

# THE DYNAMIC OF WATER BEDS IN THE BLACK RIVER VALLEY

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**Abstract.** *Studies on a river's dynamic not only give knowledge about its characteristics in general, but also help us understand how different factors influence the river's area and also provide information about its evolution. In this study, we have analyzed the course of Black River, which crosses the mountain area and also a plat plain until the confluence with the Olt River (Iancu,1962) taking into consideration the meanders movement and degradation of banks.*

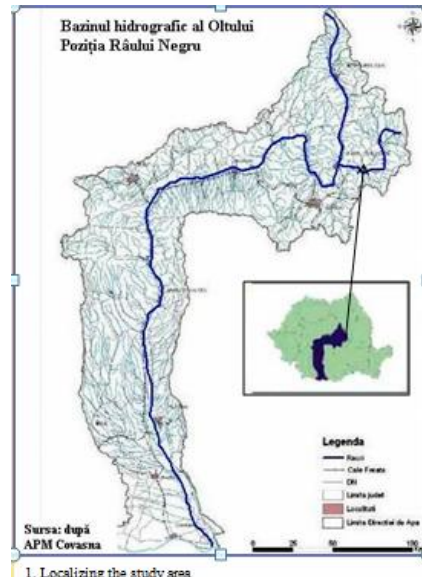
**Keywords:** water beds migration, meander, GIS, cross section, DEM

## INTRODUCTION

The analyzed area is located in the central-east part of Romania, more exactly in the east part of Brasov Plain, and belongs to Olt River water catchment area. The river is crossing two different morphologically structured areas, the mountains and a low area, from NE to SV. Black river is a middle class river, 88 km long.

Two courses may be differentiated, up upper one, north from Reci village, crossing the mountains and collecting most of tributary streams and a lower course, where we can say the river becomes lazy and calm, it flows slowly trough sedimentary structures with a high-sinuosity, leaving behind bends and oxbow lakes.

As it is shown in the previous paragraph the dynamic of Black River is active, there are many factors that influence its movement, the erosion, transportation and accumulation of sediments. This is the purpose of the study, to show this dynamism of this fluvial system.



## MATERIAL AND METHOD

To realize this study we created spatial relationships for a period of approximately 40-50 years using two types of data sets, from the maps in Gauss-Kruger projection (1961), 1:25000 scale, and orthophoto maps completed in 2005, with a resolution of 0.5 meters.

After scanning and dereferencing the cartographic maps we digitized on both dataset lines and areas, and created an overlay (Imbroane,1999) for better visualization on the changes that appeared in the lower course during the study period.

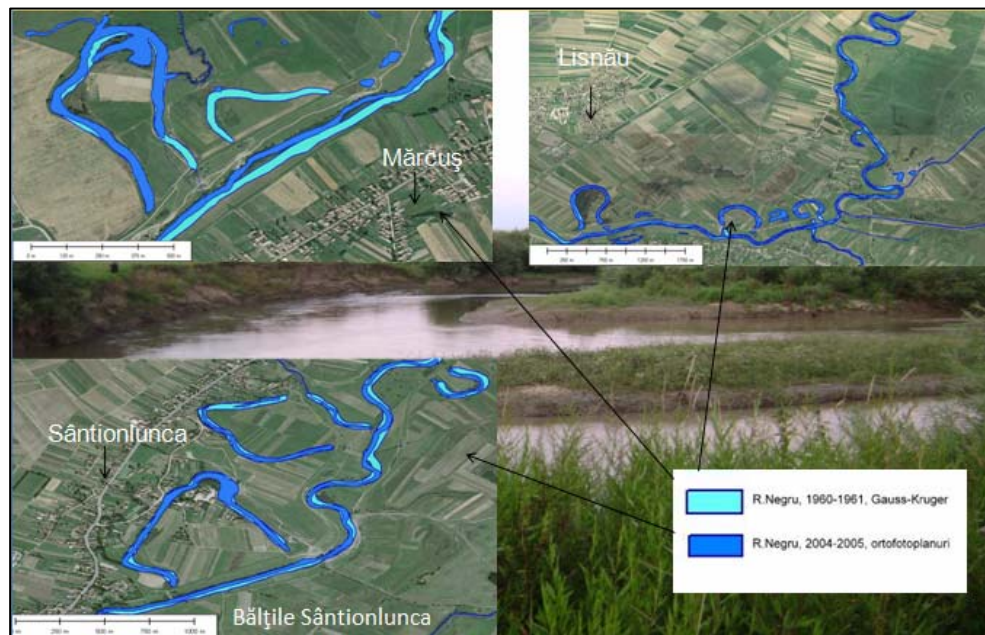


Fig. 1. The migration of meanders : light blue 1961, dark blue 2005

The cartographic material, including maps, DEM, models and simulations, georeferencing maps, working with new vectors, were processed using specialized GIS software, including geodatabase.

Using the topographic maps with major and minor lines (Gauss-Kruger, 1961), we generated a DEM (Digital Elevation Model) to highlight the conditionings imposed of the migration and meandering phenomenon of the river beds.

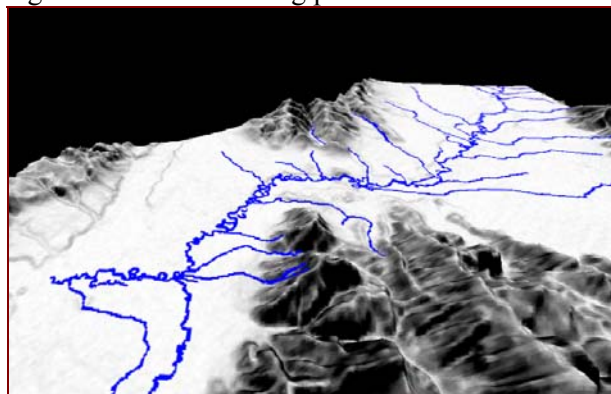


Fig. 2. Digital Elevation Model for the Black River basin

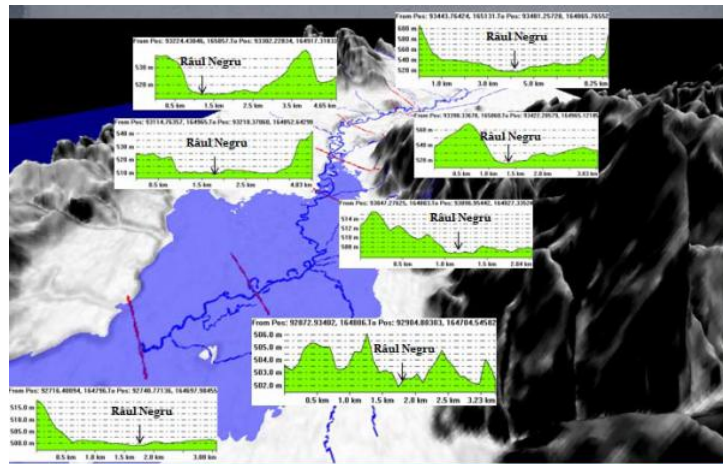
For a detailed approach of the processes involved in the meanders migration we used hydrographic and rainfall measurements. Also SRTM data has been added to the layers.

## RESULTS AND DISCUSSION

The variable geometry of the valley has been highlighted during the overlay step where we could see the migration of beds, and understand the geologically conditioning, the influence of climate, soils, water, vegetation, and human also in the appearance of these morphological sculptures. The configuration of this land still suffers landscape changes, morph metric and not only.

In a cross sections trough the valley, we can notice that the left side of the river floodplain is a predominantly low area, often swampy, in sedimentary deposits, meanwhile on the right side, the floodplain enters the higher area of piedmonts, closer to the mountains or cuts debris cones of tributary streams.

In the tight area in the middle of the picture is the village of Reci, where scientists believe that the mountains raised so high and close because of tectonic activity from the area.



**Fig. 3. Cross sections through the Black River Valley**

The main critical processes identified along the river are the undermining of slopes and banks fall, which requires the need for works to combat degradation; also another critical process is the spasmodic modeling of the water; pollution with all kind of substances and the accumulation of too much energy in the junctions, which takes to a sudden rise of water flow.

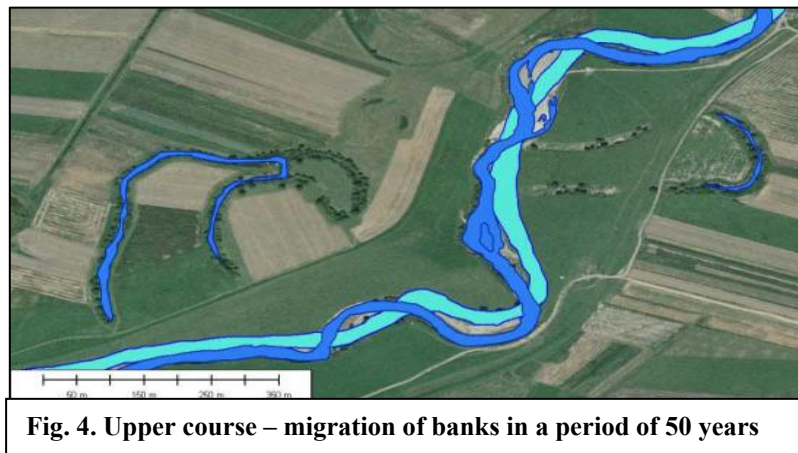
The junction areas are characterized by: influx of water (for example in the north of Reci there is a serial junction ), chaotic accumulation of solid flow, which generate imbalances in the beds; the presence of more small islands with high mobility, especially in the spring when the flows are high and during summer flood; sharp erosion of banks, followed by collapses and especially the increase of

meanders (with the clear perception of their migration) and forming a level plain unstable, subject to flooding.



One of the important aspects to discuss when the dynamism of a river is discussed is the type of channels that can be found in the valley, not only generally but also with details about its characteristics and existing landforms.

From this point of view, in the upper course of the river alluvial beds predominate, especially from the point that the river entered the flat area. This is the area of Quaternary deposits, where both banks and bed are alluvial. Interferes with sectors of mixed bed , steeped in the rock (otherwise, on this territory of poor cohesion) in place.



**Fig. 4. Upper course – migration of banks in a period of 50 years**

In the lower course , the sinuosity of beds is reduced from 1.08 to 1.05 and also the degree of bled. From place to place on the convex shore appear sandbanks, islands, and evan small sand beaches on the concave



shore. Meanwhile the convex shores are the one attacked by intense erosion, especially because of the lack of vegetation.



Fig. 5. Lower course - migration of banks in a period of 50 years

## CONCLUSIONS

In conclusion, we can say that a study over the dynamics that involves a fluvial system there will always be changes at micro or macro scale, and in the case of this valley we can say that it is still a young one though after carefully analyzing the situation in the field there must be taken some measures, to protect the river and also the area around it.

The applicability of this study is not only about updating information for the studied area, also could help as a point of geographical landmark for protecting and conservation of nature and also in planning to regulate meanders and strengthen banks.

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