

Geologic heritage in Slovenia

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One of the main aims of nature protection efforts is to preserve and protect sites of outstanding natural interest, including geological localities.

Geologic processes and geologic heritage are part of geosphere and hydrosphere. Geologic heritage embraces a number of phenomena such as different kinds of outcrops, mineral deposits and fossil sites, stratified layers, tectonic phenomena (e.g. folds, faults) characteristic relief formations, caves and caverns, springs, moors... All these phenomena help us understand the origins of the earth's crust and of landscape, and partly the development of life on Earth. Relief forms and geological formations often constitute havens for animal and plants. Geological phenomena may be referred to as geotopes. Bayerisches Geologisches Landesamt (1993) defines geotopes as geological phenomena. Natural landscape forms or artificially created outcrops may consist of individual objects or parts of a natural site. Geotopes that are worth preserving are characterized by rarity, uniqueness, diversity, special geological significance and outstanding form of beauty. They are of utmost importance to science, natural history, and local culture studies.

Quarries and mines are of particular interest as geohistorical sites, since some of them reveal much about the history of man's use of mineral resources and thus about the way of life at a certain time as well as about geological phenomena.

The protection of mineralogical and paleontological heritage has some specific features. Mineral and fossil collections may be referred to as movable geological objects, as they consist of specimens gathered in geological sites. It is

essential that specimens be collected in a proper way and collections be adequately looked after. Here it should be noted that they are quite often given away or sold, often to foreigners. In this way, however, objects of utmost importance to natural heritage are irretrievably lost, as is stressed by the Paris Convention on World Natural and Cultural Heritage.

Thus geological heritage may also be defined as:

- a historical record in nature and human history;
- a historical record in human history;
- an unrenovable natural resource;
- phenomena that can occur on the earth's surface or; underground;
- phenomena that are immovable from their natural site, and;
- movable objects in collections of natural and cultural heritage, and as;
- geological features (or geotopes) are also an abiotic basis of biotopes and landscapes.

"It is true that proper emphasis is given to species and habitat protection, but geological and geomorphological phenomena should not be neglected. Biodiversity depends on geodiversity, though when only living things are discussed, this aspect can easily be forgotten (Peter Skoberne)."

The importance of "in situ" protection

1a. to nature protection:

- presentation of geological monuments and sites in their natural location,
- presentation of the development of Earth and of sites of aesthetic, cultural and scientific value in their natural location,
- education,

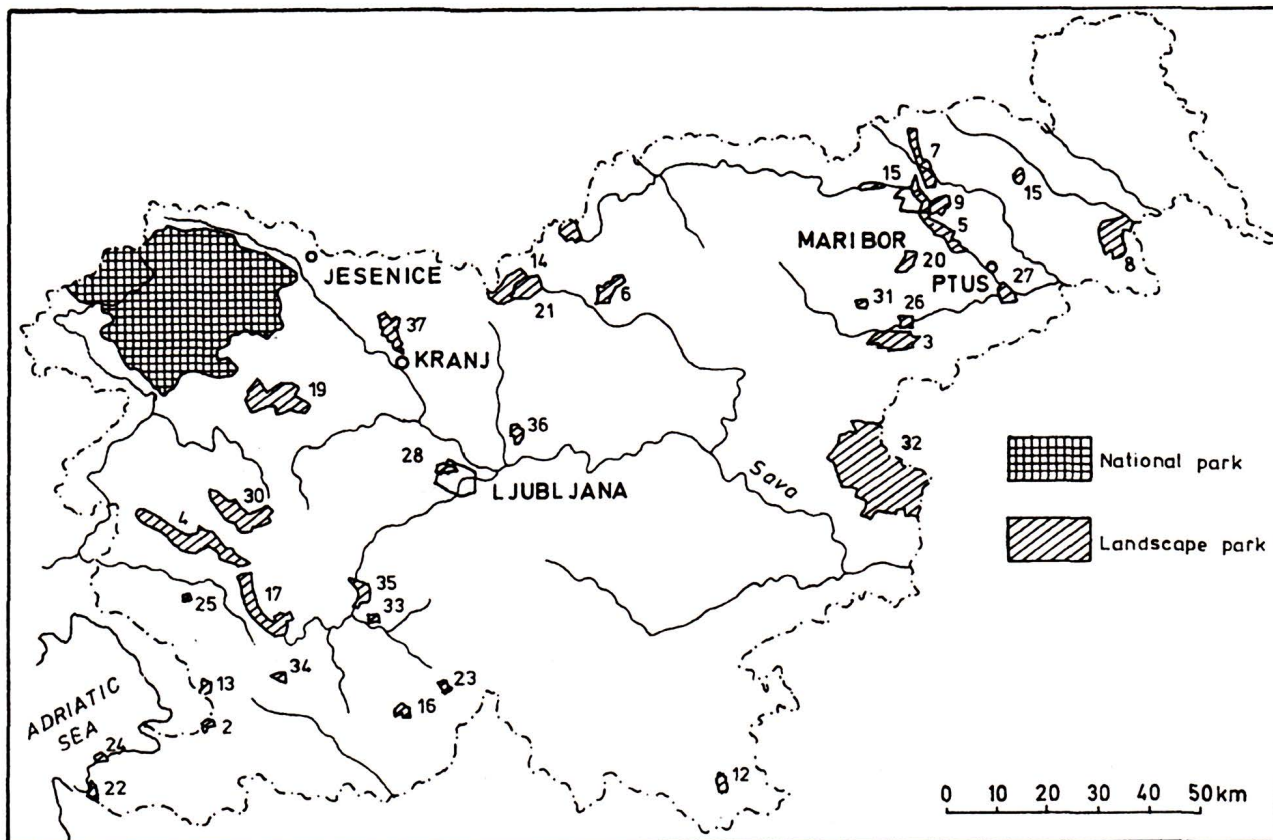


Fig. 1 Sketch map for the location of the principal geotopes, national and landscape parks of Slovenia

- formation of noncommercial attitude to heritage, and
- a gradual process of elimination of reckless pursuit of profit from natural heritage,
- geological nature trails that should keep people away from endangered sites.

1b. to museum collections:

- gradual completion of collections,
- presentation of locally found minerals, fossils and rocks,
- preservation of movable artefacts of natural and cultural heritage,
- education.

2. to science:

- availability of minerals and fossils in their natural state as found in their natural site,
- studies on fossils and locations in which they were found are becoming increasingly popular world-wide,
- a constant source of data due to scientific development,
- gradual completion of systematics.

3. to collectors:

- opportunity for systematic collecting in given sites,

- acquisition of new knowledge.

4. to the general public:

- people obtain some basic information about fossils in their natural site,
- development of an appropriate attitude to natural heritage,
- gradual elimination of reckless pursuit of profit.

5. to education:

- presentation of scientific principles is included in the educational system and in mass media programmes,
- topics which are not fully included in teaching programmes should be dealt with by extramural activities.

6. to societies, which are not a substitute for government authorities, but they are:

- groups of people who have the same interest and are involved in some extramural activities,

- as non-government organizations and natural history associations, they should:

- * help promote geology in different spheres,
- * promote geology and geological natural heritage within nature protection,
- * make proposals for the protection of objects or sites of geological or other natural heritage,
- * play a major role in the education of the general public by providing information on

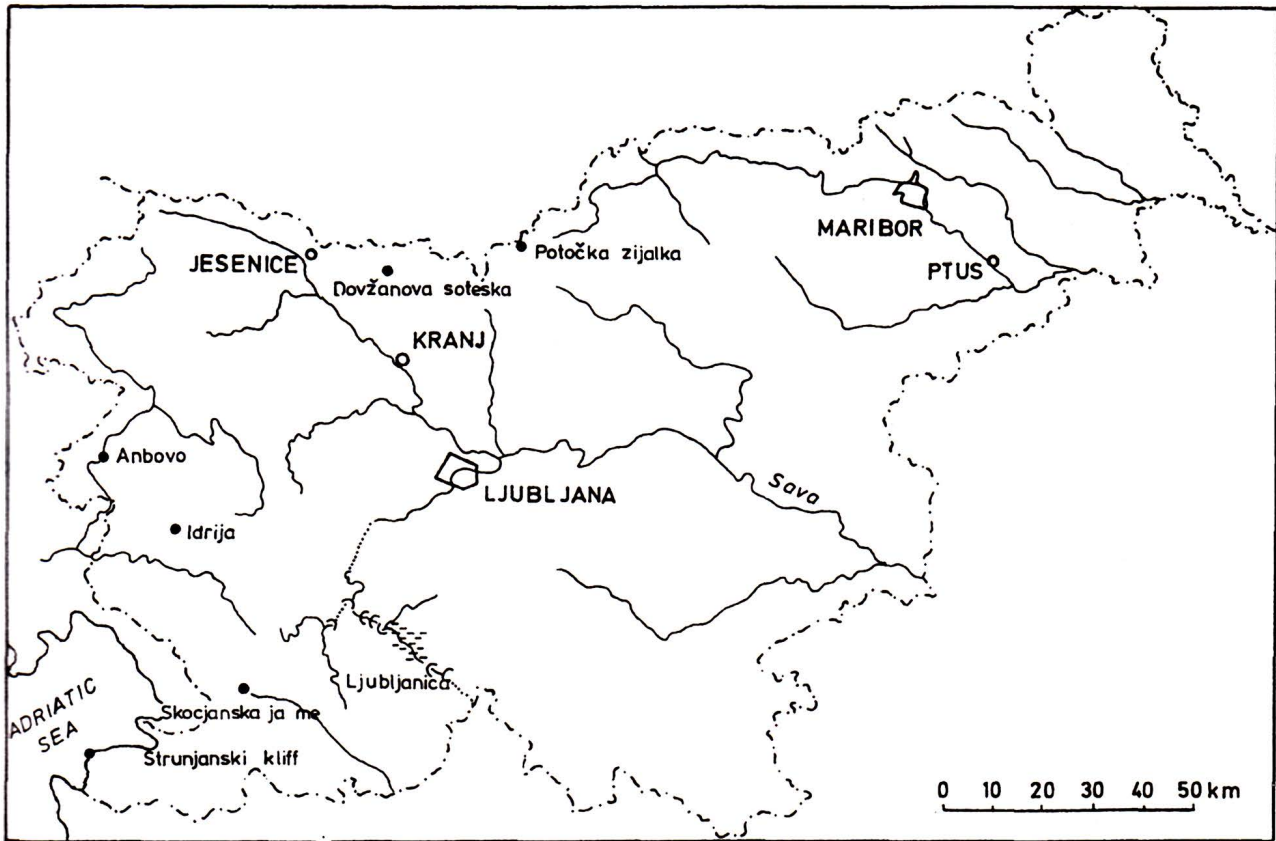


Fig. 2 Sketch map for the position of the main geotopes that will be proposed for inclusion in the World Geological Heritage List

geological heritage and its importance.

The protection of geological heritage encounters a number of professional and legal problems as well as practical difficulties. One of the main problems is lack of the awareness of the need for conservation on the part of professionals and the general public, and inadequate co-operation between geology, natural history, museums, societies and other institutions concerned with spatial issues. Another problem is insufficient professional involvement in activities pursued in geological localities, along with the lack of supervisory control. In addition, there is a problem of traders in minerals and fossils.

A new nature conservation law that is in preparation will provide for the preservation, conservation, and improvement of the state of natural sites and nature protection, including geological heritage.

Current legislation on nature conservation

At present, the Natural and Cultural Heritage Conservation Act of 1981 is in force. Its major drawback is decentralisation of responsibilities.

Besides, it is not precise enough. In Article 2 natural and cultural monuments are defined as immovable or movable objects or groups of objects, sites and parts of a natural landscape that are of cultural, scientific, historical and aesthetic value. Natural heritage includes geological formations, beds containing fossils or minerals, geomorphological formations, surface and underground karst features, gorges, glaciers and glacial formations, springs, waterfalls, cascades, lakes, marshes and swamps and moors, bogs and fens, streams and rivers, river banks and coastal area, rare typical ecosystems, habitats of plant and animal species, relicts, and typical plant and animal species, trees, landscapes, vantage points, mountain tops, parks and gardens.

Conservation regime for geologic heritage

For geological heritage protection, the following conservation regime has been suggested in the professional proposal for a new nature protection law. Here it should be noted that certain aspects of the current conservation regime have been improved.

General conservation regime

A) It is permitted to:

1. remove a certain amount of fossils, minerals and rocks for a particular purpose such as scientific research or collecting;

2. remove fossils and minerals from their natural location only by using a classic geological hammer and the chisel.

B) It is not permitted to:

1. make alterations to topography of land and to objects of geological heritage (e.g. surface and underground works such as levelling, deepening of the terrain), which can directly or indirectly affect geological heritage;

2. construct any buildings, infrastructure, reservoirs or regulate rivers in geological sites;

3. change the water level of moors and wetlands as well as of rivers and lakes;

4. fill up geological profiles, outcrops, caves, quarries with soil, rubbish or any other material;

5. cause damage to geological heritage by blasting or other kind of vibrations;

C) If permission is granted by a nature conservation authority, it is permitted to:

1. utilise rocks for commercial purposes (e.g. expand a quarry)

2. manage certain geological sites in order to popularise geological heritage. and for tourist and other educational purposes by making paths for visitors and vantage points and by putting up signs and other information;

3. remove more fossils, minerals and rocks than permitted under A/1., and use other equipment than stated in A/2. for scientific, cultural and educational purposes (e.g. restoration of cultural monuments).

Special conservation regime

Each protected geological monument or site is under a special conservation regime that specifies conservation regime detailed conditions, stipulations, limitations, and exceptions.

Protected geological locations in Slovenia

The following sites are protected as geological natural monuments under special geological conservation regime:

1. Dovžanova soteska (paleontological locality, gorge, biotope)

2. Jezerci v Bobovku pri Kranju (paleontological, botanic, zoological locality)

3. Kozja dnina (paleontological locality)

4. Kovk (paleontological locality)

5. Selovec v Trnovskem gozdu (paleontological locality)

6. Vajndol (paleontological locality)

7. Lesno brdo quarry (Triassic black limestone with fossils),

8. Podpeški kamnolom-Roman quarry (Jurassic black limestone with fossils)

9. Divje jezero (spring, lake, tectonic locality, biotope)

10. Drenov grič (folds)

11. Ključ (folds)

12. Bedrova grapa — sedimentary rocks

13. Polskava — location of serpentinite rocks

14. Visole — location of serpentinite rocks

15. Smrekovec-Komen — silicate rocks

16. Cezlak — location of quartz monzogabbro (local name cezlakite)

17. Polskava — Roman marble quarry

18. Bistrica — Roman marble quarry

19. Kopriva — karst "marble" quarry (limestone).

20. Kislá voda — mineral spring

21. Trébuša — sulphur spring

22. Zvepleni studenec pri Riherju — sulphur spring

23. Klevevž — thermal cave spring

Two localities are protected within a landscape park and a nature reserve:

9. Nanos-southern and western slopes along with summits Pleša, Grmada in Tura — landscape park (mountain top, paleontological and botanic locality)

10. Triglav Lakes Valley — natural reserve (glacial valley, glacial lakes, paleontological locality, tectonic phenomena, biotopes).

Indirect protection

Geologists have only taken part in the nature conservation efforts for the last five years. As a result, some localities and sites have not been geologically evaluated yet. In addition, it is often difficult and not always necessary to separate geomorphologic, geologic and hydrologic natural heritage, as they all are part of the same dynamic earth's system. This is why some localities are not under the geologic conservation regime.

Currently, 25 paleontologic — paleolithic localities in caves are protected within the framework of archeological heritage. Proposals have been made for the protection of a further 72 paleontological localities. Within the subterranean natural heritage, 6 localities of mineral deposits in caves are protected, while other 3

surface localities and 7 localities in caves have been proposed for protection. There are also 6 localities of tectonic phenomena and 19 localities of outcrops proposed to be protected. At present, 6 caves with rocks of special interest are protected, while further 5 such caves have been proposed for protection. Proposals have also been put forward for the protection of 8

quarries and 7 mines. One quarry is currently protected as a biotope, while another one has been proposed for protection as a natural monument. Moors are geologically interesting as sites in which pollen analyses may be conducted. At present, 4 moors are protected, whereas a further 6 have been proposed for protection.