VULNERABILITIES INDUCED BY RELIEF IN THE LOCATION OF THE ROMAN GEOSITES IN DROBETA AREA

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Abstract. - Vulnerabilities induced by relief in the location of the roman geosites in Drobeta area The presence of numerous evidence of anthropogenic interventions in the proximity of Drobeta, during II-VI centuries, were the starting points for developing a strategy for interdisciplinary research of the valences of sites / targets with historic and archaeological potential of this area defined as geosites.The initiative to combine geographical and geomorphological arguments, with the historical and archeological one to envisage the reception of these values in terms of interdisciplinarity, has as a final aim the valuing and enhancement of the geosites in this location.Research results lead to an easier perception of the dependence of human activities of area morphology and of the relief role in locating and arranging Roman geosites. Using specific methods for geomorphology I identified landforms preferred by the Romans for sites location (settlements, fortifications, roads, cemeteries etc.), but also the vulnerability of the geosites and geomorfosites at contemporary geomorphological processes.The analyze performed on the roman architectural ensemble from Drobeta shows a number of impediments or vulnerabilities due to location morphology in the development and settlement of Roman geosite.

1. INTRODUCTION

Severin area, starting with the II century A. D. , had an unprecedented economic, social and cultural development, due to the infiltration of elements, specific to the Roman civilization at the Northern part of Danube, after the formation of the Roman province Dacia, in the year of 106 p. Chr.

The territory of the present city of Drobeta Turnu Severin represented an important strategic point, during the two Dacian wars (101-102 and 105-106 A. D.)[1], due to the geographical position at the Western edge of the Danube field (before the entrance of the river in the Iron Gates defile), from where you could easily make a connection with all the land access routes over the Carpathian and Balkan mountains[2], the Adriatic See ,the Aegean Sea or the Black Sea. So, Emperor Marcus Ulpius Traianus (98-117) decided to put a strategic military base here, unique in the Roman world, built between 103-105 A. D., represented

[1] Tudor 1968, p. 32-36.
[2] Tudor 1971, p. 86.

by the bridge over the Danube[3], stone fort[4], amphitheater[5] and baths[6], all these buildings being located in the immediate vicinity of the bridge.

The geographic area of Severin, by complex geological composition, representing the vorland unit of the Orogen Carpathian, with Miocene deposits (sarmatian), Pliocene (Pontian-Dacian) and Quaternary (Pleistocene - Holocene) shaped by external agents with selective action, determined a morphology varied with morphogenetic steps of valley (meadow, river terraces, slopes and interiver), with processes associated with geomorphological vulnerabilities. Severin Depression, bounded on the West and North by hilly units belonging to Mehedinți Plateau (Oglănicului Hill, 280 m; Dudaşu Schelei Hill, 260 m; Budilovăț Hill, Viilor Hill, 192,8 m), and in East by hilly units belonging to the Motru Piedmont, presents as a pool 'amphitheater", guarded by higher elevations in the piedmont hills (200 m), and in Southern part, it was bordered by the Danube, with the island of Şimian (50 m). Integrated to the valleys Turnu-Severin-Halânga-Malovăț, Depression of Severin is drained mainly by Topolnița river and its tributary Ogaşul Sec, left tributaries of Dunube (Valea Fântînei, Dudaşul Schelei river, Crihala river, and Tăbăcarilor valley), *„being an extension of the plain terraces of Oltenia"*[7].

2. DATA AND METHODS

Starting from the information contained in the works of history on the period of pre-Roman and Roman occupation in the land of Severin, sources and archaeological remains of the Roman period, we formulated the hypothesis of correlation between the morphology of the territory and development of roman geosites (the camp of Drobeta and bridge Apollodorus, the baths and the harbor). Cartographic analysis allowed (by georeferencing of maps) a sequence of historical events and geomorphological processes unfolding that area by favorability or geomorphological restrictiveness, the current outline of the old Roman city (civitta vechia).

[3] Tudor 1931, p. 154-159.
[4] Florescu 1933, p. 3-24; Găzdac *et alii* 2015, 16-18.
[5] Petolescu 2013, p. 124, p. 125; Petolescu *et alii* 2015, p. 67-70.
[6] Bărcăcilă 1938, p. 41-52.
[7] Cucu, Popova Cucu, 1980, 26.

3. RESULTS AND DISCUSSION

The morphology of the basin is outlined by the terraces of the Danube bridges (T2,T3,T4) whose overheads are masked by erosion of aprons and accumulation, so it came to be known as the „Severin field". Dominant in Severin morphology is the bridge of the third terrace, with a relative altitude of 40 - 45 m (70 m absolut altitude), plain, weak fragmented by the streams of Topolnita waters. This *Field of Severin* bordered at East by Topolnița valley, continues to East through the Cerneților field. The first terrace level of Danube is positioned today, at the normal flow of the river in the stage of meadow, and the meadow (proper) is covered by the waters of the lake of the Iron Gates Hydroelectric Group II.

The second terrace level of Danube is the one that keeps in its alluvial deposits, the ruins of the old Roman fort (Foto 1) and the medieval fortress of Severin. The second terrace of Danube, with a relative altitude of 15-22 m, narrower in front of the city, continues in the Southern-Eastern and East with the terrace of Topolnița, more developed. Behind the terrace there was formed a glacis spread to the base of Viilor Hill (Răsura Hill, Buliga Hill, Mușa Hill). The bridge of the terraces (30 -35 m relative altitude) is the most wide-spreaded one and it was exploited for the construction of the industrial city or socialist town, with a network of rectangular streets, in the matrix of the Roman construction.

Foto 1. Old Roman fort Drobeta

The first roman building where the works started was the rectangular fortification, with stone walls (the fort), having the dimensions of 137,5 m x123 m, located on the second terrace of the Danube and occupying an area of 2 ha. In parallel were developing the works for building the bridge piers, that had to unite the two shores of Danube. This point was chosen by the Romans as following the characteristics of the riverbed and laminar course of the river in this sector, by

taking into account that the terrace on which it was to be built the fort, has a dominant position to the upstream and downstream of the bridge line, which would have given to those who defended the fortification the possibility of an excellent visibility both upstream and downstream. The bridge terrace is fragmented by a series of ravines on the North-South, which lined up from East to West, on a distance of about 1km. The presence of these concentrated forms of erosion can be seen as a vulnerability factor of relief, reported to the anthropogenic of achieving the architectural complex from Drobeta.

The gully erosion called „ogaşul Tăbăcarilor" was located in the Eastern part of the Roman fort, at about 100-150m, today being clogged due to intensive human intervention at the end of the XIX- century and the first decades of XX century (Foto 2). On a plan drawn up by Colonel Fernando Luigi de Marsigli (Fig.1) in XVII century, it can be seen that, in that period, the drain of tanners was very well developed[8], on a length of 200 m to North, starting from the Danube riverbed and continued to East about 100–150 m.

Foto 2. Gully erosion of Tăbăcarilor

An interesting description of the ruins of the Ancient Drobeta town was left to us by Ion Ionescu from Brad, that reminds of „ogaşul Tăbăcarilor "saying

[8] Marsigli 1726, vol. II, 22, 25-30;

that it was „ In distance of about 110 hamper (about 220 m), begins from the shore of Danube a deep valley of about 14 hampers, goes in straight line at North, losing slightly in a distance of about 110 hampers" , and at about 500 m West of the bridge ruins, he remembers of another „valley that covers a sum of rivers that flow in the Danube today" .

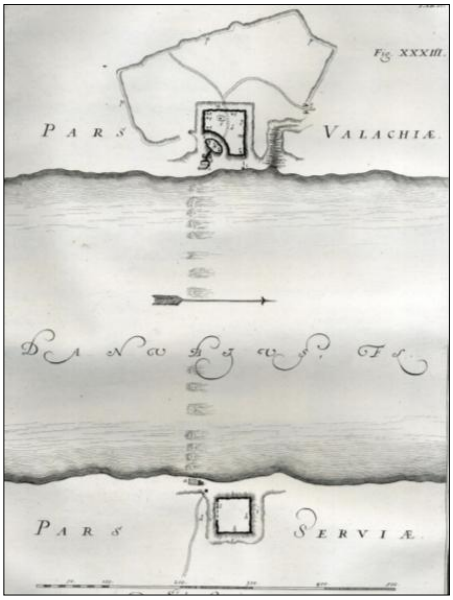

Fig. 1. Plan of the two camps from Drobeta and Pontes and the alignment of the bridge built by Apolodor of Damascus (apud Marigli 1726, vol II, tab. 10).

From this raven, that has the name of „ogaşul Fântânilor" one can now see just a part of its drainage, in a total length of about 70 m, targeted on Northern-Southern direction, south of the present Carol I boulevard, in the schoolyard of Traian National College. At the end of the XIX centrury, after the archeological diggings done by Grigore Tocilescu[9], there is executed a plan (Fig.2.A) and a more detailed surveying of the area (Fig.2.B), which encompassed the fort and the ruins of the bridge and surrounding area. On the plan done by Pamfil Polonic is also figured the „ogaşul Tăbăcarilor", that appears differently by the representation from the plan of Marsigli (Fig.1), meaning that to North the length of the valley exceeds more the Northern boundary of the fort without continuing to East.

There were ravines in the West of the fort, at about 25 – 30 m. One of them had the drainage targeted to the North-South (Fig.2.B), with a length of about 100 m, whose dejection cone opened before the portal bridge built by Apolodor of

[9] Cantacuzino 2001, p. 159-161.

Damasc[10], positioned at the level of the first terrace or the meadow terrace. Today the bridge foot is flooded frequently, once with the rise of the river level (Foto3).

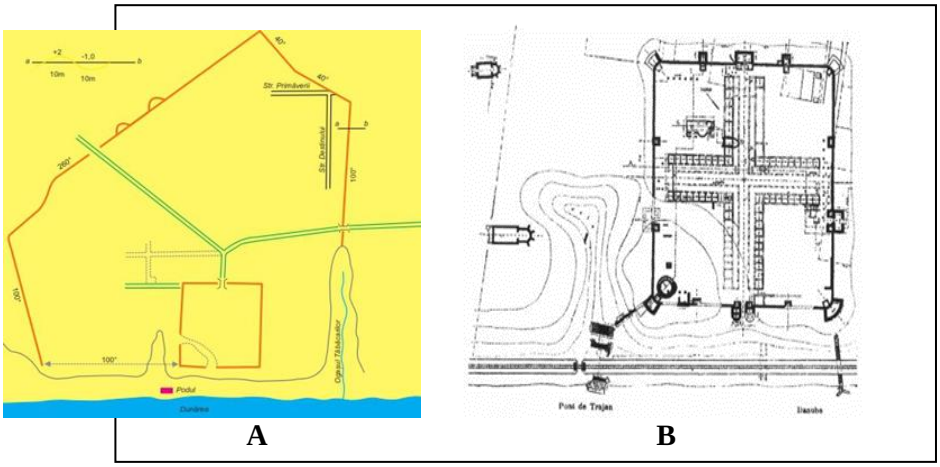

Fig. 2. A.Drobeta Roman city plan drawn up by P. Polonic (cited Găzdac et alii 2015 Map 7); **B.**Topographical Drobeta Roman ruins after Gr. Tocilescu excavations since 1897 (apud Cantacuzino,2001,fig. 1).

Foto 3. Foot bridge of Apollodorus.

[10] For technical details of the bridge built at Drobeta see: Asbach 1958, p. 14-19; Dupperex 1907; Tudor 1931, p. 149-194; Tudor, 1935, 77-90, Tudor 1971, 96-140 .

The works on the bridge of Apollodorus, the monumental building, began, probably in the spring of 103 A. D., in parallel to the public baths (the therms) and military amphitheater, buildings located on the same terrace, at 150 m, respectively 200 m of the fort. To achieve the bridge there was to be constructed 20 piles in the riverbed (Fig.3), made in a core of stone and brick masonry, linked with cousin mortar, plated with arge blocks of shaped limestone.

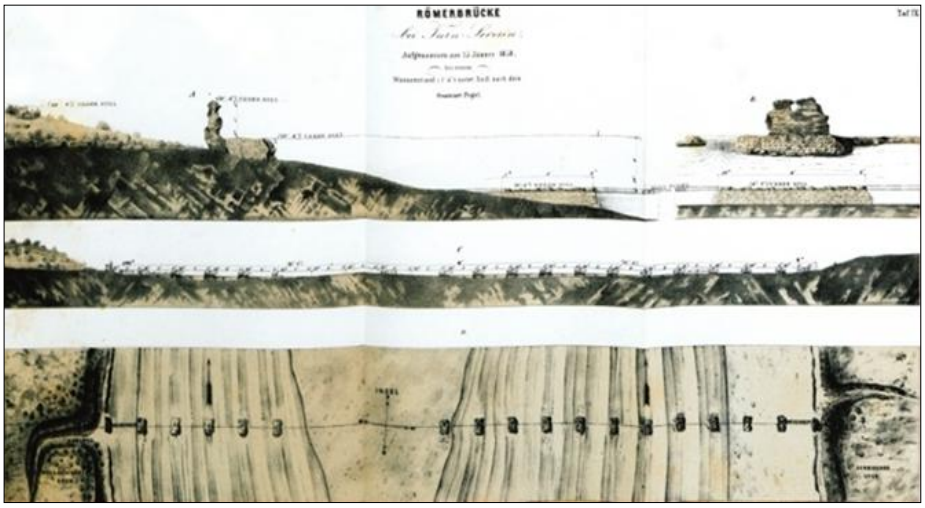

Fig.3. Transverse profile and plan of the ruins of Roman bridge from Drobeta (Asbach 1858 Taf).

The technical solution for the edifying the feet was the placement of caissons[11] in the Danube riverbed made of oak pillars, and in their interior was made the proper masonry. In order to build these caissons it is likely, that the Danube course was partially deflected to the today Serbian shore where, in front of the current Kladovo city[12], there was an arm of the river used by the Romans for deflecting the river course, if it were to believe the information transmitted by Procopius of Cesareea[13]. This channel is visible even today, on a length of about 2, 5 km, at South and South-East of Kostol locality. This solution had a double role, one to lower the river flow in order to build the piers of the bridge, but also for the insurance of a portion of the Danube waterway, because the craft will not have to pass through the bridge piers, there where, the currents could pose serious seafarers. Of course, in this context should be considered the milestones related to river flow and climate region and also the features of the Danube riverbed at full

[11] Davidescu 1980, p. 59.
[12] Tudor, 1935, p. 81-83.
[13] FHDR II 1970, p. 465.

banks in Drobeta[14], area. It was observed the presence of a sand bank (Fig.3), that continues from Şimian island, located at about 2 km downstream, that is much higher compared to the portions located near the two sides.

The Danube riverbed, on the alignment of Drobeta Turnu - Severin consists of crystalline rocks, broken, easily erodible and superimposed to the hydropower lake of Iron Gates II so that, nowadays it is very difficult to appreciate the denudation rate of the river denudation.

Fast currents of the Danube, leaving the gorge boilers[15], calm here and the water yearly deep average (etiage) of about 8 m. The amplitude of a water course is inversely proportional with its flow velocity and how in front of the current city of Drobeta Turnu Severin, the recorded magnitude is 9,57 m/s, the water course has a fairly low speed, which, certainly, was one of the prerequisites of chosing this location, by the architect Apolodor of Damasc. On the other hand, fluctuations of Danube level caused also banks caving, the most affected one being the left of the course, as evidenced by the fact that, over the centuries, water came to cell erode and North bridge abutment.

The buildings of the baths were in the same situation, especially the South, whose rooms were built to Danube (Fig.4), reaching very close to the riverbed. It is possible that bank erosion in the thermals (Foto 4) have occurred also in the Roman period, proof that, in the third century it was found a remake of thermal installations, undertaken by cohort I Sagittariorum . Such processes of erosion occurred, certainly, in the downstream of the bridge, causing damage to port facilities situated at about 150 m. The only information about these construction are scarce and are based on observations made on the field at the end of the XIX th century, when had been identified and destroyed some remnants of masonry construction , by the works carried out on railway track Bucureşti-Vârciorova.

The next period marks around this architectural complex, developing a civilian settlements , elevated to municipium (118/119) and colonia (193), occupying the area from the northern and western area of the fort, in surface of about 50 ha .

The Eastern border of Drobeta has always been given by “ogaşul Tăbăcarilor”, while, at the West side of the fort, the settlement developed gradually,over the II-III centuries, when the maximum territorial expansion occurs, to near of “ogaşului Fântânilor”. In the northern part, the limit of the civilian settlement is hard to be precise, but, after the observations made in the XIX-th century, iti seems that it was located at a distance of about 500m of the fort ruins. This area was surrounded by a groove with a width of 10 m and a depth of 1 m, having insdie a wave wide of 10m and tall of 2m. In the East, during an archaeological survey conducted in 1963, it was observed a wall 0,70 m thickness, made of stones linked with lime mortar , most likely the same as described by Ion Ionescu from Brad and Grigore

[14] Davidescu 1980, p. 59.
[15] Tudor 1971, 87.

Tocilescu, above ground wave, if we also consider that, in the digging of 1963 this wall started to shape at the depth of 0,43 m, calculated from ground level since excavations.

Fig.4. Drobeta.Thermal installations (undertaken by cohort I Sagittariorum)

Foto 4. The thermae of old fort Drobeta

Based on these issues it is likely that the defending ditch of the Roamn town had also a role of catching the rain water trickling from the center of Severin Depression, and whose flow was a condiderable one, evidence the erosion forms ravines type that are present on the second terrace of Danube. What matters more in terms of morphological vulnerability of territory in locating the the Roman city on this terrace of Danube crossed by numerous ravines is that, their appearance was certainly favored, by the Danube south slope riverbed, with a maximum value of 0,40°[16], resulted after the erosion of the quaternary deposits, that determined some asymmetrical, respectively, the left shore of Danube being weaker developed, which explains the absence, of the flood plain and widening the Danube riverbed.

4. CONCLUSIONS

The relief characteristic around the municipality of Drobeta Turnu Severin and Severin depression imposed some favorability, and restrictiveness in relation to the location and also the geosites development of the Dacian-Roman and medieval period, and, up to now, man-made intervention, cumulated with the action of Danube have conducted at the appearance of some vulnerability morphological factors, whose impact had adverse consequences over the structure and components of Roman geosites from Drobeta (the bridge, baths buildings, and the ports).

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[16] Cucu, Popova Cucu, 1980, p 56.

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