Mapping of tourism suitability regarding wetlands

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Abstract: Within this article is presented the mapping methodologies of cultural service based on wetlands tourism suitability, outcome as a nationwide map the Romanian localities placed near wetlands. Further for a local level, considered as a case study, was establish the tourism suitability regarding the villages situated near Divici-Pojejena wetland, located in the South-Western of Caraș-Severin County (in the Danube Gorge). The tourism suitability was in both situations established on a classification based on a map created in a GIS environment, overlapping a series of variety layers, based on nationwide and local criteria. Based on this study was assembled a database of localities exhibiting tourism potential in terms of wetlands tourism suitability. The method presented can be used to extrapolate and calibration at a regional and national scale.

Key-Words: tourism suitability, wetland, cultural services, Divici-Pojejena wetland, mapping, rural tourism

1. Introduction

Tourism suitability represent the potential of a specific area regarding the attractiveness (*Comănescu, 2009*), so tourists are interested to visit and spend some time in this area, this is determined both by natural and anthropic factors. Following the analysis of some elements series that are related to tourism attractiveness will be determined the tourist suitability of wetlands in Romania, later to be analysed at the local level, using the pilot study, Divici-Pojejena wetland area.

2. Data and methods used to determine the tourism suitability

To achieve the suitability tourism map there were used a series of data, as well as background GIS data with the positioning of settlements, the number of inhabitants per village, number of accommodation units, the number of tourists visiting the wetland, the average length of tourists stay (*Romanian National Institute of Statistics, 2016*), wetland surface area (*Langake, 2013*), background Google maps, field data and questionnaires.

Tourist suitability of a village situated near wetlands is an indicator determined both by the natural environment potential and also the infrastructure of the surrounding area (*Ciangă, 2009*). Potential tourist suitability of a specific area regarding the attractiveness, for which tourists are led to visit and spend a certain amount of time in that area, it is determined both by the natural and anthropic factors (*Neacşu, 2016*). Determining tourism suitability regarding wetlands of each locality we overlap a series of thematic layers each contributing in this calculation.

2.1. Data and methods used to determine national tourism suitability

Based on a nationwide localities positioning map, were stacked several layers, such as, number of inhabitants, number of tourists, accommodation units, wetlands and

access roads/transport. In a GIS environment using the data mentioned above were implemented a series of methods used to determine tourism suitability. In the first phase, based on the positioning of localities at a national level (point type representation), we created a buffer representing the influence of settlements related to the number of inhabitants (*INSSE, 2016*). Further we interpolate the buffers with the wetlands layer that where within the buffer area (*Langake*, 2013) for the entire country. Further a series of ranks for each locality where created for: nights spent of tourist per accommodation, tourists per inhabitants, access roads classes (road, rail, Danube) and wetlands (*Laslo L., 2015*) area within the proximity of the localities (*Figure 1*).

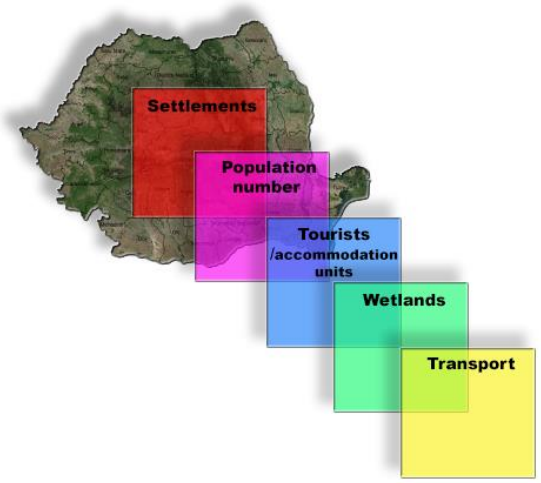

Figure 1 - Thematic map layers

Each thematic layer generated is classified in turn into 5 ranks based on the values of the database related to each, so every rank have treated a value between 5 and 1.

The final process in obtaining the suitability map consists in merging two of the indicators in a single one, the number of inhabitants and tourist, into tourists per inhabitants. Hence the four resulting indicators, where ranked and weighted, in function of their importance:

- the number of tourists per 100 inhabitants, weighing for 40% of final rank;
- the area of wetlands per locality, weighing for 30%, of final rank;
- nights spent of tourist per accommodation, weighing for 20% of final rank;
- access roads type (three roads types, railway and Danube river) weighted for 10% of final rank.

Resulting in a map regarding the level of tourist suitability of localities situated near wetlands areas in Romania.

2.2. Data and methods used to determine local tourism suitability

2.2.1. Number inhabitants per locality

The Divici-Pojejena wetland, part of the Iron Gates Natural Park, situated in Caraș-Severin County (in the Danube Gorge), at the border with Serbia, occupying an area of 440 ha on the administrative territory of Pojejena locality. This area was formed mainly due to the influence the dam construction at the Iron Gate I hydroelectric power-plant and through the waterworks correction of the Danube riverbed downstream of Baziaș (on the Serbian side of the Danube).

Divici-Pojejena wetland is incorporated by the territory of Pojejena locality, comprised of five villages with a population of 2884 inhabitants, according to 2011 census; the population is divided as follows:

Table 1 - Number of inhabitants per locality

Locality	No. of inhabitants
Pojejena	1085
Belobreşca	656
Radimna	560
Şuşca	482
Divici	342

2.2.2. Number of accommodation units

The accommodation facilities that are currently active in the localities along the wetland are: 3 guesthouses with 76 available beds. In terms of accommodation near the study area, there are other 4 accommodation units, summing 69 available beds. Therefore in the surrounding area of Divici-Pojejena wetland would be available for tourists a total of 147 beds within this 7 accommodation units (*Table 2*).

Table 2 - Number of seats per accommodation locality

Locality	No. accommodation seats
Pojejena	46
Belobreşca	9
Radimna	0
Şuşca	0
Divici	92

2.2.3. Tourism attraction

The main attraction of the area is the Divici-Pojejena wetland (*Figure 2*), along with other objectives, such as spiritual places, if we refer to churches, there are also two archaeological sites, namely a Roman fort at Pojejena and Dacian fortification at Divici and two other protected areas, "Râpa cu lăsturni" and "Calinovăţ" island" (*Table 3*).

Table 3 – No. sights per locality

Locality	No. sights		
	Archaeological sites	Churches	Natural objectives
Pojejena	1	2	1
Belobreşca	0	1	1
Radimna	0	1	0
Şuşca	0	2	1
Divici	1	1	3

The Serbian churches have a specific provincial-baroque architectural style, influence which is common for this area (*Pojejena parish, 2016).* These are important points of interest in attracting tourists, the majority where built in the beginning of the twentieth century, and are close to the main road, namely DN 57, respectively DN 57A (*Boboc M., 2016*).

Other elements that have tourism potential are: Călinovaţ Island, Pojejena tourist port and the bird watching observer, placed next to the national road between the localities of Pojejena and Şuşca (*Matei M., 2016*).

Fig. 2 - Divici-Pojejena wetland images

Tourism suitability can be based on the traditions of this area, represented by specific events on holidays or various cultural events organized in the area. Also an attractive element for the surrounding area is the practice of hunting. There are 3 hunting grounds in the area, Pojejena, Belobreşca and Socol, according to the Timişoara Forest Guard (2016). The hunting activities in these 3 funds takes place in the forest area and the exemplary available are wild boar, deer, rabbit and pheasant.

2.2.4. Access roads to the localities

The availability of a zone is defined by the mileage on transport routes that connect this area, travel time, terms and condition of access. In terms of transport, the analysed localities are connected to different roads to the main DN57 Oraviţa-Moraviţa, but also on the Danube River, except Radimna town which is at a distance of 1.7 km from the shore. The nearest railway station is in the town of Răcăşdia (Caraş-Severin County), that is located on the railway line number 924, Oraviţa-Iam. Therefore localities connectivity at access roads is as follows in *Table 4*.

Table 4 - Connectivity transport routes

Locality	Access roads	Danube	Distance from the railway station (km)
Pojejena	2 (DN 57, DN 57A)	1 (touristic port)	35
Belobreşca	2 (DN 57A, DJ 111)	0	37
Radimna	1 (DN 57A)	0	31
Şuşca	1 (DN 57A)	0	36
Divici	1 (DN 57A)	0	40

Also, the Iron Gates Natural Park Administration has developed a bicycle route that crosses the Divici-Pojejena wetland, called "thematic educational route Balta Nera - Ostrov Moldova Veche", accessible by national road DN57, having a length of about 34 km, and a scroll estimated average time of about 8-10 hours of cycling.

Based on the identified objectives positioning, it has been determined the crossing average distance from one objective to the rest of the objectives, and also their position relate to the accommodations units, using the access roads across the villages. The average distances regarding accommodations units and tourism attractions was determined using the IDW function in Arc Map (ESRI), resulting in two raster with the average mileage from one location point to the other ones.

Following a questionnaire applied to locals in the Pojejena locality some of the answers are relevant to make an idea of their perception linked to the tourism potential area and their answers regarding the attractiveness were the following: walking, fishing, swimming, flora and fauna.

3. Results

The result of this study represents the tourism suitability at a national and local scale, in the form of a map indicating the tourism potential of the localities situated near a wetland. Thus a locality with a large number of people and with a developed infrastructure access is a viable to a greater influx of tourists oriented towards the wetland near it.

3.1. National level wetlands tourism suitability map

After applying all the criteria, with the role to filter the localities with active accommodation units at a national level, it resulted in a map indicating their tourism suitability (*Figure 3*). This map represented by a series of five final ranks, prorated on the basis of the attributes of the classified layers (*Ciobotaru N., 2016*).

The result indicates values between 1 and 4.2, for each of the 960 localities considered in the study, based on the importance of wetlands for tourism attractiveness (*Table 5*).

Table 5 - Final ranks of tourism suitability for each locality

Rank	Values between
5th	1-1.6
4th	1.61-2.7
3rd	2.71-3.2
2nd	3.21-3.6
1st	3.61-4.2

The distribution of tourism suitability ranks amongst localities is presented bellow in *Table 6*.

Table 6 – Number of localities per rank

Rank	Number of localities
5th	154
4th	617
3rd	144
2nd	31
1st	14

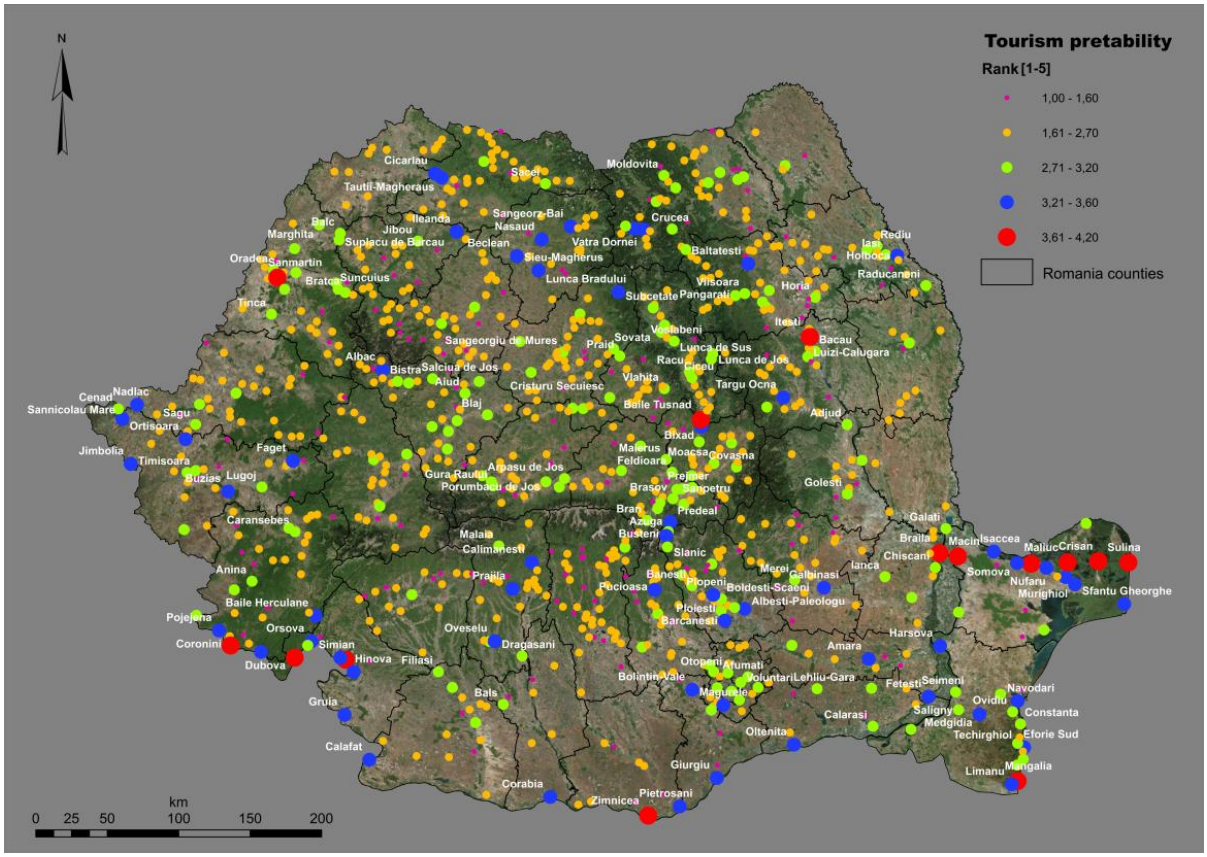

Figure 3 – Tourism suitability of nationwide wetlands map

Table 7 – The first 15 positions in the table of tourism suitability on wetlands in Romania

No.	Locality / County	Final rank
1	Sulina / Tulcea	4.2
2	Brăila / Brăla	4
3	Crișan / Tulcea	4
4	Coronini / Caraș-Severin	3.9
5	Iteşti / Bacău	3.8
6	Sînmartin / Bihor	3.8
7	Mangalia / Constanța	3.8
8	Băile Tușnad / Harghita	3.8
9	Simian / Mehedinți	3.8
10	Dubova / Mehedinți	3.8
11	Zimnicea / Teleorman	3.8
12	Măcin / Tulcea	3.8
13	Maliuc / Tulcea	3.8
14	Tulcea / Tulcea	3.7
15	Pojejena / Caraș-Severin	3.6

According to the applied criteria has resulted that the locality in Romania with the highest degree of tourism suitability based on wetlands (*Table 7*) is situated in the Danube Delta and it is Sulina, Tulcea. Also in the top 30 positions some resorts can be found such as Mangalia, Eforie Sud, Băile Tușnad. Interesting is the fact that the town of Băile

Tușnad, is the only mountain situated locality in the first 15 final rank. Of the 14 localities classified in rank 1, five are located in Tulcea county, of which the city of Tulcea, also noteworthy is that the cities Tulcea and Brăila (2nd value in the final rank) are the only two county residences present in the first rank.

Regarding the Divici-Pojejena wetland area, it is represented at a national level through Pojejena commune in Caraș-Severin County, ranking 15 out of 960. To be analysed in detail the elements that contribute to the attractiveness of the Pojejena commune, implicitly the 5 component villages and Divici-Pojejena wetland, part of the Iron Gates Natural Park.

3.2. Local tourism suitability map

The criteria which may have a significant influence on the tourism suitability is accessibility, therefore a map was designed based on a input reported to the tourism potential of the Divici-Pojejena wetland. Based on data reported to the distances of the analysed tourism elements in the surrounding area, namely accommodation, sightseeing (natural site, archaeological site, tourist port and bird watching) and the wetland area, namely the points where a accession within the wetland through the road is present. Thus it was determined the road distance between accommodations and tourism elements such as: landmarks, churches and main access points to the wetland area, but also between each element of the touristic sights, churches and main access points to the wetland area and the remaining elements.

In a GIS environment a map was created (*Figure 4*), in which each touristic element is represented as a point and has a value determined from processing the distances reported to the other elements.

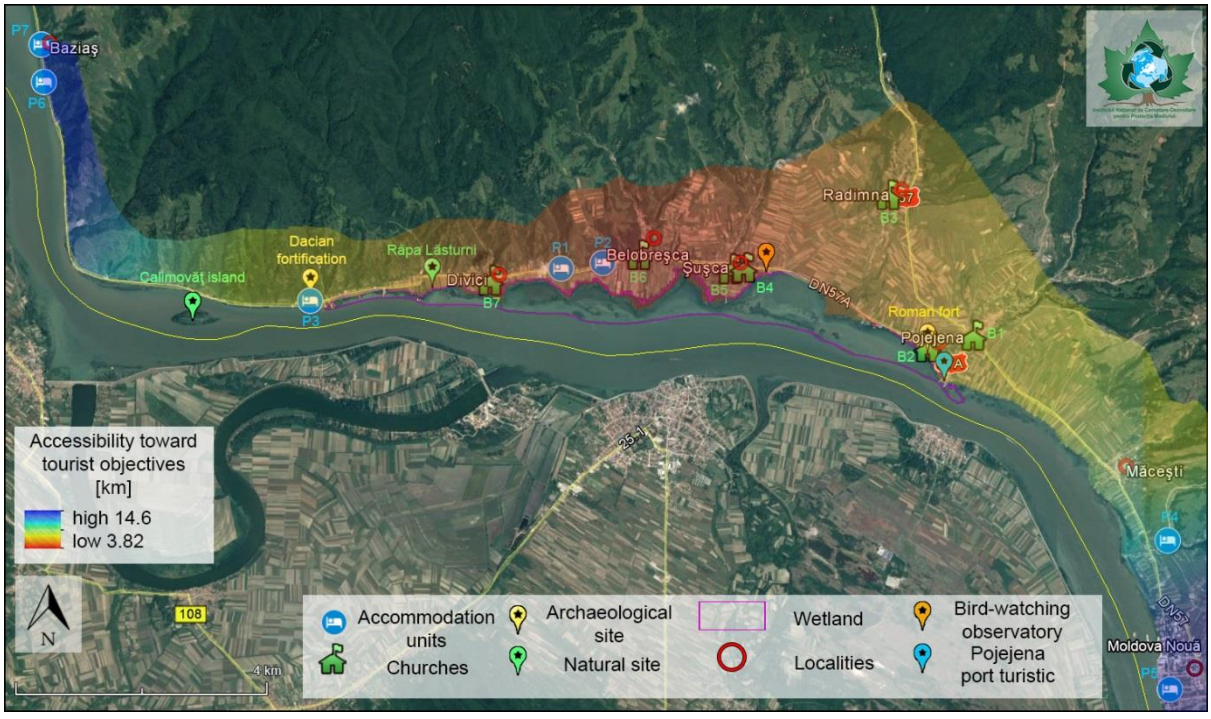

Fig. 4 - Perception of tourism activities in the wetland Divici-Pojejena

Based on these values a surface was generated (raster), consisting of a colour palette that represents the accessibility situation of the tourism elements in the analysed area, reported to the distance of these elements between each other, basically the average distance travelled for a tourist from a certain point to the tourism sights present in the area. The resulting map, the accessibility of the tourism objectives across the Divici-Pojejena wetland, extends from Baziaș in West to Moldova Nouă in East, in South it follows the Danube shoreline, and in North it limits the localities located in this area. Therefore a tourist staying in the centre of the analysed area is provided with a good access to the sights present in and near the Divici-Pojejena wetland.

4. Conclusions

Based on the resulted table of tourism suitability on wetlands in Romania, was observed that the localities situated in the top of the tourism suitability table are localities placed along the shore of the Danube River, or in the Danube Delta. Both at national and local level, the tourism suitability of the localities situated near the wetlands are determined by the economic development through transportation infrastructure, accommodations, but also attractions or their level of promotion. Attracting a large number of tourists is closely linked to these elements, the conditions at their disposal and activities that can be done during their stay. All these factors lead tourists to visit and lodge in a particular location. The criteria taken into account at national level can be replicated for almost any country, following or improving the analysed steps, but at a local/regional level, the situation is special because the defining criteria for tourism sustainability is closely linked to tourism infrastructure, economic development and touristic graduation, which the respective area benefits.

With this data, knowing what localities have a high rank regarding cultural service based on wetlands tourism suitability, having a great natural potential, but with a lack of infrastructure (accommodation units, tourism graduation), can be implemented a series of strategies for attracting investment, to boost the number of tourist and due so increasing the local economy.

Many of these wetland areas are not well arranged for tourists, some may have missing information boards, regarding the delimitation of the area, the flora and fauna found in the specific area.

Once located at a national level, a specific locality with a nearby wetland can be analyzed at a local level, thus identifying with a precise detail the elements that can make this location more attractive to tourists, based on its natural potential and spotting the elements that can be improved so that it can be more appealing to tourist. This can be useful for underdevelopment locations that possess a natural potential regarding wetlands, identifying also other local touristic attractions that can build up to a better touristic attractiveness.

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