

Geoheritage in Europe and its conservation

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ProGEO

(The European Association for the Conservation of the Geological Heritage)

The only record of the history of our planet lies in the rocks beneath our feet: rocks and the landscape are the memory of the Earth. Here, and only here, is it possible to trace the processes, changes and upheavals which have formed our planet over thousands of millions of years: the more recent part of this record, of course, includes the evolution of life, including Man. The record preserved in the rocks and landscape is unique, and much of it is surprisingly fragile. Today it is threatened more than ever. What is lost can never be recovered, and therefore there is an urgent need to understand and protect what remains of this our common heritage.

ProGEO objectives are:

- To promote the conservation of Europe's rich heritage of landscape, rock, fossil and mineral sites.
- To inform a wider public of the importance of this patrimony, and of its relevance to modern society.
- To advise, in our countries and in Europe as a whole, those responsible for protecting our Earth heritage
- To organise and participate in research into all aspects of planning, science, management and interpretation that are relevant to geoconservation.
- To involve all countries in Europe, exchanging ideas and information in an open forum, and taking a full part in conservation in a global setting, including the formulation of conventions and legislation.
- To work towards an integrated European listing of outstanding geoscience sites, thus enabling full support to be given to the work of other international bodies, as well as to national initiatives towards site protection.
- To achieve an integrated approach to nature conservation, promoting a holistic approach to the conservation of biological and physical phenomena.

If you share these aims, join us and work with ProGEO!

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This book is dedicated to
Gerard Gonggrijp, the founder and secretary of the
European Working group (EWGESG).
and
George Black, the first president of ProGEO.

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TURKEY

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Introduction

The modern concept of geological heritage is relatively new to Turkish Earth-science literature and Turkish society. However, such terms as wildlife, nature protection and ecology have been familiar since the 19th century. This is to be expected, as modern geology in Turkey began in the 1930s, in particular with the founding of the Institute of Mineral Research and Exploration (MTA).

MTA, the Turkish geological surveying institution, was founded in 1935 through the contributions of senior western geologists, some of whom wanted to escape from the nationalistic atmosphere in Europe (<http://www.mta.gov.tr/english/mta/history.html>). They worked both for MTA as field geologists and at universities in İstanbul and Ankara. At that time, a new generation completed their geology education in Turkey and abroad, and a strong survey programme was started for the preparation of geological maps (at scales of 1:250,000 and 1:100,000). In the 1950s, after completion of the mapping programme, it was concluded that Anatolia included many unique formations, stratigraphic sections, fossil fauna, structures, landforms, and so on. These were described in hundreds of scientific reports and papers as significant contributions to the Earth sciences. For example, the term *mélange* with its modern meaning was first introduced to the literature by Bailey and McCallien (1950) as one of the results of these Turkish studies (Şengör, 2003). In the late 1960s and 1970s, the number of geological research projects increased significantly, and then meetings, panels and workshops about these geological monuments began to be organized under the ‘umbrellas’ of the Geological Society of Turkey (TJK; which was, unfortunately, closed down in 1985) and MTA. Brainstorming about natural heritages and how it could be conserved increased (Ketin, 1970; Öngür, 1976), and the first Turkish popular geo-journal, *Yeryuvarı ve İnsan*, was released by TJK to draw attention to “nature monuments” (Arpat, 1976, Arpat and Yılmaz, 1976). Some historical or mythological stories like

Noah’s Flood and Noah’s Ark, Nimrod (*Nemrud* in Turkish), and the Camels of Nimrod helped to popularize these activities, but, unfortunately, all this was stopped suddenly in the late 1970s because of a troubled political situation in the country.

The Superior Council for the Conservation of Natural and Cultural Property (founded in 1961 and revised in 1983 and 2005) and the Regional Conservation Council (1961), which are advisory and technical committees of the Ministry of Culture, respectively, are the bodies that authorized such matters as site selection, registration and conservation, but they concentrated mainly on archaeological sites and movable cultural objects, paying less any attention to natural ones. This was probably a necessity, due to the extremely high number of cultural sites in Turkey. Moreover, the geology of the country is so rich and complex (from Precambrian to Quaternary), that registration of all kinds of natural sites, even only of the most important, would have severely affected society, as there would not have remained enough living space (Fig. 1). As a result, only geological sites in or around registered archaeological sites were fortunate enough to achieve protection, e.g. the Pamukkale Quaternary travertines near Hierapolis (Denizli) and the tuff cones and maar in Cappadocia (Nevşehir) (figure 2-4).

An increasing population, combined with industrial development, began to cause the loss of forest and farmland in Turkey, and the state had to put an article into the Constitution in 1961 about the maintenance of forest boundaries. This was legislation that was also good for the conservation of many geological sites situated in forested areas. Additionally, many places had been registered as national or natural parks (figure 1), and so they had already been efficiently protected. The results of a recent project show the importance of national parks not only for wildlife and nature conservation, but also for the protection of geo-sites (Kazancı et al., 2007, 2008, 2009).

In the 1980s, governments had to pay more attention to natural sites as the society showed interest in them as a result of television and other media,

Left: Meke maar in Capadocia. Photo W.A.P. Wimbledon

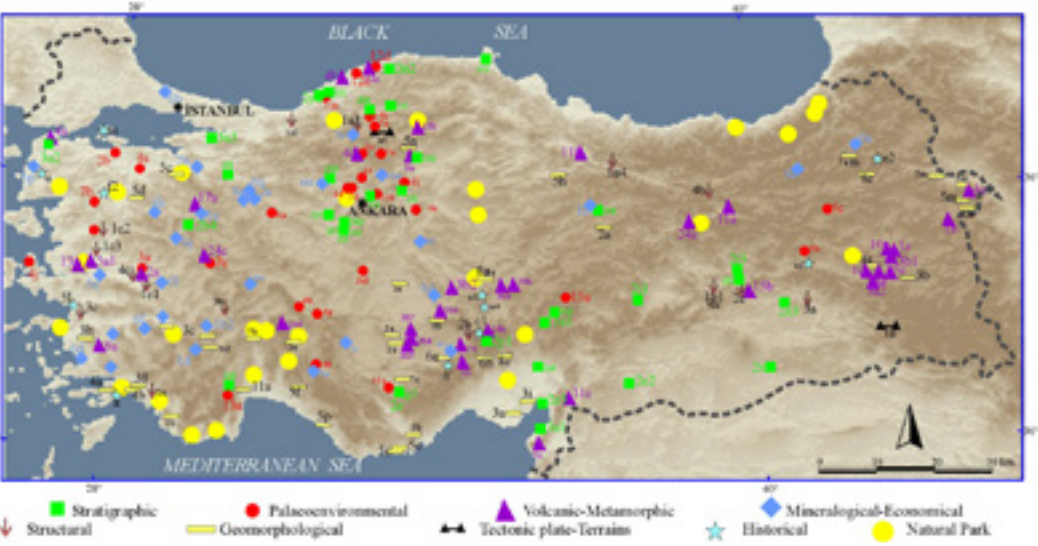


Figure 1. Geographic distribution of some selected and protected areas of Turkey. Note that a symbol of each group represents three or more sites in the same region. The geosites (460) in the map are from Jemirko's list, however the registered natural sites are over 1,160.

and private and some new official bodies were founded for the protection of the natural environment. Inclusion of some sites in UNESCO's World Heritage List promoted progress. In 1997, a national action plan was prepared for heritage protection (Bademli, 1997). However, only a small part of the plan has thus far been realized. JEMIRKO, the first NGO in Turkey for ProGEO activities, was formed in the year 2000.

Finally, one can easily say that there are many authorities, many laws, and many bureaus, in addition to a considerable enthusiasm amongst officers, to protect the nature and/or natural heritage of Turkey; but, in contrast, threats to geosites are increasing parallel to popularization of the geoheritage and relevant concepts within the society. Subsequently, new methods and/or new techniques are urgently needed to achieve geoconservation.

Legal base

Geological heritage or geosite terms are not included in Turkish legislation, in such words, in spite of the mention of all kinds of natural objects. It is noteworthy that there are many laws and

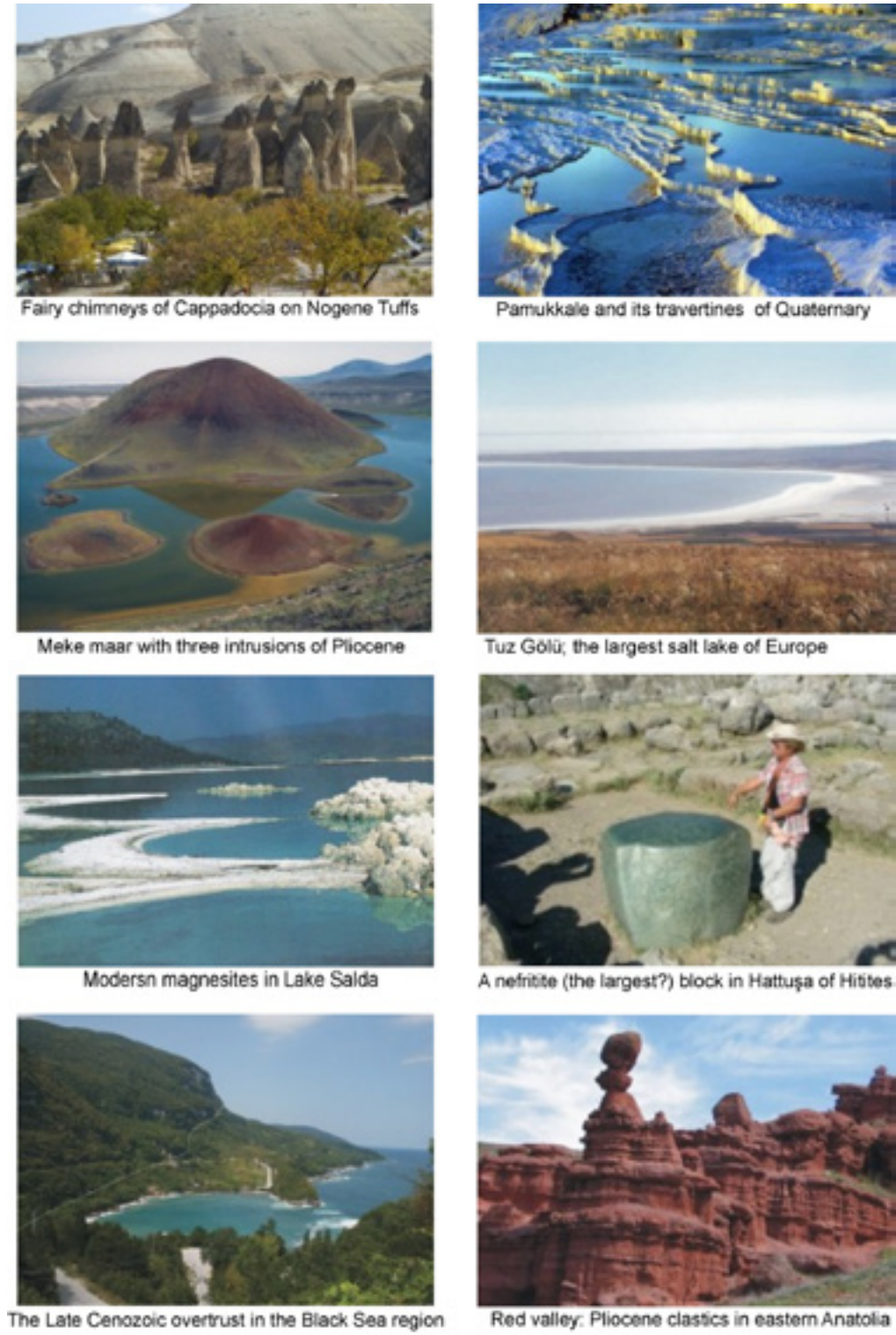
directives for the protection of the environment that have been created by different offices or ministries at different times, each resulting from their own particular needs. The most emphasized terms within the context of Turkish legislation are "natural matter", "natural object", "natural monument", "natural parks", "natural objects to be protected", and, in addition, the two geological terms "fossil" and "mineral". However, the meaning and/or frame of each term are defined separately as appendices of the related text, to avoid misleading applications. The current legislation can be categorised in two groups as follows:

Laws directly related to protection

Four laws in Turkey authorise some institutes to protect the environment, lands and some sites. However, geoconservation is scarcely found in these laws and when it does appear in the articles, it is mentioned as the 'physical environment' or 'natural sites'.

The Law on the Conservation of Natural and Cultural Property (No. 2863) was enacted by the

Right: Figure 2. Some touristic and protected geosites in Anatolia.





Figures 3. Some registered but non-touristic geosites.

Ministry of Culture in 1983, and it mostly targets archaeological sites and objects. Under it, all kinds of historical and natural monumental material belong in the ownership of the state, and trade, export and private use are forbidden. Since July 2003, responsibility for the protection of the natural heritage has been entrusted to the Ministry of the Environment and Forestry from the Ministry of Culture, as the latter has been combined with the old Ministry of Tourism. In 2011, a new institute, the General Directorate for Conservation of the Natural Properties was designated under the Urban and Environment Ministry.

The Law for the Environment (No. 2872) was enacted in 1983 and revised in 2006, and under it all kinds of activities and investments in rural areas, including on private land, have to be kept at a distance from the registered protected sites, and also such activities and investments have to be permitted by the Ministry of the Water and Forestry or the Urban and Environment Ministry.

The Law for National Parks (No. 2873) was enacted in 1983 by the Ministry of Agriculture and Forestry of that time, in order to conserve scientifically, naturally and culturally interesting parts of lands, forests and mountains, and under it specified areas can be designed as “national parks”.

The Law for Soil (Protection of) and Landuse (No.

5403) was enacted in 2005 by the Ministry of the Environment and Forestry as agriculture, nature and wildlife were endangered because of rapid urbanism and accelerating industrial activities. This law specifies that all medium- and large-size projects and all investments in rural areas have to prove that they do not threaten nature.

Laws indirectly related to protection

It is possible to say that the legal base in Turkey has been revised completely in the last decade, particularly since 1985, towards the protection of the environment. Hence, many laws describe the responsibilities of institutions and prescribe limits to anthropogenic activities, in the way of nature conservation. The Law for Construction (No. 3194; 1985), The Law for Coasts (No. 3621; 1990), The Law for Forests (No. 6831; 1956), and The Law for Mines and Mining (No. 5177; 2004) provide significant legal bases for the protection of physical and biological environments. However, some other laws promote anthropogenic events and land use. For example, the Law for the Encouragement of Tourism (No. 2634) was enacted in 1982 and has been revised in 2003 to enlarge the authority of the Ministry of Culture and Tourism over all wildlife, eco-tourism, and geo-tourism etc.



Figure 4. Miocene petrified forest (Camlıdere-Ankara)

As result, the legislation of Turkey that relates to nature conservation is highly detailed. It is possible that in some cases the abundance of so many instructions and regulations may create a large and unwieldy bureaucracy.

Organisation and policy

It is hard to say that there is a well-designed Turkish policy concerning nature conservation, in spite of these many regulations. The large span of the dates of enactment of the aforementioned laws, and the abundance of responsible institutes may support this suggestion. Laws and instructions were formed when needed, and defined only the limitations of anthropogenic activities. Particularly after the Rio Conference in 1992, regulations became more prohibitive and the main policy is to apply current rules and instructions. On the other hand, the present administrative system for conservation seems to be very strong, as three ministries (the Ministry of Culture and Tourism, the Ministry of the Water and Forestry and the Ministry of the Urban and Environment) and many institutes are involved. It is worth noting here that formal and/or governmental organisations can change when a new government comes in. For instance, two previous ministries, Culture and Tourism were merged in 2002, the ministry of

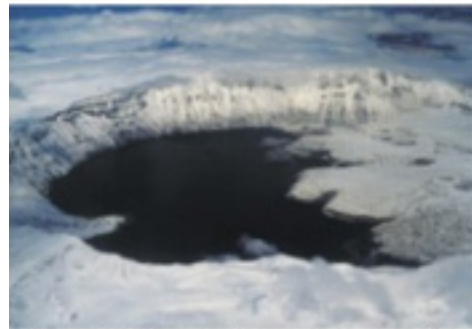
Environment and Forestry changed to the Ministry of the Water and Forestry and the Ministry of the Urban and Environment was formed in 2011.

The Turkish state bureaus involved in nature conservation can be categorized into three groups as authorized, responsible and related organisations. The related ones seem to be the most crowded and most important, as they produce the scientific information about geosites and the natural heritage. Presently, the body with most authority and directly responsible for conservation is the General Directorate of Culture and Museums (www.kulturvarliklari.gov.tr). It replaced, in 2004, the old “General Directorate for the Conservation of Cultural and Natural Property”. It applies law No. 2863 as did the previous institution, but in the past this focused mostly on cultural sites. The second most involved institute concerned with conservation is the General Directorate of Nature Conservation and National Parks (www.milliparklar.gov.tr). This is also a young administration, formed in 2004 under the Ministry of the Environment and Forestry (now, the Ministry of Water and Forestry). For years it has focused on national parks only, but for the last five years it has been authorized to concern itself with both national parks and nature protection; though its legal power is restricted in comparison with that of the earlier mentioned body. A nice competition between these two authorized directorates occasionally provides some good opportunities for the environment and conservationists. A third organisation is the Environmental Protection Agency for Special Areas (www.ockkb.gov.tr/EN/), founded in 1989 by a cabinet decision, to examine and protect important areas like islands, lakes, peninsulas, and coastal zones or deltas. It worked under the telescopic control of the Ministry of the Environment and Forestry until 2011, but its name is now the General Directorate for Conservation of Natural Properties and it is under the Ministry of the Urban and Environment.

Some institutions, even if they are not responsible for the area of nature conservation, have behaved very responsibly and served efficiently in the protection and development of the environment.



Afyon Castle: An acidic intrusion of Neogene



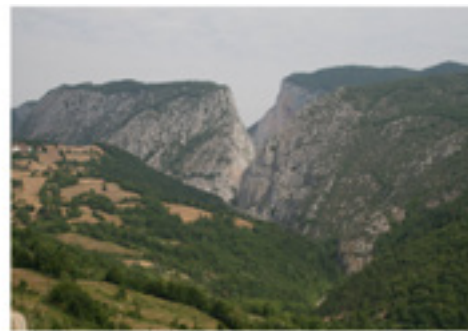
The crater of Nemrud Volcanoe (eastern Anatolia)



Wave-cut terrace of Lake beyşehir



Taphonies on granites of the Menderes Massif



Valla Canyon on Mesozoic Platform limestones (northern Anatolia)



Columnar basalts of Neogene in Galatian volcanics



A modern sinkhole from central Anatolia



Stalagmites of Ballica Cave, Tokat

One of them is the General Directorate of State Hydraulic Works (DSI). It makes an effort to search for and protect surface- and ground-waters in addition to concerning itself with matters of water assurance, consumption and management (www.dsi.gov.tr/english). The General Directorate of Afforestation and Erosion Control is another hidden hero of nature conservation in Turkey, establishing suitable plants on mountains and in rural areas, and particularly in burned areas (www.agm.gov.tr). Fires, which are a common environmental problem in the whole Mediterranean region, trigger rapid erosion and this is one of the main threats to geosites and geoheritage areas in Turkey (Kazancı et al., 2005).

Bodies concerned with geoconservation have important roles in research into and the introduction of geosites and geoheritage to both societies in general and ministries, as these institutions are experts in the Earth sciences. However, they have no official or legal responsibility for this topic. The General Directorate of Mineral Research and Exploration (MTA), the geological surveying organisation of Turkey, is the first of such bodies (www.mta.gov.tr/english). It produces different maps, sections and all kinds of scientific information about physical nature. In addition, MTA is the owner of the largest natural history museum of the country, and so it can present powerful publicity about natural formations. The Turkish Petroleum Corporation (TPAO: www.tpao.gov.tr) is another institution working on sub-surface exploration of the country, even if it has focused on petroleum. During their expeditions its Earth scientists have discovered and published on many geosites and geological monuments.

Ninety-six universities and twenty-six geology departments are another important group of related specialist bodies. The Geological Society of Turkey (TJK: 1945-1985) and then the Chamber of Geological Engineers (JMO: founded in 1974), which are two NGOs of Earth scientists, have since 1946 organised annual geological congresses without a break in the series, and these

Left: Figure 4. Some selected but non-protected geosites.

meetings have promoted the idea of geoconservation in Turkey.

There are many, large and small, conservationist NGO groups (not less than fifty) supporting efforts to conserve nature, the environment, wildlife, animals, animal rights, wetlands, soil, water, landscape etc. Only the Turkish Association for Protection of Geological Heritage (JEMIRKO) is involved in geoheritage and geoconservation. The basic activities of these bodies are the introduction and some promotion of their special topics. However, their contributions to nature conservation are significant as they are bridges between society, nature and state bureaus. Mostly dependent on their activities, internal tourism and particularly geotourism has increased in recent years. It has brought good income, but sometimes it has caused an increase in site mismanagement. Presently, official, responsible and related bodies have been seeking a sustainable solution.

Site selection and registration

In the Turkish legislation three types of registration are possible for both cultural and natural sites, and these are classified as first-, second- and third-order, for conservation purposes. The first-order sites are closed to all kind of usage and activity. The second-order sites are closed to new construction, but previous usage can continue, whereas the third-order sites are open for activities, provided the appropriate permissions are obtained from the ministries.

The registration of a cultural or natural site for conservation is carried out by the Superior Council for Conservation (SCC) and Regional Conservation Council (RCC) that work according to given regulations and instructions. For our topic, the important rule is the Regulation on Identification and Registration of Immovable Cultural and Natural Property to Be Protected, released in 1987 and based on law No. 2863. According to this regulation, the registration procedure must start with identification of a relevant site which is already known (that is, selected informally). Selection and registration seem to be essentially the same activity. Scientific reports,

publications, or proposals for registration from individuals or bureaus can be reasons for the RCC to start identifying a site or sites. A team of three or more experts prepares a detailed report about the site for the RCC, adding its own assessment in terms of possible registration. When agreeing with the report, the RCC considers the suggestions and/or objections from different sides and then it publicizes the registration. This decision is open to objections raised by the SCC, but it rarely changes. The number of RCCs in the country is twenty-eight, and they work like a court.

As for nature conservation, the selection and registration works for a site as set out in the Law for the Environment (No. 2872) is the same, more or less, as for cultural sites, with the exception of conservation councils. Instead of councils, bodies authorized by the Ministry of the Water and Forestry and the Ministry of the Urban and Environment identify, discuss and then register the sites. Generally, procedure starts upon a notification letter from a naturalist, a local authorized person and/or even a villager about the beauty and significance of the site. Later, experts of the relevant bureaus visit the site to identify the registration type and category. This work can take time due to different technicalities together with shortage of experts in the relevant offices. However, the designation of an area as a national park or a first-order area in private ownership can only be decided by the cabinet upon the suggestion of the relevant ministries.

The number of registered sites will be given in the next chapter. When looking at the list of these selected sites, one can see a limited number of geological sites, most of which are caves and/or landscapes (www.kulturvarliklari.gov.tr/BelgeGoster.aspx). This is not unexpected when we consider the country's geology; however, identification of geosites needs further expertise. It seems that a satisfying result can be obtained with the contributions of NGOs and related institutions; otherwise this old debate will continue (Ketin, 1970; Öngür, 1976; Sol and Ünder, 1999; Kazancı, 2001).

JEMİRKO's way is rather different from that

of the official registration procedure. All Earth scientists, whether members of the association or not, can join in the selection process. There is a detailed, descriptive form used to propose a "geo-site" that is distributed widely to colleagues and is also published on the web. Proposals are evaluated by the relevant subject committee, each of which is formed by five appropriately experienced geologists, and if necessary they visit the site. The results are discussed in the general assembly of JEMİRKO for a final decision and then they are announced. Proposers follow the categorisation of geosites in ProGEO's geosites classification scheme (e.g. Theodosiou-Drandaki et al., 2004). A geosite may occur in more than one category. In the last ten years, JEMİRKO has identified 460 geosites (and 8 potential geoparks) through its procedures (www.jemirko.org.tr) (figure 1). However, about one fourth of these geosites is cited in the official list.

Protected sites

Apart from categorising registration types as first-, second- and third-order, sites are put into different categories by authorized bodies of the related ministries. According to a description of the SCC based on law No. 2863, there are six categories of sites: 1) Archaeological sites (7,766), 2) Natural sites (1,166), 3) Urban sites (220), 4) Historical sites (142), 5) Superimposed sites, in two or more categories (393), and 6) Urban archaeological sites (35). The numbers in the brackets display the number of sites in that category through the country. The total, 9,722 sites, are under the three levels of protection described above (first, second, and third order). The general opinion is that these sites represent only one third of the unregistered sites. Unfortunately, only a few registered sites are being efficiently protected (Figs. 2-4).

The number of Natural Sites on the list of the Ministry of Culture and Tourism is relatively high (1,166) and the majority of them are geomorphological or simple geographical sites i.e. landforms, waterfalls, valleys, beaches, lakes or wetlands. It should be noted that they are natural formations, but relatively few of them display typical

characteristics of the geosites (e.g. Wimbledon, 1996; Barretino et al., 1999). Typical or not, they are far from reflecting the real geosites or the geosite potential of the country. Jemirko's list, even if it is not official, can give much more relevant geoscientific information. Only 107 of the 1,166 registered sites are in the Jemirko's list. The difference between lists of Jemirko and the ministry is probably due to various interpretations of geo-conservation of the proposers.

The Ministry of the Water and Forestry has determined four conservation categories based on law No. 2872. These are 1) National Park, 2) Nature Park, 3) Site for Nature Conservation and 4) Nature Monument. Presently, Turkey has forty-one national parks covering an area of 897,657 ha, thirty four nature parks in 79,047 ha, thirty-one nature conservation areas in 46,575 ha and one hundred and five nature monuments covering 5,286 ha (www.milliparklar.gov.tr and www.kulturvarliklari.gov.tr). Except for some of the nature monuments, all others belong to the state. Of the nature monuments registered, nearly all are old, individual trees and/or a patch of forest included old trees. The sites registered by the Ministry of the Water and Forestry seem to have been selected only for biological conservation; however there is no discrimination in the regulations. Except for some biological monuments like old trees, 176 of the 211 natural sites mentioned above, are already in the list of Jemirko.

A Special Environmental Protection Area is another category for nature conservation. Fourteen sites (areas) have been registered and given first-order importance by the Turkish Environment Protection Agency (now the General Directorate for the Conservation of Natural Properties) (www.ockkb.gov.tr/EN/). All are famous and touristic places i.e. Köyceğiz, Gökova, Datça, and Belek, etc and some of them are also registered by other institutions. For instance, the Ihlara Valley of the Cappadocia region, and Pamukkale in western Anatolia have been included in different categories of all lists. Since the main goal of the Special Environmental Protection Area registration is to protect nature and the landscape particularly from

bad housing development, the area of each area and their combined total are fairly large (12,111 km²). Of course, there are many individual geosites within these areas, but they are not cited as the intrinsic values behind protection. Fourteen areas and their 33 geosites have been listed by Jemirko. It is nice that all these areas have been actively protected by gendarmes and park rangers, as it is done in the national parks.

Management

According to present legislation, the management of a registered site is the responsibility of the institution that accepted the selection and registration of that site. However, not all sites can be efficiently managed, because of the large number of sites and various additional technical problems (budget, insufficient number of experts, authorization problems within offices and so on). The best management that has been working for years is that which was set up in the National Parks, where a separate team was formed for each park by the related general directorate. A manager, a few officers and up to ten park rangers work for each national park. The majority of the park budget is provided by the state; they even have some income from visitors.

Some impressive archaeological and natural sites have been designed as open-air museums by the Ministry of Culture and Tourism, and so they changed from being ordinary sites to being touristic places. The management of some of these sites is very good and there are even competitions between different institutions because of their high incomes. Unfortunately, the number of such lucky natural sites is not much more than ten or fifteen, and the rest of them are without a protector. Privatisation and the hiring out of caves and other interesting sites seem to be a new government policy. It is hoped that this policy will serve for the conservation of geosites. There is no widespread or systematic management or maintenance of geosites, nor do any have a management plan that is focussed on their geo(morpho)logical interest.

Facilities

Natural formations and geological heritage in Turkey can attract much interest where they have a photogenic appearance and touristic potential. Publications are mostly in the form of advertising, instead of educational or scientific introductions. It is striking that nearly all-scientific research has ignored the natural heritage character of the Turkish geosites. Recently, NGOs and some amateur sport groups interested in trekking, biking or hunting have started to contact local administrations to work on natural sites, and leaflets and booklets have been produced although they are far from being satisfactory. In order to conserve the geosites, it is known that education and research are necessary as permanent efforts. Thanks to JEMİRKO's encouragement, some university geology departments have recently formed student working groups for natural heritage. These are organising indoor activities for local people. In addition, MTA has decided to set up a project group for professional research on geoparks and natural heritage, and Ankara University has promised to start a graduate programme on the subject. "The Kızılcahamam-Çamlıdere Geopark" which is the first in Turkey could be realized in 2011 as a joint project of the state bureaux and NGOs mentioned above (www.jeoparkankara.com). It comprises 23 geosites, some of which are endangered (Kazancı, 2012).

Conclusions

Turkey is a large reservoir of natural heritage due to the complex geological evolution of the country, although, unfortunately, it has not yet compiled a complete inventory of its geological heritage. Moreover, the abundance of cultural and historical heritage together with a heavy burden of official regulations (mostly serving archaeological sites) seems not to have had a positive influence on geoconservation. The government and the ministries are very active on conserving the cultural sites, but not similarly keen on taking care of the registered natural sites, excluding the national parks and some special areas. It is possible to say, unfortunately, that only 65-70 geosites in the list of Jemirko have been conserved by the government to international standards. On the other hand, some progress on this topic has indicated that good developments will be realized in a moderately short time. State institutes like MTA, DSI and TPAO (see the Organisation and Policy chapter for full form of the names) and a social group, JMO, have recently started to get involved in research on geosites and geoconservation. JEMİRKO, which is the only, and a very young, such association, focuses directly on the geological heritage. What is more, its geoparks proposals have received great attention from Earth scientists and local administrators, as they will promote geo-tourism activities. As result, geosite, geopark and geoconservation ideas are enlarging in the society, bringing hope for the future.

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