# RESTORING MEASURES FOR THE HIDDEN SPRINGS IN DANUBE FLOODPLAIN -STUDY CASE *ASCUNSA* SPRING FROM DABULENI AREA-

**Daniela Liana DUDĂU[1], Adina Sanda MARIAN[1], Sorin CORICI [1], Ioan OANA STOICA [1], Cristina ȘCHIOPU[1] , Mircea Eleodor CHIMEREL [1]**

[1]*Jiu Water Basin Administration, Nicolae Romanescu Street, no.54, Craiova, Dolj county, Romania*

*author email: danieladudau@yahoo.com*

**Corresponding author email: danieladudau@yahoo.com**

**Abstract**

*The climate changes of the last decades, the exaggerated exploitation of the water resources for agriculture have seriously affected the surface and ground water bodies, bringing a major imbalance in the water system for many regions in Eastern Europe. In Romania, the phenomenon of drought and desertification affects tens of thousands of hectares annually, the lack of water being felt in many areas, but lately also in the use as a source of drinking water. Many rivers in the S-W part of Romania managed by the Jiu Water Basin Administration have become non-permanent (temporary) rivers during the summer, when the drought reduces water availability. Jiu river has an 11% decrease of the multiannual average flow according to the studies and researches of the last 20 years.*

***Key words**: ground waterbody, hidden springs, floodplain*

## INTRODUCTION

Climate changes associated with pollution, deforestation and landscape degradation make some areas experience aridity phenomena (Achim, E., et all., 2011). The Ascunsa spring is located at the border, between Dabuleni and Calarasi localities, in Dolj county. It is also situated in Nature 2000-The Dunes of Dabuleni area designated for the protection of bird species and their specific habitats. Ascunsa spring is vulnerable at the desertificationwhose multiple causes are relatedto a complex of factors.Drought phenomenon affects and implies (depending on its duration and intensity), a varied number ofcomponents for the geographic environment.This is due, in the first place, to the lack of precipitations or their deficit, and the negative effectsare visible on vegetation, soil andhydrological resources. Drought is a time-based phenomenon and aridity is a characteristic
of acertain region on which two factors acted simultaneously, namely: clime and anthropogenicimpact.

The sandy soils determine a rapid infiltration of water, reducing surface runoff in favour of underground ones.The groundwater level varies in depth from 7-8 m on the terrace, to 2-3 m at the inter-dune level and to 0.5-1.5 m in the case of low-lying areas (Năstase, A., et all. 2003). The climate, with Mediterranean influences, is temperate, semi-humid, with hot summers and somewhat milder winters. The average annual precipitation is 512 mm, with large oscillations from one year to another, having a maximum at the end of spring and the beginning of summer and a minimum in winter. The study area is one of the most exposed to the climatic risk phenomenon regions in the country.

## MATERIALS AND METHODS

**The materials** used in this research are represented by water samples collected for physico-chemical determinations, with the aim of establishing the quality of the Hidden spring, respecting the sampling and analysis techniques according to the regulations in force.

Also, the flows of the Hidden stream, generated by the spring of the same name, were evaluated and established according to the working instructions of the Hydrology, Hydrogeology and Basin Forecasts Department of Jiu Water Basin Administration.

The samplings were carried out during 2025 year, starting withJanuary, throughout the favourable period for these kinds of activities.All the materials were made available by JiuWater Basin Administration, which ensured the transportation, equipment, expertise of specialists and processing of the data obtained through this research.

**The method** for defining the ecological status of water bodies using physico-chemical and biological quality elements is described in WFD 60/2000/EC.

This presents the way to assess the ecological status of rivers using biological quality elements for 5 ecological statuses of aquatic ecosystems (high, good, moderate, poor and bad ecological status).

To assess water quality of the hidden spring, determinations were made for the physico-chemical indicators in water samples taken in to account 2 sections- the spring section and the section placed downstream of *Dabuleni Research Institute water abstraction point*, according to the working procedures implemented by the Jiu River Basin Management Plan office, using data from the water quality laboratories within the Jiu Water Basin Administration.

The local laboratories developed and provided test reports for the analyses performed on water samples taken during periods relevant for algae development, and these analyses formed the basis for the assessment of the ecological status of the water body under study.

## RESULTS AND DISCUSSIONS

**The general context and the status of the waterbodies** in Danube River Floodplainhave a decreasing flow; low values of the multiannual flow being recorded in the last years in Romania, especially in 2024. The current year (2025) was unfortunately characterized by very large decreases in flows for the rivers of S-W Romania, the decrease in the level of average annual precipitation and significant increases in average air temperatures. Not only the population had to bear the consequences of these climate changes, but also the ecosystems, respectively the network of protected natural areas in the vicinity of large rivers, such as the Jiu River or the Danube River, suffered through the reduction of aquatic or terrestrial biodiversity. This phenomenon is also frequently encountered in the Dabuleni area, which represents the implementation area of Jiu WBA research team.This type of spring is a sustainable terrace spring according to the assessments of experts in the field and according to the flows estimated by hydrological specialists from Jiu WBA.In the 19th century, the Hidden spring area had 32 springs (*Ascunsa*), which provided drinking water for the inhabitants of the localities of Dabuleni and Calarasi. Due to climate change, the number of springs has decreased dramaticallywith 4 springs being active during the summer (Figure 1), and 6 springs being active in the autumn, during the rainy season.

Figure 1 Hidden spring area

Accordingtotheresults obtained, the chemical status of the ground water bodies in the floodplain of Danube river isa good chemical status, the monitorised physico-chemical indicators being within the limits corresponding to the drinking water quality (fig.3-6). The measures that are required are focused on the ecological rehabilitation of the springs, unclogging activities, restoring the spring water collector channel, protecting the spring catchment area and educating farmers in the riparian area to comply with water management legislation.

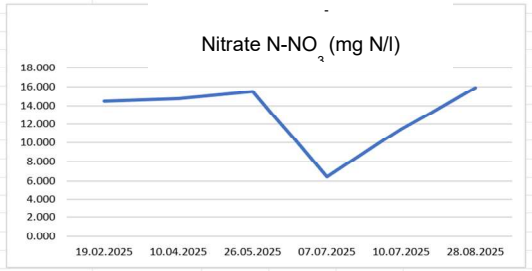


Figure 2-Nitrate level in the Hidden spring

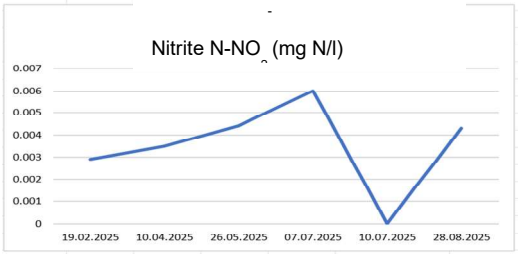


Figure 3-Nitrite level in the Hidden spring

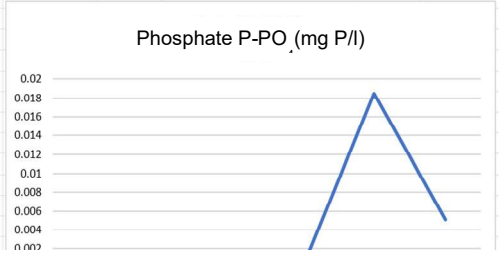


Figure 4-Phosphate level in the Hidden spring

The results obtained through flow measurements for the Ascunsa stream generated by the researched springs (figure 5 and table 1) led to the results graphically presented as follows: during the dry season, the springs have a reduced flow, and during the rainy season, the investigated aquifers are recharged.

The major problem of these springs is related to the phenomenon of terrace erosion, which generates clogging and reduction ofthe volume of water downstream of springs.

Table 1. Evolution of the Hidden spring flows during the 2025 year

| Hidden spring flow (Dabuleni area) | | | |
|---|---|---|---|
| Data | Population/farmers | Dabuleni Research Institute | Total Flow |
| | Q=l/s | Q=l/s (ian-apr 2024) | Q=l/s |
| 31.01.2025 | **4.47** | 2.414 | 6.884 |
| 19/02/2025 | **1.68** | 2.414 | 4.094 |
| 07.03.2025 | **4.14** | 2.414 | 6.554 |
| 10/04/2025 | **4.69** | 2.414 | 7.104 |
| 26/05/2025 | **1.08** | 2.414 | 3.494 |
| 7.07.2025 | **1.39** | 2.414 | 3.804 |
| 10.07.2025 | **1.65** | 2.414 | 4.064 |
| 17.07.2025 | **1.58** | 2.414 | 3.994 |
| 28.08.2025 | **4.09** | 3.46 | 7.550 |

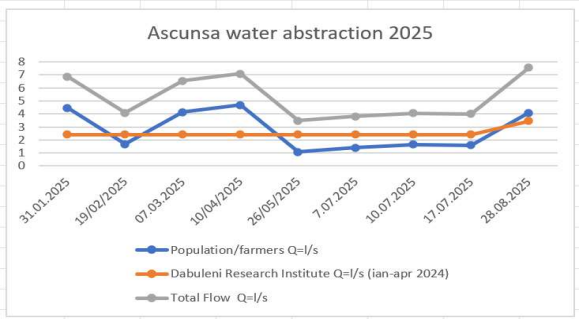


Figure 5-Abstraction flows of the local farmers and Dabuleni Research Institute

The research results led to the following conclusions: in order to benefit from the waters of this spring, which from a qualitative point of view is superior to other resources in the Danube River Meadow, it is necessary to capitalize on

the terrace springs in the Danube Meadow, natural springs that can be used sustainably, both economically and ecologically.

These are natural water sources that appear at the contact between permeable and impermeable geological formations on the terraced steps flanking the Danube River floodplain, have relatively constant flows and have valuable physico-chemical qualities (drinking water).

They can be used in many ways - they can be captured to supply small towns or isolated householdsthey can become natural points of attraction (thematic trails, relaxation areas); low or medium flows can be used for local irrigation, especially for special crops (orchards, early vegetables).

Conservation and ecological protection must be considered through the arrangements that protect the habitatslikerecreation of the wetlands, micro-ecosystems, which can be used as environmental quality monitoring points or can become landmarks for ecological reconstruction projects.

## CONCLUSIONS

The research results led to the following conclusions - ecological rehabilitation will lead to the restoration of the natural functions of the springs, by restoring the hydrological regime, water quality and connectivity with adjacent ecosystems.

Stabilization of slopes and limitation of erosion were achieved through ecological techniques (bioengineering, plantings, natural consolidations), which reduced the risk of clogging of springs and reduced soil degradation.

The rehabilitation of the springs will contribute to increase the resilience of the local ecosystems in the climate change context, due to the restoration of the buffer zone and the increase in natural filtering and self-regulation capacity.

The focus on nature-based solutions (NBS) demonstrate that aminimal impact intervention can have sustainable effects and reduced long-term maintenance costs.

The socio-economic benefits of the ecological rehabilitation are significant, including: the possibility of relaunching local activities (tourism, agrotourism); improvement for access to water for local consumption; increase the landscape and recreational value of the area. The involvement of the local community and administrations has led to better protection of the springs, and continuous monitoring mechanisms ensure the sustainability of the interventions.

Ecological rehabilitation is becoming a replicable model for other spring systems affected by pollution, uncontrolled abstractions or morphological degradation. By combining technical and ecological interventions, it has been demonstrated that it is possible to maintain the balance between resource use and environmental conservation.

## ACKNOWLEDGEMENTS

This research work was carried out with the support of the Jiu Water Basin Administration, National Administration *Apele Romane* and with the technical support offer by the Dutch Water Authority through the Blue Deal programme for the *Tackling drought* project, financed by the Netherlands.All analyses for the water samples were assured by the Water Quality Laboratory from Craiova.

## REFERENCES

Achim, E., Manea, G., Vijulie, I., Coco, O., Tirl, L., (2012). *Ecological reconstruction of the plain areas prone to climate aridity through forest protection belts. Case study: Dabuleni town, Oltenia Plain, Romania*. Forest Research and Management Institute (ICAS), Bd. Eroilor 128, Voluntari – Ilfov, Romania, University of Bucharest, 1 Bd. Nicolae Balcescu,

sector 1, Bucharest, ProcediaEnvironmental Sciences14 (2012), p. 154 – 163;

Năstase, A., Năstase, M., (2003).*Botanical reserves in Dolj County*. Oltenia Museum, Craiova, Romania. Satu Mare-Studies and communications, vol. II-III-Natural Sciences, p. 244-247,https://biblioteca-digitala.ro;

https://eur-lex.europa.eu; - Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy;

https://jiu.rowater.ro;

https://www.scdcpndabuleni.ro/ro/aca