

# CONSIDERATIONS FOR USE OF LAND - CASE STUDY - BAHLUI DRAINAGE BASIN

## CONSIDERAȚII PRIVIND MODUL DE UTILIZARE AL TERENURILOR - STUDIU DE CAZ - BAZINUL HIDROGRAFIC BAHULUI

**CRENGĂNIȘ Loredana Mariana<sup>1</sup>, BĂLAN Isabela<sup>1</sup>**

e-mail: barganlro@yahoo.com

**Abstract.** *The article presents the use of land, flood control works, dams and bank consolidation, land improvement or water alimentation, to which adds the settlements and transportation networks in Bahlui drainage basin on Corine Land Cover reference European data. Use of specific programs related to GIS analysis specialized software, ArcGIS or TNT Mips allowed use to extract quantitative values of surfaces with different land uses.*

**Key words:** GIS, hydrographic basin, Corine Land Cover.

**Rezumat.** *Articolul prezintă determinarea modului de folosire al terenului, lucrările de regularizare, îndiguire și consolidări de maluri, de îmbunătățiri funciare sau cele legate de alimentarea cu apă, la care se adaugă rețeaua de localități și căile comunicații din bazinul hidrografic Bahlui pe baza datelor europene de referință Corine Land Cover. Pe baza utilizării programelor specifice legate de analiza GIS software-ul ArcGIS sau TNT Mips a fost posibilă extragerea datelor referitoare la modul de folosire al terenurilor.*

**Cuvinte cheie:** GIS, bazin hidrografic, Corine Land Cover.

## INTRODUCTION

Real world entities are so complex that they should be classified in classes of objects with certain thematic similarities and modeled in spatial database. Objects from a spatial database are defined as representations of the real world that have associated attributes.

Generally, geospatial data have three major components: location, attributes and time. Attributes are often referred to as "data subject" or "non-spatial data" and related to spatial or geometric data. An attribute has a defined characteristic of the entity in the real world.

Attributes can be classified as normal, ordinal, numeric, conditional or who describe other features. The attributes values are often listed in attribute tables that establish the attributes and spatial data such as the point, the line and the area and between attributes (Kyaw et. al., 2012).

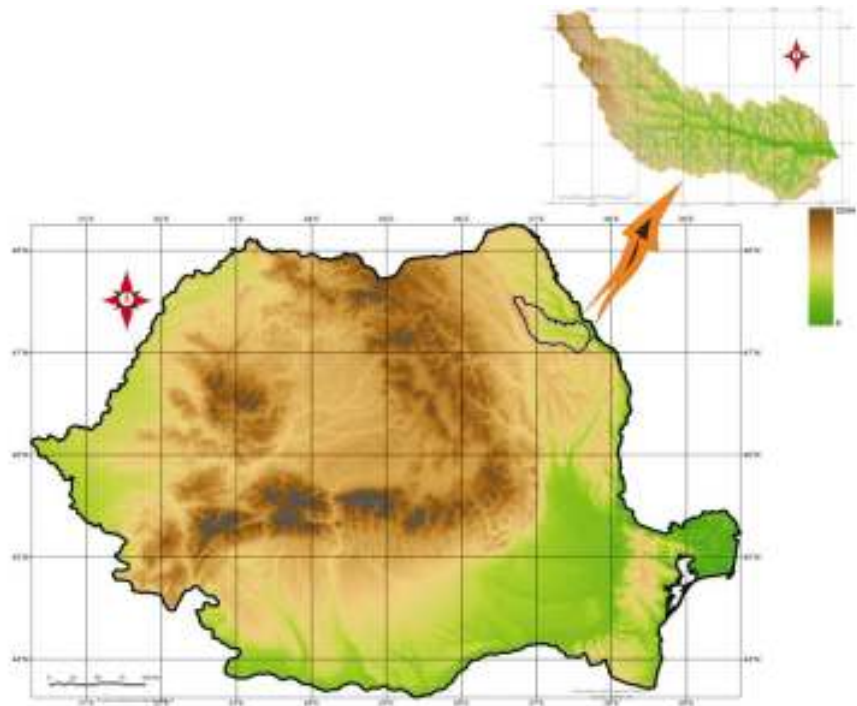
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<sup>1</sup>Gheorghe Asachi Technical University of Iași

## MATERIAL AND METHOD

Bahlui hydrotechnical system manages a total of 11 permanent reservoirs and 7 temporary reservoirs with a total attenuation volume of 79.7 million cubic meters. The embankment works on a length of 50 km, remove from the flooding effect the industrial area of Iasi, the Tg. Frumos, and the communes Ceplenita, Tomești, Holboca respectively 900 ha of arable land.

In Romania, Bahlui catchment is located in the north-east region of the country, overlapping an area with a central position in northeastern Moldova Plateau, integrating in hydrological relation to the system of the middle Prut River (figure 1).



**Fig. 1** - Geographical location of Bahlui basin in Romania  
(Ionuț Minea, 2010)

One of the most used sources for the construction of spatial databases is represented by the existing classic cartographic fund. In Romania the most topographic maps presents on the north an indicator called nomenclature, consisting of a sequence of letters and digits. It is found both on the maps / plans in Gauss-Krüger projection and on those in the 1970 stereographic projection in the and on those in the 1970 stereographic projection and is derived based on the maps distribution system adopted by Romania in 1952 ([www.earth.unibuc.ro/](http://www.earth.unibuc.ro/)).

Cartographic framing of Bahlui catchment on existing topographic maps and plans on analog support is given with the geographic frame sizes in (table 1).

Table 1

**Cartographic framing of Bahlui catchment on existing topographic maps**

No.	Scale topographic maps and plans	Number of sheets contained in Bahlui basin	The scoring sheets	Geographical frame dimensions	
				$\Delta\varphi$	$\Delta\lambda$
1	1:1 000 000	1	-	4°00'00"	6°00'00"
2	1:500 000	2	A,B,C,D	2°00'00"	3°00'00"
3	1:200 000	4	I,...,XXXVI	40'00"	1°00'00"
4	1:100 000	5	1,2,...,144	20'00"	30'00"
5	1:50 000	13	A,B,C,D	10'00"	15'00"
6	1:25 000	36	.a,b,c,d	5'00"	7'30"
7	1:10 000	120	1,2,3,4	2'30"	3'45"
8	1:5 000	519	I,II,III,IV	1'15"	52",5

The Bahlui catchment area fits geographically in the Moldavian Plateau, Moldavian Plain subunit (Jijia Depression), represented only by its southern sector. It is characterized by a relief with hilly interfluvies or as low plateaus with normal altitudes of 125-150 m, which is repeated on large areas. The shapes with extended gradients to the southeast, with only one side steeper towards north and northeast, as well as the large valleys with floodplains and slopes affected by landslides, degraded by the water rushed from the summer rains, are the most representative morphological features.

One of the biggest projects in Europe in terms of land use and detection of changes occurring in a certain period of time is the "Corrine Land Cover". This is a project involving all the countries of Europe. The project uses data from digital sources such as satellite imagery (Landsat, SPOT HRV) and cartographic sources, such as land use maps, topographic maps and even forestry maps. The data resulting after interpretation are offered at a scale of 1:100000. The smallest unit mapped is about 25 ha, and the changes that occur during the study are reported only if they occur in an area less than 5 hectares. So far in this project, data were obtained for the period 1990-2000-2006 ([www.eea.europa.eu](http://www.eea.europa.eu)).

LANSAT space program was an initiative of NASA and is currently considered the longest program for remote sensing of earth resources.

Usually a thematic classification of an image involves several steps: entities extraction, sampling, labeling. The end result is a transformation of the numerical image into descriptive data that show different types of materials or conditions. Under the labeling process, the data is converted to a form that has an information value (R. Schowengerdt, 2007).

LND SAT ETM + satellite scene (table 2) can be defined as a square surface within which simultaneously scanning and detection of the spectral response of objects and phenomena are performed. Through the digital conversion in pixels matrix system, of 8-bit, results digital images result, on a gray scale, as they appear upon taking the scene.

The surface of a satellite scene is about 34,000 km<sup>2</sup>, which means a much larger area than an aerial photo. In fact it would include the equivalent space occupied by 1,600 aerial photograms of common format (23x23 cm). Images are compatible with a resolution of 30m, with 1:200 000 scale topographic map.

Inlay and redesign of data was done using ArcGIS.

Table 2

Technical data sensors		
Landsat ETM+ Enhanced Thematic Mapper +		
Channel	Wavelength [nm]	Spatial resolution [m]
Blue	450-515	30
Green	525-615	30
Red	630-690	30
NIR	750-900	30
SWIR1	1550-175	33
TIR	1040-1250	60
SWIR2	1550-1250	30
PAN	500-900	15
705 km 185 x 185 km		

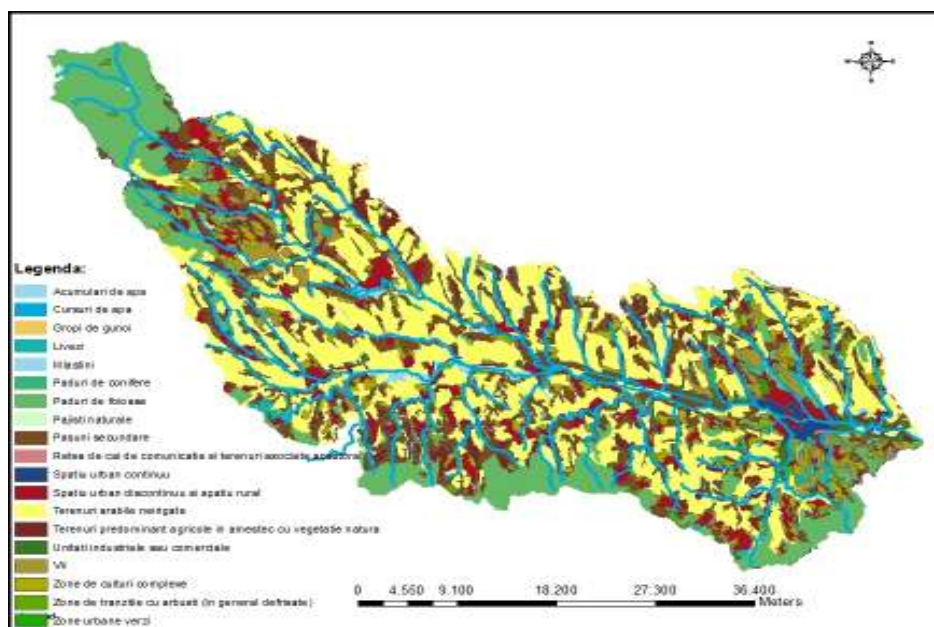
## RESULTS AND DISCUSSIONS

The major part of the catchment surface is used in agriculture (67.5%). The analysis of the surface for the land use categories from Bahlui catchment (Table 3) showed the predominance of agricultural land (occupying 67.5%) of the total area, of which 58.7% is arable land.

Table 3

Land use categories attributes				
Attributes of Category de utilizare a terenului				
	LABEL RO	RGB COLOR	Shape Leng	Shape Area
Parcuri de bălăne	128-255-000	78267,301089	10503099,132	
Parcuri secundare	230-230-077	1856,431501	13513,355933	
Spații urbane discontinu și spații rurale	255-000-000	41882,099839	9695493,79456	
Zone de tranziție cu arbuști (în general defrișate)	166-242-000	3257,242629	414330,789639	
Parcuri naturale	204-242-077	4894,859669	1150990,57993	
Parcuri secundare	230-230-077	1837,722931	96998,381252	
Zone de tranziție cu arbuști (în general defrișate)	166-242-000	1484,225638	95821,811742	
Parcuri naturale	204-242-077	2799,250311	336310,2996	
Zone de tranziție cu arbuști (în general defrișate)	166-242-000	2868,210125	282914,788896	
Terenuri agricole neirigate	255-255-168	88889,218713	21883081,5448	
Parcuri secundare	230-230-077	15851,825158	3190671,145811	
Zone de tranziție cu arbuști (în general defrișate)	166-242-000	2881,164801	329018,981424	
Terenuri agricole neirigate	255-255-168	12259,879899	4771890,599999	

Other areas of agricultural land are occupied by vineyards and orchards, occupying 8.75%. Other areas of land identified in the case study were forests, occupying 11.8%. It was also highlighted the area covered by natural and artificial lakes, with an area of 2420 ha and unproductive lands, about 1630 ha (Figure 3).



**Fig. 3 - Land use in the catchment area Bahlui**

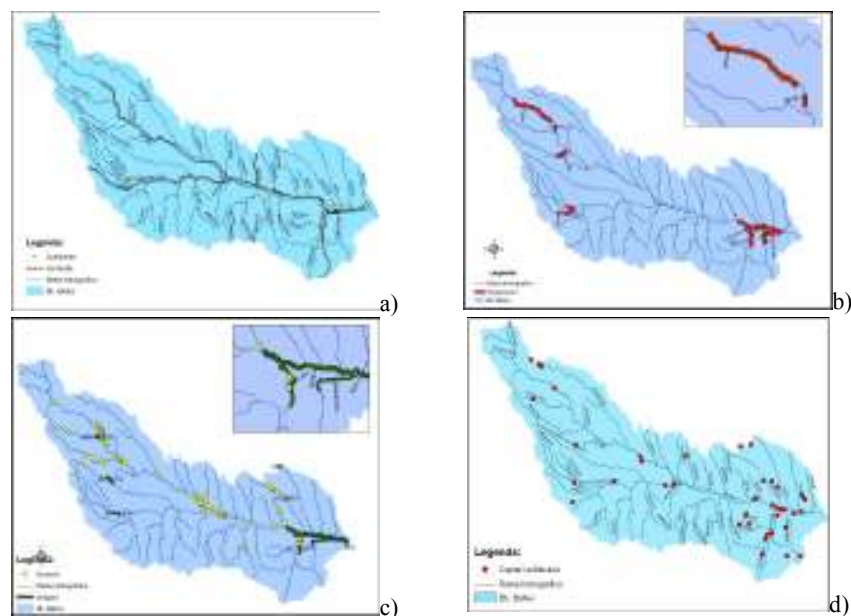
The expansion of agricultural land was performed over time at the expense of forest areas, more extensive in earlier stages of agriculture development. In this context, there has been a significant decrease of the moderating factor of the forest, in the system of disturbance factors, of great magnitude, involved in the morphological changes of the Bahlui catchment.

Also to be highlighted is the role that forest litter has in retaining a portion of rainfall, especially the role of forested areas, characterized by a much higher natural drainage compared to the soils of agricultural land.

The implementation of this modern information system, based on known technical data for Bahlui catchment allows query by the beneficiaries for various digital information.

Figure 4 shows the digital information represented by relating the absolute plane rectangular coordinates of various planimetric details as follows:

- query for the hydrographic network and railways (figure 4a);
- query for rectification of the hydrographic network in Bahlui catchment (figure 4b);
- query for the hydrographic network, for the embankments and soil erosion control works (figure 4c);
- query for the hydrographic network and underground water abstraction in Bahlui catchment (figure 4d)



**Fig. 4 - Geospatial query of the Bahlui river basin**

## CONCLUSIONS

1. Achieving the Access database format, including how the land use, adjustment works, soil erosion control works and groundwater abstractions, is a modern computer system that can be used by farm owners and other beneficiaries.
2. Based on ArcGIS software, a fully automatic algorithm to detect land cover and also provides the possibility to obtain high precision data was developed.
3. The implementation of this modern computer system, besides ensures high economic efficiency due to the speed of operations for input, storage and operation of any changes and also to the possibilities to visualize and print at the required scale.

## REFERENCES

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