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TOURISM VALORISATION OF THE GEOMORPHOSITES FROM BUZĂU SUBCARPATHIANS CONTENTS

-DIGEST-

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CONTENTS

Key words : geomorphosite, subcarpathians, Buzău, morphometers, geology, geomorphological processes, applied geography, tourism traffic, accommodation, methodology, business opportunities, infrastructure, economy, sheet, values, research.

INTRODUCTION

Cunducting a research about tourism valorisation of the geomorphosites in th Buzău Subcarpathians was a necessity because in this region problems such as the identification and economic valorisation of these landforms have not been treated as a whole. Research,more or less scientific, has been done on some small parts of the area which were considered to be interesting at a time.This is how a few of the geomorphosites have been promoted through media – Pâclele Mari mud volcanoes (less known are the ones from Beciu or Berca), the White Stone from Mânzăleşti, Meledic Plateau (in the same area as Meledic Plateau there are also the cliffs from Malu Roşu, the stone waves from Lopătari or the fossil area in Vintilă Vodă) and many other examples though some are yet to be discovered.

The main purpose of this research was to identify the geomorphosites in the Buzău Subcarpathians and for achieving this task, besides using the existing bibliography, field research (started in 2003) has been done with the help of a good knowledge of the region and its access roads. At the same time there has been a collaboration with the local town halls and ordinary geographers that live in this area (geography teachers) for a better information regarding the studied region.

Also important were the discussions with the county level decision makers who can assist with the developement of tourism and economy in this area, finding new ways to improve tourism activities. Based on these facts we tried to realize an efficient touristic valorisation of all the identified geomorphosites.

The scientific approach wanted to emphasize the economic value of these geomorphosites so that together with the other tourist attractions they would form a whole which will bring a

financial growth to the communities here. For this reason the issue of the touristic potential valorisation was handled by dividing the area into smaller geographical units: Slănicului superior basin, Răcădăului hill, Breazu hill, Istriţa hill, Berca-Arbănaşi anticline, which will be later integrated in the Buzău Subcarpathians chain, while showcasing the economic programs and exploitation methods.When choosing the areas,it was taken into account the large number of geomorphosites each one of them holds, as well as the way in which they are perceived by tourists – some of them are popular (Berca-Arbănaşi anticline etc.) while others are unknown (Breazu hill sau Salcia basin).

As final, the research must support the community by bringing in new ideas, proposing models of tourism valorisation, doing a pertinent analysis on the developement of tourism as an important economic activity of the region ,or if not, at least be regarded as a warning signal for the local communities in order to take advantage of nature and improve their living standards.

I BUZĂU SUBCARPATHIANS – LOCATION, LIMITS, GENESIS

1.1. Geographical position and spacial relations with the neighbouring units

They are a component of the (Subcarpaţii Curburii?). In the northern part the Buzău Subcarpathians are bordered by Pintenul Ivăneţu and Pintenul Văleni, both belonging to (Carpaţii de Curbură?). The region's southern part is bordered by the Romanian Plain.

1.2. Geographical limits of the Buzău Subcarpathians

The northern limit has the following configuration: it starts from the Lopătari Depression followed by the contact with the paleogene flysch alongside Terca, Luncile, Plaiul Nucului, Brăeşti, Ruginoasa, Stănilă,Buzăului Valley, Păltineni, Poienile, Brădet, Chiojdu, Starchiojd, Bătrâni, Ceraşu and Teleajenului Valley.

The southern limit is very well defined.West to the Buzău river there is the Istra Mountain(part of Dealu Mare Mountain situated between Buzău Valley –east and Cricovul Sărat Valley-west)where it has a sharp contact with the subsidence plain of Buzău (120-150m) in the eastern part and Gherghiţei Plain in the western part.The contact with Buzău Plain is made through fault lines.

The western limit leading to Prahovei Subcarpathians is formed by Telejean river which flows through Vălenii de Munte Depression until the beginning of Podeni Depression.Alongside these limits you can find the next towns/villages : Drajna de Jos, Gura Vitioarei, Piatra Bogdăneşti, Coada Malului, Măgurele. The limit is continued by Podeni Depression (Fig. 5), in whose south is situated Bucovelului Hill - a component of Prahovei Subcarpathians, and by the Cricovului Sărat Valley which goes on until it reaches the plain. The eastern limit goes towards

Râmniculuі and Putnei Subcarpathians to the beginning of Lopătari Depression on the course of Slănic river and it finishes off at its confluence with Buzău river next to Săpoca. From here the limit is continued by Buzău Valley and it ends at the contact with the (omonimă??) plain close to the city of Buzău.

Administratively it is located on the territory of two counties:Buzău and Prahova, regionaly the area belongs to the developement region Muntenia – South and South-East.

1.3. Genesis and paleogeographic evolution

Geologically , Buzaului Subcarpathians present a wide variety of complex lithologic sequence closely related to the different conditions of sedimentation , the nature and intensity of tectonic movements . in Ceraşu Hill are found the oldest geological formations of Buzau Subcarpathians belonging to the Mesozoic- layers of flysch sandstone , conglomerates . The next oldest formations are composed of Paleogene flysch in northern Subcarpathians at the contact with the mountain area . These are represented by hard sandstones Paleocene - Eocene of age . Neogene deposits are of great expansion , approximately 90% are represented by sedimentary rocks and unconsolidated , wrinkled . They correspond to floors of Miocene and Pliocene . Middle and Upper Quaternary is represented by alluvial cones and terraces along the Buzaului,Cricovului valley and their tributaries ;

In conclusion geological complexity of the region favored the emergence and development of various landforms with special features that have given rise to geomorphosites with unique specificity .

II RESEARCH METHODOLOGY

2.1. Geosites and geomorphosites - concept and content

The study is based on " last generation "concepts , which appeared in literature only two or three decades ago. These are words to emphasise that geography needs to become not only a " readable " science but also a useful one in today's economic environment . Conceptual aspects refer to notions that define how they can be harnessed special elements of the landscape , in this case the landscape and recovery of their economic means .

Geomorphology contributes to the development of mankind , bringing its economic , social and cultural benefits. Thus, we need to know exactly by what means and how into place altenative geomorphology in solving spatial planning problems of mankind.

2.1.1. Geotopes concepts and Geosite

Geotopes term defines a small geographical unit which is formed as an indivisible whole . It is a hierarchically organized system that can be the basis of all systematic complexes . Emerged and

developed as a concept in the Mediterranean . Expresses the desire to highlight the connections between most of the landforms , geomorphological processes and tourism. By developing a simple definition of the geotop we can determine four to five traits that contribute to the selection of a reliefogenic site.

2.1.2. Geomorphosite - concept, content and functional relations

Panizza and Piacente in 1993 define the concept as " landform and geomorphological processes that are important in understanding the evolution of Earth ." This can be assessed aesthetically (intuitively) or scientific (quantitative) . In 2001 Panizza returns and redefines - " geomorphosites are landforms that have received a scientific , cultural and historical , aesthetic and / or socio - economic development based on perception and exploitation by man."

Latest approaches to the concept were made by Reynard and Pralong (2004), the first one defines geomorphosite as " a portion of the land area of particular importance in understanding the evolution of Earth , keeping the main value on the scientific , the rest being of secondary value ."

The universally accepted definition is that a geomorphosite or geomorphological point (place) is defined as " a portion of the land area of particular importance in understanding the evolution of Earth's climate and life " (Grandgirard 1997 Panizza 2001 Reynard 2004) .

2.1.2.1. Geomorphosites and geotourism

A practical way of enhancing geomophosites can be achieved with geotourism and / or Geoparks . These are the most modern tools to increase geomorhosites capacity to become important sources of income for the area . Geotourism is a form of tourism to address scientific knowledge about the geological composition of the region, with its significant sites for geological knowledge . Geotourism is conducted on the geologically relevant routes - Georoutes

Dowling (2009) sets out the principles underlying the geotourism :

1.This is the ecological basis , therefore the objectives that will represent geotourism resources should be analyzed from the bedrock , reaching the major forms of relief and its microforms ;

2 . geotourism must be sustainable - that is to promote and protect geological heritage ;

3 . geologically informative character for people who are interested in this type of approach of tourism;

4 . it is beneficial to communities across the practice, because they can support ecomonic development;

5. it is manifestation of the touritic phenomenon , thus providing tourist satisfaction .

2.1.2.2 .. Geomorphosites and morphotourism

The role of the landscape in tourism activities is known , given that it "is " infrastructure of this process . Landscape attract by contrasted shapes the attention of tourists , much stronger than if it were uniform or if it had uniform details .

Geomorphosites main types : (after Ielenicz , M., 2009)

1 . geomorphosites derived from geographical geosites with touristic value :

- River - on the action flowing waters : gorges, ravines , natural nooks , fords etc . ;
- Ice : glaciers, cirques , moraines , masses of debris , glacial valleys and so on ,
- Karst caves , sinkholes, Uvala , springs , limestone etc settlements . ;
- Wind : dune , Barcan , rocky plateaus , fields , etc. gems . ;
- Coastal : deltas , lagoons , estuaries , beaches, sea coasts , coastal belts , cliffs , etc. . ;
- Volcano : volcanic cones , plates volcanic eruptions in the crater lakes and so on ;
- Current geomorphological processes : collapse , subsidence , landslides , torrential floods , mudflows , etc. solifluxion . ;
- Geomorphosites related to eruptions of gases or vapors : mud volcanoes , geysers ;

2 . geomorphosites related to protected areas (ecosites) natural reservations ; natural parks , national parks , dendrologic parks , natural monuments ;

3. geomorphosites related to water (hidrosites) : lakes, karst springs , mineral springs , valleys etc.

4. . geomorphosituri related to human activity (antroposites) - caused by human settlements , due to economic features : quarries, abandoned mines , canals, lakes , dams , etc. .

5. other geomorphosites :

a geological sites : structural tectonic sites, paleosites (rocks , precipices , marbles , plates, horsturi , grabens) fossil sites etc. . ;

b. historic sites :archeological, medieval places where major battles took place , forts, fortresses , castles , ruins, etc. ghettos . ;

c. cultural and artistic sites : places as source of inspiration , places where various activities with specific cultural or religious importance take place ;

d adventure sites : places to climb , tracking of biking , rafting , enduro , etc. ..

Sandra M. Panizza and Piacente (2003) mention that geosites are within the scope of concern of several areas:

1. scientific research - you can study processes , geological and geomorphological phenomena that led to the genesis of the relief ;

2. in the cultural field - they can provide interpenetration of natural and cultural elements ;

3. they are a source of inspiration for various artists ;

4 . they are tourist attractions.

These attributes are associated increasing complexity of their value.

2.1.3 . Brief history of geomorphosites research worldwide and in Romania

During its short history, this concept has aroused a lot of interest for geographers, and this resulted in the enunciation of many definitions for this concept. Steps that have been taken in defining and understanding the geomorphosites have the following route :

- 1993 the concept of " geomorphological values "is introduced (Geomorphological assets / biens géomorphologiques) by M. Panizza ;
- 1994 a new concept defined by A. Carton and colab. - " Real geomorphological " (geomorphologic goods / biens géomorphologiques) ;
- 1994 Hooke defines " geomorphosite " (Geomorphosites / Sites géomorphologiques) ;
- 1995, 1997, 1999 Grandgirard and colab. Introduces the concept of " geomorphological geotopes " (Geomorphological geotopes / Géotopes géomorphologiques) ;
- 1997 Rivas et al. Defines the concept of " sites of geomorphological interest " (Sites of geomorphological interest / Sites d' interet géomorphologique) ;
- 2001 M. Panizza adopts a new name ,that of the" geomorphosite " (Geomorphosite / Géomorphosite) ;
- 2004, 2005, 2009 E. Reynard redefines the notion of geomorphosite taken from Panizza ;
- 2007 J. Pralong , redefines the term geomorphosite and explains how to research and value thereof .

The concept came to Romania by the Italian branch universities in Oradea and Bucharest. Among the first geographers who have been busy with this phenomenon are Ilieş Dorina and Nicolae Josan from the University of Oradea. Studies now appear as:

- Preliminary Contribution to the investigation of the geosites from Apuseni Mountains (Romania) - Dorina Ilieş , Nicolae Josan (2007) ;
- Some Aspects regarding the genesis of geosites - Dorina Ilieş , Nicolae Josan (2008) ;
- Geosites - Geomorphosites and Relief - Dorina Ilieş , Nicolae Josan (2009);

Geography , University of Bucharest participates in the development of this subject through the studies published in various publications such as :

- Inventoring , Evaluating and Tourism Valuating the Geomorphosites from the Central Sector of the National Park Cehlău - Laura Comănescu , Dobre , R. (2008) ;
- Inventoring and Evaluation of Geomorphosites in the Bucegi Mountains - Laura Comănescu Nedelea , N., Dobre , R. (2009);
- Geotop , GEOS , Geomophosite - Ielenicz . M. (2009).

University of Cluj- Napoca representatives who approached closely this theme were:

- Ioan Mac , wtto in 2000 defines the notion of the site;
- 2005 Petrea Dănuţ s define the site as a " significant portion of the territory bearing " ;
- Virgil Surdeanu and collaborators initiated in 2009 a project to inventory geomorphosites with landslides in Transylvania ;
- Ioan Aurel Irimuş in 2010 describes the landscape in terms of tourism potential and exploitation ;
- Inventoring Cards for Regionaly Relevant geomorfosites - Gabriela Cocean (2011) ;
- The Assessment of Geomorphosites of Touristic Interest in The Trascău Mountains - Gabriela Cocean Surdeanu , V. (2011) ;
- Trascăului Mountains - Relief , Geomorphosites, Tourism - Gabriela Cocean (2011) ;

2.2. Methods of mapping the geomorphosites in the Buzăului Subcarpathians

Castaldini (2005) provides a modern map , rich in information, easy to read for the general public . The support was the general geomorphological map that captures the current processes in the geomorphosite, using simple graphic symbols , which were added to the main points of tourist interest : the accommodation and catering, sights of interest such as cultural, religious , architectural etc .

For the study of Buzaului Subcarpathians were made : maps, for present geomorphological processes , geomorphological sketches for a part of the geomorphosites and digital maps . For each area with geomorphosites, using the method of Castaldini ,were made geo –touristic maps.

2.3.Methdos of evaluation of geomorphosites in Buzăului Subcarpathians

Research methodology will be presented in the following subsections and it is structured in three main areas :

1 . in the first phase it will be analyzed and presented the geographically specific methodology , the classic one , which includes principles, methods and procedures covering the entire spectrum of geographical sciences ;

2 . the second phase will cover the research methodology in terms of tourism attractiveness of the landscape ;

3. The third stage refers to the specific research methodology of geomorphosites .

2.4.1. Geographical Research Methodology

This may include specific steps that are made for a good conduct of the study . This methodological approach consists of several steps :

- Documentation stage , which formulates the problems and describe the territory under study ;

- The stage of analysis of the existing situation in the territory. References are quantitative and qualitative must lead to clear outline Geotop , structures , functions and dysfunctions and post-operational imaging ;

- Audit phase aims to assess achievements in relation to the goals set.

2.4.2. Research methodology in terms of tourism attractiveness of the landscape

The second methodology is typical for the geography of tourism. The scientists used a set of principles , common research methods and the entire geographic area , and some specific ones as well .

2.4.3 . Inventory and assessment methodology of the geomorphosites

From the beginning , there was a need to establish a methodology to be more efficient and accurate in assessing geomorphosites . First attempts are made since 1994 by Panizza and Cannillo . The paper made by the both was synthetic and watching baseline to which were added the bracket divided into two groups : the main one (geology, geomorphology , valences Paleogeographic geomorphosite) and a secondary that contained cultural, aesthetic and environmental values.

Since then geomorphologists that approached this area of research have added rich inventory and evaluation methodology . In this context can be metioned :

1 . Pralong provided a method which focuses on tourism value of the geomorphosite. He believes that tourism is the average of the value of landscape , as well scientific , as its cultural, historical and economic value. This method was taken by Comănescu and Dobre who inventoried Ceahlău National Park .

2 . Gabriela Cocean departs from this method that enriches and diversifies , adapting it to Trascăului Mountains habitat , managing to get an inventory and evaluation of a tourist is point of view for geomorphosites of very good quality. In the first study the basics of geomorphosite (the geomorphological , aesthetic and environmental) in the second part she deals with functional values , those which determine economic / tourism usability of the geomorphosite (the cultural, scientific, economic / tourism) , and finally those values lowering the tourism potential of the geosite.

3. Bianca Toma takes some of the methodology used by Gabriela Cocean ,processing it and obtaining the original inventory sheet used to evaluate the salt of the geomorphosites in theTransylvanian Depression . Part of this assessment is suitable for geomorphosites on salt and salt breccia in the area of Buzaului Subcarpathians.

III. THE MORPHOMETRY OF THE BUZĂU SUBCARPATHIANS

3.1. Hypsometry and morphogenetic levels

3.1.1. The morphogenetic levels of the landforms

After the analysis of the connections between structure (tectonics and lithology) and landforms, the morphostructural subdivisions were individuated, characterised by their morphology, main fault lines, lithology and the age of the formations which constitute them. As a result, three morphostructural areas were identified (Badea, L., Niculescu, Gh., 1964): the area of the piemontan hills *formed on Levatine-Quaternary monoclinal structure* – situated outside the Subcarpathians; *the area of Pliocene hills and depressions* – characterised by simple, large, asymmetrical folds. Situated between Slănic Valley and Teleajen Valley. They are characterised by simple, large, almost symmetrical folds; the area of hills and depressions corresponding to Mio-Pliocene structures – it is very wide.

3.1.2. *Hypsometry*

After the analysis of the hypsometric levels, it can be observed that they have a nonuniform distribution. The highest one is between 201-300 m, 301 – 500 m and 501–700 m, and the lowest one is between 701 – 1000 m and 1000 – 1136 m (tabel no.1). In conclusion, the hypsometric analysis of the Buzău Subcarpathians offers us the image of a complex landform, which includes altimetric levels with specific altitudes to hilly landforms, which enables the presence and development of a great variety of geomorphosites.

3. 2. The depth of the fragmentation

The depth of the linear erosion (caused by flowing waters) is analysed with the help of the depth map of the fragmenation. The values of the parameter offer us information about the intensity of this erosion and of the relative height of the slopes.

In the area of the Buzău Subcarpathians, the values of the depth of the fragmented landform show that the intensity of the linear erosion is influenced by the lithostructural, neotectonic and hydroclimatic characteristics.

Depending on the median value (112m/km^2) and on the maximum value (269 m/km^2), and also on the surface of the studied area, five classes have been identified, whose values show the existing differences.

3.3. The horizontal fragmentation of the landform

The values of this parameter express the degree of discontinuity, generated in the horizontal plan of the morphological surfaces of an area. The different values of the horizontal

fragmentation of the landform are caused by an extremely variable and different alternation, which the corridors of valleys and the interfluvial landforms register on the surface.

The median value of the horizontal fragmenation is of 0,81 km/km^2, while the maximum value is of 6,44 km/km^2 (tabel no.3). The significant difference between these values determined the existence of six classes (Fig. 30).

Taking everything into consideration, the density of the fragmentation, in this case conditioned by lithology and also by the intenisty of the fluvial processes, represents a factor with direct consequences on the dynamics and on the territorial distribution of the current geomorphological processes.

3.4. The geodeclivity

Knowing the values of the geodeclivity is a main requirement for the geomorphological quantification of a territory. The ground inclination, along with petrography and structure, determine the intensity and the type of modelling processes of the substratum.

The landforms of the Buzău Subcarpathians are characterised by an alternation of the slopes, which has high values and slopes with high morphodynamics and low values in meadows and depressions. The study of the slopes offers precise information about the use of the slopes in the creation of means of communication, about the location of the accommodation and tourism base and about the safety of tourist activities.

3.5. The orientation of the slopes

The processes that shape the slopes are influenced by the position towards the cardinal points. Consequently, the position of the slopes constitutes one of the fundamental elements which influence the direction and the intensity of the way the geomorphological processes action. It determines the caloric regime and the soil humidity, it influences the processes of frost-defrost, the type of coverture deposits on the slopes and it determines the qualitative differences in the action of the processes before the erosion. By influencing the quantity of the directly radiant energy, the position determines some differences in the type of spontaneous vegetation, the drainage regime etc. Knowing the morphographic and morphometric parameters of the Buzău Subcarpathians indicates the territories which are susceptible to be affected by the currents geomorphological processes. This outlines the first images of the morphodynamics that characterises the valley-slope systems, and also the measures that need to be taken for the tourism in the region.

IV. THE MORPHOLOGY OF THE BUZĂU SUBCARPATHIANS

The Buzău Subcarpathians are different from the Curvature Subcarpathians (Buzău Subcarpathians being a subunit of the Curvature Subcarpathians), due to:

- their transverse hydrographic network;
- their diverse lithological and petrographic structure;
- their complex structure;
- general orientation of the folds, which is from North-East to South-West as far as Nişcov Valley and from East to West beyond this valley;
- their endogenous and exogenous tectonic mobility;
- their degraded landscapes;
- their landform inversions.

The altitude of the landforms varies from 300 metres to 800 metres.

4.1. Types of landforms

The study of the types of landforms – petrographic, sculptural, fluvial, and also of the current geomorphological processes can explain the distribution and the localisation of the possible tourist landforms. According to the obtained information, we can know precisely which geomorphosites identified in the Buzău Subcarpathians can be used for tourism purposes.

4.1.1. The structural landforms

The individuation of this type of landforms has been conditioned by petrography and by tectonic evolution. Under these conditions, the landforms have two types of structures: folded and monoclinal.

The studied area has the most complex structure due to its complex evolution in the Neozoic period. Therefore, between Slănic and Telejean, there is a structure with large folds, numerous anticlinal vaults and synclinal depressions. In the centre, there is a system of large Mio-Pliocene folds, and on the outside there is a monocline or diapir vaults. This complex morphostructure is caused by two factors:

- the progress of the main structures at the same time with the alignments of the petrographic facies – forming cuestas and structural surfaces;
- the river generations.

4.1.2. The petrographic landforms

The Buzău Subcarpathians have a great lithologic diversity. The morphostructural units are characterised by the variety of the rocks, which determine the structural forms in this region. Therefore, the nature of the rocks is the main cause of the current aspect of the landforms. One can affirm with certainty that „the marly clay from the Mio-Pliocene structures determined the altimetric landscape, the hills have a moderate slope, and the sandstone, the conglomerate and the tuffs contributed to the evolution of the high structural landforms, with suspended synclines and monoclinal cuestas.”(Petrescu-Burloiu, I., 1977).

a. *landforms developed on clay facies, clay-marl facies and loamy facies*.

The slopes have extremely active dynamics, with soil slips and mudflows. The landforms are the result of simple undulations, slips or waves. There are also the badlands, specific to the areas with mud volcanoes ;

b. landforms developed on sand, gravel and boulders – there are ditches and grooves separated from the ridges and towers like the earth pyramids. Formed by cementation: concretions, babe, vălătruci.

c. landforms developed on limestone, represented by lapies and sinkholes (Măgura).

d. karst and pseudokarst landforms, developed on salt. On the surface. there are tubular and linear lapies, separated from the ridges, dissolution niches, sinkholes, uvalas (resulted from coalescence of sinkholes), pseudocanyons etc.

4.1.3. The fluvial landforms

The Buzău Subcarpathians have a well-organised hydrographic network. The River Buzău flows through this area and the biggest part of this region is included in its hydrographic basin. The western part is included in the hydrographic basin of the River Ialomița.

While in the Curvature Subcarpathians the river valleys are transverse, in the Buzău Subcarpathians they can be transverse, longitudinal or diagonal due to complex landforms. The sectors of the transverse valleys alternate with those of the longitudinal valleys or of the diagonal valleys.

The terraces are well-represented, even if initially they were thought to be fragmented. Altimetrically, they are represented in the following way: 1–3 m, 5–8 m, 10-14 m, 20–25 m, 30 - 40 m, 50–60 m, 80–90 m, 110–120 m, 140-160 m, 180–200 m. Usually, the inferior terraces 1–3 m and 5-8 m are well-represented.

The processes that take place in the inferior river channel enable the movement of materials from the slopes and they also bring gravel and sand in the major river channel.

4.1.4. The current geomorphological processes

4.1.4. The current geomorphological processes

The geological structure, the distribution of the hills, the rivers which drain the region and the presence of the vegetation determined the great intensity and frequency of the geomorphological processes in this area.

The geomorphological processes had a quick evolution, with the major contribution of the anthropic factor, which accelerated both their extension and intensification. As a result, the lands were degraded, the geographical landscape changed and various microforms of land were created.

The most frequent geomorphological processes in the Buzău Subcarpathians can be classified in two main categories: the processes of soil erosion and the slope processes.

4.1.4.1. The processes of soil erosion

Depending on their formation and on the conditions of their evolution, the most frequent processes are caused by the action of water and by gravitational processes.

The pluvial erosion affects large areas in the Buzău Subcarpathians. The main forms that action on the landforms are the gutters, the gaps and the ruts, which are frequent in the central part of the Subcarpathians. The torrents are numerous, they cover wide areas, they have great length and they are reactivated by each quantity of precipitation that exceed the average of the area. The soil erosion predominates in the massifs with slight inclination. In the forest areas, it is associated with other geomorphological processes.

4.1.4.2. The slope processes

The movements in the Buzău Subcarpathians are:

- slumps, which can be produced in the superior part of the basins situated under the ridge of the hills (Podu Muncii, Sătuc etc.) or in the areas where they detached from the breaking lines;
- falls are common in Buzău Valley in Chirleşti, in Pănătăului, Boului, Bâsca Chiojdului Valleys. Frequently, they are combined with slumps – frequent in Bălăneasa, Sibiciu, Sărăţel Valleys.

Soil slips are formed due to presence of clay. In the Buzău Subcarpathians they influence the shape of the slopes. In the central part, these processes occupies 35% of the surface.

Mudflows are common on steep, deforested slopes, formed by an alternation of sandstone, clay, marl and sand. They are determined by heavy rain and snowfall and the lack of vegetation. They are frequent in the Buzău Valley, but also in Sibiciu Valley and Pănătău Valley, with length of 200 – 400 m, and some can exceed 1500 m, with width of 10 – 40 m. Some of them are grassed over and stabilised: Posobeşti Hill and Cătiaşu Hill.

4.1.4.3. Current geomorphological processes – case studies

The case studies emphasize that in the Buzău Subcarpathians, the intensity of the geomorphological processes is different due to their lithology. In this context, there has been done a research on lithologically different geographical units. As a result, the dynamics and the number of current geomorphological processes are different in the studied region and at the same time the structure of the geomorphosites is varied. The case studies were carried out for: Răcădău Hill, Istriţa Hill, the Berca anticline – Arbănaşi, Bazinetul Salcia, the Superior Basin of Slănic Valley, Breazu Hill, Buzău Corridor between Vipereşti and Ciuta.

V. THE EVALUATION OF THE GEOMORPHOSITES FROM THE BUZĂU SUBCARPATHIANS

5.1. Evaluation methods for the geomorphosites from the Buzău Subcarpathians

The evaluation sheet of the geomorphosites includes unique elements, which give high accuracy to the evaluation. For a better understanding, all the scores given to each geomorposite have been explained in order to avoid inaccuracies.

The first part of the evaluation of the geomoprhosites from the Buzău Subcarpathians includes the analysis of those elements of the geomorphosite which represent the ”base” and which offers essential and structural value. This analysis includes geomorphological, esthetic and ecological values. The evaluation was made according to a numerical scale from 0 to 1, using five quality indices, which had the role to emphasize the main characteristics of the analysed geomorphosites. These indicators mainly analyse the positive aspects. In this evaluation, the negative aspects are also quantified, which decrease the value of the geomorphosite. Both positive and negative aspects offer a complete image of the studied landform.

First of all, we analysed those elements of the geomorphosite which constitute the ”base” and the essential and structural value. This includes geomorphological, esthetic and ecological values.

The calculation of the structural value is made by the summation of the following values:

$$VS = VS1+VS2+VS3$$

Where: VS –the structural value;

VS1-the geomorphological value;

VS2-the esthetic value;

VS3-the ecological value

These values are a summation of several indicators, specific for each of them. The evaluation sheet includes a second part, focused on the values given by man in the course of time. In this category, there are included the scientific, educational, economical and also the tourist values. The score is on a numerical scale from 0 to 1, each category of indicators quantifying specific values. All of these indicators establish a real value of the geomorphosite, taking into account the positive values. For an accurate result, the values which decrease the tourist potential of the geomorphosite will also be taken into account. As a consequence, the basic value is added to the functional value, from which we exclude the restrictive attributes, obtaining the real value of the geomorphosite. The functional value was established after the application of the following formula:

VF= VF1+ VF2 + VF3, where: VF – the functional value; VF1 – the cultural value; VF2 – the scientific value; VF3 – the economical value.

The restrictive attributes (tabel no.8) are those that have a negative action on the geomorphosite. In this category, we can include the natural risks, the vulnerabilities of the geomorphosite, the existence of economical activities, which could affect the image and the integrity of the geomorphosite, and also its pollution level.

Therefore: AR= AR1+ AR2 + AR3 + AR4 + AR5

Where: AR – restrictive attributes; AR1 – natural and anthropic risks; AR2 – vulnerability to risks; AR3 – the existence of economical activities which could affect the tourism; AR4 – pollution; AR5 – unesthetic elements.

The formula of the total value of the geomorphosites is the following:

VT = VS + VF- AR, where: VT – the total value of the geomorphosite; VS – the structural value of the geomorphosite; VF – the functional value of the geomorphosite and AR-the restrictive attributes.

5.2. Types of geomorphosites in the Buzău Subcarpathians

The Subcarpathians cover a very large area and numerous geomorphological processes have determined the formation and destruction of some geomorphosites.

The geomorphosites from the studied area can be classified according to the following criteria:

- *the landforms where they were identified:* defiles, carsto – saline plateaus, caves, anticlinal depressions, isolated massifs;
- *lithologically:* geomorphosites developed on salt massifs, hydrosites, geomorphosites developed on sandstone, geomorphosites developed on old geological forms;
- *their location:* geomorphosites situated in the valleys, slope geomorphosites;
- *their spatial extension:* singular geomorphosites, punctual geomorphosites, linear geomorphosites.

5.3. The hierarchy of the geomorphosites from the Buzău Subcarpathians

The region of the Buzău Subcarpathians includes 54 geomorphosites. For each of these morphosites there were made diagnosis sheets, providing an accurate evaluation; the obtained scores determined a realistic hierarchy which indeed represents the existent reality in this region, emphasized by the number of tourists. In the first place there are the mud volcanoes, being the most ”valuable” considering their structural and functional value, and in the last place there is the geomorphosite ”Babele de la Budeşti”. It is interesting that the four perimeters of the mud

volcanoes did not have the same score according to the evaluation, even if they are close to each other.

5.3.1. The inventory sheet of the geomorphosites fron the Buzău Subcarpathians

According to the above mentioned indicators, there are inventory sheets made for all the geomorphosites which were identified in the studied area. It is worth mentioning that the criteria which were used are appropriate for this study.

The first part of the inventory sheet includes the identification data of the geomorphosite: its position in the hierarchy, where it is situated, its typology, the territorial-administrative unit where it is situated, the total score and the score divided into three values- basic, functional, restrictive. In the second part, there are the detailed scores presented for each value and the arguments for the evaluation. The inventory sheet includes: the indicative from the hierarchy tabel; the location of the geomorphosite; the administrative unit; the typology of the geomorphosite; the extension; the total, the structural and the functional value, the value of the restrictive attributes; detailed explanations of the scores after the analysis done on the geomorphosite; there are presented some models of diagnosis sheets.

5.4. Other geosites from the Buzău Subcarpathians

- *historical geosites* : *Neolithic archaeological sites, Dacian-Roman archaeological sites, fortresses/ ruins of medieval fortresses and ruins of monasteries, castles/mansions, monument houses;*
- *religious geosites: wooden churches, stone churches built between 1600–1900, monasteries;*
- *cultural geosites:. museums, sculpture camps.*

DIAGNOSTIC SHEET OF THE GEOMORPHOSITES

NAME	**PÂCLELE MARI** **MUD VOLCANOES**	
Indicative	T1	
LOCATION	5 km away from Policiori,asphalt road	
UAT	Scorţoasa	
Tipology	Complex geomorphosite- craters, cones, specific vegetation,bad soil, etc.	
Extension	areal	
Total value	29pt	
Structural value	10,75pt	
Functional value	18,75pt	
Restrictive attributes	0,50pt	

STRUCTURAL VALUE		
TYPE	PT.	JUSTIFICATION
Geomorphologic	6,25pt	- complex genesis –tectonic movements that produced cracks, lithology, natural gas emanation found in the area,water infiltration,processes that take place under gravity's acton ; (1p) - visible dynamic;(0.75p) - reunites four pints of interest – craters, geomorphological forms, gas emanation, mudflows,vegetation specificity ;(1p) - area of over 10 ha ;(0,75p) - very well preserved; (1p) - unique sample;(0,75p) - has an unique structure; (1p)
Estetics	3,75pt	- has unique features displayed horizontally ,detached from the limitrophe relief;(1p) - visibile from a medium distance;(0,75p) - the distance between the geomorphosite and the accessible area is under 25m; (1p) - high chromatic contrast;(1p)

Ecological	1,50pt	- reservation of national interest;(0,75p) - hosts halophytic plants - Nitraria schoberi and Obione verrucifera; (0,75p
		FUNCTIONAL VALUE
TYPE	PT	JUSTIFICATION
Cultural	4,25pt	- presence of Rătești Monastery; (1p) - presence of Berca citadel ruins;(1p) - over 30 representations;(1p) - occasional manifestations; (0,25p) - identification with the geomorphosite; (1p)
Scientific	4,50pt	- subject of at least 2 scientific works; (0,75p) - remarkable scientific potential; (1p) - polyvalent education resource; (1p) - model with punctual value; (0,75p) - international representative character ; (1p)
Economic	9,75pt	- has tourist activity; (1p) - it is a national tourist attraction;(1p) -accessible road to the landmark;(1p) - situated 10 km away from Berca;(0,25p) - 30 km away from an urban area with more than 100000 inhabitants ;(1p) - area located within the main tourist flow; (1p) - offers tourists an unique experience; (1p) - tourism is valued permanently;(1p) - safe area for tourists; (1p) -promoted internationally; (1p) - touristic infrastructures in the geomorphosite's area; (0,50p)

RESTRICTIVE ATTRIBUTES	
PT	JUSTIFICATION
0,50pt	- area with low risks; (0,25p) - vulnerable,though not completely; (0,25p)

5.5. Natural hazards and tourism valorisation of the geomorphosites in Buzău Subcarpathians

Risks conditioned by natural hazards registered in the Buzău Subcarpathians are :

- Risks caused by geomorphological hazards;

- Risks caused by geologic hazards – they are produced by tectonic earthquakes with a very high frequency;
- Risks caused by hydrological hazards –floods which resulted from periods of heavy rain;
- Risks caused by climate hazards;

5.6. Ways of protecting the geomorphosites from Buzău Subcarpathians

The main types of protected areas in the Buzău Subcarpathians are:

a."*Ţinutul Buzăului*" geopark is a project run by the Buzău County Council in 2010, together with the town halls of 18 villages(15 of them are located in the investigated area) and the Geomatic Centre of the University of Bucharest;

b. Natural reservations of national interest- this category includes:

c. *Natural monuments of national interest;*

d. *Sites of community importance (SCI)* which will become special conservation areas.

VI. THE TOURISTICAL EXPLOITATION OF GEOMORPHOSITES IN THE SUBCARPATHIANS OF BUZAU

6.1. The accessibility and attractiveness of the geomorphosites in the Subcarpathians of Buzau

6.1.1. Accessibility

The access to various touristical attractions, including the geomorphosites in the region, is an important aspect of tourism. The issue of accessibility in the areas with geomorphosites in the Subcarpathians of Buzau can be viewed from two different aspects. One of them regards the accessibility of the relief because of the morphometric and morphodynamic characteristics it has, while the other one is related to the means of communication.

6.1.2. Attractiveness

Attractiveness is important in terms of how it increases the tourism potential of the region and thus increase the possibility of its touristical exploitation. The relief attractiveness of the Subcarpathians of Buzau can be measured using various components which are a measure of natural tourism potential.

6.2. The current state of tourism exploitation

6.2.1. Structures of tourist reception

6.2.1.1. The accommodation

The studied region has a relatively large number of accommodation units. These are placed in hotels, motels, inns and guesthouses, and their distribution in the area studied is quite disproportionate. Most of them are located in the county of Buzau in the neighboring county of Prahova and their number is quite small (chart 1).

Chart 1. Structure of accommodation in the Supcarpathians of Buzau

Type of accommodation	Numărul de locuri
Hotel	754
Motel	80
Hostel	78
Guesthouse	672
Inn	65
Bungalow	50
Villa	80
Rooms for rent	18
Campus	100
School Camp	500

To conclude – There cand be seen a growth in the number of accommodation places, especially in the tourist guesthouses. This tendency is growing because the residents of the region of Buzau follow the successful example of other tourism areas in the country.

6.2.1.2. Catering establishments

The network of the catering establishments for tourism in this region is unevenly distributed and somehow according to the accommodation. Many catering establishments are components of the accommodation structures mentioned in the previous subchapter. The total number of places in the restaurants from the studied area is 4196. It should be noted that there were not taken into consideration the "tables" belonging to guesthouses of 1-3 daisies that offer full board for tourists (figure 3).

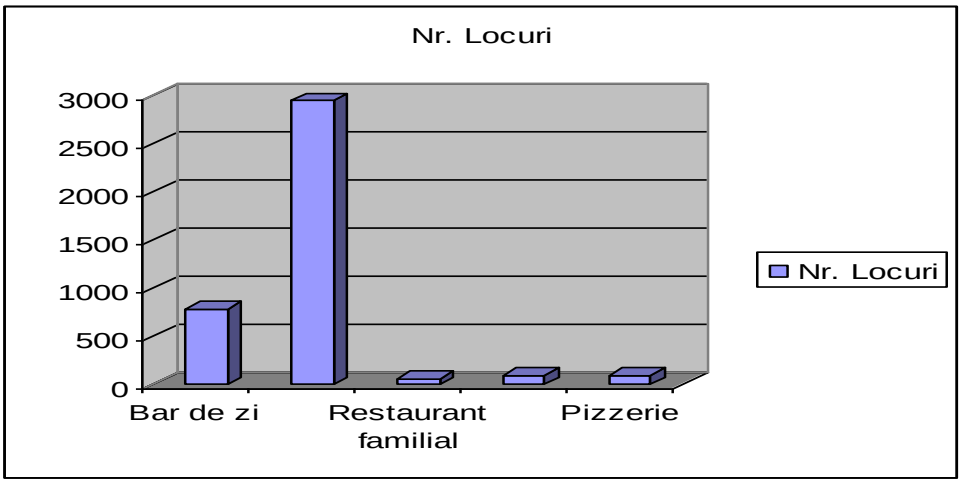

Figure 1. Number of places in the public alimentation in the Subcarpathians of Buzau - 2012.

6.2.2. Tourist circulation

The main tourist flows are mainly to national roads crossing the Subcarpathians of Buzau : DN 2 – makes the connection between Bucuresti and Moldova; DN1B – ensures the transit of Ploiesti to Moldova; DN10 Buzau – Brasov, runs through the heart of the region, bringing the largest number of tourists, this way ensuring one of the links between the southern Transylvania and the Black Sea.

Secondary flows run along the county road DJ 203K, which runs parallel to the Valley of Slanic, and DN 1A is the western marginal highway of the region, ensuring one of the links between the Capital and the tourist area of Brasov, the last one actually being the one that "steals the tourists" from the western part of the region, directing them to the tourist centers of Cheia and Brasov.

6.2.3. Types of tourism practiced in the Subcarpathians of Buzau

The main types of tourism practiced in the Subcarpathians of Buzau are: traffic, stay, oenological, ecumenical, balneary, rural tourism and agritourism.

6.3. Policies to promote and develop tourism in the Subcarpathians of Buzau

Development and promotion policies for tourism have a national component, a regional/county one and a local one. All these have as strategic objectives: growth in the number of tourists who visit the studied region and development of the identity elements at national and European level by highlighting all the local traditions. This way, the promotion and development priorities are:

- the implementation of touristic programs;
- the implementation of marketing activities, human resource development and institutional framework in the field of tourism;
- the development of technical infrastructure and tourism.

6.3.1. National policies for developing and promoting the tourism

The *EDEN Project* (October 2012 – July 2013 – the project "European Destinations of Excellence") was launched by the European Commission through the Enterprise and Industry General Directorate/Tourism Unit in 2006, and has as main objective the development of a sustainable European tourism and the growth in the number of tourists visiting a non-traditional destinations. The land of Buzau is part of this.

6.3.2. Regional and county policies for development and promotion of tourism

They focused on the implementation of touristic programs for: rural tourism development, Balneoclimateric tourism development in Sarata Monteoru, cultural and ecumenical tourism development, programs for the ecotourism sector, the development of marketing activities and tourism infrastructure.

6.3.3. Development and promotion policies for local tourism

These were represented by the following types of measures: providing tax incentives to investors in this sector, making websites, technical infrastructure rehabilitation, marking of trails, funding for local festivals.

6.4. Tourism development premises in the Subcarpathians of Buzau

Tourism development should be an approach to involving local communities and state institutions, that is aimed at raising living standards.

6.4.1. Tourism particularities in the Subcarpathians of Buzau

- positive aspects: the existence of a unique or very rare variety of forms and types of sights, human intervention has made valuable scientific, cultural, educational or historical objectives, such as: monasteries, churches, mine oil, cities, castles and so on;
- negative aspects: concentration of geomorphosites in a fairly compact area between Buzau Valley and Slanicului de Buzau Valley; lack of landmarks in the area situated in

the West of river Buzau, insufficient accommodation base, unfortunately placed, most of the accommodation places being built in Sarata Monteoru resort and on Buzau valley, away from areas with most tourist attractions; difficult access for most of the objectives due to the lack of modernized roads; poor national and international promotion; presence of Cheia and Brasov touristic regions in the northern Subcarpathians of Buzau, which attract an important part of the tourists.

6.4.2. Ways to streamline the tourism in the Subcarpathians of Buzau

The measures that can lead to an effective exploitation of the natural and anthropic potential of tourism in the area:

- upgrading, rehabilitation or construction of infrastructure access;
- rehabilitation of existing tourism infrastructure;
- construction of new touristic structures closer to the tourist attractions
- increasing the safety of tourists during touristic activities
- valorization of the local customs and traditions;
- effective promotion at internal or international events;
- implementation of polarizing centers that can fulfill tourists' needs;
- tourism promotion through websites;
- training programs for young people in the region;
- supporting the investors through facilities provided by local communities;
- efficient use of agricultural resources;
- exploitation of mineral springs
- implementation of trails.

For a better optimization of tourism exploitation in the Subcarpathians of Buzau I made some case studies for geographical units that have the highest density of geomorphosites. Within these I have tried to come up with solutions in order to increase the touristic exploitation and, in the meantime, to increase also the income communities have in those regions. Case studies were conducted for: Dealul Răcădăului, Dealul Istriţa, Anticlinal Berca – Arbănaşi, Bazinetul Salcia, upper basin of the Slănicului valley, Dealul Breazu.

CONCLUSIONS

After the study conducted on the geomorphosites in the Subcarpathians of Buzau and their tourism exploitation, could be drawn the following conclusions:

1. The studied region has a wide variety of geomorphosites (according to the formation, structure, surface, location etc.) which give a special touch to its natural potential.
2. The territorial arrangement of geomorphosites may constitute an impediment to unitary tourism development in the studied area, but can be a great advantage to localities in which they are found (most of them are concentrated in a relatively small area located in the east of Buzau Valley).
3. Inventory and assessment of geomorphosites in the Subcarpathians of Buzau showed that the most popular and visited of them are those that have the highest score (mud

volcanoes, Plateau Meledic). There were also identified geomorphosites that can become "engines" of tourism in the area where they are located.

4. Although the area studied has a huge tourism potential, it is very poorly utilized.
5. Poor tourism development in the last 20 years has greatly helped the maintenance of a very low economic performance in the sector. Thus, out of the many cases which had as a result this fact, can be mentioned:
6. The exploitation of the tourism potential was "sabotaged" and the behavior of those who provide tourist services in terms of accuracy, promptitude and solicitude.
7. Infrastructure condition is a possible cause of poor capitalization of tourism potential, along with other circumstantial issues that have contributed over the years to a low valuation of tourism.
8. Implementation of programs, including these objectives, would vastly increase local communities' revenues. Other means that can be referred to have been found to be very effective in other regions of interest in Romania.
9. The involvement of local communities must be deep because this is the only way to benefit from economic uses of these sights.

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***** ANTREC Buzău**

***** Consiliul Judeţean Buzău – Biroul de promovare şi dezvoltare a turismului şi agroturismului.**

***** Direcţia Judeţeană de Statistică Buzău.**

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