sites are discussed and three basic categories of sign presented, namely: standardized site management signs; site specific information plaques and interpretative site information boards.

Palacio Suarez, J., Cendrero Uceda, A., Agueda Villar, J. (1998). El patrimonio geologico : concepto y significacion, in: Duran, J. J. (ed.) *Patrimonio geologico de la Comunidad Autonoma de Madrid*, Madrid, Asambles de Madrid, Comision de Patrimonio Geologico de la Sociedad Geologica de Espana, 49-57.

This paper presents a summary of geoconservation in the World and in Spain. It contains also a definition of geoheritage and an explanation of the necessity of geoconservation.

Palmentola, G., Lazzari, M. (2005). Proposal for a thematic itinerary on geomorphological sites along the western coast of the Salento Peninsula, southern Italy, *Il Quaternario*, 18 (1), 115-123.

This paper presents some coastal geomorphosites of the Salento Peninsula (Italy). The variety of well preserved and easy accessibe landforms and their concentration in a not wide coastal sector constitute a good opportunity for both didactic and popularization of the processes that characterize the coastal dynamics. A didactic path has therefore been realised and is presented in the article.

Pancza, A. (2003). Les moulins souterrains du Col-des-Roches, *Géomorphologie et Tourisme, Actes de la Réunion annuelle de la Société Suisse de Géomorphologie (SSGm), Finhaut, 21-23.09.2001*, Université de Lausanne, Institut de Géographie (Travaux et Recherches n° 24), 167-176.

This paper presents the cultural and economic value of the karstic caves at Le Col-des-Roches (Neuchâtel, Switzerland). Some underground mills were built in these caves and are curently one of the jewels of tourism in the Neuchâtel region.

Panizza, M. (1990). Beni geomorfologici nel bacino del fiume Panaro, in: Serafini, F., Manicardi, A. (eds.): *Il sistema fluviale Scoltenna/Panaro: storie d'acque e di uomini*, Amministrazione Comunale di Nonantola, 49-54.

Short presentation of geosites in the catchment area of the Panaro river (Italy). This paper contains also a presentation of the concept of cultural geoheritage.

Panizza, M. (1992). Sulla valutazione dei beni ambientali, *Mem. Descr. Carta Geol. d'It.,* XLII, 479-484.

The author develops two points of view of evaluation of environmental assets : an aesthetic type (of purely intuitive nature) and a cultural type (based on the scientific understanding of the asset in question).

Panizza, M. (1998). Relations homme-environnement : l'exemple d'une recherche géomorphologique de l'Union Européenne, in: Edipuglia (ed.) *Il sistema uomo-ambiente tra passato e presente*, Bari, 307-309.

After having pointed out the fundamental concepts of the relationship between man and geomorphological environment, the author presents the first results of a scientific research on these subjects, and a method to evaluate some types of natural assets.

Panizza, M. (1999). Geomorphological assets: concepts, methods and examples of survey, in: Barettino, D., Vallejo, M., Gallego, E. (eds.) *Towards the Balanced Management and Conservation of the Geological Heritage in the New Millenium*, Madrid, 125-128.

Some fundamental concepts on geomorphological assets are reviewed and methodology for their survey and assessment is presented and pointed out. A case study regarding geosites in the province of Modena (Italy) is also presented.

Panizza, M. (1999). The geomorphological approach to landscape assessment, *Mem. Descr. Carta Geol. d'It.,* LIV, 381-383.

First, some concepts for the definition and the assessment of geosites are presented. Then, the different types of risk and impact derived from the relationship between geomorphology and a project are discussed. Finally, the author proposes a methodology for the evaluation of the quality of a landform and for the quantification of the possible impacts.

Panizza, M. (2001). Geomorphosites: Concepts, methods and examples of geomorphological survey, *Chinese Science Bulletin,* 46, 4-6.

Some foundamental concepts of geomorphosites are reviewed and a methodology for their survey and assessment is presented and pointed out. A case study in the province of Modena (Italy) is presented.

Panizza, M. (2002). Geomorphology applied to cultural heritage, in: *Estudios recientes (2000-2002) en geomorfologìa. Patrimonio, montana y dinàmica territorial*, Valladolid, Dpto. Geografia-UVA, 13-20.

Within the framework of geomorphology, a stimulating perspective of training and research activities is given by the relationship between this discipline and cultural heritage or, more in general, between these assets and the whole landscape in which they are located. Research activities may then be carried out according three approaches: environmental, historical and cultural-philosophical.

Panizza, M. (2003). Géomorphologie et tourisme dans un paysage culturel intégré, *Géomorphologie et Tourisme, Actes de la Réunion annuelle de la Société Suisse de Géomorphologie (SSGm), Finhaut, 21-23.09.2001*, Université de Lausanne, Institut de Géographie (Travaux et Recherches n° 24), 11-18.

Geomorphological assets have always aroused interest owing to their spectacular features; nevertheless their intrinsec value cannot be based just

on these characteristics, but rather on the cultural, scientific, educational and geodiversity aspects. This paper proposes some considerations about the links between geomorphology and tourism and the way to develop geotourism in the context of a cultural landscape.

Panizza, M. (2005) (ed.). *Manuale di geomorfologia applicata*, Milano, Edizioni FrancoAngeli.

This book focuses on the application of geomorphology in the context of risk management and resources exploitation. The geosite concept is also discussed. Within this framework, the problems linked with territorial planning, environmental impact assessment and sustainable development are identified as foundamental aspects.

Panizza, M., Piacente, S. (1993). Geomorphological assets evaluation, *Z. Geomorph. N. F.,* Suppl.-Bd. 87, 13-18.

After a general introduction into the problems of evaluation of geomorphological assets, the authors discuss the relationships between geomorphology and Environmental Impact Assessment.

Panizza, M., Fabri, A.G., Marchetti, M., Patrono, A. (eds.) (1996). *Geomorphologic analysis and evaluation in environmental impact assessment*, Enschede, ITC.

This book focuses on the relationships between geomorphology and environmental impact assessment. It contains the following parts: A conceptual approach connecting geomorphology and environmental impact assessment (EIA). Geomorphology and EIA: a methodologic approach. EIA and landforms. EIA and processes. EIA and raw materials. GIS and EIA. Environnemental indicators.

Panizza, M., Piacente, S. (1998). *Conoscenza geologica e gestione dei beni architettonici*, Archeologia e ambiente, Ferrara-Fiere, A.B.A.C.O. Edizioni.

The relations which bind a cultural asset to the natural environment in which it fits are presented in a conceptual diagram. This diagram can assume the role of methodology of research to provide operative proposals for the management of architectonics assets and of the environment.

Panizza, M., Piacente, S. (2000). Relazioni tra scienze della terra e patrimonio storico-archeologico, *Convegno GeoBen 2000. Condizionamenti Geologici e Geotecnici nella Conservazione del Patrimonio Storico Culturale, Torino (Italy), 7-9.06.2000*, Torino, CNR-IRPI, 723-730.

The relations which bind a cultural asset to the natural environment in which it fits are presented in a conceptual diagram. This diagram can assume the role of methodology of research to provide operative proposals for the management of architectonics assets and of the environment.

Panizza, M., Piacente, S. (2002). Geomorphosites: a bridge between scientific research, cultural integration and artistic suggestion, *Geomorphological Sites: research, assessment and improvement, Modena (Italy), 19-22.06.2002*, Università degli Studi di Modena e Reggio Emilia, Dipartimento di scienze della Terra, 15-20.

In this article, the research on geomorphological sites (inventoring, assessment, protection), their cultural integration and their artistic suggestion are discussed by making reference to examples at a local, national and international level.

Panizza, M., Piacente, S. (2003). *Geomorfologia culturale*, Bologna, Pitagora Editrice.

This book proposes the integration of the culture in the geomorphological studies. It presents some basic concepts of the geomorphology, the importance of this discipline within the context of risk and environmental impact assessment and the cultural value of geomorphosites.

Panizza, M., Piacente, S. (2005). Geomorphosites : a bridge between scientific research, cultural integration and artistic suggestion, *Il Quaternario*, 18 (1), 3-10.

The geological aspects has not yet assumed its proper value as a Cultural Asset because of a static approach of the geoheritage current in society. The paper shows that new occasions for re-launching Geology as a cultural and social discipline has recently developed in the fields of scientific research on geosites, of cultural integration between the geological-geomorphological aspects of a territory and the other landscape components and of artistic suggestion of those geosites wich have been source of inspiration.

Panizza, V. (ed.) (2003). *Geomorphological Sites: assessment and mapping*, Cagliari, Dipartimento di Scienze della Terra, Università degli studi di Cagliari.

The workshop "Geomorphological Sites: assessment and mapping (Cagliari, Italy, 1-5.10.2003) focuses on the research concerning geomorphosites, on their assessment and mapping in particular.

Patzak, M., Eder, W. (1999). "UNESCO GEOPARK" - New Unesco Programme for the environment and sustainable development, *Geologia Insubrica,* 4/1, 17-18.

This paper presents the world network of natural parks labelled "UNESCO Geopark". These parks are designed to become a tool for a better understanding of the geoheritage and a better use of the abiotic resources, by increasing public awareness for a balanced relationship between the humans and the Earth.

Patzak, M. (2001). UNESCO and Geological Heritage, *2nd European Geoparks Network Meeting, Lesvos (Greece), 3-7.10.2001*, Mytilene (Lesvos, Greece), Natural History Museum of the Lesvos Petrified Forest, 21-24.

This paper presents the efforts made by UNESCO towards the geoconservation, in particular the cooperation with the European Geoparks Network.

Pelfini, M. (2007). Un esempio delle interazioni fra dinamica geomorfologica e frequenza turistica: la rapida evoluzione dei geomorfositi di alta montagna e l'incremento del rischio lungo gli itnerari glaciologici, *Geologia e turismo. Beni geologici e geodiversità, Terzo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 1-3.03.2007*, Bologna, Associazione Italiana Geologia e Turismo.

This paper focuses on the risks of geomorphological processes for tourists that visit glacial geomorphosites or glaciological paths.

Pellegrini, L., Boni, P., Verces, P., Carton, A., Laureti, L., Zucca, F. (2005). The Geomorphosites in Lombardy, *Il Quaternario*, 18 (1), 39-61.

This paper presents the geomorphosites inventory of the region of Lombardy (Italy).

Pereira, P., Pereira, D. I., Alves, I. C., Meireles, C. (2002). Patrimonio geomorfologico do sector oriental do Parque natural de Montesinho (NE Portugal), in: *Estudios recientes (2000-2002) en Geomorfologia. Patrimonio, montana y dinamica territorial*, Valladolid, Dpto. Geografia-UVA, 423-430.

This paper presents the geoheritage of the Montesinho Natural Park (Portugal) and discusses the relationships between geology, geomorphology and landscape in the context of this park.

Pereira, D.I. (2005). A New Bridge on the Duoro River: Linking Geological and Cultural Heritage, *IV International Symposium ProGEO on the Conservation of the Geological Heritage, Braga (Portugal), 8-12.09.2005*, University of Minho, 13-20.

This paper presents the links between geological and cultural heritage with the exemple of the Duoro river (Portugal).

Pereira, D., Pereira, P. (eds.) (2005). *Geology as background for a top-class geological and cultural heritage in the Douro region (Northern Portugal)*, Braga (Portugal), University of Minho.

This field trip guide book focuses on the cultural value of the geoheritage in the Douro region (Portugal).

Piacente, S. (2005). Geosites and Geodiversity for a cultural approach to Geology, *Il Quaternario*, 18 (1), 11-14.

In western culture there always seems to have been an inherent difficulty in ackowledging the importance of Nature diversity. In the twentieth century, particulary during the last few decades, there has been a reversal of this tendency. In this context, a new need of contact with the nature has developed and consequently the geodiversity is becoming more important.

Piacente, S., Giusti, C. (2000). Geotopos, una oportunidad para la diffusion y valoracion de la cultura geologica regional, *XI Simposio sobre la Ensenanza de la Geologia, Santander, 11-15.09.2000*, 134-136.

This paper presents a project of promotion of the geoheritage in Italy. Besides carrying out the listing and assessment of the most important sites of geological interest, this project is directed to the development of educational and tourist routes and cultural itineraries, in order to emphasise the potential opportunities for knowledge and fruition of the regional geological heritage.

Piacente, S., Poli, G. (eds.) (2003). *La Memoria della Terra – La Terra della Memoria*, Bologna, Edizioni L'inchiostroblu.

The idea behind the creation of this volume is to put together the results of investigations that aim to show Geology's more attractive side; not the "severe" face linked to hazards and risks but the "milder" face made up of attractive diversities, history and visual and emotional enjoyement.

Piccini, L., Saur, U., De Waele, J., Mietto, P. (2005). The Italian register of natural hypogean geosites: a preliminary report, *Il Quaternario*, 18 (1), 155-162.

This paper presents the preliminary report of the Italian register of natural hypogean geosites, defined as subterranean natural voids that represent exceptional naturalistic and/or cultural value. A provisional list of these sites is proposed and already shows the exceptionality of the Italian hypogean heritage. The aim of this project is to increase public awareness of this heritage.

Pounder, E.J. (1996). Geomorphological conservation: opportunities afforded in Greater Bristol, in: Bennett, M.R. (ed.) *Geology on your doorstep : the role of urban geology in Earth Heritage Conservation*, London, Geological Society, 85-95.

The importance of Regionally Important Geological/Geomorphological Sites

(RIGS) is discussed with reference to the Greater Bristol areas. The public perception of three urban geomorphological sites is examined via a simple questionnaire. The results demonstrate a clear interest on the part of the general public in the landscape around them and a wish to see it conserved. Education, public awareness and local planning are the keys to the effective conservation of such sites.

Pralong, J.-P. (2004). Le géotourisme dans les régions de Crans-Montana-Sierre (Valais, CH) et de Chamonix-Mont-Blanc (Haute-Savoie, F), *Paysages géomorphologiques, Séminaire de 3ème cycle CUSO 2003*, Université de Lausanne, Institut de Géographie (Travaux et recherches n°27), 225-241.

The aim of this paper is to present a general view of geodidactic use of geosites in the areas of Crans-Montana-Sierre (Valais, Switzerland) and Chamonix-Mont-Blanc (Haute Savoie, France). Characteristics, functioning and consequences of such activities are discussed by taking into account the steps of promotion, exploitation and transformation, defined as necessary for implementing and developing geotourism.

Pralong, J.-P. (2004). Pour une mise en valeur touristique et culturelle des patrimoines de l'espace alpin: le concept d' « histoire totale », *Histoire des Alpes,* 9, 301-310.

This article proposes a method to increase the value of geosites and landscapes of the Alps. This method suggests to popularize Earth sciences by showing the depth of the concepts of time and history and by showing the links between different kinds of heritage (geo(morpho)logical, cultural, historical, biological).

Pralong, J.-P. (2005). A method for assessing tourist potential and use of geomorphological sites, *Géomorphologie: relief, processus, environnement,* 3, 189-196.

This paper presents a method for assessing tourist and exploitation values of geomorphological sites in a tourist and recreational context. Its aim is to propose criteria to quantify and qualify their potential in terms of scenic/aesthetic, scientific, cultural/historical, and socio/economic values, and to use this potential in terms of degree and modality of exploitation.

Pralong, J.-P. (2006). Utilisation touristique de cavités karstiques dans les roches évaporitiques: le cas du Valais central (Suisse), *Gestion durable de l'environnement karstique. Actes de la réunion annuelle de la Société Suisse de Géomorphologie (SSGm), La Chaux-de-Fonds, 3-4.09.2004*, Sion, Institut Universitaire Kurt Bösch (IUKB), 55-67.

This paper focuses on the use of superficial and underground karstic sites for tourist and recreative purposes. Risk management and site preservation as well as optimization and number of visitors seem to be the major aspects to take into account and to study.

Pralong, J.-P., Reynard, E. (2005). A proposal for the classification of geomorphological sites depending on their tourist value, *Il Quaternario,* 18 (1), 315-321.

This paper presents theoretical frameworks concerning the relationships between geomorphological landforms and processes and tourist and recreational activities. Some models of this relationship are proposed. Finally, an ensuing classification of geomorphological sites according to the use of their scenic, scientific, cultural and economic values is developed.

Prikryl, R. (ed.) (2004). *Dimension Stone 2004. New Perspectives for a Traditional Building Material*, Leiden, A. A. Balkema Publishers.

This book contains the contributions presented at the conference "Dimension

Stone 2004" (Prague, 14-17.06.2004), that aimed to bring together experts from many fields of research including geology, rock mechanics, geotechnics, stone extractive industry, restoration and architecture. This book provides a state-of-the-art information on recent developments in the use and application of dimension stones throughout the World.

Prinetti, F. (1994). Sites et paysages géologiques en vallée d'Aoste (Italie) : le cadre naturel et juridique de la protection dans une région alpine, *Mém. Soc. géol. France,* 165, 255-257.

In Italy, the most active legislative source for territorial development is the region. Thanks to its small size, it can acquire flexible and selective institutional tools. The need for such tools to protect geological features is not obvious to the members of the Regional Council. The Regional Natural Science Museum aims mostly at setting up a scientific attitude, for a geological awareness of the great wealth of the area's natural and traditional landscapes.

ProGEO (1998). A first attempt at a geosites framework for Europe - an IUGS initiative to support recognition of a world heritage and european geodiversity, *Geologica Balcanica*, 28, 5-32.

This paper presents the ProGEO project to compile a list of European significant geosites to better conserve and promote the geoheritage and the geodiversity. The article contains a preliminary list of such sites for several European countries.

Quaranta G. (1992). Geomorphological assets: conceptual aspect and application in the area of Croda da Lago (Cortina D'Ampezzo, Dolomites), in : Panizza M., Soldati M., Barani D. (eds.), *First European Intensive Course on Applied Geomorphology, Modena - Cortina d'Ampezzo, 24.06-3.07.1992*, Modena, Istituto di Geologia, 49-60.

This paper focuses on the concept of geosite and shows its usefulness in environmental impact studies. It also proposes an example from the Dolomites (Italy).

Reid, C. (1994). Conservation, communication and the GIS : an urban case study, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, The Geological Society, 365-369.

In urbanized areas, new development continually creates temporary exposure whilst threatening existing ones. This paper describes how the GIS is being used within the English authorities to monitor and protect Sites of Importance for Nature Conservation and Sites of Special Scientific Interest.

Reid, C. (1996). A code practice for geology and development in the urban environment., in: Bennett, M.R. (ed.) *Geology on your Doorstep : the Role of Urban Geology in Eart Heritage Conservation*, London, Geological Society, 147-154.

In heavily urbanized areas new development threats existing geosites. Within the Metropolitan Borough of Dudley a newly adopted code of practice aims to monitor and control this development and to improve the interaction between the geologist and the developer.

Reynard, E. (2002). Institutional Resource Regime (IRR). A tool for managing the protection and exploitation of Geomorphological Sites, *Geomorphological Sites: research, assessment and improvement, Modena (Italy), 19-22.06.2002*, Università degli Studi di Modena e Reggio Emilia, Dipartimento di scienze della Terra, 21-26.

This paper aims to present the concept of Institutional Resource Regime and to show the possible application of this institutional approach for improving

the management of geomorphological sites.

Reynard, E. (2003). Öffentliche Politik, Eigentumverhältnisse und Schutz von Geomorphologischen Geotopen, *Geotope - wie schützen / Geotope - wie nutzen. 7. Internationale Jahrestagung der Fachsektion GeoTop der Deutschen Geologischen Gesellschaft und der Arbeitsgruppe Geotopes des Geoforums der Schweizerischen Akademie der Naturwissenschaften, Bad Ragaz, 19-24.05.2003*, Hannover, Deutschen Geologischen Gesellschaft, 94-101.

This paper focuses on the application of the Institutional Resource Regime concept on the protection of geosites.

Reynard, E. (2004). Geosite, in: Goudie, A. (ed.) *Encyclopedia of Geomorphology*, London, Routledge, 440.

This paper presents the concept of geosite. It gives a definition of geosites and presents their values and the threats affecting them. It also focuses on conservation strategies and on assessment methods.

Reynard, E. (2004). Géotopes, géo(morpho)sites et paysages géomorphologiques, *Paysages géomorphologiques, Séminaire de 3ème cycle CUSO 2003*, Université de Lausanne, Institut de géographie (Travaux et Recherches n° 27), 124-136.

This article defines and characterises geomorphological sites. It also approaches their various characteristics and proposes a classification of ten principal types of geosites, including geomorphosites. After having discussed the vulnerability of geosites, the author studies the question of the value of geosites and finishes by presenting some recently developed methods for assessing geosites.

Reynard, E. (2004). L'évaluation des géotopes géomorphologiques en Suisse, *Paysages géomorphologiques, Séminaire de 3ème cycle CUSO 2003*, Université de Lausanne, Institut de géographie (Travaux et Recherches n° 27), 138- 149.

This paper focuses on geosite assessment in Switzerland. Improvements have been made on geomorphological site assessment during the last decade in four main domains: theoretical reflections by V. Grandgirard in his PhD thesis, geosite inventories, environmental impact assessment and natural objects inventories.

Reynard, E. (2004). Paysages géomorphologiques : perspectives de recherche, *Paysages géomorphologiques, Séminaire de 3ème cycle CUSO 2003*, Université de Lausanne, Institut de géographie (Travaux et Recherches n° 27), 255-258.

This paper gives some research outlooks issues from the conference "Paysages géomorphologiques. Séminaire de 3ème cycle CUSO 2003" (Lausanne - Fribourg, 10-14.02.03, 25-29.08.2003) concerning the relationships between landscape and geomorphology, landscape and institutions, landscape and geomorphosites. It also focuses on geoheritage and on the way to promote it.

Reynard, E. (2004). Protecting stones: conservation of erratic blocks in Switzerland, *Dimension Stone 2004. New Perspectives for a Traditional Building Material, Prague, 14-17.06.2004*, Leiden, A.A. Balkema Publishers, 3-7.

Because of their high value in reconstructing former glacial extensions, erratic blocks are considered as important geosites in Switzerland. In the 19th century, most of them were endangered by the granite extraction industry. This paper recalls the principal steps that permitted the conservation of major erratic blocks in Switzerland, and some recent actions for conserving and

promoting them.

Reynard, E. (2005). Geomorphological sites, public policies and property rights. Conceptualization and examples from Switzerland, *Il Quaternario,* 18 (1), 323-332.

The paper analyses the importance of institutional rules for protecting and managing geomorphological sites. A framework, called Instituitional Resource Regime, is proposed. It combines the analysis of the property rights concerning the resource and the public policies regulating its exploitation and protection. Two Swiss examples are presented to illustrate the analytical possibilities offered by this concept.

Reynard, E. (2005). Géomorphosites et paysages, *Géomorphologie: relief, processus, environnement,* 3/2005, 181-188.

Landscape research has been divided in two main domains, the naturalistic approach and the social one. The author proposes to define the geomorphological landscape as a portion of the Earth surface, which is viewed, perceived and sometimes exploited by Man. The perception of the geomorphology of an area confers values to it. In all processes of analysis, protection and optimisation of geomorphosites, this double component, objective and subjective, has to be taken into account.

Reynard, E. (2006). Valorisation géotouristique du karst de Tsanfleuron (Valais, Suisse), *Gestion durable de l'environnement karstique. Actes de la réunion annuelle de la Société Suisse de Géomorphologie (SSGm), La Chaux-de-Fonds, 3-4.09.2004*, Sion, Institut Universitaire Kurt Bösch (IUKB), 69-79.

This paper develops the principal elements that constitute the geomorphological value of the Tsanfleuron glaciokarst and presents the main steps of tourist development in the area, and its impacts on landscape and landforms. It also presents the way to develop geotourism in this area.

Reynard, E., Holzmann, C., Guex, D., Summermatter, N. (eds.) (2003). *Géomorphologie et Tourisme, Actes de la Réunion annuelle de la Société Suisse de Géomorphologie (SSGm), Finhaut, 21-23.09.2001*, Université de Lausanne, Institut de Géographie (Travaux et Recherches n° 24).

Proccedings of the conference "Géomorphologie et tourisme" (Finhaut, Switzerland, 21-23.09.2001).

Reynard, E., Morand, S., Ammann, T. (2003). Protection et mise en valeur touristique d'un site géomorphologique : la région du Sanetsch (Valais, Suisse), *Géomorphologie et Tourisme. Actes de la Réunion annuelle de la Société Suisse de Géomorphologie (SSGm), Finhaut, 21-23.09.2001*, Université de Lausanne, Institut de Géographie (Travaux et Recherches n° 24), 35-52.

The geomorphology of the Sanetsch area (Switzerland) is rich and diverse. During the 1990s, the tourist pressure accentuated and created many negative impacts on the landscape: destruction of landforms, soil erosion, impacts on the landscape. Various measures attempted to promote and protect the geomorphology of the area, but they still had little concrete effects. Special planning should be a solution for improving the geomorphological protection of the area.

Reynard, E., Pralong, J.-P. (2004). Geoturismo in Svizzera: esperienze e vie di ricerca, *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 85-87.

This paper presents the management of the geoheritage in Switzerland. It focuses on geoparks, geosites and geotourism.

Reynard, E., Pralong, J.-P. (eds.) (2004). *Paysages géomorphologiques. Actes du Séminaire de 3ème cycle CUSO 2003, Lausanne – Fribourg, 10-14.02.2003 – 25-29.08.2003*, Université de Lausanne, Institut de Géographie (Travaux et Recherches n°27).

Proceedings of the "Séminaire de troisième cycle romand de géographie" on geomorphosites and landscapes (Lausanne - Fribourg, Switzerland, 10-14.02.2003 - 25-29.08.2003).

Reynard, E., Gentizon, C., Pralong, J.-P. (2005). La géoconservation : pour un renouvellement de la protection de la nature en Suisse, in: Dambo L., Reynrad, E. (eds.) *Vivre dans les milieux fragiles : Alpes et Sahel. Hommage au Professeur Jorg Winistorfer*, Université de Lausanne, Institut de Géographie (Travaux et recherches n° 31), 57-70.

This paper pleads for a better acknowledgement of the intrinsec value of geoheritage within the framework of Swiss nature protection. An integration of the assessment of the geoheritage in the protection of nature, landscape and heritage and an integration of protection and promotion of natural environments are proposed.

Reynard, E., Panizza, M. (2005). Géomorphosites : définition, évaluation et cartographie. Une introduction, *Géomorphologie: relief, processus, environnement,* 3/2005, 177-180.

This paper focuses on geomorphosite definition, assessment methodology, mapping methods and site protection to achieve the goal of assessing and protecting geomorphosites.

Rivas, V., Rix, K., Frances, E., Cendrero, A., Brundsen, D. (1997). Geomorphological indicators for environmental impact assessment: consumable and non-consumable geomorphological resources, *Geomorphology,* 18, 169-182.

A methodological approach is proposed for the incorporation of geomorphological features into environmental impact assessments. A series of quantitative indicators and indices are proposed, so that impacts on both consumable and non-consumable geomorphological resources can be objectively determined. Procedures for the integration of individual indices into general impact assessments are also proposed.

Röhling, H.-G., Schmidt-Thomé, M. (2004). Geoscience for the public: Geotopes and National GeoParks in Germany, *Episodes,* 27/4, 279-283.

This paper describes the German initiatives on geotope conservation and the implementation of National geoparks and their use for education and tourism.

Saccani, A. (2004). Qualificare e promuovere reti italiane di geositi con identità comuni: l'esperienza del coordinamento aree protette ofiolitiche (C. A. P. O.), *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 81-82.

This paper proposes a better coordination in management of similar geosits. An exemple of the management of ophiolitic geosites in Italy is proposed.

Salerno, G. (2004). Organizzazione territoriale delle conoscenze geologiche per un'azione di marketing territoriale, *Geologia e turismo. Opportunità nell'economia del paesaggio, Secondo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 3-4.11.2004*, Bologna, Associazione Italiana Geologia e Turismo, 103-105.

This paper proposes a geosite management method based on GIS.

Salvan, H.M. (1994). Un problème d'actualité: la sauvegarde du patrimoine géologique. Quelques réflexions., *Mém. Soc. géol. France,* 165, 229-230.

This paper analyzes the various threats to geological heritage and proposes some non administrative mesures to conserve it.

Santangelo, N., Santo, A., Guida, D., Lanzara, R., Siervo, V. (2005). The geosites of the Cilento-Vallo di Diano National Park (Campania region, southern Italy), *Il Quaternario*, 18 (1), 103-114.

The purpose of this work is to present a preliminary identification and inventory of the main geosites of the Cilento-Vallo di Diano National Park (Campania, Italy). Geomorphosites are surely widely represented. This inventory represents a first step for the knowledge and promotion of the geoheritage of this region.

Schlüchter, C. (1994). A model of consensus in aggregate mining and landscape restoration : science- industry- conservation, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, The Geological Society, 39-42.

The consumption of sand and gravel per capita in Switzerland is considerable. A seminal conflict over the conservation of a key Quaternary section in a pit at Jaberg in 1978 led to an awareness amongst Earth scientists, the extractive industry and planners that geoscience understanding was an important element in effective planning of aggregates extraction. Discussions with representatives of the aggregate mining industry since 1978 have ended in the successful establishment of a "Foundation for Aggregates and Landscape". This partnership between industry and Earth scientists offers the prospect of a sustainable approach to managing the sand and gravel resource.

Schlüchter, C. (1997). Vom menschlichen Eingriff zum Geotop?, *Zbl. Geol. Paläont.,* Teil I , 1995 (7/8), 787-792.

In 1713 a river (Kander, Switzerland) was diverted directly into a lake through an artificially excavated tunnel. Since then, a man-made river landscape with a dry sector and with a deep gorge has evolved. The river incision since 1713 has lowered the groundwater table regionally, which has made gravel and sand mining possible. Conflicts between sand and gravel mining and conservation tendencies rise the question of the legal situation of a man-made landscape with regard to the establishment of geological heritage policies.

Schlup, M. (2007). Les « géotopes » du Chemin des Blés, *« Documents » de l'Association pour le patrimoine naturel et culturel du canton de Vaud*, 9, 27-30.

This paper proposes a walk in the Gros de Vaud area (Vaud, Switzerland) to discover some geological sites of this region.

Schoeneich, P. (2007). Géotopes, biotopes et paysage : vers un concept intégrateur du paysage, *« Documents » de l'Association pour le patrimoine naturel et culturel du canton de Vaud*, 9, 15-20.

This article focuses on geosites and on their relationships with biotopes and landscapes. A concept for a more integrated protection and management of landscape is also proposed.

Schoeneich, P., Steiner, P. (1999). Les méandres de la Venoge - Protéger un processus

érosif?, *Geologia Insubrica,* 4/1, 97.

This paper focuses on the challenges of the protection of a dynamic geosite (Venoge, Switzerland).

Seppi, R. (2000). La valorizzazione di alcuni siti minerari del Trentino, *Natura Alpina,* 51, 83-86.

This paper presents some projects to promote the geoheritage of the mining area of Calisio (Trentino, Italy).

Serjani, A., Neziraj, A., Jozja, N. (1997). Methods and criteria used for classification and selection of geological sites in Albania, *ProGeo '97, Tallinn – Lahemaa National Park (Estonia), 2-4.06.1997*, 58-67.

Albania is rich in geological sites testifying about the history of the Earth during past geological epochs. In Albania, the aspect of Geological Heritage Conservation has been never treated up to the last years. On the ground of publications and discussions of the European Association of the Geological Heritage Conservation in the framework of ProGEO and the experience, Albanian geologists have defined the criteria and methods for classification and selection of geological sites of Albania. At the same time, is being compiled preliminary classification and selection of geological sites of special scientific importance, and a preliminary list of outstanding geological sites.

Serjani, A., Jozla, N., Neziraj, A. (1998). Geomorphological sites of Albania, *Geologica Balcanica,* 28, 3-4, 129-136.

Albania is characterized by a typically alpine accidented mountain relief. Different types of relief, and namely, structural-erosional, karstic, river-erosional, erosional-denudated, glacial, seacoast landforms are present. In such a manner are formed a number of geomorphological sites of natural aesthetic and scientific importance or with climate-curative features. Geomorphological sites in Albania are of local, district's, national and some of Balkan or European importance. In appendix: List of geomorphological sites of Albania.

Serjani, A., Hallaci, H., Neziraj, A., Hallaci, A. (2001). Karst and geotops of karst origin in Albania, *Bulletin of the Geological Society of Greece,* XXXIV/2, 811-817.

Albania is one of the most karst-developed countries in Europe. The most widespread karst landforms in carbonate rocks there are valleys, caves, cones etc., while into salt rocks there are formed many karstic lakes and depressions. Up to now about 80 karstic caves, karst fields, valleys, and plains have been determinated.

Serrano Canadas, E. (2001). Espacios protegidos y politica territorial en las islas Shetland del Sur (Antartida), *Boletìn de la A.G.E.N.,* 31, 5-21.

The protected areas of South Shetland islands are linked to the uses and human history. Today, they are combined of disconnected areas where tourism, national policies and science have the main importance to proclaim, to conserve and the territorial use of protection figures. In this work, it is proposed to unify management of Antarctic protected areas.

Serrano Canadas, E. (2002). Elementos geomorfològicos singulares y pérdida patrimonial: el caso del glaciar rocoso de Los Asnos (Alto Campo, Cantabria), in: *Estudios recientes (2000-2002) en Geomorfologia. Patrimonio, montana y dinamica territorial*, Valladolid, Dpto. Geografia-UVA, 431-441.

The assessment and protection of geomorphological heritage is a necessity at

different scales, from the landforms association as landscape constituents until the individual and isolated landforms. This paper presents the example of the Los Asnos rock glacier, that has been destroyed by ski resorts works.

Serrano Canadas, E. (2002). Geomorphology, natural heritage and protected areas: lines of research in Spain, *Geomorphological Sites: research, assessment and improvement, Modena (Italy), 19-22.06.2002*, Università degli Studi di Modena e Reggio Emilia, Dipartimento di scienze della Terra, 27-33.

This paper summerizes the state of knowledge of the management and conservation of the geoheritage in Spain.

Serrano Canadas, E. (2002). Hielo, montanas, mar y fauna: El tourismo en las islas Shetland del Sur (Antartida maritima), *Revue de Géographie Alpine,* 21, 9-23.

The development of Antarctic tourism has led to more frequent landings of cruise ships at an extremely limited number of sites, resulting in serious problems of overcrowding in coastal areas which are ecologically very fragile. The tourists generally visit the ice-free areas and particularly those areas with exceptional landscapes. From an ecological point of view, such sites are not only the richest, they are also the most sensitive. Today, tourist activity must be regulated to ensure the management of protected areas and conservation of the environment.

Serrano Canadas, E. (2002). La evolucion del conocimiento fisico de las montanas, in: *Montanas*, Barcelona, Lunwerg editores, 53-65.

This paper focus on the evolution of the understanding of mountains and contains the following sections: Myth, science and religion in the perception of mountains; The physical discovery of a strange world: Opening the mountain up to knowledge of the 18th century; The mountain as a source of knowledge: Romantism and the study of glaciers; Global and planetary exploration, education and understanding: the meaning of mountains.

Serrano Canadas, E. (2002). The evolution of the physical understanding of mountains, in: *Mountains*, Barcelona, Lunwerg Editores, 306-312.

This paper focuses on the evolution of the understanding of mountains and contains the following sections: Myth, science and religion in the perception of mountains; The physical discovery of a strange world: Opening the mountain up to knowledge of the 18th century; The mountain as a source of knowledge: Romantism and the study of glaciers; Global and planetary exploration, education and understanding: the meaning of mountains.

Serrano, E., Gonzalez-Trueba, J. J. (2005). Assessment of geomorphosites in natural protected areas: the Pico de Europa National Park (Spain), *Géomorphologie: relief, processus, environnement,* 3/2005, 197-208.

This paper aims to propose a methodology for the assessment of geomorphosites that could be applied to natural protected areas at the local scale.

Sinclair, M.T., Stabler, M. (1997). Tourism and environmental issues, in: Sinclair, M.T., Stabler, M. (eds.) *The Economics of Tourism*, London, Routledge, 155-213.

This work connects tourism and natural assets and presents some aspects of the protection of natural resources and of economic aspects related to tourism and environment.

Smith, B.J. (2005). Management challenges at a complex geosite: the Giant's Causeway World

Heritage Site, Northern Ireland, *Géomorphologie: relief, processus, environnement,* 3/2005, 219-226.

This article explains the geological backgroud and significance of the Giant's Causeway World Heritage Site. The geological and geomorphological importance of this site is underestimated: in effects, its protection focuses on biodiversity.

Strasser, A., Heitzmann, P., Jordan, P., Stapfer, A., Stürm, B., Vogel, A., Weidmann, M. (1995). *Géotopes et la protection des objets géologiques en Suisse : un rapport stratégique*, Fribourg, Groupe de travail suisse pour la protection des géotopes.

This report focuses on the protection of geosites in Switzerland. It presents their values and the actual legislation concerning them. It also explains the situation of protection of geosites in Switzerland and in foreign countries. Finally, it proposes a way to improve their protection.

Strasser, A., Felber, M. (1998). Geotopschutz in der Schweiz – Ein steiniger Weg zum Bewusstsein, *GeoForum Actuel*, 14-16.

In spite of the long Swiss tradition in the field of geoconservation (protection of erratic blocks for example), the legislation actually does not focus on it. Therefore, a working group for the protection of geosites was created in 1994. This article presents the various tasks carried out by the working group and proposes a definition of "geosite" and of "zone of geosite protection".

Stuber, A. (1993). La géomorphologie dans les domaines de la protection de la nature et du paysage. Exemples d'application cartographiques, *Cartographie géomorphologique - Cartographie des risques, Les Diablerets – Randa, 19-21.06.1992*, Lausanne, Institut de Géographie (Travaux et Recherches n° 9), 45-51.

This article points out the place of geomorphology and Earh heritage protection in the Swiss legislation.

Stuber, A. (1997). Protection des géotopes, in: Geiger, W., Stuber, A. (eds.) *Manuel de protection de la nature en Suisse*, Lausanne, Delachaux et Niestlé, 83-91.

Short summary of geosite protection in Switzerland.

Stürm, B. (1990). Moraines suisses, *Naturopa*, 26-27.

Moraines are typical forms of the landscape in the center of Switzerland. During the last years gravel exploitation has endommaged them. The article stresses the need of protection of this important type of geosite.

Stürm, B. (1994). Intégration de la protection du patrimoine géologique dans l'aménagement du territoire en Suisse, *Mém. Soc. Géol. France,* 165, 93-97.

Even in a progressive and relatively well-developed planning system as the Swiss, the field of Earth science conservation is scarcely integrated and therefore plays a minor role. A kind of catalyst, which is at work in favour of the conservation of Earth science sites, is missing. A planning category called geotope could overtake that catalytic function. The term geotope could play the same role as the term biotope. Strong impulses from international level are necessary. An International Convention on the Conservation of Geological Heritage could initiate and support the desirable development in the different signatory states.

Stürm, B. (1994). The geotope concept : geological nature conservation by town and country planning, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.)

Geological and Landscape Conservation, London, The Geological Society, 27-31.

This paper focuses ont the way to increase geosite protection thanks to territorial planning. Geosite protection areas could affect subsequent plan settings and could determine the future intervention possibilities. In this way town and country planning could provide powerful instruments by which effective site conservation could be achieved. Existing deficiencies in the legislative framework could be sorted out with the help of an International Convention.

Stürm, B. (1996). The influence potential of physical planning – a big chance for geotope protection and geosphere focused landscape management, *Geologica Balcanica*, 29-31.

This paper focuses on the way to increase geosite protection thanks to territorial planning.

Stürm, B., Hipp, R. (1999). Geotopschutz mit Mitteln der Raumplanung, *Geologia Insubrica,* 4/1, 71-77.

This paper focuses ont the way to increase geosite protection thanks to territorial planning. Geosite protection areas could affect subsequent plan settings and could determine the future intervention possibilities. In this way town and country planning could provide powerful instruments by which effective site conservation could be achieved. This article gives a brief overview of the Swiss planning system. An example shows how geotope protection can be successfully integrated in town and country planning.

Thorvardardottir, G., Thoroddsson, T.F. (1994). Protected volcanoes in Iceland : conservation and threats, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, The Geological Society, 227-230.

This paper focuses on geoconservation in Iceland. It presents the different possibilities to protect volcanoes and the threats affecting them.

Ting, Z., Xun, Z. (2004). Geoscientific signifiance and classification of National Geoparks of China, *Acta Geologica Sinica,* 78/3, 854-865.

The conservation of geological remains in China, especially in renowned sites with historical or cultural significance, has long been paid attention to. As the urban residents become more interested in returning to an harmony with the nature, tourism related sciences and knowledge gets more attractive. Geosites and geoparks can definitely play an important role to lead this historic tendency.

Vogt, J. (2006). *Gebietsschutz und Prädiktisierung als Elemente einer endogenen Regional entwicklung und als Instrumente der Regionalplanung*, Geopark- und Geotourismusforschung, Karlsruhe, Regionalwissenschaftlicher Fachverlag (RWFV).

The article focuses on the problems evolving from the interdisciplinary character of geopark and geotourism research. It tries to integrate geosites and geoparks into the existing systems of planning regulated by public law.

von Salis, K. (2004). Archaeogeotope im Oberengadin, *Swiss Geoscience Meeting 2004, Lausanne, 19-20.11.2004*, Lausanne, Académie Suisse deas Sciences Naturelles (SCNAT), 321.

This paper presents the cultural (archaeological) value of some blocks in Engadin (Switzerland).

Weder, M. (1999). Zwischen Abbau, Wertschöpfung und Geotop, *Geologia Insubrica,* 4/1, 93-94.

This paper presents the conflicts between gravel extraction and geosite protection.

Wegmann, S., Fierz, S. (1997). Témoins de l'histoire de la Terre, *Protection de la nature,* 1/97, 4-9.

This short article presents the concept of geosites and the situation of their protection in Switzerland.

Wiedenbein, F.W. (1993). Die Bedeutung des Geotopenschutzes für Freizeit und Fremdenverkehr, *Naturschutz Wasserschloss Mitwitz,* 1/93, 193-200.

This article focuses on the meaning of geoconservation for spare time activities and tourism.

Wiedenbein, F.W. (1994). Origin and use of the term « geotope » in German-speaking countries, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, The Geological Society, 117-120.

Geotope protection includes all kinds of measures of preservation, development and management of sites of Earth science heritage – geotopes. The aim of geotope protection is the preservation of geodiversity. In the framework of Earth science conservation, the term can perform the same function as the term biotope does in land use planning and nature protection.

Wildberger, A., Oppliger, M.-H. (2001). Géotopes, géotopes spéléologiques, géotopes d'importance nationale, *Stalactite,* 51/1, 41-50.

This paper focuses on karstic geosites in Switzerland. It defines the concept of geosite, explains their assessment and gives an outline of the Swiss legislation in this field. The authors focuses then on karstic geosites and gives a list and a description of the ones who have a national importance.

Wilson, R.C.L. (1994). Earth science conservation: the need for education and training, in: O'Halloran, D., Green, C., Harley, M., Stanley, M., Knill, J. (eds.) *Geological and Landscape Conservation*, London, Geological Society, 473-475.

This paper focuses on the need to raise public awareness of the value of Earth science conservation and to provide training materials to enable more people to become involved in practical conservation activities.

Wimbledon, W.A., Benton, M. J., Bevins, R. E., Black, G. P., Bridgland, D. R., Cleal, C. J., Cooper, R. G., May, V. J. (1995). The developement of a methodology for the selection of British geological sites for conservation: part 1, *Modern Geology,* 20, 159-202.

This article focuses on the conservation of the geological heritage in Britain. It recalls the historical background of geoconservation in Britain and presents the Geological Conservation Review as the fuller and most comparatively-justified site assessement programme in the World.

Zanoletti, E. (2007). Il patrimonio geologico della Valle Strona (VB): un'opportunità per il turismo, Geologia e turismo. *Beni geologici e geodiversità, Terzo Convegno Nazionale dell'Associazione Italiana Geologia e Turismo, Bologna, 1-3.03.2007*, Bologna, Associazione Italiana Geologia e Turismo.

This paper presents the geoheritage of the Strona valley (Italy).

Zarlenga, F. (1996). I Geotopi, dalla ricerca scientifica alla pianificazione, controllo e gestione, *Società Italiana di Geologia Ambientale,* IV, 3-5.

This paper focuses on geosites in Italy. It describes the legislation concerning them and their management.

Zouros, N. (2004). The European Geoparks Network. Geological heritage protection and local development, Episodes, 27 (3), 165-171.

The European Geoparks Network was established in June 2000. Its main objective is to cooperate on the protection of the geological heritage and the promotion of sustainable development in their territories. The purpose of the "European Geopark" trademark would be to share information and expertise, and to define certain common tools in areas of common interest.

Zouros, N. (2005). Assessment, protection, and promotion of geomorphological and geological sites in the Aegean area, Greece, *Géomorphologie: relief, processus, environnement,* 3/2005, 227-234.

This paper focuses on the geoheritage of the Aegean area (Greece). It presents the situation of the assessment, protection and promotion of geosites in this area.