

Original article

Constraints in Management of Protected Areas (Case Study: Buila - Vânturarița National Park)

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Abstract

This study offers a general perspective on conservation status and socio-economic constraints in Buila-Vânturarița National Park. Buila-Vânturarița National Park (BVNP) is a protected area established in 2004. The park is also a protected area in the European Union, as part of the Network European Ecological Natura 2000 (as Site of Community Interest: ROSCI0015 Buila - Vânturarița, and Special Protected Area: Cozia-Buila-Vânturarița ROSPA0025). Buffer zone of the park is a fragile area where economic development of Bistrița limestone quarry needs to respect the conservation of environmental components. From a legal perspective, the park buffer zone does not allow economic activities which are destructive to the environment. The main constraint remains the overlapping of the southern limit of BVNP and Natura 2000 sites over the operational perimeter of the quarry Bistrița (area of about 16 ha) and access roads to the top of the quarry. The opening activity in the top of the quarry is important for regional socio-economic context (chemical industry). An environmental impact assessment was applied for quarry which is placed very close to the park. The problems of current and future constraints need to be carefully identified and quantified in protected areas of Romania, as do the root causes and effects of these constraints.

Keywords: constraints, protected area, national park, environmental impact assessment

1. Theoretical outline

There are many names for protected areas around the world. International Union for the Conservation of Nature (IUCN) has defined six major categories of protected area, based on their main management objectives [7].

Thus, an national park, viewed as protected area managed mainly for ecosystem protection and recreation [7], is defined as “a natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or

occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible” [7].

Most Protected Areas exist within a legal and administrative framework [8]. The conditions for establishing and managing protected areas vary greatly from region to region, and from country to country. In the last decade, Romania has an important regulatory framework for protected areas: Law No. 5/2000 approving the National Plan for Land Use (Section III - Protected Areas); Government Decision No. 2151/2004; Government Decision No. 1581/2005; Government Decision No. 1284/2007; Ministerial Order No. 1964/2007;

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Government Emergency Ordinance No. 57/2007). Romania has 845 Protected Areas categorized in 5 of the 6 IUCN Categories [7]. The following categories of protected natural areas are accepted in Romania, defined in terms of the management tasks assigned: National Park (13 national parks totaling 3158.6 km²), Nature/Natural Park (thirteen natural parks totaling 7282.72 km²), Scientific Reserve (52 and 1112.77 km²), Nature Reserve (617 natural reservations totaling 2043.55 km²), Natural Monument (234 natural monuments totaling 77.05 km²), Biosphere Reserve (3 totaling 6620 km²), Wetland of International Importance (RAMSAR site); EU and UNESCO definitions are also accepted [9]. In Romania, many protected areas have diverse management plans but in all cases they are not approved in terms of legislation. These areas define a range of zones for management, each one normally emphasizing particular types of use. This helps protected areas to accommodate, in a structured way, the wide range of management needs and demand for use [1]. The national parks have two basic functions: *ecosystems protection and recreation*. Generally, a national park is likely to have two main types of zone: (a) legal zones/core conservation zones and (b) management zones/buffer zones and transition/sustainable development zone (areas adjacent to the managed area). Thus, a national park should be more strictly protected where ecological functions and native species composition are relatively intact ("core zone"). In this case, the surrounding areas should serve as buffers zones to the protected area.

Internal zoning of protected natural areas of national interest include [10]: (a) *areas with strict protection*, (b) *full protection zone*, (c) *buffer zones*, and (d) *zones for sustainable development of human activities* (Government Emergency Ordinance No. 57/2007). In Romania, we consider that a national park (NP) implies four "dimensions":

(a) *The institutional dimension* - a national park is a global protected area included in the IUCN category II and national institutional context;

(b) *The conservation and scientific dimension* - a national park is an special area for nature conservation and biodiversity for scientific, educational and recreational purposes; a PN is a relatively broad territory (e.g. from several thousand to hundreds of thousands of hectares) with slightly modified or natural ecosystems, landscapes, plant and animal species, geomorphological sites, fossils and geological phenomena of scientific and educational interest;

(c) *The legislative and administrative dimension* - a national park is a territory with protection measures to prevent/eliminate any human interference from exploitation and to respect fully the ecological, geomorphological and aesthetic features; some human interventions are permitted but only in order to ensure optimal conditions for the protection of species of plant and animal and other elements of the natural environment and landscape;

(d) *The socio-economic dimension* - a national park is important within the local socio-economic context (i.e. for local communities and stakeholders which owning land in the park, for traditional land uses activities, business operators which activate in the proximity etc).

2. Territorial and conservational context

The Vâlcea Carpathians and Buila-Vânturarița massif are of great value [3, 4] given their natural and specific cultural landscape (with monasteries, historic buildings and pastoral traditions). Buila-Vânturarița massif [2], as part of Căpățanii Mountains, is situated in the central-northern part of the Vâlcea County, Romania (figure 1). The massif is dominated by two calcareous ridges that are disposed from south-west to north-east: Târnovu Massif in north-western part and Buila-Vânturarița in south-eastern part. This massif is spreading from the west of the Bistrița Gorges to the east of Olănești Gorges. The connection of massif to Căpățanii Mountains is made by Plaiul Netedu, Plaiul Lespezi and Plaiul Hădărău. Buila-Vânturarița limestone ridge has a linear type of extension, with the length of 14 km and the width of 0.5 - 2.5 km (extension of the Jurassic limestones). The absolute altitude appears in the Vânturarița Peak at 1885 m [10]. Buila-Vânturarița National Park (BVNP) is a protected area established in 2004. The overall objectives of the BVNP management plan are: conserving and promoting biodiversity and cultural diversity for local sustainable development, involvement of local communities and stakeholders in activities such as ecotourism, conservation habits and traditions, environmental education, sustainable exploitation of resources, public awareness and environmental research [11]. From legislative point of view, Buila-Vânturarița National Park (BVNP) was established by Government Decision No.2151/2004 from studies conducted by the Association Kogayon (Costești, Vâlcea County). PNBV is the smallest national park in Romania with about 4186 ha. Since 2006 the PNBV Administration is located in Horezu City (Vâlcea County). BVNP is situated within the municipalities Costești, Bărbăești and Olănești (Vâlcea County).

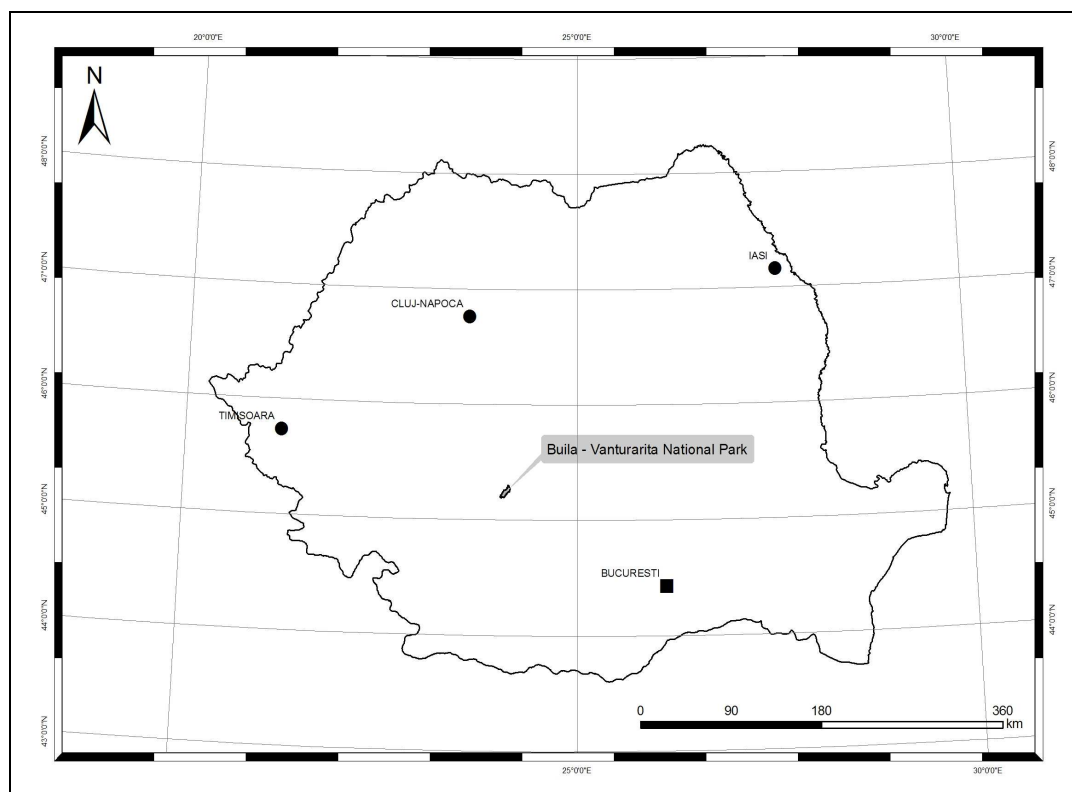


Figure 1. Geographical location of Buila-Vânturarița National Park

BVNP is including in IUCN Category II as national park and it is defined as “protected area for ecosystem protection and recreation”. Category II protected areas are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities [7]. The park area includes fractions of both terrestrial and aquatic ecosystems less influenced by human activities where traditional activities are allowed only for local communities and stakeholders. These traditional activities are covered by BVNP management plan elaborated during 2006-2009 by BVNP Administration and Kogayon Association [11].

The park is also a protected area in the European Union, as part of the Network European Ecological Natura 2000 (as Site of Community Interest or *SCI* - ROSC10015 Buila-Vânturarița, and Special Protected Area or *SPA* - Buila-Vânturarița ROSPA0025) [12].

This massif was declared as a national park for its ecological, landscape, geological, hydrological, and fauna features. It is an isolated area, relatively high (maximum altitude at 1885 m) and with a large inaccessible biodiversity and geodiversity. Natural isolation (the park has only 6

points of entry and access on National Road 67 Râmnicu Vâlcea-Târgu Jiu) of BVNP plays an important role in the national and European conservationist context [10].

A small part of southern limit of park coincides with the perimeter of mining zone named Arnota-Bistrița which is located into the Costești commune (Vâlcea County) (figure 2). The operating license for this mining area has been approved by the Government Decision No. 652/2000, published in Official Monitor No.373/2000 (license was accorded for 20 years).

A complex of geological, geographical and ecological factors (e.g. rivers, topography, microclimate and the presence of Jurassic limestone) contributes to the great biodiversity and geodiversity of the park (i.e. rocky habitats, caves, forests, grassland and wetlands). It is noted the presence of the Mediterranean species and glacial relicts in this park. The massif offers the most important conditions for the survival of European large omnivores and carnivores. Buila-Vânturarița massif is a complex natural area for biodiversity which is also influenced by geological substratum and which generated a functionally diverse landscape. Erosion of limestone rocks creates a unique landscape abounding in exokarst and endokarst (e.g. over 80 caves and pit caves, spectacular gorges, springs, limestone pavements etc) [6].

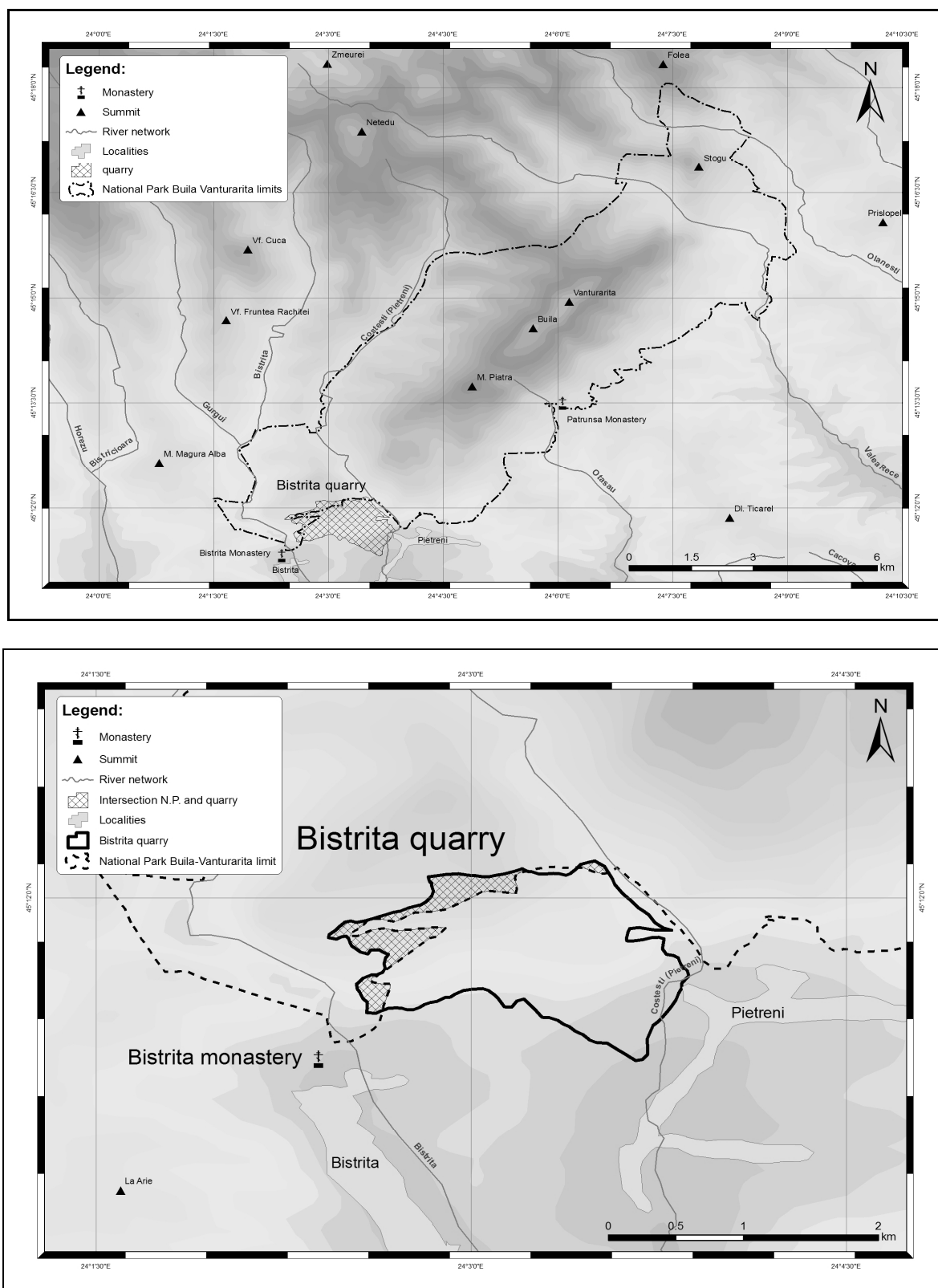


Figure 2. Administrative limits of Buila-Vânturarița National Park (a) and Bistrița quarry (b)

3. Environmental, legislative and socio-economic constraints

Many pressures, impacts and constraints are specific for national and natural parks in Romania. The literature mention some of them: legal logging operations that are permitted in the buffer zone by

the Romanian legislation; mining activities and mining of construction materials; land use changes; economic importance of protected species; poaching and hunting; infrastructure development; hydraulic works and road construction; loss of traditions of wood exploitation; waste mismanagement; diverse

economic activities and tourist pressure; wrong delineation of the parks boundaries; overlapping institutional and administrative competencies; ecological, social, economic, administrative and legislative constraints; small number of staff and low capacity for the implementation of existing national and European legislation; ownership of land (e.g. forests and grazing land); economical and financial interest of stakeholders; lack of interest of local communities and individuals etc.

Within the context of Buila-Vânturarița National Park we identified the following constraints:

(a) Socio-economic constraints: the status of land ownership (e.g. 55% in state property and 45% in private property) - restitution of forests and pastures to local communities; the presence of Bistrița limestone quarry; overlapping of park boundaries on the operational area quarry (even if operating license is granted by Romanian Agency for Mineral Resources for 20 years, starting in 2002 – a surface of about 16 hectares of PNBV land will be placed in the operational area of quarry and sustainable development zone); the operational roads crosses the park;

(b) Institutional and legislative constraints: sometimes relations amongst the PNBV management – local landowners - stakeholders - local authorities - the competent environmental authorities are difficult and need to be improved; failure to comply with conservation and forest management plans; vulnerability to illegal actions and/or profits (e.g. road construction and natural resources exploitation); differences of opinion between stakeholders related to access at the forestry resources etc;

(c) Administrative constraints: the small number of field staff (park rangers), reduced fines and enforcement capacity; redefining the internal zoning of the park; uncertainty regarding to the stability of financial resources; insufficient monitoring of human actions and species protected; the uncertainty about the main objectives of park management; financial and motivational problems etc.

4. Environmental impact assessment of bistrița quarry area

The economic operator of quarry is National Salt Company SA, Râmnicu-Vâlcea subsidiary. Mining license was granted for a period of 20 years (from 2000 to 2020) and was approved by Government Decision No. 625/2000, published in Official Monitor No. 373/2000.

Government Decision No.2151/2004 has established National Park Vânturarița-Buila even if operating license for the mining area has been

approved by the Government Decision No. 652/2000. By delineation of economical and conservation areas, these legislative rules create major operational problems in the limestone quarry Bistrița and environmental issues in the southern part of the park [12].

Bistrița-Costești limestone quarry is located within the commune Costești at a distance of 40 km from Râmnicu-Vâlcea city. The limestone deposit is located on the interfluvies between the Bistrița and Costești rivers at the south part of the Buila-Vânturarița massif. The finished product is represented by limestone for chemical industry (e.g. Oltchim, Govora) and it represents 99% of quarry production. Thus, pieces of limestone of 4 – 40 cm diameter are used in the industrial process but this material can be used on local and regional roads [4]. Limestone quarry current production is 3000 tons per day with a recovery rate of 50% of the material extracted. Life cycle of quarry is estimated to 20-30 years. The area occupied by quarrying activities is of 1.161 km² (constructed areas and infrastructure). A technological waste dump (about 30 million tones) has been put into operation in 1960. This deposit is located close to the quarry and is affected by superficial landslides.

The villages located near the exploitation quarry, Bistrița (about 500 m away) and Pietreni (about 600 m), are affected partially by landslides, emissions, pollutants, vibrations and loud noises. Arnota monastery and Schitul 44 even if are located on the quarry protection pillar they are affected by vibrations and noise [12].

The current landscape of quarry generates a powerful visual impact which induced a obvious discontinuity in the southern buffer zone of the national park. Visual effects are consequences of the geographical location at the limit of massif which offer a broad perspective on quarry from the main transport routes. Thus, environmental state of quarry is dominated by fragility without the possibility of returning to a natural state.

The main natural risks of exploitation area are related to geomorphological processes (e.g. collapses, landslides, run-off, ditches, and gullies), weather events (e.g. droughts, torrential rains, thunderstorms, fog, hail and frosts), land exploitation and soil degradation. The ecological restoration of this site should be considered in order to mitigate the degradation of the environment in the southern buffer zone of the national park.

Technological risks are associated with quarrying activities and operations, exploitation and processing of limestone and their potential effects can be mitigated through compliance with safety and protection of labor and equipment used.

However, technological risks are more important and require a real evaluation of reservoir status. Limestone quarry area is a tectonic zone and the operation efficiency is now only 40% due to poor quality of the deposit. In addition, tectonic faults may reactivate and may cause massive landslides and collapses to the south and east.

A preliminary analysis of the environmental impact generated by quarry was realized for the

southern buffer zone of BVNP. This assessment method is based on estimates of environmental quality indices depending on a weighting scale. For each of the environmental factors (e.g. water, air, soil, vegetation, fauna and human settlements) we calculated a quality index (QI).

A note of evaluation (Ne), which is based on the outcomes of environmental analysis, is accorded to each quality index (table 1).

Table 1. Correlation between assessment notes, type of environment, level of impact and environmental effects (adapted after Rojanschi, Bran, Diaconu, 2002 [5])

Note of Assessment	Type of environment, level of impact and environmental effects
10	Unaffected environment
9	Environment is affected by the legal limits allowed Level of impact 1 Major positive effects
8	Environment is affected by the legal limits allowed Level of impact 2 Medium positive effects
7	Environment is affected by the legal limits allowed Level of impact 3 Low positive effects
6	Environment is affected more than the legal limits allowed Level of impact 1 Negative effects
5	Environment is affected more than the legal limits allowed Level of impact 2 Negative effects
4	Environment is affected more than the legal limits allowed Level of impact 3 Negative effects
3	Degraded (polluted) environment Level of impact 1 Long-term harmful effects
2	Degraded (polluted) environment Level of impact 2 Medium-term harmful effects
1	Degraded (polluted) environment Level of impact 3 Short-term harmful effects

Thus, the following marks have been awarded:

Water quality index (QI - WATER)

Waste water is not collected in a wastewater treatment plant and Costești river is affected by pollutants generated by industrial waste deposit. Impact of waste water and polluted rainwater is relatively moderate so we give a note of evaluation 8.

Air Quality Index (QI - AIR)

At the level of quarry, air quality is influenced by the heavy-duty transportations. For air quality index is given a note of evaluation 8.

Quality index for soil, vegetation and fauna (QI - S, V, F)

Now, protected area status and specific legislative constraints make as impact of mining on soil, vegetation and fauna to be relatively low, so we give a note of evaluation 8. In the future, extension of quarry will affect the quality of priority forests and habitats, protected species and landscape.

Quality index for Human Settlements (QI - HS)

Due to the limestone quarry location relatively short distance from the inhabited area, the impact on human settlements is limited, so we give a note of evaluation 9.

These notes permit the classification of environmental factors in accord with the allowable limits established under legislation regulations (e.g. limit 1, 2 and 3). Method to calculate the global

pollution index (GPI) is based on analysis of environmental effects.

Thus, we construct a chart in which the ideal environment is represented graphically by a regular geometric figure inscribed in a circle with radius equal to 10 units of weighting. In this case, environmental impact assessment is based on global pollution index (GPI) which is a quantitative expression of the state of environmental pollution.

After analyzing the magnitude of the impact we can conclude that: (a) $GPI=1$ there is no pollution, and (b) for $GPI>1$ there are changes in environmental quality.

This index derives from the ratio between two surfaces which represent the ideal and actual conditions of the environment, as it follows:

$$GPI = Si/Sr$$

Where:

Si is surface of ideal state of the environment

Sr is surface of actual state of the environment

IPG values help in determining and highlighting the effects of anthropogenic activity on a scale of environmental quality. Estimation of environmental quality indicators has been guided by their scale of evaluation. Based on the values G.P.I. we established an environmental quality scale (table 2):

Table 2. Scale of GPI values and environmental effects (adapted after Rojanschi, Bran, Diaconu, 2002 [5])

Values of GPI	Environmental effects of activity
1	Environment is natural and unaffected by human activity
1 - 2	Environment is affect by human activity by the legal limits allowed
2 - 3	Environment is affected by human activity and causes discomfort to life forms
3 - 4	Environment is damaged and causes problems of life forms
4 - 6	Environment is affected by human activity and becomes dangerous to life forms
6	Environment is completely degraded and is improper for life forms

For Bistrița limestone quarry, the relation between notes given for environmental factors is represented by a geometric shape whose surface is

151.5 (*Sr*) (figure 3). Thus, the global pollution index for the limestone quarry is calculated as follows:

$$GPI = Si/Sr$$

$$GPI = 200/151.5 = 1.32$$

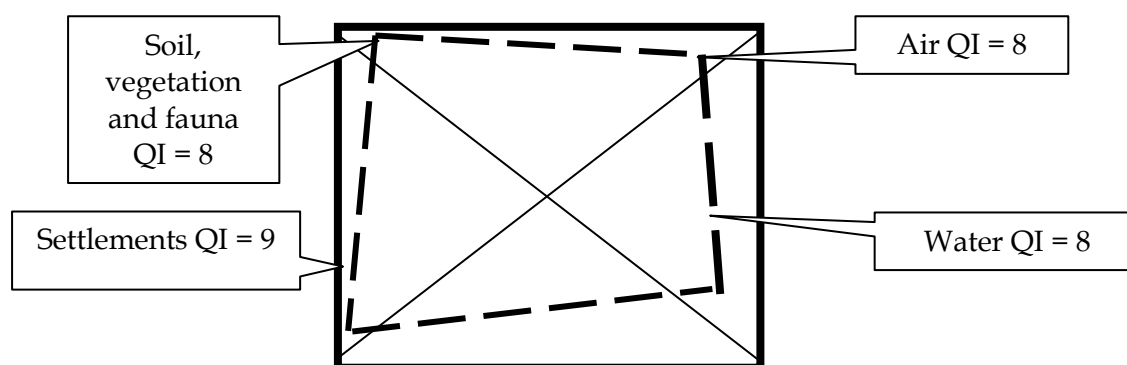


Figure 3. Graphic representation of quality indexes

Global pollution index (GPI) has a value of 1.32 and this shows that the activity of quarry will affect the environment within acceptable limits in the southern buffer zone of park.

5. Conclusions and perspectives

In conclusion, we consider that some remarks must to be mentioned: real constraints related to modifying of the southern boundary of the park (imposed by Natura 2000 context) and its

interference with quarry area; a new legislative decision need to be take by the National Government and Environment Ministry; the “domino” effects would seriously affect the economic activity of chemical platforms (Oltchim and Govora); a cost-benefit analysis related to socio-economic and environmental context is compulsory; necessity to improving management plan of PNBV and collaboration with local community and stakeholders; new impact studies on habitats and natural landscapes; assessment of tourist pressure; lack of an environmental restoration plan; land use changes in the quarry and buffer zone etc. Therefore, a new decision of environmental authorities is compulsory as soon as possible.

Finally, we mention as this approach is a preliminary one and some details remain to be solved in the near future.

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