



IMPORTANT GEOSITES OF POLAND IN RELATION TO THE ECOLOGICAL NETWORK NATURA 2000

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Abstract. National and international programs of nature protection unevenly support and promote bio- and geoconservation. The European Ecological Network NATURA 2000 is obligatory to member states of the European Union. It contains two directives dealing with areas of birds protection and areas with habitats of endangered species of plants and animals. The IUGS GEOSITES project, carried out by the ProGEO Association, is of fundamental importance for the geoconservation on international level. The comparison of proposed networks NATURA 2000 and GEOSITES in Poland, and in one of her Southern provinces proved that they are coherent in some large protected areas only. The integration of both programmes is not satisfactory because geological and geomorphological elements are reflected in the NATURA 2000 marginally or even incidentally. Therefore, the international directive of the geosites protection should be introduced in a short time.

Key words: nature conservation, GEOSITES project, NATURA 2000 programme, coherence of European networks, Poland.

Abstrakt. Narodowe i międzynarodowe programy ochrony przyrody nierównomiernie wspomagają i promują ochronę przyrody żywej i nieożywionej. Europejska Ekologiczna Sieć NATURA 2000 jest obligatoryjna dla krajów Wspólnoty Europejskiej. Obejmuje ona dwie dyrektywy, zgodnie z którymi wyznaczane są obszary ochrony ptaków oraz ochrony siedlisk zagrożonych gatunków roślin i zwierząt. Projekt IUGS GEOSITES, realizowany w Europie przez Asocjację ProGEO, ma fundamentalne znaczenie dla geoochrony na poziomie międzynarodowym. Porównanie projektowanych sieci NATURA 2000 i GEOSITES w Polsce, a także na przykładzie jednego województwa z południowej części kraju wykazało, że ich spójność dotyczy jedynie niektórych, dużych obszarów chronionych. Integracja obu programów jest niezadowalająca, ponieważ elementy geologiczne i geomorfologiczne są tylko marginesowo uwzględniane w projektowaniu sieci NATURA 2000. Konieczne jest uchwalenie międzynarodowej dyrektywy dotyczącej geostanowisk.

Słowa kluczowe: ochrona przyrody, projekt GEOSITES, program NATURA 2000, spójność sieci europejskich, Polska.

INTRODUCTION

The modern system of nature conservation should be directed towards the protection of all biological and geological integrated values. Relations between different components of the animate and inanimate nature must be taken into consideration carefully and adequately. At the time of scientific programmes, co-ordination at the international level and the development of the European strategy of nature conservation is the one and only right way to go. Nevertheless, the imbalance in biological and geological conservation follows at

every turn at present time. Some current and proposed programmes carried out during the enlargement of European Union may help redress this imbalance. Promotion of geological heritage is presently based on the following programmes, documents and regulations:

- WORLD HERITAGE CONVENTION of UNESCO, adopted the Convention concerning the protection of the World Cultural and Natural Heritage (started in 1972).

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- PAN-EUROPEAN BIOLOGICAL AND LANDSCAPE DIVERSITY STRATEGY, submitted by the Council of Europe (1995).
- IUGS GEOSITES Project promoted by ProGEO — the European Association for the Conservation of the Geological Heritage (1996).
- EUROPEAN LANDSCAPE CONVENTION, adopted by the Council of Europe (2000).
- EUROPEAN GEOPARKS NETWORK, resolved by UNESCO and supported by the European Union (2001).

The integrated nature conservation system in Europe may be implemented through the co-ordination of two programmes: European Ecological Network NATURA 2000 and the IUGS GEOSITES project. Their first test will be undertaken in Poland.

FRAMEWORK OF THE MOST IMPORTANT GEOSITES IN POLAND

General criteria for inventories helping in selection of areas and sites of special geomorphological interest are similar in many European countries. In setting-up the inventory and in preparation of documentation necessary for creation and development of the network in Poland, the following features were taken into account (Alexandrowicz *et al.*, 1992, 1996):

- representativeness and typical character of a given region in terms of geological and geomorphological features;
- the importance of an object for the history of knowledge of the geological region;
- diversity of features and values represented by a given site;
- rarity, curiosity and exceptionality of site and occurred phenomena;
- aesthetic, scenic and cultural values;
- accessibility for scientific research and educational use;
- persistence and susceptibility to natural and anthropogenic transformations;
- degree of disturbance and potential threats.

By the above mentioned criteria, genetic types of sites and their values are recognised and defined. After the introductory stage, varied criteria adapted to the regional features of site type will be applied at the next stage and proposed adequately to the protection category (Alexandrowicz *et al.*, 1996). The method for selecting sites, presented in brief here, permits to distinguish the sites qualified to different levels of local, regional and international (inter-regional, global) significance.

The IUGS GEOSITES Project refers to identification, listing and documentation of geosites or site-set (areas) characterised by values of international significance (Wimbleton, 1999). The project is carried out in Europe by ProGEO since 1996. Particular countries choose and justify their own sites in the regional geological context following the specified selection methodology (Wimbleton *et al.*, 1999). In this way, the most important geosites have been included into the national lists as candidates to the European network (Wimbleton *et al.*, 1998; Alexandrowicz *et al.*, 1999).

If only present internationally accepted values of nature would be taken into consideration, the prepared European geosites network might be seriously impoverished as it would not cover geological phenomena. The individuality of particular geological region encompasses the diversity of stratigraphical formations, facies, rocks, tectonical structures and landforms. They determine geological pattern of each country. Stratotypes of litho- and biostratigraphical units, their bound-

aries, outcrops of specified rocks, structures of the bedrock and landscape reflecting different forms of relief are also typical regional elements. They should not be excluded during the selection of geosites and their inclusion into the protected network.

Trans-boundary areas being under different regulations in neighbouring countries need special attention and co-operation in frontier regions. Countries of particular parts of Europe have joined in Regional Working Groups of ProGEO to develop the selection of sites and generation of the database. National frameworks of particular countries should be comparable to propose the common network. This action would eventually lead to constitution of the European geosites network co-ordinated by the IUGS GEOSITES Project.

The progress of geosites identification and selection is not uniform. In particular countries, the draft European list of key geosites compiled by W. A. P. Wimbleton has been more or less verified and supplemented (Wimbleton *et al.*, 1998). The Polish list comprises at present about 150 most important and representative geosites (Alexandrowicz, 2003). In relation to the preliminary list, the number of localities increased twofold but their supplementation is still not excluded (Alexandrowicz, 1998). Subsequently, a database of geosites is prepared (in English) in accordance with the global geosites inventory format (Johansson *et al.*, 1998; Wimbleton *et al.*, 1999). Methodological principles used for the database are presented separately in this volume (Miśkiewicz, 2004). Data on particular geosites and areas with site-sets are prepared successively by team of geoscientists co-ordinated by the author as part of the national project.

Candidates selected for the European framework are qualified according to their principal values (Fig. 1). More than one third of them are related to stratigraphy: 28% to Phanerozoic, 10% to Quaternary, and only 1% to Proterozoic. Geomorphological objects constitute another important group of sites (29%). Less numerous candidates represent palaeobiology (12%), palaeoenvironment (6%) and petrography (5%) while all remaining types, connected with tectonic structures, mineralogy, mineral deposits and cosmogeology reach together 9%.

The Polish list of geosites designated for the European network includes both objects protected and proposed for protection (Fig. 2). The first ones prevail. They are the selected national parks as site-sets (7%), nature reserves (26%) as well as individual objects: nature monuments (12%) and documentary sites (11%). A half of the not protected ones has just obtained the documentation and will soon receive the legal registration

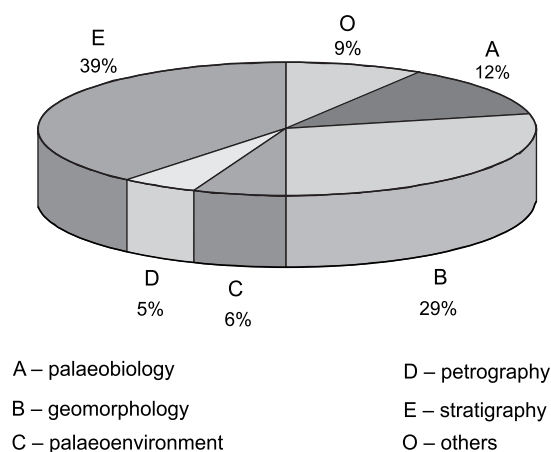


Fig. 1. Main types of 150 Polish geosites selected for the European list

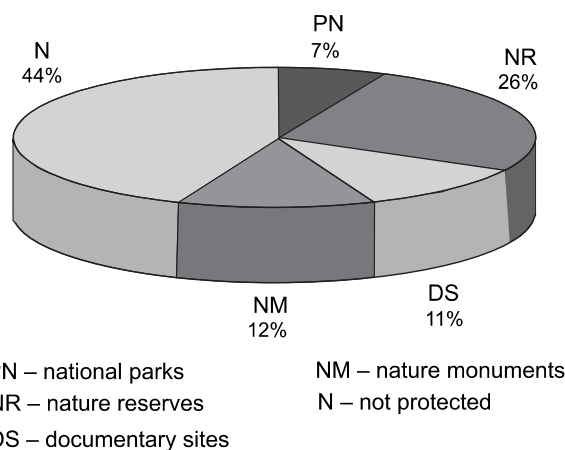


Fig. 2. State of 150 Polish geosites protection selected for the European network

into various categories. Some of the objects are situated in landscape parks.

The distribution of about 150 selected most important and representative sites is closely compared with the geodiversity of particular regions of Poland (Fig. 3). Three classes of geodiversity: the highest, the middle and the lowest ones have been distinguished. They correspond to the structure of geological bedrock, the range and thickness of Quaternary cover and with the main elements of the relief. The southern part of the country and small fragments of Baltic coast belong to the highest class. Cliffs, dunes and spits stretching along

the coast of Baltic Sea are still shaped by active littoral and aeolian processes. The structural relief is a principal feature of mountains and uplands morphology in Southern Poland. Pre-Quaternary formations of different age and facial development crop out in many places and are accessible as sites.

Geosites — candidates for the European list are concentrated especially within areas of the highest geodiversity class. The most part of proposed geosites is situated there forming a network composed of site-set in 10 selected national parks, 7 landscape parks and in the Wieliczka Salt Mine — the monument of Word Heritage. Numerous protected geosites and pro-

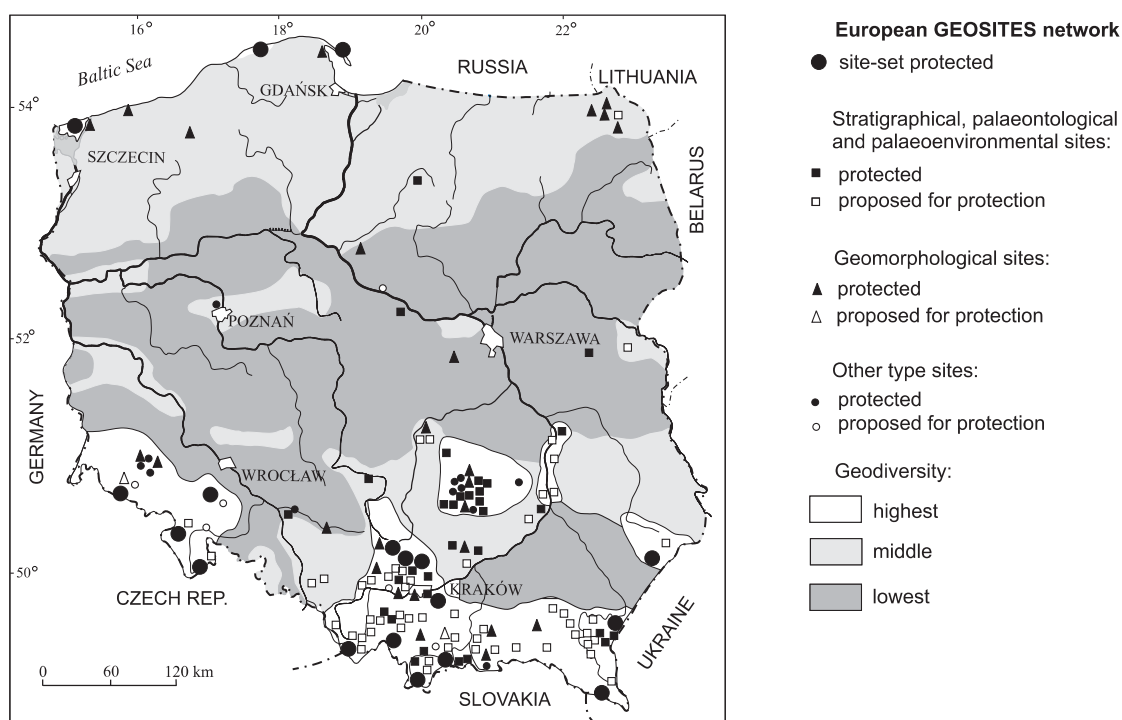


Fig. 3. Distribution of the most important geosites, candidates for the European GEOSITES Network

posed in different categories for protection are distributed in mountains and uplands. They represent mainly stratigraphic, palaeobiological, palaeoenvironmental and geomorphological values of nearly completely investigated regions: Carpathians, Silesia–Cracow Upland and Holy Cross Mts (Alexandrowicz, Alexandrowicz, 1999; Alexandrowicz *et al.*, 1999; Urban, Wróblewski, 1999). Noteworthy is the conservation project enclosing stratotypes of fossiliferous Cretaceous deposits in the middle section of the Vistula River (Walaszczyk *et al.*, 1999). Sudetes — another very interesting region with a rich evidence of geological history — need supplements for creation of individual geosites to protect all the geodiversity (Bobiński *et al.*, 1999). The trans-boundary region of Eastern Poland: Roztocze Hills, should become the enlarged conservation area.

Quaternary deposits cover the remaining part of Poland. Area of young glacial relief with belt of end moraine and Lakeland generated during the last Scandinavian ice-sheet represents the second class of the geodiversity. Beside high values of the landscape, big erratic boulders and outcrops of glacial/interglacial sediments are the geosites proposed for the network (Ber, 1999). Some areas in the Central and Southern Poland have also been enclosed to the same class of geodiversity.

A large area of Central Poland and the Carpathian Foredeep have the lowest geodiversity category because of the human impact: landuse and forestry considerably have transformed them. Only a few proposed sites are located there.

COHERENCE OF THE EUROPEAN NETWORK NATURA 2000 AND GEOSITES

European Ecological Network NATURA 2000 is the basic programme of nature conservation, obligatory to the member countries of European Union (EU). This network is to protect representative and endangered natural habitats, and rare and endangered species of flora and fauna. Its standards are defined by the following EU legal acts: *Directive on the conservation of wild birds* (1979) implemented in the form of Special Protected Areas (SPAs) and *Directive on the conservation of natural habitats of the wild flora and fauna* (1992 and further) indicated as Special Areas of Conservation (SACs).

The NATURA network is formed independently of domestic conservation systems, to some extent within them. In the first instance, the network has to function in the conservation plans, in the second one — in the plans of spatial management of the area. In Poland project of this network is being prepared

in accordance with the directives. The Ministry of Environment supervises it. On the basis of the Habitats Directive — 277 areas, and on the basis of Directive of wild birds — 141 areas were selected (Baranowski, 2003). Territories of these areas cover 17.57% of the country.

Proposed network of the NATURA 2000, selected particularly with respect to natural habitats, is undoubtedly of great importance also for geodiversity conservation. Natural habitats of European importance are selected on the basis of their geographical, abiotic and biotic features (Mróz, Perzanowska, 2003). Abiotic features are not specific natural values particularly deserving conservation and, therefore, the NATURA network does not take into consideration the necessity of bio- and geodiversity integration, although their interdependence exists there (Alexandrowicz, Kozłowski, 1999; Alexandrowicz *et al.*,

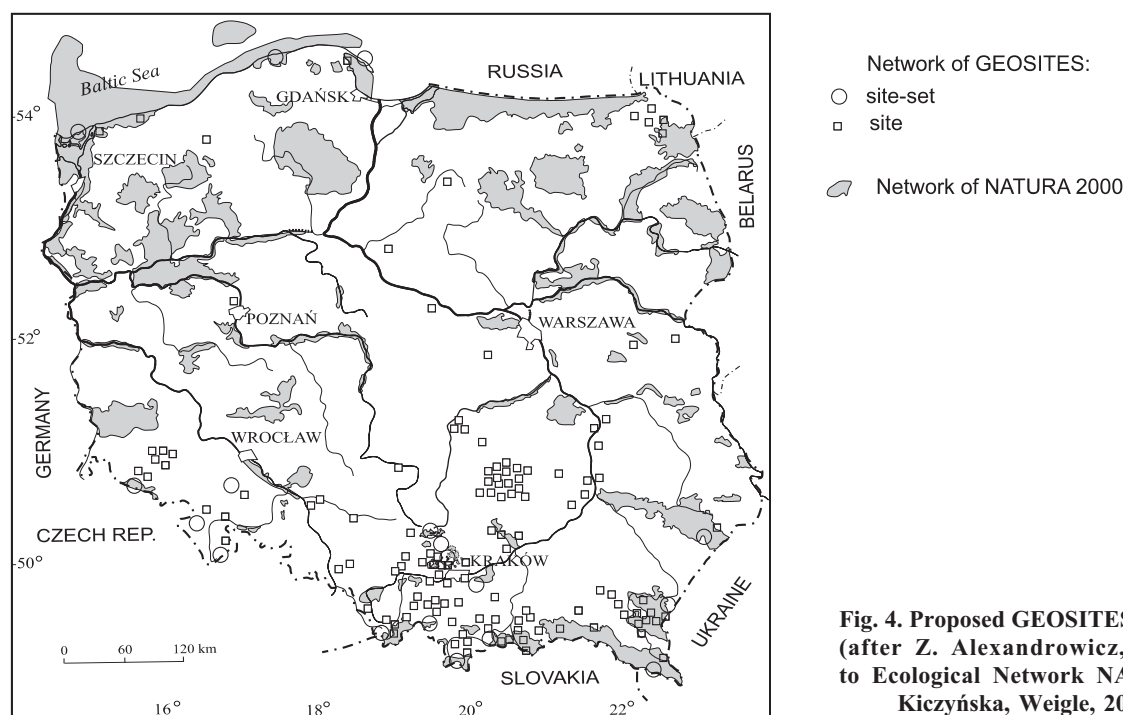


Fig. 4. Proposed GEOSITES Network of Poland (after Z. Alexandrowicz, 2003) in relation to Ecological Network NATURA 2000 (after Kiczyńska, Weigle, 2003, simplified)

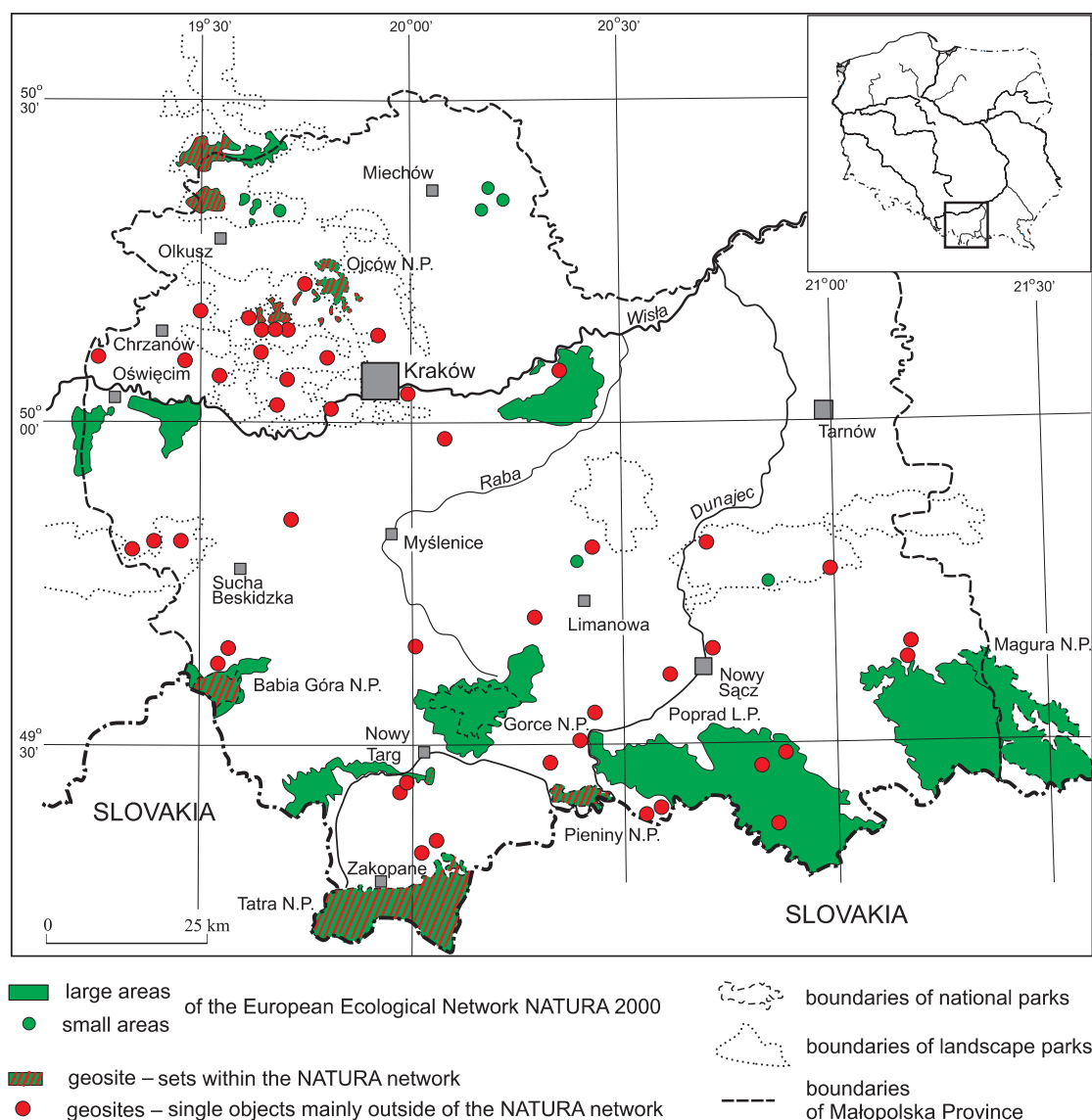


Fig. 5. Coherent networks of NATURA 2000 and GEOSITES; a case of the Malopolska Province in Southern Poland

2002). Cohesion of the idea and activity between particular nature conservation disciplines is necessary, and this will be the challenge for the 21st century.

Convention on Biological Diversity, confirmed in 1992 during the international conference in Rio de Janeiro, as well as several other conventions and agreements are the base for creation of the European Ecological Network NATURA 2000 (Makomaska-Juchiewicz, Tworek eds., 2003). Polish government has ratified most of these conventions (Weigle ed., 2002). The network NATURA 2000, supported by directives addressed to members of EU, is the leading element of the Pan-European Ecological Network (PEEN) and the base of its strategy. It would create the coherent conservation system enclosing the biological and landscape diversity of Europe. Unfortunately, the geological interest is not included there and has been only marginally mentioned in the PEEN. In consequence, it is doubtful if the Pan-European Ecological Network

may really create the coherent nature conservation system enclosing both biological and geological values of the nature.

Preliminary analysis of geosites distribution, formed on the background of NATURA network and suggested by Poland for the European network, is less or more incoherent in particular regions of our country. This concerns individual, small but important geosites in particular (Fig. 4). Ecological network which has already been planned, especially the vast areas being under domestic conservation as national parks or landscape parks in general, corresponds with areas belonging to high geodiversity class (Alexandrowicz *et al.*, 2002). Concentrations of geosite-sets are situated within large areas selected in accordance with directives of NATURA network. The two independently delineated areas cover partly or even completely each other. Southern Polish mountain national parks and landscape parks are the best examples of such coincidence.

The coincidence of both networks is clearly expressed also in the northern part of the country, along the sea-coast. Within the highest diversity zone of the Polish Uplands, the geosites number is higher than their biological counterpart. The considerable number of geosites connected with numerous abandoned and protected quarries left outside the NATURA network characterises Holy Cross Mts. and the central section of the Vistula river valley. On the other hand, an interesting geological belt of Roztocze Hills is a part of a large area included within the NATURA network, extending between the Vistula valley and the Poland–Ukraine boundary. The Silesia–Cracow Upland, including Polish Jura Chain, has special status in the GEOSITES project due to its specific structural and denudation landscape, advanced nature protection and the selection for promotion as geopark. The NATURA network encloses a part of these valuable rocky localities.

In the remaining part of Poland, characterised by middle and lower classes of geodiversity, almost all proposed important geosites are situated outside the NATURA network. Both described networks do not coincide here but, hopefully, this may be changed in the future.

NATURA networks covering particular provinces have been presented in detail on maps in 1:350,000 scale. They help to understand the relation between the both networks: NATURA and GEOSITES. Małopolska Province is a good example of advanced development of these networks (Fig. 5). Western Carpathians with their Foothills and Fore-Carpathians Depression as well as the southern part of the Silesia–Cracow Upland are parts of this province. The domestic system of nature protection is represented here by 5 national parks, 11 landscape parks, 83 nature reserves and numerous individual objects or small areas protected mainly as natural monuments, documentary sites and sites of ecological use.

Large and small areas proposed for the NATURA network so far cover 11.7% of the whole province and are rated as the highest class of geodiversity (Fig. 3). Concentration of geosites within 4 national parks and 4 other protected areas is coherent with the NATURA network (Fig. 5). The remaining 41 geosites are situated outside this network, though partly in its close neighbourhood. About 58% of them are still not under the legal protection although they are already documented and notified to authorities.

PERSPECTIVES OF THE GEOCONSERVATION DEVELOPMENT

Identification of the important geological areas, site-sets and individual sites of international significance is the basic aim of the IUGS GEOSITES project. In particular countries it should be supported by national efforts. Unfortunately, this project does not obligate authorities of the EU member states, as it does the NATURA 2000 programme. The last one is based on numerous conventions and agreements and is subordinated by the directives of the Council of Europe. Lack of similar directives makes difficult or even impossible to create the GEOSITES Network and to confirm its legal protection.

The Directorate of Culture, and Cultural and Natural Heritage of the Council of Europe accepted in 2003 *Draft Recommendation on conservation of the geological heritage and areas of special geological interest in Europe*. It supports the activity but has no obligatory power such as directives of European Ecological Network NATURA 2000. The above mentioned recommendation encloses the following programmes:

the GEOSITES (IUGS and ProGEO programme), the European Diploma for Protected Areas, the European Geoparks programme and the World Heritage Convention (UNESCO).

Within the areas indicated by the Habitats Directive of the NATURA 2000 Network, geological and geomorphological features should be regarded much more seriously than at present in order to combine both geo- and bio-conservation aspects of natural diversity.

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