

# AN INFORMATION SYSTEM FOR WATER RELATED PROTECTED AREAS IN JIJIA RIVER BASIN

## REALIZAREA UNUI SISTEM INFORMAȚIONAL AL ARIILOR PROTEJATE DIN BAZINUL HIDROGRAFIC JIJIA

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**Abstract.** According to the Water Framework Directive and the Romanian Water Law, the European Union reporting requirements have led to the need for protected areas identification and mapping within river basins, in order to achieve a unitary spatial database in Europe. ArcGIS software was used for mapping. This software offers many possibilities for information storage, analysis and graphical representation. Thus, 121 drinking water protected areas, 20 zones for protection of habitats and species (Special Protection Areas, Special Areas of Conservation and Natural Reservations) and 90 localities in nitrate vulnerable zones have been identified in Jijia river basin.

**Key words:** Information system, protected areas, quality criteria

**Rezumat.** Pe baza prevederilor Directivei Cadru a Apei și a Legii Apelor, respectiv a cerințelor solicitate de către Uniunea Europeană, s-a trecut la identificarea și cartarea ariilor protejate din cadrul bazinelor hidrografice, prin realizarea unei bazei de date spațiale unitare la nivel european. Pentru cartarea acestora a fost utilizat programul ArcGIS, care oferă numeroase posibilități de stocare, analiză și reprezentare grafică a informațiilor. Astfel, în bazinul hidrografic Jijia au fost identificate 121 arii protejate pentru captările de apă destinate consumului uman, un număr de 20 zone destinate protecției habitatelor și speciilor unde apa este un factor important (arii de protecție specială avifaunistică, arii speciale de conservare și rezervații) și 90 localități în zone vulnerabile la nitrați.

**Cuvinte cheie:** sistemul informațional, arii protejate, criterii de calitate

### INTRODUCTION

A protected area is a clearly delimited geographical space, recognized, designated and managed on the basis of legal acts or other effective means, aiming to achieve long term conservation of nature as well as for the environmental services and cultural associated values. (Introduction to protected areas in Romania, 2009).

The requirement to reach the good water status of water bodies in the European Union countries according to the Water Framework Directive has imposed separately analysis of bodies that are included in, coincide with, or include protected areas (Water Framework Directive, 2000) in order to monitor the water specific parameters.

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In Romania the identification and analysis of protected areas related to water is carried out by the „Romanian Waters” National Administration. The River Basin Management Plan includes a special chapter where these protected areas are identified and mapped. This paper presents the protected areas in the Jijia river catchment.

## MATERIAL AND METHOD

Jijia basin is located in the North-Eastern part of Romania, in Botosani and Iasi Counties. Jijia River springs west of Pomirla, on the Western slope of Bour Massif, Ukraine. The length of Jijia river belonging to Ukraine is about 4 km. It is the most important tributary of the Prut River, with a length of 275 km and a catchment area of 5757 km<sup>2</sup> in Romania.

The basin's layout has a lengthen shape and Jijia river has a lateral position in it. More than 75% of the basin's total area is developed on the right, from where it receives the most important tributaries of the Prut River: Bahlui, Jijioara, Miletin and Sitna (Pantazică M., 1974).

The hydrographic network of the basin includes 144 rivers with a total length of 2181 km. More than 80% of the rivers have temporarily flow. On these rivers 110 surface water bodies were designated, of which 18 are lakes. 28 of these water bodies are on permanent rivers and 82 are on temporary rivers (Prut - Bârlad hydrographical Area River Management Plan, 2010).

Water Framework Directive impose a specific monitoring of the protected areas, especially for water bodies used as drinking water sources, water dependent habitat areas and species protection areas.

In order to deliver reports in a unitary information system at European Union level WISE system, "Water Information System for Europe" has been introduced.

In accordance with the requirements of the Water Framework Directive (2000) and the Water Law (107/1996, further amended), the categories of protected areas where water is an important factor shall be: areas used as drinking water sources, areas for the protection of economic important aquatic species, recreational areas - including swimming areas, nutrient sensitive areas - including vulnerable zones and areas for the protection of habitats and species.

In the studied catchment area there are no areas for the protection of economic important aquatic species, or bathing areas.

Article no. 51 of the Water Law contains the Methodology for achieving the registry of protected areas (2005).

Protected areas are zones with special protection established under the law for the protection of surface water and groundwater or for conservation of habitats and species directly depending on water.

The data sources for achieving database of protected areas at national level are: the National "Romanian Waters" - for the areas designated as drinking water sources, Forests National Administration "Romsilva" – for the areas designated for protection of the aquatic economic important species, the Directorates for Agriculture and Rural Development - for the nutrient-sensitive areas, including areas designated as vulnerable zones, the Environmental protection agencies – for the areas designated to protect habitats or species where the maintenance or improvement of water status is an important factor for protection, including zones important for Natura 2000.

ArcGIS software was used for inventory and representation of different types of protected areas in the studied basin. ArcView is a GIS component which provides tools for exploring, selecting, editing, displaying, analyzing, symbolization and

classification of data, updating of metadata being a very useful tool in mapping of protected areas; for example:

- mapping the locations of water supplies started from the simple knowledge of the spatial position of a water source, one of the facilities of the software consisting in the possibility to use multiple coordinate systems within the same project. The user may choose the system of coordinate for submitting the results, thus for reporting to the European Commission in Romania it was agreed the ETRS89 coordinate system - geographic coordinate system, and for internal reporting the Stereographic projection system 1970 is used (figure 1).

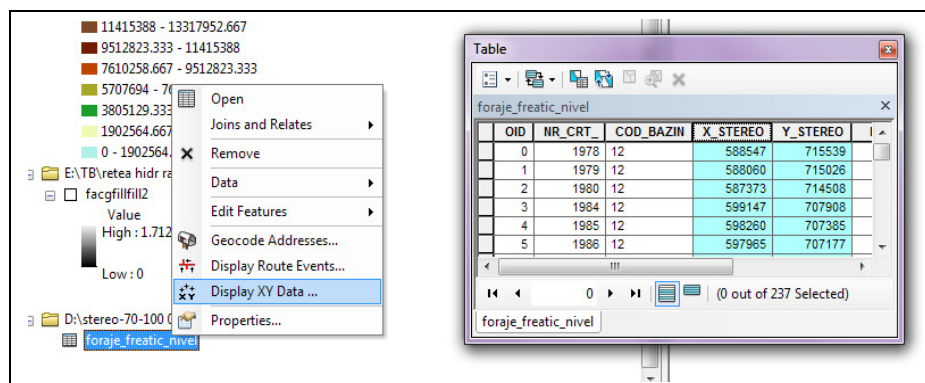


Fig. 1 - Spatial layer obtained from a xy location of a water source

- the software allows the introduction of new information on the graphically represented objects as attributes, through a common link column between their spatial databases and other database existing in a different format.

The source of data used in this paper is the Prut-Bârlad Water Basinal Administration.

## RESULTS AND DISCUSSION

Water related protected areas have been identified by overlaying in GIS the informational layers containing the water bodies with the layers containing the protected areas designated by the national legislation. Three types of protected areas resulted in the studied catchment:

### • Drinking water protected areas

The designation of drinking water protected area, adjacent to the surface water intakes, was based on the following criteria: providing more than 10 m<sup>3</sup>/day or serving more than 50 people.

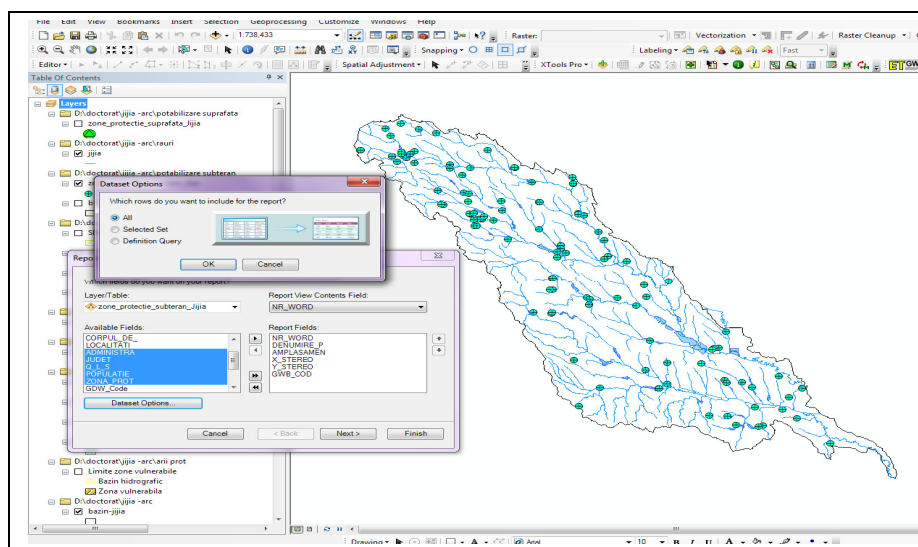
In Jijia catchment three drinking water protected areas from surface sources have been designated. The main characteristic of the water intakes from surface water are shown in table 1.

Also the 118 wells which are the starting point for the ground drinking water protected areas were graphical represented, the associated information being presented in a table format similar to those in Table 1, by generating reports tools (figure 2).

Table 1

### Characteristics of water intakes from surface sources

Water intake	Location	Administrator/supplied localities	Flow (l/s)	Supplied population
Halceni reservoir	Miletin river, in Halceni	APAVITAL Iasi / Sectia Vladeni / Vladeni	1,53	650
Parcovaci reservoir	Bahlui river, în Pircovaci area	APAVITAL Iasi/ Sectia Harlau/Harlau, Ceplenita	20,1	6982
Tansa – Belcest reservoir	Bahlui river, în Belcesti area	APAVITAL Iasi/ Sector Belcesti/ Belcesti, Focuri, Coarnele Caprei	3,84	1151



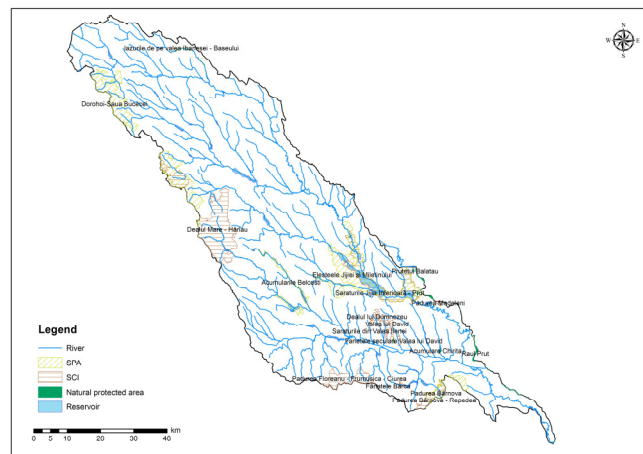
**Fig. 2 - “Drinking groundwater protected area” – generating report (Screenshot)**

• **Water dependent habitat and species protection areas** - there are 20 protected areas for the protection of habitats and species, which are totally or partially included within Jijia catchment: SPA Dorohoi Șaua Bucecei, SCI Dealu Mare Hârlău nature reserve Pădurea Tudora, Eleșteele Jijiei și Miletinului: (SPA și SCI Sărăturile inferior Jijia natural reserves Teiva Vișina și Prutețul Bălătau), SCI and Prut River nature Reserve, SPA Belcești Accumulations, Medeleni Forest SCI, SCI Dealul lui Dumnezeu, SCI Sărăturile din Valea Ienei, SCI Valea lui David, nature reserve Chirita accumulation, SCI Pădurea Floreanu-Frumușica-Ciurea, SCI Pădurea Bârnova-Repedea, SPA Pădurea Bârnova, SCI Fânețele Bârca, SPA Pădurea Micleşti.

In Figure 3 the thematic map of the spatial distribution of protected areas mentioned above was presented.

Some of these are included in the Nature 2000 network - the European Union's main instrument for nature conservation, a network of natural or semi-natural areas, where vulnerable plant, animal species and natural habitats must be

protected. In these areas are protected: 2 species of mammals, four amphibians, one of fish, two invertebrates, 30 species of birds and other 62 important flora and fauna species.



Prutețul Bălățău  
Natural Reservation



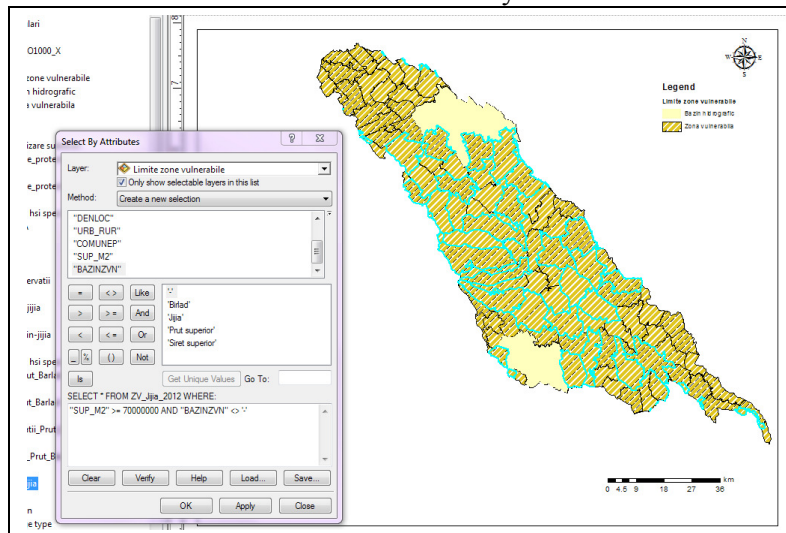
Pârcovaci reservoir  
Natural Reservation

**Fig. 3 - Protected areas of habitats or species in Jijia catchment area**

- **Nitrate pollution vulnerable zones** are areas of agricultural land that drain into nitrate polluted waters or waters which could become polluted by nitrates from agricultural sources and contribute to the pollution of groundwater.

In Jijia river basin 90 Cities/Localities in the Upper Prut vulnerable area were identified.

Figure 4 shows the spatial distribution of vulnerable areas and a query example of data contained in the informational layers.



**Fig. 4 -“Vulnerable zones in Jijia river basin” - location and spatial database query example**

The information regarding the types of the protected areas, contained in spatial databases can be also used for reporting, e.g. WISE system, as it can be seen in Figure 5.

Protect	TypeOfProtectedArea	TypeOfAssociation	ValueStatusPr
RORW13.1.15_B4	525 Nitrates	within protected area	
ROLW13.1.15_B4.1	526 Birds	within protected area	
ROLW13.1.15_B4.1	527 Habitats	within protected area	
ROLW13.1.15_B4.1	528 Nitrates	within protected area	
ROLW13.1.15_N4.2	529 Birds	within protected area	
ROLW13.1.15_N4.2	530 Habitats	within protected area	
ROLW13.1.15_N4.2	531 National	within protected area	
ROLW13.1.15_N4.2	532 Nitrates	within protected area	
ROLW13.1.15_B5	533 Nitrates	within protected area	
RORW13.1.15.2_B1	534 Nitrates	within protected area	
RORW13.1.15.3_B1	535 Nitrates	within protected area	
RORW13.1.15.4_B1	536 Nitrates	within protected area	
RORW13.1.15.5_B1	537 Nitrates	within protected area	
RORW13.1.15.6_B1	538 Nitrates	within protected area	

Fig. 5 - WISE system report - screenshot

## CONCLUSIONS

1. The inventory and the update of the information on protected areas constitute at present a requirement on ensuring biodiversity, conservation of natural resources and protection against natural disasters.

2. ArcGIS software is very useful for updating databases containing different types of protected areas, because it provides the possibility of overlapping informational layers, allowing interrogation and analysis, enabling users to obtain both accurate visual information and extracting reports. Based on the analysis performed, we can conclude that in Jijia catchment area there are a number of 121 drinking water protected zones, the protected areas for species and habitats cover 11% of the catchment area and 89% of the basin area is vulnerable to nitrate pollution.

3. The information contained in the spatial databases can be presented both graphically as maps or easily integrated in reports or other databases in specific EU reporting system (WISE), or used for other water management analysis required for the achievement of the sustainable development program.

## REFERENCES

1. Pantazică M., 1974 - *Hidrografia cîmpiei Moldovei*, Editura Junimea, Iași
2. Stanciu E., Florescu F., 2009 - *Ariile protejate din România Noțiuni introductive*. Editura Green Steps, Brașov
3. *Legea Apelor 107/1996 completată și revizuită prin Legea 310/2004*
4. *Planul de Management al spațiului hidrografic Prut-Bârlad*, Monitorul Oficial, Partea I nr. 616 din. 31/08/ 2010
5. *The Water Framework Directive 2000/60/EC*