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# The tourist map, scientific tool that supports the exploration of protected areas, Bihor County, Romania

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**Abstract.** The study area is a Nature 2000 protected site from Bihor County, Romania. The present study aims at identifying the opportunities for the implementation of a bio-economic exploitation system, by tourism development, according to its necessities for conservation and protection of cultural and natural elements. The landscape value is assessed, using different available thematic layers, using a combination of GIS and graphics. The resulting visibility of the tourist map of natural and anthropic values can be a very useful tool for tourists, the conservational custodian of the Nature 2000 site, local public administration for tourism development and leisure activities, participative touristic planning etc.

**Keywords:** Nature 2000, sites, tourism, tourist resources

## **Introduction**

The Valea Roşie (Red Valley) Nature 2000 site is situated on the territory of Bihor County, in north-western Romania (Figure 1). By Government Order no. 1964 / 2007 of the Ministry of Environment and Sustainable Development, with regard to the creation of the protected natural area sites of European Community importance it was declared a Nature 2000 site, an integral part of the European Nature 2000 ecological network in Romania, with ID ROSCI0267. It is a complex specific habitat of beech forests *Asperulo-Fagetum* type, of which deciduous forests occupy 86%, followed by land occupied by forests in transition (5%), pastures (5%), grape vine (2%) orchards (2%). In this area, with a surface of 819 ha there are 14 species protected of rare plants found on the red list, species of amphibians and reptiles of national importance (Covaciu-Marcov et al., 2009; Ghira et al., 2002) and a well preserved natural forest habitat. In this context, the conservation management actions must be complementary in terms of capitalizing the touristic and recreational aspects of the site.

The preparation of cartographic materials constitutes a first step towards the superior capitalization of an area of European importance in proximity to an urban center, Oradea, which is in continuous expansion. Using such cartographic resources, masses of tourists could be mobilized and coordinated along certain routes so that their recreational needs can be met, and also issues related to conservative-protective aspects of the site can be served. It should be noted that although currently the site is visited frequently, there is not a clear record of the number of visitors. Also there are few sources underlying the basis of the map drawing and graphical materials (tourist maps, maps of the habitats of protected flora and fauna species, tourist brochures, info boards, tourist signs, website etc). All these materials have a decisive role for facilitating the sustainable educational environment (Berbecaru & Botez, 1977; Bădulescu, 1999; Kostova & Atasoy, 2008; Rodrigues & Teresinha, 2015; Nelson & Seraphim, 1997).

The documents drafted constitute an important scientific tool for both the management team and custodians of the Nature 2000 site, the local public administration, for tourism and leisure activities, participative tourist planning in the area protected (Tomczyk & Ewertowski, 2011) etc.

Therefore the goal of the Tourist map of Valea Roşie Nature 2000 site (Bihor county), Romania, lies in the fact that the Nature 2000 network is a system that does not exclude humans, rather it is intended as a network integrator that seeks a better human-nature communion, with certain facets towards the sustainable development and sustainable planning of the territory. Following this tendency, we can affirm that the map is a useful tool which can contribute with its role and functions, to a better conservation of biodiversity, the preservation and conservation of the environment, development of tourist and recreational activities (Martinez-Graña et al., 2011). Among the main functions this cartographic tool can fulfil we mention interconnection, development, protection, knowledge, awareness etc. The main goal was to develop a map that was easy to read and understand by tourists, represented by people with specialized training in this area or close to the domain, but also for people with no specialist training (Castaldini, 2008; Ilieş et al., 2011).

For this purpose, because of the lack of specialty studies regarding the mapping of rare species (which will be elaborated within the management plans), the trails have been proposed following the field observations and the results obtained through a focus group, with the participation of specialists from the domains of geography, biology, sports, medicine, environmental protection, sociology, geology and the custodian. Most part of the trails proposed this way follow the existent forest roads. We also mention the fact that in the moment of establishing exactly the habitats of rare species, the proposed trails will be updated so as they would not get in conflict with the need to protect them.

### Study area

The study area is located in the north-east of Romania, in Bihor County, in close proximity to Oradea City (fig. 1). From an orographic point of view Valea Roșie Nature 2000 site is located in the morphological subunit of the Oradea Hills in the Western Hills unit of Romania, north of the Crișul Repede River (fig. 1).



Figure 1. Local and regional location of Valea Roșie Nature 2000 site

From geological point of view, the study area is composed of clays, rocks and sands of Panonian age, with the development of certain slope processes: landslides, flows, ravines, in the Hills of Oradea and from Quaternary formations, actual and sub actual alluviums in the Western Plain, Crisurilor Plain subunit (Pop, 2005, Geological map 1 : 200 000).

Regarding the soils, representative for the Nature 2000 Valea Rosie site are the brown soil and regosoil (The Soil Map of RSR 1: 200 000).

From a morphological perspective, the analyzed area overlaps with the Oradea Hills subunits with an altitude between 150 m and 296 m; the study area is drained in the south, by the Crișul Repede River and among the representative lake units we can mention: Lake Paleu, Lake Săldăbagiu, Lake Fughiu and a string of man-made lakes located along the Crișului Repede River, on its right side, upstream of Oradea.

The area is located in the temperate zone, the annual average temperature is 10.3°C and yearly rainfall average is 612.9 mm yearly rainfall average (Posea, 1997; Pop, 2005; Dragotă, 2006; Aurelia, 2007; Herman, 2012). The altitude characteristics have created a series of conditions favourable for other aspects of climate, hydrographic and bio-edaphic factors with decisive impact on the installation of a distinct ecosystem in which has developed a specific habitat of beech forest *Asperulo Fagetum*. In this habitat live and cohabit the following protected species of flora and fauna: *Triturus cristatus*, *Bombina variegata*, *Bombina orientalis*, *Bufo bufo*, *Rana ridibunda*, *Aster sedifolius* ssp. *canus*, *Cimicifuga europea*, *Dianthus guttatus*, *Leontodon croceus* ssp. *Rilaensis*, *Potentilla norvegica*, *Rumex thyrsoiflorus* ssp. *Thyrsoiflorus*, *Vicia sparsiflora*, *Rana dalmatina*, *Alopecurus pratensis* ssp. *laguriformis*, *Chamaecytisus rochelii*, *Corydalis solida* ssp. *slivenensis*, *Dianthus trifasciculatus* ssp. *deserti*, *Orchis morio*, *Rhinanthus borbasii*, *Salvia amplexicaulis*, *Natrix natrix* (Covaciu-Marcov et al., 2009; Ghira et al., 2002). The presence of the above listed species in the analyzed area has contributed to the introduction of this area, with a surface of 819 ha, by the Order 1964 / 2007 of the Ministry of Environment and Sustainable Development, regarding the institution of protected natural area regime of the sites with communitarian importance, as integrating part of the ecological European network Nature 2000 in Romania, within the European network of Nature 2000 sites under the name of Valea Rosie, with the identification code ROSCI0267. On this background, special attention has been given to the anthropic component analysis, with emphasis laid on the study of population and human settlements (the localities Oradea, Saldabagiu de Munte, Paleu, Uileacu de Munte, Ineu and Fughiu), regarded through the perspective of their role referring to the impact upon Nature 2000 site Valea Rosie. Since the belonging of an area to the Nature 2000 network does not necessarily imply the conservation of this area, but rather the identification of the optimum human-nature communion, a kind of bio-economic development, of integration of the anthropic component into a given are, we consider fortunate the elaboration of "The tourist map of Nature 2000 site Valea Rosie, (Bihor County), Romania" as a first step in accomplishing this purpose.

## **Materials and methods**

### **Field survey**

In order to create the tourist map of the Valea Rosie Nature 2000 site (Bihor, Romania), between September 2014 and December 2015 a series of activities were carried out in the field by the research team. Their purpose was to confront the information obtained from bibliographical sources, aerophotointerpretation etc.,

with the reality in the field and possibly to complete the analysis initiated by earlier studies and research (Baias et al., 2010; Herman & Tătar, 2015; Ilieș et al., 2011; Ilieș et al., 2013; Ilieș et al., 2015; Ilieș & Wendt, 2015; Pop, 2005; Wendt, 2011). There have been identified six routes for optimal practicing of tourism and other environmentally friendly sport activities, in the Nature 2000 protected site, such as jogging, tourist orientation, hiking, horseback riding, Nordic walking, cycling; the locations of lookout points, place for picnic, observation gazebos were marked. Further more the locations of the following future intended features were marked: tourist boards, tourist signs, tourist trails, parking and not least the objectives of tourist interest among which: man-made resources such as wooden churches and cellars dug into the substrate (forming part of the cultural heritage) and also touristic structures of public food services and accommodation, locations for practicing pleasure flights, horse-riding, other recreational activities (fishing, golf, etc). Among the working instruments used we mention: topographic maps scales (1: 5,000, 1: 10,000 1: 100,000), orthophotoplans, satellite images, word topographical maps, DEM (Digital Model Elevation), GPS, software (GIS), etc.

#### **Data base creation**

The map database was made up of information: text (various texts, records of observations), graphics (shape file sites, icons, symbols, graphics), photos (pictures taken in the field), video material (recordings made in the field) (Rosa, 2011).

#### **Map creation**

When making the touristic map of Valea Roșie Nature 2000 site (Bihor County, Romania), the “Topographical map 1:100 000” elements was used as a background on which were overlaid text, photographic and graphic information shapefile type (point, line and polygon) (fig. 2).

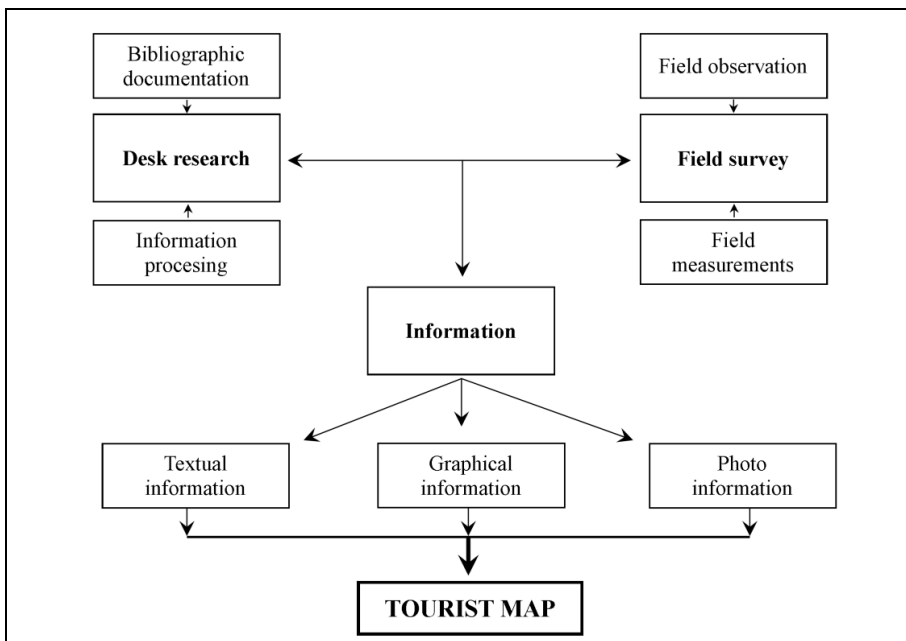


Figure 2. The conceptual scheme of methodology used

They were obtained by the research team during the fieldwork phase using the tools provided, including: anecdotal notes, camera, camcorder, GPS etc. In this way the land was mapped with all the highlights that will create the touristic map structure proposed in the present study. Their processing was done in GIS, by creating and overlapping layers corresponding to each and every structural element (trails, tourist attractions, background elements, etc.).

After a detailed analysis (bibliography, focus group and field survey) of the information thus gathered, it was decided to keep the following structural elements in order to make the map: 6 tourist trails proposed of a total length of 111.5 km (Table 1); 6 graphics related to tourist routes, with the name of the route length, maximum altitude, minimum altitude, degree of difficulty; 5 photos with related information, which illustrate various aspects of the area defining the site, information on the morpho-hydrographic units; the locations of: 4 restaurants; 4 accommodation units; 4 points where you can practice other recreational activities; 2 equestrian centres; 1 monastery; 1 wooden heritage church; 2 areas with cellars dug into the substrate, registered as part of the cultural heritage, 1 place where one can practice pleasure flights, 4 points of interest and the locations where it is proposed to be placed: 8 observation gazebos; 6 places for picnic, 2 lookout points; 1 parking; 4 proposed tourist boards; 7 proposed tourist indicators.

On the map, each structural element is represented in such a manner as to be readily accessible to the general public and provide useful information quantitatively and qualitatively, in as short a time as possible.

Table 1. Proposed tourist trails

No. Crt.	Trail name	Trail colour	Maximum altitude (m)	Minimum altitude (m)	Length (km)	Degree of difficulty
1	Trail no. 1 - Valea Roşie	Red	286,5	127	39,6	Medium
2	Trail no. 2 - Valea Roşie	Violet	286,5	133,8	30,2	Medium
3	Trail no. 3 - Valea Roşie	Brown	273	150,5	14,3	Easy
4	Trail no. 4 - Valea Roşie	Pink	271,5	159,4	10,2	Easy
5	Trail no. 5 - Valea Roşie	Black	271,5	159,4	9,1	Easy
6	Trail no. 6 - Valea Roşie	Light blue	271,2	159,4	7,1	Easy

## Results and conclusions

The tourist map of Valea Roşie Nature 2000 site (Bihor County, Romania) is meant to cover the existing gap in terms of scientific and promotional material that can be easily read and understood by tourists, by people with specialized training in this area or close to the domain, but also for people with no specialist training or even for people with secondary education. It is a very useful tool, both scientifically

and from a practical point of view. If the scientific importance emerges from its methodology, which targeted detailed analysis of each structural element and the relationships that these elements develop in relation to each other, the practical importance emerges from the functions that the proposed map may perform for tourists, public administration, custodians, etc.



Figure 3. The tourist map of Valea Roșie Nature 2000 site, Bihor County, Romania

Further on, the studies on optimizing the use of Valea Roșie Nature 2000 site, will be continued by other actions including the creation of touristic boards, tourist signs, tourist trails, leaflets, a website, various applications for smartphones, virtual flight etc.

**Software**

Collecting the information related to the tourist routes and locations in which to place various elements of the map and also the locations of tourist objectives was done using the GPS. The information thus obtained was then converted to shapefile. The maps were prepared in ESRI ArcGIS 9.3. We used GIS to produce materials based on various published and unpublished information sources.

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