THE INFLUENCE OF ANTHROPIC ELEMENT ON THE PEŢEA RIVER NATURAL RESERVATION

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Abstract:

The purpose of the present study is to quantify and interpret correlatively the effect of the anthropic pressure and of the meteorological-climatic factors on the evolution of the habitat and the natural balance in the Peţea River natural reservation.

In the period 2010-2012 one monitored the physical indicators, the thermal condition, the acidification, the oxygen condition, the nutrients, the salinity.

The obtained results have allowed the identification of some measures intended to diminish the impact of the anthropic activities on the hydro-geo-ecosystem.

Key words: hydro-geo-ecosystem, protected natural area, habitat, biological cycle, extinction

INTRODUCTION

The 1 Mai resort is known to have a tradition in the south-eastern Europe's balneal tourism.

It is found at 46°56'05″, northern latitude and 21°59'01″- 22°00'04″, eastern latitude and from an administrative standpoint it belongs to Rontău village, Sânmartin commune (Posea G., 1997).

The balneal uses are ensured by the geothermal water deposit, present on a fault which characterizes the Western Plain.

In the space Haieu - 1 Mai the geothermal water source was ensured by the springs: Ochiul Ţiganului, Ochiul Pompei and Ochiul Mare (Danciu V., 2005).

Due to the continuous extension of the services, in the last decades, the character of strongly anthropized space of the resort has increased.

The increase of the geothermal water consumption, associated with the evolution of the meteorological-climatic factors have determined in time, the clogging of the Ochiul Ţiganului and Ochiul Pompei springs, situated up the river from Ochiul Mare which is currently active (Danciu V., 2005).

The presence of the geothermal water has allowed the perpetuation of the ecosystem: river and thermal springs, which offer habitation conditions for the Nymphaea lotus var. thermalis, Melanopsis parreyssi and Scardinius

erythorophtalmus, sbsp. racovitzai relict species (Burescu P., 2002, Godeanu S., 2002).

The Pețea River natural reservation was established in the year 1992, the status of natural reservation being reconfirmed in the year 1985 by the decision no. 22 of the Council of ministers. According to the decision no. 19/1995 of the Bihor County Council, from the standpoint of the biological representation it is a mixed reservation: botanical and zoological, having, due to the location, a landscape value as well (Doniță N., 2005).

The natural reservation is delimited on the upstream of the Pețea River from the historical spring (Ochiul Țiganului) towards downstream, up to the Venus poolside (Gafta D., 2008).

The natural frame has allowed the delimitation and identification of 3 zones (Management Plan, 2004 edition, elaborated by the Cris Country Museum):

- zone I, from Ochiul Țiganului to Ochiul Mare;
- zone II, Ochiul Mare, from Podețul Țiganilor to Puntea Rontău;
- zone III, from Puntea Rontău to Venus Complex;

According to the management plan project elaborated by the Cris Country Museum, 3 functional zones are distinguished:

- the strict protection zone - is considered the zone of Ochiul Mare(interior zone II), intended for scientific research, is the most representative zone because here is where the thermal water lily vegetates and the endemic species habit (Dihoru G., 1994, Gafta D., 2008);

- the special protection zone(full protection) - is considered the entire perimeter of the reservation, with a surface of 10,8 ha (all 3 interior zones), the territory being subjected to a careful monitoring in regards to biodiversity;

- the buffer zone - in which management/capitalization activities of the natural resources are allowed stretches from the exterior of the enclosure up to the most elevated terrain levels which surround the perimeter with special protection;

- the social-economic interest area will comprise the infields, tourist constructions and management or parts with other activities, which take place in the vicinity of the reservation or with possibilities of influencing the biological diversity here.

The special scientific value of the habitat and of the three species have determined actions which aimed at their maintenance and preservation, materialized by:

- the observation of the ecosystem's evolution and the monitoring of the environmental parameters (air and water temperature, rainfall level, water

and mud chemistry, status of the flora and fauna) (Mălăcea I., 1969, Mănescu S., 1994);

- the control of the pollution level (Rojanschi, 2004).

The management of the protected natural area takes into account two aspects, considered to be essential:

- the correct management of the geothermal deposit, with the insurance of the normal flows of the springs which fuel the river (Gâştescu P., 2009);

- the establishment of the buffer zones based on the aggressiveness of the anthropic influence and the identification of those activities which may affect the balance of the ecosystem (Nicoară M., 2009, Vicaş G., 2012).

MATERIAL AND METHOD

Achieving the social-economic projects, proposed by the general urban plan of Sânmartin commune, determines the affectation of the natural frame in a complex manner.

Based on the ampleness with which the anthropic pressure manifests itself, the intensity of the impact may be expressed in several ways, based on the significance of the affected zone, the duration of the manifestation, the possibility of cumulation of the effects (Vicaş G., 2012).

The current environmental standards recommend and accept the following impact types: direct impact, indirect impact, cumulative impact and residual impact (Order 135/2010).

The purpose of the present study is to quantify and interpret correlatively the effect of the anthropic pressure and of the meteorological-climatic factors on the evolution of the habitat and the natural balance from this space.

The extended drought period from the summer and autumn of 2011 and 2012, as well as the inappropriate management of the geothermal water deposit have led to the drop of the water level, the reduction of the water sparkle in Ochiul Mare and the dramatic drop of the water temperature (10°C), thus it is needed to supplement the warm water input by pumping.

The extremely low temperatures which characterized the period January - February 2012 have potentiated the negative effects induced by the unwanted association of the previously mentioned perturbing factors (Cristea M., 2003).

The monitoring of the water body quality, Ochiul Mare, was carried out by field observations, physical-chemical and biological analyses.

The followed parameters were: the physical indicators, the thermal condition, acidification, oxygen condition, nutrients, salinity (Mănescu S., 1994).

The obtained results are rendered in table no. 1

Table 1

Parameter	Values	Posted Values 2010			Posted Values 2011			Posted Values 2012		
		min	max	med	min	max	med	min	max	med
Flow	mc/s	0,081	0,136	0,104	0,088*	0,088	0,088	0,03	0,04	0,035
Temperature	°C	24	30,6	28,4	21,0	30,0	26,3	17	25	21
pH		7,1	8,3	7,5	7,3	8,0	7,7	7,39	7,60	7,48
MS	mg/l	3,0	26,0	13,5	4,0	43,0	15,3	15,0	46,0	30,5
OD	mg/l	2,00	7,30	4,58	1,50	5,40	4,03	4,6	5,7	5,45
CBO5	mg/l	0,70	3,00	1,65	0,50	3,00	1,62	1,4	4,1	2,45
CCOMn	mg/l	1,00	3,80	2,03	-	-	-	-	-	-
CCOCr	mg/l	5,00	26,00	9,83	5,00	30,00	10,50	<10	10,0	-
NH_4	mg/l	0,008	0,091	0,0028	0,020	0,048	0,036	<0,015	0,122	-
NO_2	mg/l	0,003	0,006	0,005	0,003	0,006	0,005	<0,003	0,008	
NO_3	mg/l	0,210	1,920	0,433	0,110	0,230	0,178	0,07	0,22	0,21
N Kjeldahl	mg/l	0,057	0,575	0,372	0,0045	0,515	0,175	-	-	-
N organic	mg/l	0,049	0,567	0,343	0,0014	0,488	0,140	-	-	-
N total	mg/l	0,290	0,950	0,658	0,250	0,650	0,358	0,28	0,44	0,36
orto Phosphates	mg/l	0,0035	0,0240	0,0103	0,0035	0,0220	0,0088	0,004	0,010	0,0076
P total	mg/l	0,0065	0,0640	0,0302	0,0160	0,0530	0,0305	0,018	0,021	
Conductive		59400	62400	609,50	566,00	621,00	584,20	-	-	-
Filterable Residue	mg/l	381,0	400,0	390,8	36,30	398,0	374,6	-	-	-
Ca	mg/l	84,8	96,7	90,2	72,9	97,7	84,9	-	-	-
Mg	mg/l	16,5	29,5	23,1	17,9	29,9	22,3	-	-	-
Na	mg/l	9,6	13,0	10,7	-	-	-	-	-	-
Alkalinity	mg/l	5,30	5,90	5,62	5,00	5,80	5,56	-	-	-
HCO_3	mg/l	323,3	359,9	342,6	305,0	353,8	339,2	-	-	-
Zn	mg/l	5,00	28,00	13,83	-	-	-	-	-	

RESULTS AND DISCUSSIONS

By analysing the obtained values one notices the continuous and constant drop of the flows and temperature:

- the maximum flows have dropped from 0,136 mc/s(2010) to 0,088 mc/s (2011), respectively to 0,04 mc/s (2012) ;
- the minimum flows have dropped from 0,081 mc/s(2010) up to the complete depletion in the summer of 2011 and 2012 ;
- the maximum temperature has dropped from 30,6°C(2010), to 30°C (2011), respectively to 25°C (2012).
- the minimum temperature has dropped from 24°C(2010), to 21°C (2011), respectively to 17°C (2012).

As for the acidification, oxygen condition, nutrients and salinity, the values have remained approximately constant.

The pronounced drop of the flows is in direct connection to the rainfall condition. Another cause is the ever greater consumption of

thermal water, due to the uses of: boarding house, heating systems, pools etc.

CONCLUSIONS

1. The use of geothermal water over the support capacity of the deposit induces a direct impact on the source, affecting the ecosystem's viability. The essential condition for normal evolution of the hydro-geo-ecosystem is the rational exploitation of the geothermal deposit and the observance of the norms established by the Operating Regulation of the reserve.
2. The increase in the share of the concreted surfaces, to the detriment of those covered with spontaneous vegetation induces the modification of the terrain's water condition.
The drainage coefficient of the meteoric water is 0,95 for the surfaces fitted with covers respectively 0,85 for the asphalted surfaces, while in the case of the grassed surfaces it is circa 0,1.
Thus the amount of water coming from rainfall which infiltrates the ground is considerably reduced and the amount of drainage waters which carry along materials in suspension, traces of mineral oils etc. increases proportionally, affecting the emissary.
3. The asphalt layer and the concretes essentially modify the natural enzymatic processes from the soil (cumulative and residual impact). The shielding produced by asphalting and concreting modifies the hydrodynamic condition, the condition of the gases, increases the local pressure and alters all the physical-chemical indicators, characteristic to the soil.
The anaerobe fermentations are favoured, with harmful consequences on the soil biology, to the detriment of the aerobe ones, which take place predominantly under normal conditions.
Their modification is reflected directly upon the floral-faunal biodiversity of the zone.

Recommendations
- the quantification of the currently used flows, with the purpose of maintaining the state of balance between the support capacity of the deposit and its users;
- the reduction to a minimum of the concreted surfaces, with the purpose of keeping the surfaces covered with spontaneous vegetation;
- the placement of the constructions will be done so that one ensures a green space, of lawn type, with the width of 5-10 m, positioned between the built-up space and the buffer zone;
- the establishment of an aquaculture centre which would ensure biological material, thus constituting the genetic reserve for the perpetuation of the

species in situations of natural or anthropic risk and with a view to expanding the area of the three protected species(Vicaş G., 2012);
- the continuous monitoring of the flows and water temperature in the three interior zones of the Peţea River natural reservation.

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