

TRANSFORMATIONS OF SOMEȘ RIVER BED IN THE URBAN AREA OF SATU MARE

C-O. MAREȘ

Abstract. Transformations of Someș River bed in the urban area of Satu Mare. The study captures the spatial-temporal evolution of the Someș river bed and the anthropic interference over it in the metropolitan area of Satu Mare. Over time the inhabitants of these lands led a permanent struggle with Someș waters, which flooded frequently. Due to the low drainage slope and the intense meandering in the urban sector, over time a series of hydro-technical works for rectifying the river bed and embankments to reduce the effects of the floods were needed. Before 1777 there were 39 meanders on the territory of the urban area, which through extensive works have now been suppressed. The works performed took place in three main stages. Through these works were converted into agricultural land and later in built surfaces about 800 ha of swamps and arms. Due to the hydro technical works the length of the course in the urban area decreased from 36.5 km to 13 km. The cross-sections made at the Satu Mare hydrometric station revealed a deepening of the river valley in its own alluviums due to the influence of several factors.

Keywords: meanders, slope, rectification, profile, rehabilitation, instability, ecosystem, Satu Mare.

1. INTRODUCTION

Satu Mare municipality is located in the north-western extremity of Romania, at the intersection of the parallel 47°47'30" N latitude with the meridian of 22°52'30" E longitude, the intersection of the two coordinates junctioning in the proximity of the Decebal bridge. It has developed in the central sector of Someș' low plain, at an average altitude of 126 m (NMN). From a geomorphological point of view, the studied area falls to the Micula Plain to the north of Someș and Someș Plain - Homorod to the South. Hydrographic, the municipality is located in the lower part of Someș, at a distance of about 15 km upstream of the river's exit from Romania and about 40 km upstream of the confluence of Someș with Tisa. The Someș River basin is extended on an area of 15740 km² of which 15217 km² in the territory of Romania. The total length of Someș is 427 km, out of which 376 km in Romania and 51 km in Hungary. On the territory of Satu Mare County it is about 60 km, out of which about 13 km are in Satu Mare metropolitan area, which crosses the east - west direction.

The emergence and subsequent evolution of the urban core is determined by the cooperation of natural factors with favourable historical and socio-economic ones. The presence of the numerous meanders of Someș constituted a natural fortification, causing the emergence of the primary urban nucleus in this sector of intense divagation. The urban area presented at its beginnings two urban nuclei Sătmar (Zotmar) and Mintiu (Németi). Around the centre - the Villa Zotmar, inhabited by the natives, the Teutonic settled around the year 1000 and later the German colonists arrived on these lands. Documentary attestation as a well-defined locality appears as *Castrum Zathmar* (1213) or *Castrum Zhotmar* (1239). The name Sătmar would derive from the *Salzmarkt* toponym, a salt merchant (salt brought to Someș from Ocna Dej), but a derivation from the Latin *satum* is not excluded.

In the same period, on the opposite shore of Someș is built another locality called Mintiu (Németi) by German settlers brought by Queen Gizela, the wife of King Stephan I of Hungary, the very toponym of the city then supporting this fact, (Nemes meaning *German* in Hungarian).

It is supposed that Mintiu existed at the beginning of the 11th century. Satu Mare (Zhotmar) was located south of a Someș River and Mintiu (Németi), north of Someș. The two settlements were distinct localities and were connected by a wooden bridge, their defence against the floods of the Someș being made through palisade-type dams. The existence of the two settlements took place in a permanent battle with Someș' waters and its floods.

2. DATA AND METHODS

The maps were developed using GIS methods, methods for re-establishing the route of the old Someș' bed and the meandering system. The database was represented by the raster and sketch representations provided by the Satu Mare County Council, Satu Mare County Museum, Satu Mare SGA and Satu Mare National Archives. Also, the consultations of the various bibliographic sources have added a lot of information used in the elaboration of the present material. The approached research methods consisted from direct observation in the field, analysis and interpretation of the cartographic and written materials. The editing and processing of cartographic elements was done through the Arcmap program. Editing cross-sections was done through Office Excel.

3. RESULTS AND DISCTIONS

Due to a low drainage slope of 0.2 - 0.5%, the Someș River presents a strong meandering in the lower section. Prior to 1777, in the urban area there were about 25 meanders downstream and 14 upstream, revealing the drowning of the

river in its own alluvial deposits. After the regularizations made in the year mentioned, 5 meanders upstream and 9 downstream are quoted. Thus, the course length in the urban perimeter was very large measuring about 36.5 km.



Fig. 1. Perimeter of the urban centre and the river bed of Someş, XIIIth century (Source: Reconstruction after Satu Mare County Council data)

After 1543, a series of corrections were made to the Someş River bed in order to defend the fortress. Through these works the fortification remains isolated on an island and is connected to the main roads by three bridges. The Sătmar (Szatmar) urban core was formed along a central street forming a square, which followed the curved trajectory of the Someş meander. Since 1691 there have been processes for the rectification of Someş River bed, dams and swamps. The processes of backfilling and rectification of Someş' meanders were particularly high in the years 1712-1715. Much of the embankment and sanitation work was carried out by the farmers' association, especially in the Someş' urban sector.

In 1760 it was decided to remove the arm that separated the towns of Mintiu (Nemeti) and Sătmar (Szatmar) through a shuttle.

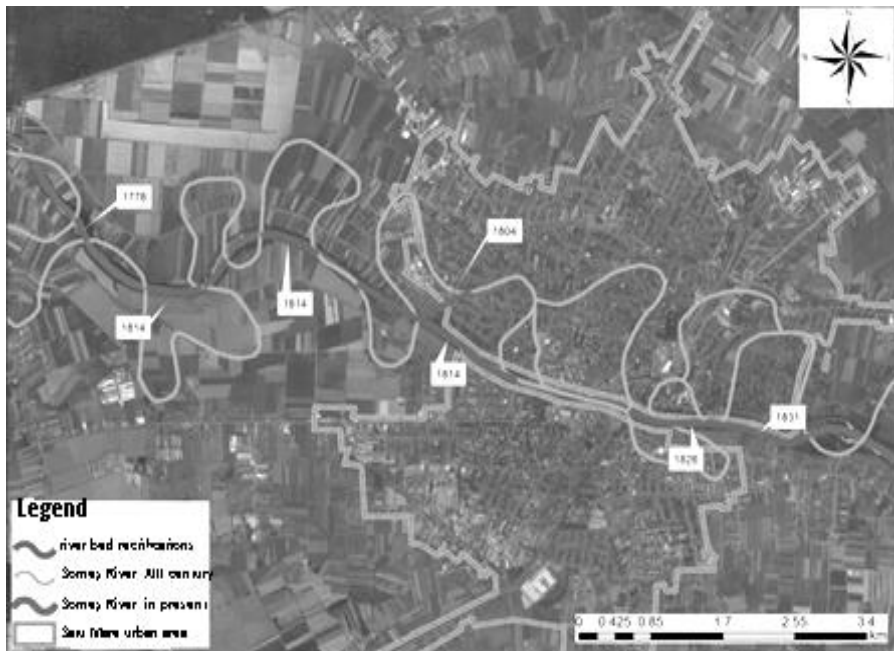


Fig. 2. Rectification stages of Someș River bed in the urban area of Satu Mare.
Reconstruction after Satu Mare County Museum data.

Due to the bed rectification, Someș' old meander formed a jog, gradually sanitized, and its place was occupied by gardens and green areas.

Filling the ditch's fortress and the old meander was a gradual process over the years. The reconstruction from 1780 still retains the route of the old meander. The hydro-technical rectification works included three main stages:

- □ 1543 - 1760 especially in the south and the centre of the urban area;
- □ 1770-1814 predominantly in the western sector;
- □ 1826-1831 in the eastern sector of the urban area.

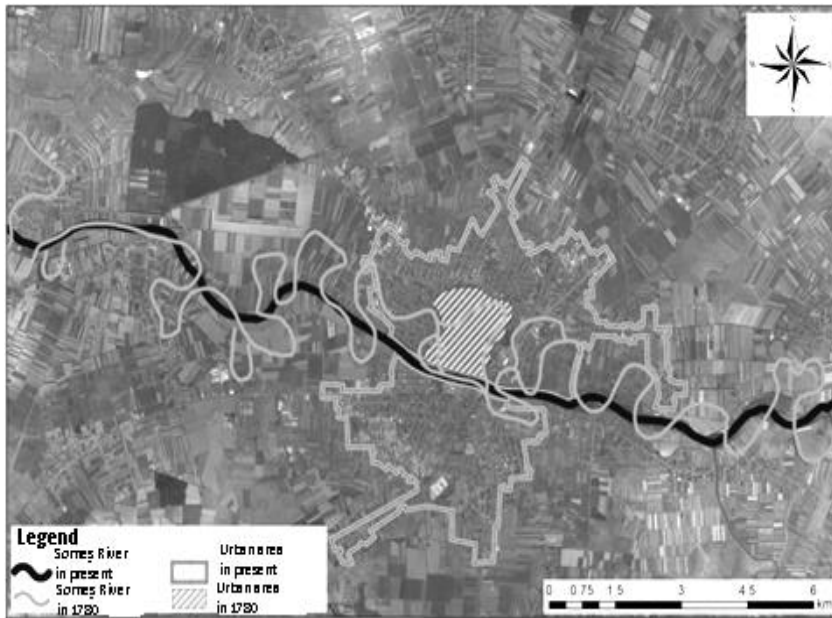


Fig. 3. Perimeter of the urban centre and the river bed of Someș in the XVIIIth century
(Source: reconstruction after Satu Mare County Council data)

Through the systematization works in Someș' meadow, the river bed was reconfigured on the today route, building defence dams on a length of 17.3 km on the right bank and 11 km on the left bank only in the urban sector. Through the remediation, about 800 hectares of land were converted from swamps and meanders into agricultural land. By closing and flooding the meanders, the natural ecosystem was suppressed, and the Someș River degree of anthropization increased in this sector.

The cartographic reconstruction from around the year 1850 reveals the final deflection of the meander separating the initial urban nuclei: Sătmar and Mintiu and their union in the Satu Mare urban nucleus. A series of dead arms continued to exist until the beginning of the 20th century, when they later start silting, and finally stumbling

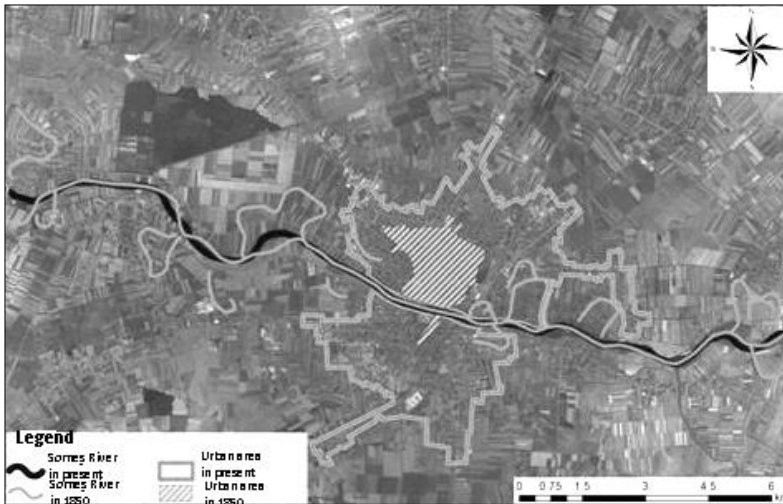


Fig. 4. Perimeter of the urban centre and the river bed of Someș around 1850
(Source: reconstruction after Satu Mare County Council data)

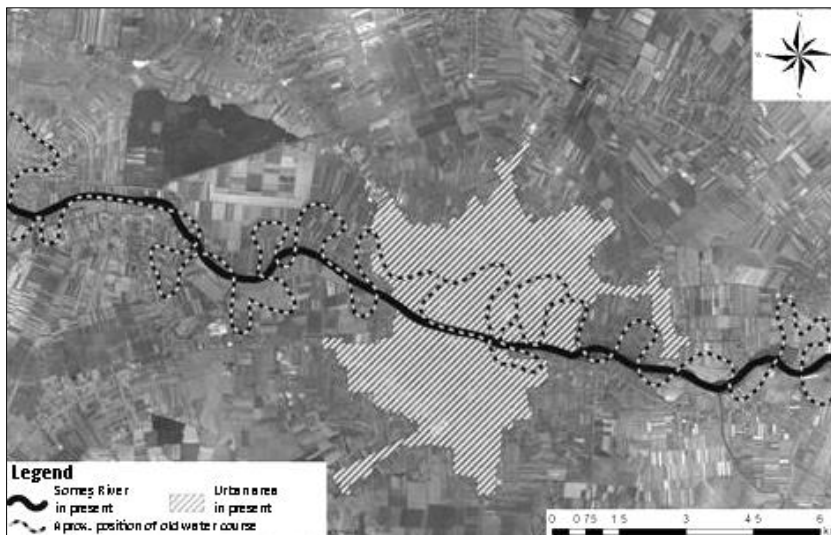


Fig. 5. Perimeter of the urban centre and the river bed of Someș at present
(Source: reconstruction after Satu Mare County Council data)

At present, the Someș River has an almost straight track along the urban route, with 90% of the river bed being anthropically rectified in the urban area. The length of the river bed of the urban sector is about 13 km.

4. CONCLUSIONS

Anthropic actions have had a great impact on the geographic space of the studied area.

The impact is manifested by:

- Deformations of the observable topographic surface and currently in the old meander sector;
- Instability of the foundation ground requiring careful design of the foundation structure;
- Infiltrations in the buildings basements on the route of old meanders known that the modification of the river bed does not imply implicitly the final change of the underground course;
- Suppression of the natural ecosystem in the studied territory, specific to wetlands ecosystem;
- Significant change of the elements of the geographical space in the Satu Mare urban area;
- The profound change of landscape elements with the high level of urbanization from the studied area;
- corroborated with the construction of the current dams, the flood risk has been significantly reduced;

Within the Someș River thalveg in the urban area (Satu Mare hydrometric station), a number of modifications of the bed morphometry have been noted in recent years.

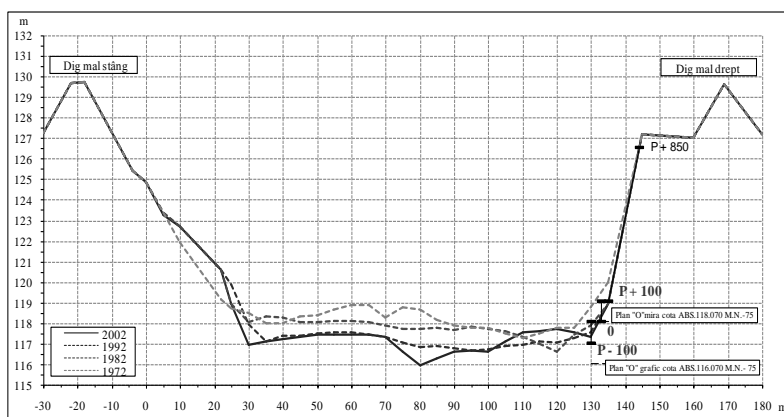


Fig. 6. Evolution of the cross-section profile in the Someș minor river bed in the section of the Satu Mare hydrological station, in the period 1972 - 2002 (Source: Satu Mare SGA Archive)

Someș' thalweg shows morphometric changes of the river bed, the intensity and depth of the changes being surprised by the transverse profiles made in the backyard's plane for 30 years.

Changes may have as cause:

- a subsidence process influenced by the descening area of Bodrog (Hungary);
- a rinsing cycle of Someș;
- the influence of upstream storage lakes that retain a segment of alluviums and change the natural drainage regime;
- the influence of upstream and downstream ballasts that cause slope changes;
- river bed rectifications that have modified the average flow rate of river water in the sector;
- the presence in the river bed of riprap and debris of former decommissioned hydro-technical works that cause changes in the flowing stream from the bed.
- the deepening of the thalweg may endanger the stability of hydro-technical constructions (bridges, dikes).

It can be concluded that due to the action of the mentioned factors there are morphological changes in the Someș River thalweg, the river, in the urban sector, deepening its thalweg in its own alluvial deposits.

REFERENCES

1. Dancu, P, (2008), *Apa Sătmarului - Un secol de istorie tehnologică*, Edit. Dacia, Cluj Napoca
2. Kovacs, M. C., (2005), *Geografia agriculturii din Câmpia Someșului*, Edit. Napoca Star, Cluj Napoca
3. Radosav, D, Porumbăcean, C, (2016), *Monografia Județului Satu Mare*, Edit., Argonaut, Cluj Napoca
4. *** (1992), *Geografia României IV*, Edit. Academiei Române, București,
5. *** (2017), *Arhiva SGA Satu Mare-ABAST*, Cluj Napoca
6. *** (2009), *Arhiva Consiliului Județean Satu Mare*
7. *** (2018), *Arhiva Muzeului Județean Satu Mare*
8. *** (2017), *Arhivele Naționale Satu Mare*