



DOI 10.1515/pesd-2017-0038

PESD, VOL. 11, no. 2, 2017

THE IMPACT OF TOURISM AND ECOLOGICAL FOOTPRINTS ON PROTECTED NATURAL AREAS. CASE STUDY - DRAGON'S GARDEN (GRADINA ZMEILOR) SALAJ COUNTY – ROMANIA

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Keywords: protected natural area, tourism, degradation, conservation

Abstract: This paper will deal with the degradation of the Nature Reserve, The Dragon's Garden, caused both by tourism but also human intervention, aspects which have been noticed from the study visits in the area.

Introduction

The protected area, The Dragon's Garden (3,00 ha surface), is located on the left versant of Almas stream, in the reception basin of Dosurilor stream, near the village Galgaul Almasului, Balan commune. The Dragon's Garden is a vast phenomenon of collapse and headward erosion formed in the Sannihaiu sandstone.

This is a low grade Miocene tile, relatively well-cemented, with gravel intersections and conglomerates, characteristic for the Sannihaiu strata in Almaş-Salaj basin. While visiting this areal I have identified two possible degradation sources of the reserve, such as: degradation as a result of disorganised tourism, quite aggressive at times and degradation because of human intervention.

Over the course of time through the action of the same erosion factors some of the formations from The Dragon's Garden have degraded and modified their form, lots of them reducing their dimension. This was mainly the action of the people who, through escalation, have caused cracking and eventually the collapse of some formations especially since the component sandstone is quite poorly cemented and thus relatively friable. Taking into account the characteristics of the urban environment and the specific social conventions, one can identify a series of needs that the city, and not only, emits more and more constantly and

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tends to transform into actions. The cause being, the desire to benefit from a Modern, civilized and ecological tourism, such as:

- Return to Nature;
- Knowledge and temporary adherence to rural-specific membership groups;
- Knowledge, understanding and creativity are also motivations that can be successfully achieved in the touristic village;
- Aesthetic motivations arising from the need for beauty, order, harmony, naturalness, beautiful and picturesque places;
- Curiosity regarding the renowned hospitality, gastronomic customs, handicrafts and rituals;
- Rest, air and fruit diet, fresh food consumption;
- Sport, hunting, recreational fishing, climbing and hiking are motivations that get an authentic note, making individual initiative and imagination possible.

Over the course of time, tourism activities in "green" rural areas generate positive effects but also undesirable effects, especially when ecological sustainability and peculiarities of the natural environment are not respected.

Given that protected natural areas are considered, the most effective means of preserving biodiversity, which are often natural islands in an ocean of development, they are the basis for creating a global society based on sustainable criteria. What is going to happen in this area is difficult to predict, and it remains to be seen whether the Romanian authorities, the citizens, will understand that the natural heritage cannot be replaced by economic benefits. Maybe there are others, who can draw our attention towards this subject, thus making us realize that we have to protect the authentic nature.

1. THE DRAGON'S GARDEN NATURE RESERVE. DESCRIPTION AND SCIENTIFIC SIGNIFICANCE

The natural protected area, The Dragon's Garden (3,00 ha surface), Figure 1, is located on the left versant of Almas stream, in the reception basin of Dosurilor stream, near the village Gâlgăul Almaşului, Balan commune. There is easy access from DN 1G Sânmihaiul Almaş - Jibou county road, near the southern border of the village of Gâlgăul Almaşului, along the Dosuri Stream.

The site is difficult to miss even from the distance, so the route to it, over a degraded pasture, does not raise any orientation difficulties. There is 1 km distance from the village until the nature reserve. **Type of protected natural area:** geological - landscape nature reserve, IUCN category IV. **Decree law:** Law no.5/2000, approving the National Territory Planning Plan - Section III - Protected Areas, Item 2682, based on Decision no. 259/1975 of Sălaj County Council, updated by the Decision no. 5/1995 and C.J. Salaj.

The Dragon's Garden represents a vast phenomenon of collapse and headword erosion, formed in the Sânmihaiu sandstone. This is a low grade



Fig. 27. Dragon's Garden (Grădina Zmeilor) photo Aurica Grec, 2015

Miocene tile, relatively well-cemented, with gravel intersections and conglomerates, characteristic for the Sânmihaiu strata in Almaş-Salaj basin. The birth of these phenomena of great proportions, with a spectacular aspect, has the following explanation: at the base of the sandstone compartment, there is a level of purple clay with a layer of coal interposed by the longitudinal profile of the Dosuri brook. The consistent depth of the brook, landslide and water infiltration to the waterproof and sliding surface of the clay were the main factors that caused the slow movement of sandstone blocks or compartments through vertical cracks parallel to the stream of the brook. Gradually the cracks became more and more widespread and the denudation and wind erosion sculpted the most bizarre forms of columns, ramparts, bridges, mushrooms, etc. Some of them are



Fig. 28. Figure 2. Mining gallery, photo Aurica Grec, 2015

over 10-12 M. Viewed as a whole, they form a strange chaotic clutter and regardless of the point you look at them, they present other more surprisingly aspects, some of them vaguely anthropomorphic.

In the N-V part there is the mining gallery (Figure 2), typically metamorphosed, which is about 100 m long and is Y-shaped, the brown coal deposits being visible. To the south of the gallery, approx. 50 m, on the left bank of the Dosuri brook, there is increasingly flattened sandstone - conglomerate beige.

The local folk tradition gives a fanciful explanation to the origins of these interesting formations, as can be deduced from the name it carries, that of the "Zmeilor Garden". Wonderful towers, citadels, bizarre formations, baptized by the locals of Dragon and Dragon lady, The soldier's Girl, The Huntsman's Girl, Horia, Cloșca and Crișan, Cleopatra's Needle (for its resemblance to Negoiu peak, Făgăraș Mountains), Monks, etc. In fact, they represented, geologically speaking, the expression of air and water erosion generated on the conglomerate rocks in a gravitational and tectonic way. As a result, the vertical cracks appeared through which pluvial waters infiltrated, 25-30 millenniums in a row, thus breaking off from the massive rock, offering a wide panorama over the Almaș Valley towards Gâlgăul Almașului.

2. IDENTIFYING THE THREATS OF THE PROTECTED AREA DRAGON'S GARDEN

While visiting this area we identified two possible sources of degradation of the reservation, namely:

- degradation, as a result of unorganized tourism, quite aggressive at times;
- degradation because of human intervention.

Over the course of time, through the action of the same erosion factors, some of the Dragon's Garden formations have degraded or changed their shapes, many have diminished their size. The people escalating the various formations here, contributed greatly causing the cracks and eventually the collapse of some formations, all the more since the constituent tiles are rather thin and therefore relatively friable. In addition, in the western part of the area, a sheepfold was made, among the upwards and columns, many of which became just piles of crushed stone.

2.1. Human interventions in the reserve, economically and tourism-based

The local public administration authorities know very little about the dos and don'ts in an area declared protected. As a result, the risk of degradation of the protected areas is very high, because to those who do not conserve the protected

areas because of petty and small personal interests, add those who do not know it is protected and they are overwhelmingly many.

2.2. Positive aspects

On my outings at the Dragon's Garden, positive aspects regarding the protection of the area could be observed:

— we have identified specimens of herbaceous Common heather (*Calluna vulgaris*), in blooming period, a northern element, rare in the flora typical of this altitude. It is a low-growing perennial shrub growing from 20 to 50 cm, which has a branched root in the soil with a creeping stalk and ascending branches. The heather has small scale-leaves (less than 2–3 mm long) borne in opposite and decussate pairs. The flowers are grouped as spike like racemes, colors ranging from white, through pink and a wide range of purples, blooming from July to September. Fruits are spherical capsules that open in four 1.5 mm valves with white set form whiskers. (Figure 3)

In this area, you can find it from the hills up to the mountainous area, vegetating in the peat bogs, pinites, small oaks on sandstones, pastures and piedmonts. For therapeutic purposes, the aerial part of the plant, the flowers and the young branches are used. The plant with antiseptic characteristics is commonly used in the treatment of urinary tract infections, prostatitis, ankle edema, hemorrhages, pharyngolaryngeal inflammation, poisoning, ulcers and ulcerations of the skin, diarrhea, dysentery, fever, leucorrhoea, rheumatism, rheumatoid arthritis (A., Ardelean, Gh., Mohan, 2008, p. 219);



Fig. 29. Common heather (*Calluna vulgaris*), photo Aurica Grec, 2015

— warning signs stating the importance of the protected natural area are on site, as well as signs presenting local legends related to the appearance of geological formations;

- area surveillance is permanently ensured by an employee of Balan Town Hall in order to prevent a negative impact of tourism on the natural protected area;
- the sanitation status inside the area and in the protected area is adequate, no uncontrolled waste disposal was found;
- ecotourism, being considered as a natural refuge, is organized not only by students with modest financial needs regarding living conditions, but also by Romanian and foreign people with a certain standard of living, which makes rural tourism a very important link that connects our country with the rest of the world. Apart from the actual rest, the tourists are invited to take part at the local traditional festivities, such as: Shepherds' Milk Fair "Measuring of Milk Production", Annual Cheese and Cured Mutton Festival "Ravasitul Oilor" marking shepherds' return from the alpine transhumance (Food and Folklore), folk tales, crafts or cattle fairs, visits to medieval castles, cultural and historical monuments, etc.

In nowadays' perspective, in order to ensure sustainability in this protected area, a management is required that respects the principles of environmental functionality through all its components. The natural system provides not only goods but also services, which are often more valuable than the first. A middle way is needed to remedy the situation, rebuild the affected ecosystems and restore a stable ecological balance. The human interventions in the area, regarding the modification of the natural environment, are only a few aspects justifying the dysfunctions, the degradation of the natural ecosystems, and the necessity of elaborating and observing the area management plan. Man, through his actions, has to shape his strategy for a balanced environment, to correct through unconscious activity the imbalances and not to provoke them. The people who live on Earth and are tolerated by the environment must understand Earth's spirituality. Environmental policy must demand awareness and a rational ecology of economic management in the context of sustainability in the future. Unfortunately, interventions of any kind on the environment are often irreversible. Nature does not have a reset button.

The town hall of Bălan commune, valorizing this natural heritage and wanting to create economic opportunities for the local community drew up a project with European funding meant to make the site worthwhile. However, the constructive intentions were partly eclipsed by the way of carrying out the works that have achieved modern constructive characteristics, inappropriate for the categories of facilities allowed by the legislation in such areas. These are represented in a complex of negative aspects; of which we will show below.

2.3. Negative aspects

Protected areas, which embody the most beautiful natural landscapes, usually attract a large number of visitors. As the flow of tourists continues to grow, there are some disturbances to the protected area. In the protected territories, the

danger of waste, dirt and household waste is a particular risk. If visitors do not behave in a civilized way, they can trigger undesirable processes, leading to the destruction of vegetation, soil, disturbances of the fauna, and even the occurrence of fires (G., Ardelean, K., Karacsonyi, 2010). Such issues have also had an effect on the Dragon's Garden, alongside intensive grazing without authorization, damage caused by uncivilized and uncontrolled tourism. For example: drawings with paint or coal on conglomerates, at the mining gallery whose entrance is painted with graphite polychrome, as well as on the Dragon (Zmeul) and Dragon Lady (Zmeoaica) which can be found opposite.

Thus, I will present the interventions / "investments" in the protected area the Dragon's Garden, as follows:

— making successive stairs along the old pastoral pathway that led to the sandstone area of the young oak forest on the Dumbrava hill, bypassing the narrow aisle on the right, naturally excavated by exogenous multimillenary sandstones and conglomerates erosions (Figure 4);



Fig. 30. Realization of successive stairs, photo Aurica Grec, 2015

— in order to reach the margin of the oak forest and the edge of the rocky ridge, ranging in height from 10 to 12 m, the builder made some steps in the friable bench of conglomerates, similar to those leading to the mausoleum, 18-20 cm high, width up to 35 cm, over a length of about 3.5 m (which do not have a high chance of survival because of the inconsistent nature of the rock, but affect the site naturally);

— paved alleys from Moigrad - Porolissum andesites, with gutters for rainwater, wood footbridges, concrete pathways, instead of the old paths which are invaded by bushes of hawthorn, dogberry and blackberry and by the shepherds' and tourists' walks on this soil with alluvium and quartz material - therefore not muddy;

— near the dry waterfall, where we went down to the mining gallery, whose entrances were "painted" by the tourists. From here I could admire the Dragon and

Dragon lady, after which I changed the prospecting direction at the base of the steep hill, finally leading to the shed with a concrete platform with benches and wooden tables;

– three observation platforms were installed on which "mushroom-shaped huts of beech-stained fir beams" were mounted, two in the upper part of the area, and one at the base (Figure 5);



Fig. 31. Observation platforms, Photo Aurica Grec, 2015

– at the base of the area, near a 10-year-old wood chalet, an amphitheater with concrete foundation, chairs, benches, podium, stairs, etc. was built by the local administration. From the information provided by the representatives of Balan City Hall, this local public authority started the preparation for the necessary documentation in order to obtain the attestation as tourist resort of local interest for Balan commune from the National Authority for Tourism. From their declarations, the existence of the chalet in this area facilitates the obtaining of the attestation as a tourist resort of local interest. For the existing construction, the Town Hall has not done the necessary steps from the point of view of environmental protection;

– north of the tourist cottage, a shed was built - for field-picnic celebrations, and a football field;

– once these works have been completed, nothing will stop the access of SUVs, ATVs or mud motorbikes, people coming for picnics, the consequences of abandoning and spreading the packaging and household waste, and the fires, being easily imaginable;

– if the local administration would have periodically cleaned the thorns, the weed and the forest, thus shaping the old and overwhelmingly numerous paths, it would have been absolutely sufficient. The restoring of alleys, gutters, footpaths, water capture would have been useless.

3. RESULTS AND DISCUSSION

The degradation of nature reserves and natural monuments damages the touristic potential depriving it of scientific, cognitive - auditory, aesthetic contribution, of some sites of uniqueness or rare vistas, or of natural habitats that have preserved a biological virgin balance. The degradation of these monuments and nature reserves in our country can be caused to a large extent by uncontrolled economic activities, their damage being unimaginable, both scientifically and economically, through the diminishing of the possibilities for their touristic capitalization. At present, the land on which the Nature Reserve, Dragon's Garden is located is the public property of the Balan Town Hall, occupying an area of 3.00 ha. Therefore, the administration of the area is the responsibility of this municipality, which has the obligation to supervise, protect and valorize the natural heritage, as well as its floral and faunal inventory.

From the researches presented there are some shortcomings, due to several factors related to the administration of this area, as follows:

- failure to respect the legislation on the regime of natural protected areas;
- the lack of a local strategy or plan to promote and valorize the reservation from a scientific and touristic point of view;

Ultimately, all of these can play a negative role for the natural heritage of this protected area. The long - term preservation and protection of elements of a geological nature, of the specific plant and fauna habitat of this protected area must pursue the following aspects, taking into account the specific legislation:

- In order to ensure the protection of geological and landscape features, any construction, drainage, embankment, as well as any human activity that could affect the ecological balance of this area should be avoided;
- Putting an end to any activities with a potential negative impact on the protected area;
- Prohibiting the initiation of new activities that could affect the integrity of the ecosystems specific to the area, as these are mandatory under the Environmental Protection Act, as follows:
 - The development of programs, projects and activities that are in conflict with the management plans or regulations of the protected natural areas or which are likely to have an impact on them;
 - Change of land use;
 - Grazing and the location of sheepfolds;
 - Commercial activities;
 - The destruction or degradation of information and signposts, constructions, enclosures, barriers, pillars, markings or any other places in the protected natural areas;

- The ignition and the use of open fire outside the specially designed and signaled areas for this purpose by the administrators or guardians of the protected natural areas;
- Leaving waste outside specially designed and signaled places for collection, if available;
- Access in the protected natural areas and practicing off-road sports allowed for public access by motorized vehicles using fossil fuels;

Taking into account the aspects presented regarding the poor management, the investments, which do not comply with the norms on the protection of the natural heritage of the "Dragon's Garden" Nature Reserve, as well as the non-ecological practices of the citizens that cause a negative impact on the area, I recommend the following:

- A policy of the locals' involvement in planning and managing the protected area is needed, which will eventually lead to joint management. This will give locals the sense of involvement and ownership of the protected area. These are the ways to cause communities to be capable of taking care of and harness their own nature heritage values in a sustainable way;
- In order to be effective in their work, protected area managers need to work with a wide range of partners outside the official nature conservation section. They have to cooperate with local farmers, local businesses, they can use conservationist volunteers. The more partnerships they will have to manage the protected area, the more people and institutions will ensure success. It is very important to form an alliance with local people so that they feel included and not excluded from what is happening in protected areas. Their representatives must be part of the management bodies. In some cases, it is advisable to go further and establish a common management system;
- Shared management of protected areas should be established based on collaboration agreements between government agencies or managers responsible for protected areas, and various mandataries (organized groups, firms, universities, nature conservation organizations, etc.) to develop and implement a specific management. Such an agreement will identify: the resources of the protected areas and their sustainable use in accordance with the purposes of the protected areas, a system of rights and obligations for these users, collective decision-making and conflict resolution procedures that may arise. For resource users, joint management has the advantage of recognizing their rights over the resources. For administrators, it makes management more feasible and more efficient, while respecting conservation goals.

Conclusions

Over the course of time, tourism activities in "green" rural areas generate positive effects but also undesirable effects, especially when ecological load capacity and ecological peculiarities of the natural environment are not respected. The following conclusions can be drawn from this paper:

- a. Traditional tourism, with non-organic practices, can cause extremely damaging effects on nature reserves or parks, disturbing their balance, specific flora and fauna. In order to eliminate the dangers of the protected areas, the local public authorities in the natural protected areas, which also have the capacity of administrating these areas, together with the environmental authorities, environmental NGOs, must collaborate to impose obligatory rules. These rules have to ensure the unaltered preservation of the natural heritage for its valorization through tourism.
- b. The overall objective is that, through sustainable management, the environment, the natural and anthropogenic touristic potential will benefit from the idea of preservation and development in a sustainable, ecological manner. General objectives set up particular measures, grouped at different levels of action: natural, economic, administrative, technical, social and political.
- c. The real and effective protection of the Dragon's Garden, like any other protected area requires the development of a management plan to highlight: the extent of nature exploitation through various activities; The degree of normality of the ecological cycles for the renewal of renewable resources; The evolution of the environmental quality in the area and the measures necessary for the preservation of the existing natural heritage.
- d. The Bălan Local Council is responsible for ensuring proper management of the Dragon's Garden. In this context, its statutory obligations for proper management and preservation of the unaltered natural heritage of the reservation imply the taking of immediate and permanent measures, including:
 - Stop all work inside and in the vicinity of the protected area, which contravenes the legislation on protected natural areas;
 - Making any works only after their approval by the Environmental Protection Authority;
 - The reserves must be restored to the original state by removing wooden chalets, mushroom-type houses, dismantling all concrete investments (footbridges, stairs, etc.), and only sand and gravel will be used for the development / rehabilitation of the alleys. The gutters around the alleys inside the sandstone - nature monuments, must be maintained, cleaned of vegetation, unclogged to ensure the drainage of the rainfall;
 - Reduction of anthropogenic aggression on the natural environment;

- Maintaining the existing natural landscape by intensifying the measures to prevent natural degradation due to works, which contravene the legislation in the field, cutting the vegetation, polluting the land;
 - Maintaining the appropriate sanitation status in the reservation;
 - Development of tourism and promotion of the nature reserve, both through the media and through educational awareness raising about the touristic value in educational institutions;
- e. Tourism can be used as a support to justify and fund the protection of natural areas and can raise awareness about environmental issues. As a way of practicing tourism, it is necessary to implement ecotourism. Ecotourism, a component of rural tourism, has the greatest implications in capitalizing on local tourism resources and in raising the living standards of the inhabitants, in full consistency with the preservation of the natural environment. Another positive effect determined by the tourist activity is its multiplier effect. Thus, the money received from the visitors can be assigned for the restoration of affected, degraded areas, the production of informative materials (brochures, flyers, posters, etc.).
- f. Effective management needs to take into account the performance targets that lead to economic efficiency in compliance with environmental legislation, new methods of educating and raising awareness of the population, and last but not least, new legislative initiatives from authorities to economically stimulate the development of sustainable tourism, especially ecotourism.

Given that protected natural areas are considered to be the most effective means of preserving biodiversity, which are often natural islands in an ocean of development, they are the basis for creating a global society based on sustainable criteria. What is going to happen in this area is difficult to predict, and it remains to be seen whether the Romanian authorities, the citizens, will understand that the natural heritage cannot be replaced by the economic benefits, and maybe if others can give us a wakeup call, it will be an asset in protecting the autochthonous nature.

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