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CHANGES OF THE ENVIRONMENTAL COMPONENTS WITHIN THE DANUBE FLOODPLAIN (MÂNĂSTIREA – CĂLĂRAŞI SECTOR) REFLECTED IN THE CARTOGRAPHIC DOCUMENTS FROM 19TH – 20TH CENTURIES

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Key words: Danube floodplain, retrospective cartography, cartographic documents, anthropic changes

Résumé. Nous avons analysé la plaine alluviale du Danube sur un secteur de 32 km de long compris entre le village de Mânăstirea et la ville de Călăraşi. Cette zone a été choisi parce que est un espace fortement anthropisé. Nous avons utilisé des sources écrites, mais surtout des documents cartographiques imprimés entre 1864 et 1975: la Carte de la Roumanie Méridionale (la Carte de Satmari, 1864, dressée sur la Carte de Fligely, 1855-1857), les plans topographiques en projection de Lambert (1929), les cartes topographiques en projection cylindrique transversale Gauss-Krüger (1975). Nous avons fait la reconstitution de l'histoire du paysage par la cartographie rétrospective. L'espace a été habité depuis le Néolithique. Dans la plaine alluviale du Danube les modifications produites dans le contexte de l'utilisation agricole ont été d'une intensité considérable. Jusqu'aux années 1960 la plaine alluviale était occupée de: pâturages, bois, lacs, marais, terrains inondables, tous sur la menace des débordements des eaux. Après les années soixante a été réalisé le endiguement du cours du Danube et la dessiccation de la plaine alluviale. Une grande partie des lacs (le Lac Boian, Iezerul Călăraşi) qui étaient dans la plaine alluviale analysée a disparu et aujourd'hui dans cet espace il y a des terrains cultivables.

Introduction

In this study, we aimed to identify and map the changes of some environmental components within the Danube floodplain, in the sector between Mânăstirea village and the city of Călăraşi, using large-scale cartographic documents from the 19th and 20th centuries. We have chosen the 19th and 20th centuries, because this is the period when the most significant changes took place.

The use of the cartographic documents belonging to the past centuries with a view to highlighting the landscape dynamics has been approached in several studies (Năstase, 1970; Toşa-Turdeanu, 1975; Bevilacqua, 1992; Favory, Raynaud, 1992; Băican, 1996; Osaci-Costache, 2004; Robinson, 2004; Rosselli, Paulmier, 2006).

Apostol (2004) considered that the long humanization of this space "makes up the argument that we cannot talk about an initial natural environment; very early humanization process did not leave any quantifiable evidence regarding any type of environment". Furthermore, the arable lands witnessed various types of ownership and this had an essential role in manifesting the pressure of agricultural activities against the natural environment and then against the anthropogenic one (Apostol, 2004).

Nowadays, the anthropogenic impact by arable land classifies the villages within this habitat as rural landscapes *strongly unbalanced*, while the pressure by pastures, vineyards and orchards is lower than in other areas of the country. The naturality index of environment (the percentage of forests out of the total surface) is very low, classifying these spaces in the category of *very strongly unbalanced* environment (Apostol, 2004).

1. Study area

We have chosen as study area the Danube floodplain, in the sector Mânăstirea – Călăraşi, which is adjoining (towards south) Mostiştei Plain (fig. 1).

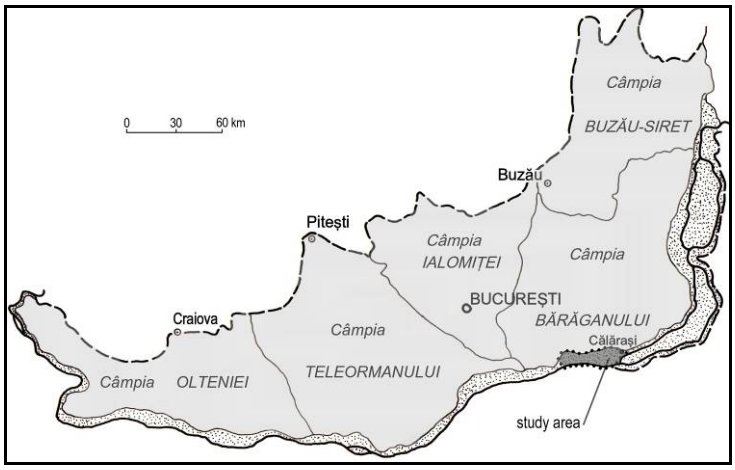

Fig. 1 - Position of the Danube floodplain (sector Mânăstirea - Călăraşi) within Romanian Plain

Between the flowing of Mostiştea River (through the Scoiceni channel) and the line Chiciu-Călăraşi the Danube floodplain is 32 km long and between 5 and 12 km wide (9 km near Mânăstirea). In the analyzed sector, the floodplain is

characterized by a gradient of 0°-1°, gradient which is useful for agricultural use of land and using the modern agricultural techniques. The absolute altitude is of 10-11 m, while the relative altitude, in relation to the Danube waters, is of 1-2 m. The maximum altitude is of 22 meters ("Movila – *mound* – Fundul Grădiştea"). Mounds have a mixed origin, natural and anthropogenic. On the left side of the Danube, beyond the floodplain there is the forehead of the first terrace of the Danube.

In natural medium, since the floodplain was very wide, there were puddles on large areas, such as Iezerul Călăraşi, which associated with smaller lakes: Boian – Călăraşi – Sfrederile (Morariu et all., 1968). Some works refer to the Lake "Boianu-Sticleanu" (Romania. Space, society, environment, 2006).

The forests of the floodplain were made of peduncle oak (*Quercus robur*) with ash tree (*Fraxinus angustifolia, F. pallisae*) together with forest floodplain of poplar (*Populus alba, P. nigra*) and willow (especially *Salix alba*). The natural vegetation of the floodplain consists of soft grass, floodplain foxtail and couch grass, locally with hydrophilic associations. The hygrophilous vegetation is characteristic in moister areas (*Phragmites australis, Typha latifolia, T. angustifolia, Scirpus lacustris* etc.). The hygrophilous vegetation can be found in other areas with excess of humidity anthropogenic produced, such as along the irrigation canals or within the habitats where the underground water has been raised. In lakes and puddles there are aquatic plants: duckweed (*Lemna minor*), hornwort (*Ceratophyllum demersum*) etc.

The analyzed territory has been inhabited even since Neolithic. Pârvan (1967) was mentioning traces of Daco-Getic establishments in Latène II and III, with traces of Hellenic penetration at Boian, Mânăstirea, Spanțov. In Vărăşti village, on "Grădiştea Ulmilor" of Boian Lake there was discovered the biggest necropolis belonging to the *Gumelnița culture*. The limits of the necropolis could not be determined, because in the north the bank was eroded by the waters of Boian Lake, and in the south the land was cultivated. There are 126 tombs, some of them being attributed to *Boian culture*, Spanțov stage, and others were not classified from the cultural point of view (Comşa, 1995). The necropolis, as spaces intended for the dead of the community, show a stage of population stabilization in this area and therefore a stage of more obvious intervention over the environment.

The necropolis from Vărăşti dates from middle and recent Neolithic, being partially contemporary with Hamangia Culture. Boian Culture was divided into four stages, the latter one called Spanțov, dating back in the millenniums V-IV B.C. There were discovered dwellings, items made of silex and polished stone, ceramics decorated by excision, zoomorphic and anthropomorphic figurines, traces of agricultural cultures (wheat, hemp) etc.

The humanization in this area took tens of thousands of years, but it was only in Neolithic that it began the transformation of natural initial ecosystems into

agro-ecosystems, strongly artificialized from the hydraulic, topographic and agronomic point of view, the agriculture being the one forcing the artificialization of natural ecosystems (Apostol, 2004).

Between 1850-1912 there was a strong impact on the environment, since in the Danube Floodplain (between Argeş River and Iezerul Călăraşi) there was recorded a population growth of 350-400% (Apostol, 2004), the Danube Floodplain being a habitat of population concentration.

2. Sources and methods

In order to highlight the temporal and spatial alterations of some environment components we have used both *written sources*, and *cartographic documents* form the 19th and 20th centuries. Obviously, this space has been represented on older maps at large scale (such as Specht's Map, 1790) or small scale, but, as we have stated, we aim to reveal the alterations that took place only in the 19th and 20th centuries.

From the cartographic documents we have selected: "Charta României Meridionale" - *Charta of Southern Romania* or Satmari's Map (published in 1864, but being a reproduction at scale 1:57600, inferior from the quality point of view, of the map of marshal Fligely, which had been made between 1855-1857, scale 1:28800), Lambert projection plans based on the raising in 1898 (scale 1:20000, 1929), topographic maps in projection Gauss-Krüger (1975).

Retrospective cartography allowed us to make some comments regarding the dynamics of the environment components within the analyzed space.

3. Results and comments

The cartographic documents used and the bibliography researched show that the greatest part of Danube Floodplain between Mânăstirea and Călăraşi was covered in the 18th and 19th centuries by lakes, backwater, puddles, swamps, arms of Danube River and floodable land.

During the past centuries, the Danube floodplain was a real safety outlet for the Danube waters, which were spilling during springtime, making up an area of great instability from this point of view. When the Danube River did not spill, the land was covered with swamps, puddles, forests, pastures. These moist areas were drained and turned into agricultural lands, the agricultural cultures prevailing nowadays within the embanked enclosures.

The first important alterations in the structure of land usage appeared after the Adrianopol Treaty was signed (1829). Its provisions determined the agricultural lands to be extended in disfavor of pastures and forests.

During the 20th century, **Boian Lake** was nearly drained. Nowadays it has only 230 hectares and a piscicultural importance. Satmari's Map proves that fact that during

1855-1857 it covered a greater surface of the floodplain (fig. 2). It is marked on the map by the name of "Lacu Boianu" (*Boianu Lake*) and it lied between the villages of "Veresci" and "Ciocânesci", and around it there were other lakes, which no longer exist: "Sticlinu" Lake, "Eseru Rotundu", "Râiosu" Lake. Furthermore, there were many arms of the River Danube, which no longer exist either.

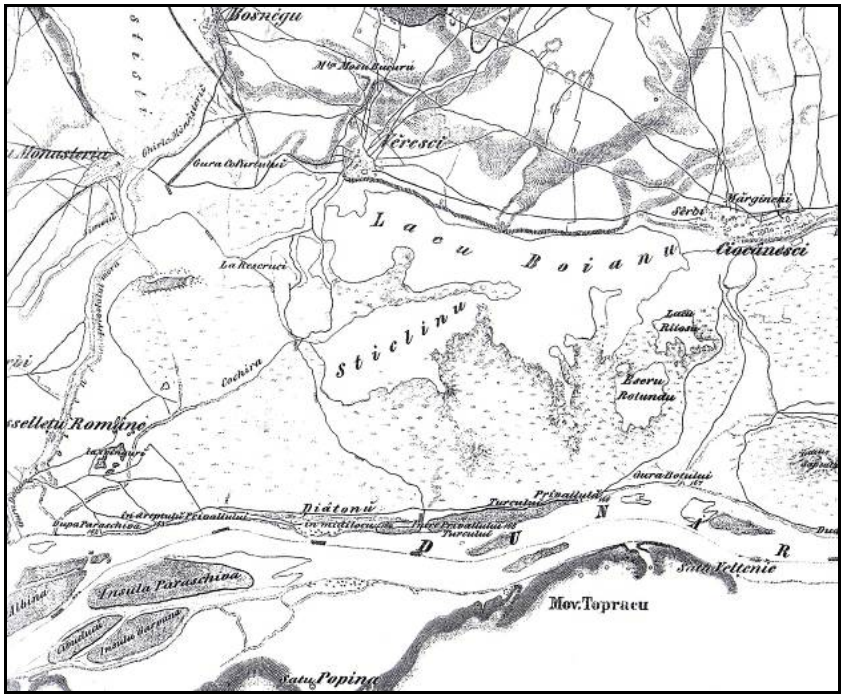

Fig. 2 - Boian Lake on Satmari's Map (1855-1857)

These lakes can also be seen on the Lambert projection plans. Due to the precision and the large scale of representation, one can clearly see that some of the lakes communicated with the others, forming lacustrine complexes. This is the case of Boian Lake which was communicating in the south-west with „ Sticlenu" Lake and in south-east with "Rotundu" and "Râiosu" Lakes (fig. 3). Some lakes were covered with aquatic vegetation ("Moş Vasile" Lake, "Sec" Lake, "Ochiul Boului" Lake, "Cepi" Lake, "Tătaru" Lake, "Stejaru" Lake etc.).

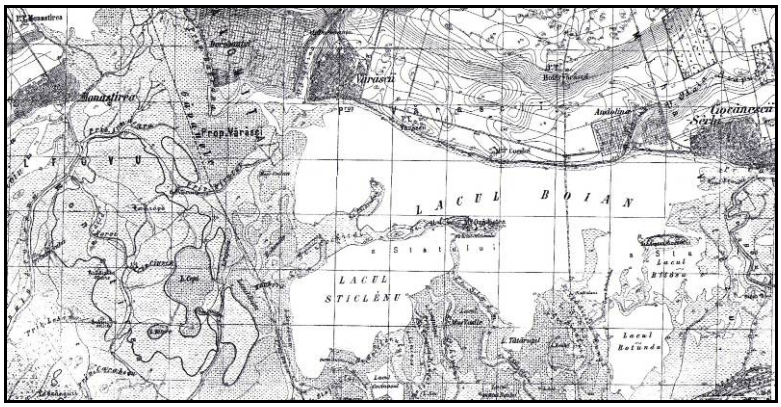

Fig. 3 - Boian Lake on Lambert topographic projection plan (1898)

It is the same case for **Iezerul Călăraşi**, represented on Satmari's Map as "Eseru de Călăraşi" (fig. 4), located west of the city of Călăraşi (which is found under the name of "Ştirbeiu"), Nowadays a greater part has disappeared, remaining only 656 hectares (Ghinea, 1996).

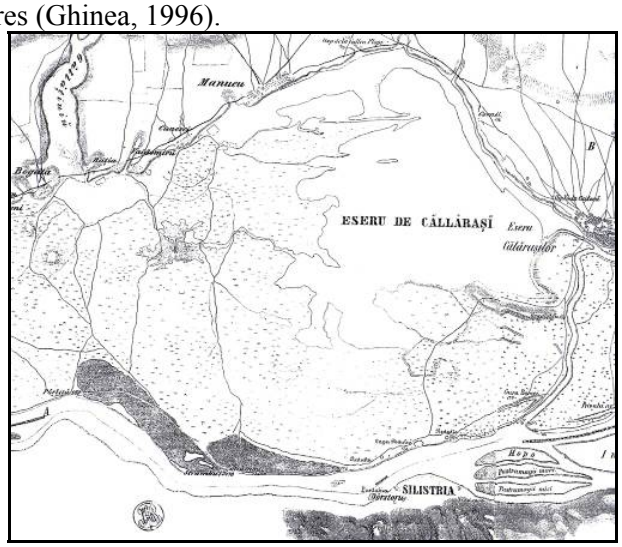

Fig. 4 - Iezerul Călăraşi on Satmari's Map (1855-1857)

In comparison with the facts from the 18th century, Lambert topographic projection plan has represented both Boian Lake and Iezerul Călăraşi much wider that nowadays (fig. 5).

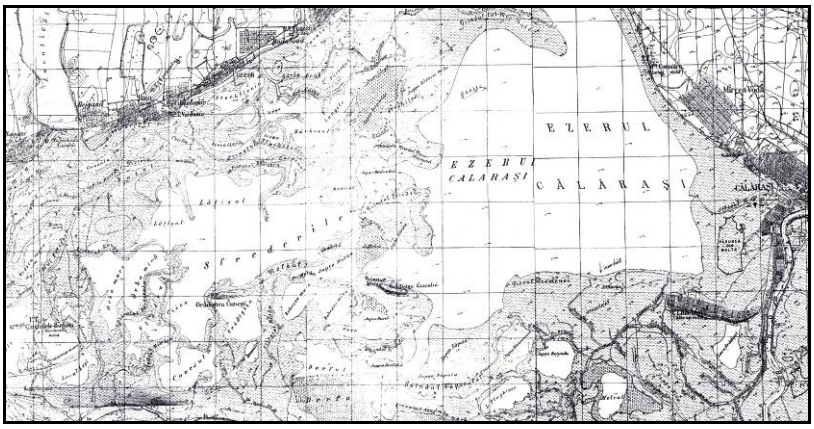

Fig. 5 - Iezerul Călăraşi on Lambert topographic projection plan (1898)

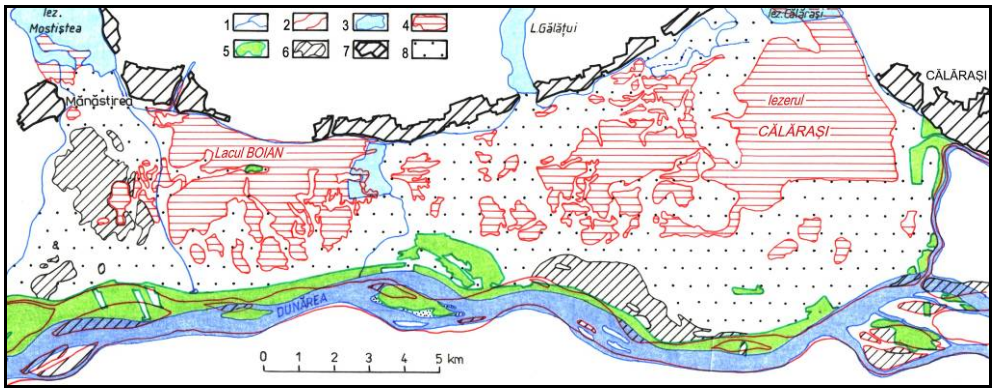

Fig. 6 - Landscape dynamics within the Danube floodplain (1898-1975)
1. watercourses (1975); 2. watercourses (1898); 3. lakes (1975); 4. lakes (1898); 5. forests (1975); 6. deforestations (1898-1975); 7. localities (1975); 8. agricultural lands currently on the floodable area of past centuries

The anthropogenic changes (draining, erecting dams, deforestation, building the irrigation canals land leveling works etc.) that took place between 1960-1970 (especially after 1962) were aiming to fight against the water excess within the floodplain, as well as its deficit on the fields and terraces. The Danube was dammed, flooding events being prevented. In the last 40 years the Danube surpassed the dams only twice. Between Mostiştea, Gălăţui Lake and Danube there are today anthropogenic junction canals.

Comparing the cartographic documents one can notice that the most important deforestation processes happened south of Iezerul Mostiştea, as well as along the Danube, south of Iezerul Gălăţui (fig. 6). These deforestation processes determined the reduction of biodiversity.

Today the forest stretches as a strip almost continuous along the Danube, between the river and the longitudinal dam. Only in a few sectors it stretches more towards north within the floodplain (south of Ciocăneşti village, north of Bulgarian locality Silistra, southeast of Călăraşi city). After the drought period between 1988-1995 other species were introduced: *Quercus robur, Q. pedunculiflora, Fraxinus excelsior* (Costica et all., 2001). These important changes have replaced the natural ecosystems of floodplain forests (consisting of *Populus, Salix, Fraxinus, Quercus*) with artificial ecosystems (in which poplars are predominant: *Populus euramericana, P. deltoides, P. alba, P. nigra* and willows: *Salix alba, S. Fragilis,* Stoiculescu et all., 1987).

In the analyzed area there are two natural reservations. The islet *"Ostrovul Ciocăneşti"* (207 hectares) was declared natural reservation (H.G.R. 2151/2004). It includes Ostrovul Ciocăneşti and the water around it, on a radial area of two meters. *"Iezerul Călăraşi"* (2877 ha) was declared natural reservation in 2004 (H.G.R. 2151/2004) and it protects about 100 bird species. Most of them are European species, while 70% are migratory species (summer guests). Here live many specimens of *Podiceps cristatus, Ardea cinerea, A. purpurea, Egretta garzetta* ecc. (Geografia României, V, 2005).

Conclusions

In the Danube floodplain, the changes that occurred due to agricultural land use were very important. By late 60's in the floodplain, there were pastures and hay-fields, lakes and swamps, all of them being permanently threatened by the floods. After that, the river was banked and the floodplain drained, today in this area being agricultural lands. The drain canals built up for fighting the excess of humidity and recovering the lands for agriculture have taken up large areas (for example Mostiştea system, the largest in the Romanian Plain, had 141900 ha). The greatest number of lakes within the analyzed floodplain area has disappeared, in this area mostly being agricultural lands.

References

Apostol, Gabriela (2004), *Câmpia Mostiştei. Studiu de geografie rurală*, Editura CD Press, Bucureşti.

Băican, V. (1996), *Geografia Moldovei reflectată în documentele cartografice din secolul al XVIII-lea*, Editura Academiei Române, Bucureşti.

Bevilacqua, E. (1992), *Évolution d'un paysage humide: le territoire de la République de Venise*, Mappemonde, 1, p. 23-26.

Comşa, E. (1995), *Necropola gumelţiană de la Vărăşti*, Analele Banatului, IV, 1, p. 55-193.

Costică, N., Roşu, C., Dumitrescu, D. (2001), *Consideraţii privind reconstrucţia ecologică a pădurilor din lunca Dunării,* Revista Pădurilor, 118, 6.

Favory, F., Raynaud, C. (1992), *La production du paysage en Languedoc Oriental dans l'Antiquité et au Moyen Âge: étude de Mauguio (Hérault)*, Mappemonde, 1, p. 12-16.

Ghinea, D. (1996), *Enciclopedia geografică a României, vol. I*, Editura Enciclopedică, Bucureşti.

Ghinea, D. (1997), *Enciclopedia geografică a României, vol. II*, Editura Enciclopedică, Bucureşti.

Morariu, T., Morariu, E., Savu, Al. (1968), *Lacurile din România. Importanţă balneară şi turistică*, Editura Ştiinţifică, Bucureşti.

Năstase, A. (1970), *Muntenia pe hărţile din secolul XVIII. Teză de doctorat*, Universitatea din Bucureşti (unpublished).

Osaci-Costache, Gabriela (2004), *Muşcelele dintre Dâmboviţa şi Olt în documente cartografice. Reconstituirea şi dinamica peisajului geografic în secolele XVIII-XX*, Editura Universitară, Bucureşti.

Păunescu, A. (2000), *Paleoliticul şi Mezoliticul din spaţiul cuprins între Carpaţi şi Dunăre*, Editura Agir, Bucureşti.

Pârvan, V. (1967), *Dacia. Civilizaţiile antice din ţările carpato-danubiene*, Editura Ştiinţifică, Bucureşti.

Robinson, E. (2004), *Coastal changes along the coast of Vere, Jamaica over the past two hundred years: data from maps and air photographs*, Quaternary International, 120, p. 153-161.

Rosselli, W., Paulmier, É. (2006), *Changes in the quality of the Valais Rhone Plain landscapes (Switzerland) based on historical map*, Revue Forestière Française, 58, 4, p. 361-366.

Stoiculescu, Cr., Ianculescu, M., Leandru, V., Benea, I., Moise, I., Milea, I. (1987), *Conservarea şi reconstrucţia ecologică a ecosistemelor forestiere de luncă sub impactul economic*, Revista Pădurilor, 102, 2.

Toşa-Turdeanu, Ana (1975), *Oltenia. Geografie istorică pe hărţile secolului XVIII*, Editura Scrisul Românesc, Craiova.

* * * (2005), *Geografia României, vol. V*, Editura Academiei, Bucureşti.

* * * (2006), *Romania. Space, society, environment*, The Publishing House of the Romanian Academy, Bucharest.