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NAVIGATION FACILITIES ON RIVERS IN ROMANIA HISTORICAL TRAVEL

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Abstract. It presents the situation of inland rivers navigation on the territory of Romania, in the course of history, according to the available documents and data. The information are systematized according to: the historical epochs of Europe: (Antiquity, Middle Ages, Modern Era), the historical regions of Romania (Transylvania, Banat, Walachia, Moldova), the rivers where a continuous and long-term transport has been carried out, with vessels of significant displacement, for the respective period (Mureș, Tisza, Someș, Crișul Alb, Bega, Jiu, Olt, Argeș, Dâmbovița, Ialomița, Bistrița, Siret, Prut).

The transport development on Romania Rivers was based on the essential advantage that all these rivers reach the Danube.

It presents the studies and development on inland waterways, the proposals or achievements of complex navigation systems, and the national scale legislation evolution.

The waterways shipping is cheaper, safe and bulky, leads to the socio-economic development of the area, pollutes the environment to an insignificant degree.

Keywords: waterways; rafting; river port; the Organic Regulations; Bucharest-Danube canal.

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1. Introduction

The huge expanse of the seas and the flow of rivers had awakened, in the soul of primitive man, three deep feelings: fear, attraction and curiosity. Over millennia, these feelings have evolved under the pressure of the essential needs and of the imagination.

On the banks of rivers, lakes and seas, appeared the fishing and the floating displacement, human settlements were founded, and, much later, appeared the navigation.

In Europe, land transport has taken place over short distances, unlike the long roads of caravan in Asia and Africa. On this “*peninsular continent*” (Mellor and Smith, 2006), the land transport was, in fact, a transshipment between the inland waterways, using the two or four wheels carts.

The very poor condition of the land routes in the Middle Ages led to the intensive use of the hydrographical network.

The most of Europe's rivers are modest in size and, in winter, suffer from frost, but in summer, due to low levels; however, the navigation was possible with simple boats.

In the Carpathian-Danubian-Pontic space, the cork and the monoxyle boat were the main and sufficient means for the prehistoric exchanges of the inhabitants, along the Danube, for fishing on the Danube with the help of nets and fences as well as for transport down the rivers and the Danube, to the Sea, two essential products for the economic life of the ancient world: the salt and the wood (monoxyle = craft of 10 - 15 m long, 0.75 m wide, made of a single oak trunk; from Greek monos = single, xýlo = wood http://adevarul.ro/locale/ploiesti/foto-monoxila-ploiesti-barca-istorie-1_5314a737c7b855ff56d5fda1/index.html)

The navigation on the waters of this Carpathian-Danubian-Pontic space is part of the vast human activity on a vast hydrographical network: from central Europe to the centre of Asia and from the Baltic Sea to the Mediterranean Sea (Botzan, 1983). One of the oldest recordings about this vast hydrographical network is “The story of the Argonauts” from the 6th century B.C.E. (uncertain).

The enormous hydrographical network favoured and guided prehistoric and historical migrations from Asia to Europe (Drăgan, 2000), and facilitated the merchants' movement on the Chinese silk and Indian spice routes.

In places where goods or ships were transhipped between two waters, mobile bridges and canals were built, but in the fords, fixed bridges were built. The confluence of two rivers and the mouth of rivers in the sea have favoured the birth of cities.

Europe is characterized by a beneficial configuration of peninsulas and continental seas, which leads to the softening of the climate, and its hydrographical network offers wonderful waterways. These characteristics had a great economic and social significance for the historical evolution of the communities on the old continent.

The Romanian people, closely linked, through millenary occupations, to the fertile land where they formed, have not proved a vocation of maritime navigation, characteristic of peoples born on islands and peninsulas arid. Instead, the inhabitants of this territory, so varied and conducive to life, have proven an unequalled art in the balanced use of water in all its aspects. One of these uses was communication on the water valleys, either onshore along these or by floating, using the raft and the monoxyle boat.

Interesting statements about the navigation on the inland rivers of the Romanian Principalities can be found in many foreign sources, mentioning the rivers: Mureș, Olt, Someș, Siret, Prut, Bistrița, Trotuș, and Argeș (Bârdeanu and Nicolaescu, 1979).

Since antiquity, the Mureș River has been an intensely used waterway for both commercial and strategic traffic. It was mentioned by Herodotus in 484 BC, under the name of *Maris*: “*These are the native-born Scythian rivers that help to swell it; but the river Maris, which commingles with the Ister, flows from the Agathyrsi;...*” (Herodotus, 1921, book 4, chap. 49, section 1)

The Mureș is, after the Danube, the second river of Romania, after the length and the third, after the catchment area.

Until the modern age, these rivers have dropped rafts loaded with grain, salt and wood. The timber brought by the same road into the Danube ports was used for the construction of ships in the Galați port scaffoldings or was loaded on merchant ships and transported to Istanbul.

2. The Period of Roman Empire Domination

The practice of navigation in the ancient times, on the inland rivers of our country, is evidenced by archaeological excavations and documents, but as regards the works on the rivers, for the navigation purpose, the documents date back to only the Roman Empire domination period.

After the Dacia conquest, the Romans used, for navigation, the largest part of the hydrographical network in natural regime, without canals, dams or locks, but accompanied by the famous Roman roads, well-executed and maintained, parallel to the water courses, some of them being used up today.

The navigation in natural regime was possible because the hydrological regime of the Carpathian-Danubian-Pontic rivers was different from the current one: it was more regular, the differences between extreme levels were smaller, the turbidity smaller, too. The explanation for this phenomenon is the high degree of forestation of land at that time.

The Romans organize the navigation in colleges or brotherhoods, e.g. „*Axiopolis was the seat of a Collegium nautae universi Danubii*”. (Stillwell *et al.*, 1976) Heavy goods were transported, and for the transport of people (couriers, clerks, merchants), fast races were used (*naves fugaces* or *cursoriae*).

The most intense transport was conducted on the Mureș and Olt rivers, tributaries to the Danube, then down to Sava River and until Italy.

On Mureș, the navigation was starting at *Apulum* (Alba Iulia), continued - through *Micia* (Deva), which, back then, was a large port - to the

confluence with Tisza and, from here, to the Danube.

The control of the Mureş River has always been one of the key military strategies. Thus, during the military operations of the beginning of the Second Dacian War of Trajan, it is assumed that the “*vexillatio*” formed of the troops of Pannonia Inferior, headed by the governor of the province of Pannonia, Aelius Hadrianus (the future Emperor Hadrian), would have penetrated to the heart of Dacia on the Mureş Valley, probably also using the river fleet - *Classis Flavia Pannonica*.

The existence of a “*collegium nautarum*” at *Apulum* is an indication that the water transport was intense, in the Roman Era.

The raw materials (gold, iron, salt, and wood) were exported to Rome and other Western provinces, by waterway. The lack of salt in neighbouring Roman provinces (the two Pannonias and the two Moesias) can explain the regularity of massive export on Mureş River.

This fact, together with the high density of civilian dwelling (through the two cities) and with the presence at *Apulum*, of the legion and of the governor of Dacia, make here the most important civil river port of Roman Dacia.

The Romans improved, for navigation, the lower course of the main rivers of Dacia and built port-cities at their mouths, as: *Sucidava* and *Turris* on the Olt River, *Daphne* on the Argeş River, *Piua Petri* on the Ialomiţa River.

The ships used mainly to patrol the river courses were *liburnae* (a *liburna* was a type of small galley used for raiding and patrols, by the Roman navy). This hypothesis is supported by the finds made at the important naval fort of Mogontiacum on the Rhine River, from the 3rd century C.E. (Museum of Ancient Seafaring in Mainz, 2017) and at the reliefs of the Trajan's Column in Rome. During the reign of Trajan (98 - 117 C.E.), the Danube fleets *Pannonica* and *Moesica* seems to include 125 main boats and 100 smaller vessels. To these, more 100 boats were added along the main tributaries.

From the 4th century, new types of vessels were introduced into the river fleet: *lusoria*, *actuaria* and *iudiciaria*, which now had a flatter bottom, ideal for meandering rivers (*navis lusoria* - a small military vessel that served for the troop transport; *navis actuaria* - a type of transport ship used by the Roman navy, was therefore suitable for the transport of supplies and horses; the ship had sails and up to 30 oars - 15 on each side, was short, narrow at bow and stern, and wider midships, had a flat hull, so that could run aground without being damaged, could go ashore both forwards and backwards, since it was equipped with rudders fore and aft; *navis iudiciaria* - a travelling court that can judge a person anywhere, was a ship fast and stable).

3. The Middle Ages

3.1. The Early Middle Ages

After the withdrawal of the Romans from Dacia (3rd century C.E), the Byzantine Empire maintains, for a relatively short period, the state of the ports-fortresses, of waterways and roads.

It follows a long period of growth and decline in the economic life of the inhabitants, corresponding to the migratory waves of the peoples of the north-eastern Black Sea.

The Roman and Byzantine constructions are totally or partially destroyed. Consequently, the sure sources attesting to navigation and facilities developed for this purpose on inland rivers are very late.

Among them, there is a document of the Byzantine Emperor Constantine VII, in 948 C.E., where is mentioned the Mureș River under the name Muresis (*Mureios*) (Köpeczi, 2001) and a document reporting that the Romanian Voivode Ahtum has established a system of customs duties in all port-cities on Mureș and Tisza (Botzan, 1990). As a result, in 1028, the king Stephen I of Hungary, refusing that royal rafts carrying salt to be taxed, enters into conflict with the Romanian Voivode Ahtum.

For the navigation purposes on the Mureș and Tisza rivers, the ports were built, the most important being *Urbs Morisena* (known in 1197 as Cenad) and Vladimirescu (downstream of Lipova).

Another document, dated 1222, attests the navigation on Olt and Mureș of commercial vessels. Thus, the Pope Honorius III confirms the donation made by the King Andrew II of Hungary to the Teutonic Knights in the Burzenland (the Land of Bârsa) (Botzan, 1983) “... *He also granted you to be free on the river named Olt, six ships and the same on the river called Mureș ...*”

On the Crișul Alb River, in the 14th-15th centuries, it was sailing even with monoxiles of 10 meters long. A specimen discovered in the 80s, in a swampy area, at Răpsig, along the Crișul Alb River, was brought to the Navy Museum in Constanța (Muzeul Marinei Române, 2017).

3.2. The Late Middle Ages

3.2.1. Navigation Facilities on Bega and Timiș Rivers

The first extensive works of regularization were carried out in Banat, in the basins of the Bega and Timiș rivers.

The main purpose of these facilities was to clean up the marshes and the riverside navigation.

Giovanni Andrea Gromo wrote in 1564, in the book “Summary of King John's Rule in Transylvania” that “*Lugoj is a large open city, through which passes the navigable river Timiș.*” (Călători străini despre Țările Române, 1980)

The Passarowitz Peace Treaty (1718), by which Serbia, Banat and Oltenia pass from Ottoman occupation to the Habsburg one, had beneficial effects on economic development in these areas, including on river navigation.

For a cheap, safe and fast transportation of raw materials and merchandise, from Banat to the central Europe, the Bega Canal was built between 1728 and 1780. The Bega canal, started at Făget, is navigable for barges of 600 tons, over a distance of 115 km from Timișoara up to the confluence with Tisza River.

At the same time, the junction with the Timiș River is made, through two secondary canals, used for drainage and for water supply.

The Bega canal still operates today, crossing the port city of Timișoara, modernized after 1944.

3.2.2. Navigation Facilities on Mureș and Someș Rivers

In the poem “*Stauromachia, id est Cruciatorum Servile Bellum*”, published in Vienna, in 1519, Stephanus Taurinus describes the Mureș and Someș rivers.

The first is described as an important auriferous river of Dacia (or Transylvania): “*aurifer fluvius ex Alpibus Transilvani*”. Springing from the Transylvanian mountains along the border with Moldova, it flows firstly along the Szekler Fields, then, already navigable, bathes almost half of Dacia.

And the Someș River, in turn, appears to be navigable, the author pointing out that this river passes through the city of Cluj, then turn to east and “*bending to the north becomes navigable, in order to the King's Salt Office can carry the ships loaded with salt, every years (...)*” (Stephanus Taurinus Olomucensis, 1519; Popescu-Spineni, 1978).

Antonio Possevino presents, in 1584, a perfect topography of the four rivers, namely the Marisio, the Aluto, the Chrisius, and the Szamos, recalling also that the latter and the first are navigable for ships, with the aid of which the salt is transported to Hungary:

”No river enters Transylvania: but four famous rivers come out: the Marisio, the Aluto, the Chriso, and the Szamos. However, the Marisio is the greatest of all: that came from those mountains of Transylvania, which touched Moldavia ... Thus, on this Marisio are ships carrying salt (and else if you want) to Hungary. The Szamos is the fourth river, who is born in Transylvania's yugs towards Moldova, and firstly flowing toward the East, and then came up Gyalu, a former bishop's castle, it extends towards the West, and by bathing the villages of Kolozsvâr, returns to the East; but it came not far from the territory of Bistricia for a valley, bending towards the Lower Pannonia, surrounds as a compass the city of Szatmar, having encountered the land of Németi at the ridge: and it is so navigable that it can hold some small ships, with which, the salt of Transylvania is carried in Hungary, at certain times of the year, ...”.

(Libro Primo. Capo 1. „Nissuno fiume poi entra in Transilvania: ma quattro celebri n'escono. Il Marisio, l'Aluto, il Chriso, il Szamos. Però il Marisio è maggiore di tutti: conciossia cosa che scaturendo strabo da que' monti della Transilvania, i quali toccano la Moldavia Così pel detto Marisio, vanno le navi, coi quali si porta il sale (et se altra cosa si vuole) verso l'Ungheria. Il Szamos è il quarto fiume, il quale nasce ne i gioghi di Transilvania verso la Moldavia, et prima scorrendo verso Oriente, et dappoi appresso Gyalu, castello già episcopale, si stende verso l'Austro, et bagnando i borghi di Kolozsvâr, ritorna verso l'Oriente; ma dappoi non lungi dal territorio di Bistricia per una valle, piegando verso la Pannonia inferiore, circonda a

guisa di compasso la città di Szatmàr, havendo all' incontro su la ripa la terra di Németi: et è tanto navigabile, che può reggere alcune piccole navi, per le quali si porta in certi tempi dell'anno il sale di Transilvania nell'Ungheria,...) (Antonio Possevino, 1913, First book, Chapter 1).

Transylvania and Banat were particularly rich lands, as Nicolaus Olahus wrote in the book “*Hungaria et Attila*”, in 1763 (Nicolai Oláhi, 1763):

“Chapter 14. On The Transylvania

II. *The people, the members well-compacted, warlike, armed, and their robust horses, good and foreseen. The whole area, now plain, now woods, alternately, it has: water watershed ... of the fertile field: of wines, gold, silver, iron, and of other metals, further, full of salt; of the oxen, bears, and of fish with his abundant ...*

III. *The rivers of Transylvania. In Transylvania, there are Saio, Bistrica, two Santos (Large and Small), two Kewres (once called Quick and White), and Marisus. And they were afterwards increased by a variety of rivers, as well within, as without the Transylvania, the majority of them are navigable.”*

(Caput XIV. De Transylvania

II. *Gens adhaec, membris bene compacta, bellicosa, armata et equis robustis bonisque provisa. Regio tota, nunc planitiem, nunc sylvas, alternatim habet: aquarum divortii, ... agri fertilis: vini ferax, auri, argenti, ferri, aliorumque metallorum, praeterea salis plena; boum, ursorum, piscium abundantissima....*

III. *Fiumina Transilvaniae. In hac Transylvania, Saio, Bistricia, duo Samos (Magnus et Parvus), ac duo Kewres, olim dictus Velox et Albus; Marisus. Quae postea diversis aucta fluviiis, tam intra, quam extra Transilvaniam, maiori eorum parte sunt navigabilia.)* (Antonio Possevino, 1913, First book, Chapter 1).

3.2.3. Navigation Facilities on the Olt River

Antonio Possevino wrote in 1584, in his “Transylvania Geography”, about the river Alutus:

“*The Aluto then emerges in the roots of the mountains of Ciculia, passing through the Barcense territory, in which is the Corona city, flows towards Cibinus (also city) near a Tower, which call Red and where they permanently oversee the floods and any arrival of the Turks. Then a narrow valley, having by both of the parties very high mountains, descends into Walachia called Transalpina: neither very far from Nicopolis, it discharges in Ister or Danube (which we want to say). That river leads some docks, rather than ships, with which wood or salt is sent, or other things.”*

(Libro Primo. Capo 1. „L'Aluto poi nascendo parimente nelle radici de' monti di Ciculia, passando pe'l territorio Barcense, nel quale è Corona città, scorre verso Cibinio (pure città) vicino ad una Torre, la quale chiamano Rossa

dove et pe'l dubbio dell' inondationi, et perchè forse non fossero sopravvenuti da Turchi, sogliono que' cittadini tener' una continova guardia. Indi per una stretta valle, havendo da amendue le parti altissimi monti, scende nella Valachia chiamata Transalpina: né molto lungi da Nicopoli si scarica nell' Istro o Danubio, che dire vogliamo. Porta quel fiume alcune zatte, più tosto che navi, colle quali o il sale, o altre cose si mandano fuori.” (Antonio Possevino, 1913, First book, Chapter 1).

4. The Modern Era

4.1. Navigation Facilities on the Upper Olt, Made under the Habsburg Occupation

The Passarowitz Peace Treaty (1718), so the Habsburg occupation, had beneficial effects on the economic development of Oltenia.

The Austrians begin planning the navigation on the Olt River, on the gorge areas between Căineni and Râmnicu Vâlcea, in the period 1718-1723. (Wolf, 1893, p. 335) The Olt River becomes navigable from Turnu-Roşu up to the Danube, which facilitates the connection between Transylvania and the Black Sea.

In the eighteenth century, the navigation on the Olt River was directed and controlled by the “*Chamber of Commerce and Crafts*” in Braşov.

A document from 1784 shows that Püthner of Sibiu obtains the privilege of transporting up to Brăila, „with its boats, woolen cloth, glass, horseshoes”, sailing on Olt, then on the Danube. (Botzan, 1990)

In 1819, “*Gheorghe Aron's boats also*” acquired navigation rights on Olt, but only downstream from Turnu-Roşu customs. (Manoliu, 1984)

In 1830, in Sibiu, “*societies to release on the Olt water, large trees and planks up to Danube*” are established.

In 1837, “*the wood leaves from the Băloiu forest, as rafts floating on the Olt River, following the route on the Danube up to Brăila*” confirming another document. (Antipa, 1921; Wolf, 1893).

4.2. Navigation Facilities on the Lower Olt, Made by Walachia

Walachia attempts to carry out regulation works on the Olt River only from the mid-nineteenth century (Wolf, 1893). Thus, in 1836, Mihail Ghica reports to the “*People's Assembly*” that they had difficulty to start the works because „*there were no engineers with a well-founded hydro-science, and to hire engineers from Austria requires too much expenditure*”.

Increased navigation on the Olt River required the construction of a port and so, in 1859, it was proposed that the Corabia village to become a port city named “*Alexandru Ioan Cuza*”. On this request, the Prince Cuza responds with a counter-proposal: “*It is approved, but with the name Mircea, in the memory of a leader with whose facts, the Romanian history is full.*”

Due to lack of financial sources, the action is postponed. Although the port was not built, however, in 1877, at Corabia, the construction of an important pontoon - bridge to use in the war of independence began.

From the 20th century, the changes in the hydrological regime, the development of internal transport routes and means of transport, and economic priorities have a low national interest for navigation on most rivers in Romania.

Starting with 1974, the Olt is regularized and arranged hydro-energetically with a cascade of accumulations and hydroelectric power plant. (Druță *et al.*, 2000) The Lower Olt was arranged for navigation with two waterways and two ports, in Slatina and Drăgănești.

The hydraulic works of Olt were designed to avoid and reduce the material and cultural losses. An example is *the Hermitage of Neagoe Basarab* (1512) on an island of the Olt, which, by an original process, was raised 6 m from its original position, to be protected from floods.

4.3. Navigation Facilities on the Jiu River

The regularization works of the Jiu River began in 1869. The following year, the Ministry of Public Works asks the Austrian engineer Kopetinski to prepare a study on the Jiu River navigability. The Kopetinski's study states that, the Jiu River can be used in natural regime only for wooden rafts until the confluence with the Gilort River. Downstream from this confluence, Kopetinski planned the route correction, embankment works, reducing the length from 270 km to 122 km, in order to increase the longitudinal slope from 0.45 ‰ to 7 ‰. By these treatments, it can provide the navigation depth of 1 m, required by the 12 tons displacement vessels.

At the technical level and with the financial possibilities of the time, the project could not be realized.

Later, the idea is repeated in 1881, when Eduard Hommaire de Hell publishes in Bucharest, another study for the canalization of Jiu River "*River Navigation in Romania and the Project of Prince Gheorghe Bibescu*", but neither this project has finalized (Hommaire de Hell and Bibescu, 1881).

Today, the Jiu River is regularized and hydro-energetically developed over a large part of its route, the main accumulations until 2000 being: Valea Sadului, Curtișoara, Turcinești, Vădeni, Tg. Jiu, Turceni.

4.4. Navigation Facilities on Argeș, Dâmbovița and Ialomița Rivers

The Argeș River springs from the Făgăraș Mountains through two waters, Buda and Capra, and, following a 340 km route, flows into the Danube, near Oltenița. Concerning the Argeș River navigation projects, there is a document of 1855 in the newspaper "Zimbrul", which says: "... *that the discussions were underway to make the Argeș in Walachia navigable, which will facilitate the Austrian trade with the Principalities Romanian*". This project also included the extension of the port of Oltenița.

A long time ago, the Dâmbovița River was a tributary of the Argeș River, upstream of Bucharest, but now, Dâmbovița crosses this city, which it has often flooded. About the works on Dâmbovița River in order to protect the capital city, there is more information, out of which some will be presented.

Thus, in 1781, Joseph Moesiodax published in Vienna the book “*Theory of Geography*”, in which he also presented the map of Walachia. (Iosif Moesiodax, 1781; Popescu, 2016) On this map, appears the Argeș - Dâmbovița canal, drawn as a bypass, right in the village of Lungulețu, to discharge the excess flow of Dâmbovița into Argeș. As mentioned, a canal maintenance team, made up of “*trenchmen*”, was permanently stationed in the village.

Later, along the river sector that runs through the city of Bucharest, there were executed maintenance works and works to dredging the Cișmigiu Lake. Moreover, a navigable canal was designed on Dâmbovița, up to the Danube.

Although it is not navigable even today, yet, in recent years, the Dâmbovița River has undergone hydroenergetic works on the upper course and a good work of regularization and sanitation on the territory of the capital.

Another river that offers sailing opportunities is Ialomița, for which studies have been conducted since the 19th century. Thus, Ion Ionescu from Brad, in the nineteenth century, and then Dimitrie Leonida draw up the project of a navigable waterway, lateral to Ialomița, between Târgoviște and Crivina. The diversion canal was equipped with two locks.

After the Second World War, Romania has the technical and material availability to make the Argeș River a waterway and so Bucharest to become a port. Currently, the Argeș River is arranged hydro-energetically by a cascade of dams, reservoirs and hydropower plants.

4.5. Navigation Facilities on the Prut, Siret and Bistrița Rivers

In Moldova, the Prut and Siret rivers, as well as some tributaries of the Siret, have been used for navigation since antiquity, but certain testimonies are relatively recent.

The Polish-Moldavian or Polish-Walachian trade routes were running from the Baltic Sea, on the Vistula, continuing on the Prut or on the Siret up to the Danube and the Black Sea. About all these, wrote in the eighteenth century, the Turkish traveler Evliya Çelebi (Botzan, 1990; Călători străini despre Țările Române, 1980), as follows: “... *The Port of Gdańsk was the port of the Iassy, where there were six major chambers of commerce.*”

The navigation on the Prut River is confirmed by Ion Neculce in “*Chronicle of Moldova*”. He writes that, in 1713, after the disaster of defeat from Stănilești (1711), the Prut has been cleaned and restored navigation: “*Neculai Voda Mavrocordat put Constantin Costache Stolnicu, with a Turkish Pasha and hundreds of people, to clean the Prut River of trees and trash. Others pull the bread barges up to Tuțora and, from there, load the bread into the wagons going to Hotin.*” (Neculce, 1955).

In 1787, A. M. d'Hauterive will submit to Prince Alexandru Ipsilanti (1786-1788) a study for the establishment of the Prut and Siret waterways. He proposes the regularization of the two rivers after their natural course and opposes the idea of linking the Siret and the Prut through a canal crossing the city of Iassy. (Royer-Collard and Martin, 1857)

In 1812, the Organic Regulations, Article 158, provided for the Siret and Prut rivers to be navigable after their connection through the Bahlui River: *“If the need would require - in time - to clean them and make them more conducive to navigation or to make communication channels, for example the union of the Siret with the Prut across the Bahlui River, that communication would be very useful for the commerce of the capital ...”* (Regulamentele Organice ale Valahiei și Moldovei, 1944)

In 1845, the “Vasile Alecsandri Spatar Society” was established for the transport on Prut, downstream of Sculeni point.

There have been other offers for the development of the Prut and the Siret in exchange for the concession of navigation, such as the request of Neculai Roșca Codreanu in 1852 or the offer of a French company represented by Royer-Collard and Martin-Rey in 1857 (Royer-Collard and Martin Rey, 1857).

The economic interest in the Prut waterway was so great that studies were made on the possibilities of navigation on its upper course.

Thus, Ion Ionescu de la Brad published, in 1866, the monograph of Dorohoi city, where reads: *“The Prut can become navigable on its upper course for small boats.”*

By its geographical position, the Prut was at the intersection of the interests of the great powers, Russia and Austria, and that is why the navigation was interrupted for a long time. To resume the navigation on the Prut, on the distance of 725 km, in 1893, a collaboration agreement between Romania, Russia and Austria is concluded. (Chiru, 1893)

In 1902, in Romania, is legalized the *“Rules of navigation and police on the Prut”* (Vermeulen, 1928).

After the Second World War, the Prut River is laid out for various uses, by building the Stâncă-Costești accumulation.

The Siret River springs from the Eastern Carpathians Mountains, on the territory of Ukraine. It is 647 km long, of which 559 km in Romania, enters the country near the Siret city and flows into the Danube, near the Galați port. The Siret has the largest hydrographical basin in Romania. (Ministerul Mediului, 1992).

Projects and studies for a Siret waterway are few and relatively recent. Among these, we mention the navigation design study drawn up in 1836 by Neculai Roșca Codreanu.

On the Siret River, even in the first half of the century 20, still the wooden rafts were sailing: *“As in Brăila harbour, a basin with silos was built. And, because it is the wood export center, originated from the rafts coming on Șiret, a new basin was built, especially for cutting wood.”* (Bart, 1933).

Currently, the Siret River is developed hydroelectric, partially.

The Bistrița River, the main tributary of the Siret, was navigable the middle of the 19th century (Scurtu and Minuț, 1978), as shown in the Organic Regulations in 1832: “*The Moldova and Bistrița rivers, who give in Siret, will serve as before to lower the rafts with wood and wood to last, without disturbing the ponds, mills and bridges lying on these waters.*” (Regulamentele Organice ale Valahiei și Moldovei, 1944, Chap. V. Section II, Art. 158).

After the Second World War, the Bistrița River was developed for multipurpose but the dams built stopped the rafting.

5. Complex Navigation Systems. Laws.

In addition to the studies and the navigation facilities on inland rivers, there have been numerous proposals or achievements of complex navigation systems as well as national scale legislation.

In the 18th century, regularization works were carried out on many rivers and were dug canals for industrial purposes “*to act mills, fulling mills, sawmills*” (Royer-Collard and Martin Rey, 1857). An example is the Zănoaga Canal, 4.7 km long, built in the Reșița area for the transport of logs. Another example is the canal for rafts, 23.3 km length, carried out in the Semenic Mountains.

In 1818, the Rulers Ion Gheorghe Caragea (1812-1818) in Walachia and Scarlat Callimachi (1812-1819) in Moldova elaborated a Code of Laws by which: “*... the small and large rivers as well as their banks and lagoons will become a public wealth*” (Article 398) (Vermeulen, 1928, p. 174) and that “*Each owner is allowed to strengthen the bank on his side, against the power and speed of the river, but no one is forgiven for doing this reinforcement, by which it would be possible to move the usual river flow, to obstruct the floating of vessels on this river, the fishing, the operation of water mills, and other rights of others.*” (Article 554)

Later, the Organic Regulations (1828-1834) impose some measures such as: in Walachia (1831) “*... for floating on the five large rivers crossing Walachia, i.e. Jiu, Olt, Argeș, Dâmbovița and Ialomița*” and in Moldova (1832) “*The Siret and the Prut that cross the country to the South and flow into the Danube will serve the descent of merchandise and products without any payment for their floating.*” (Regulamentele Organice ale Valahiei și Moldovei, 1944)

It follows other laws, such as: the *Civil Code* of 1865, then the *Constitution* of 1865 which state that “*the rivers and navigable rivers belong to the state*”.

After the Principalities Union, a policy of promoting studies and river navigation projects has been carried out, but without finalizing this one.

Such projects were initiated by the Italian engineer Eduardo Gioia in 1874 and by the engineer Constantin Chiru (Chiru, 1893) in 1890.

Another offer is given by Ed. Hommaire de Hell, in 1881, proposing

“*setting up associations for the river navigation design on rivers of Walachia and on the Siret River*“, but under the tutelage of a design and construction company in France. (Hommaire de Hell and Bibescu, 1881)

Following the 1877 War, Romania gained the independence from the Ottoman Empire and, so, the access direct to the Black Sea and to its ancient ports. The Merchant Navy of Romania was very small, most of the ships sailing in Romanian waters being foreign. Aware of the great economic potential of Romania's direct access to the Black Sea, P.S. Aurelian and others advocate for indigenous navigation on the Danube and the Black Sea, supporting the creation of maritime and river shipping companies.

In 1890, the Romanian River Navigation Service (N.F.R.) was established and, in 1895, the Romanian Maritime Service (R.M.S.) - the first state-owned enterprises, that transformed the Romanian Merchant Navy into an essential factor in the national economy. (Atanasiu, 1981; Aurelian, 1887)

In 1928, the famous engineer J. H. Vermeulen, who worked alongside Ferdinand Lesseps to carry out the Suez Canal (1869), was invited by the Minister of Public Works, Gr. C. Cantacuzino, for the development design of Muntenia Rivers. Vermeulen proposes a canal for navigation, irrigations and water supply, derived from the Danube, at Turnu Severin and ending the same into Danube, but at Galați (Vermeulen, 1928) This project was particularly complex, but from a technical and financial point of view it was not feasible at that time and, perhaps, even today.

In 1924, the “Water Law” was promulgated whereby “*water management and its economic use are state issues*”.

In the interwar period, characterized by a great technical and economic development, Romania can make the following balance sheet: in 1928, it has 700 km of inland waterways under the national regime (Prut, Siret, Mureș, and Bega) and 1,075 km of international waterways on Danube.

An overview of navigation resources is presented by the academician Dorin Pavel in his book “*Hydraulic Forces Development Plan in Romania*” in 1933. He states that “*only in Transylvania were executed until that year such special works and that, in 1927, the navigation was insured on Mureș for a distance of 368 km, on the Criș on the length of 219 km up to Bichiș, and on Someș on 98 km up to Satu Mare*”.

During the same period, Dimitrie Leonida made a very interesting project of a navigable canal between Galați and Bucharest.

Subsequently, Alexandru Davidescu will add to this project the use of water for riparian lands irrigation.

After the Second World War, in 1946, it should be noted Dorin Pavel's project for achieving a waterway on Someș River up to Baziaș. This project will be partially realized in the Criș rivers area, a few years later.

Now, the projects for two large navigation systems, totalling 1,500 km, are beginning to outline, namely:

a) the South-eastern system comprising: the Siret-Mostiștea Canal,

including works on the lower course of the Siret River to become navigable and the Bucharest-Danube Canal, including works on the lower course of the Ialomița River to become navigable;

b) the Western system comprising: the Someș - Bega Canal, that include works on the lower course of the Someș, Mureș, Timiș, and Bega rivers to become navigable.

5.1. The Waterway Bucharest - Danube

Nicolae Cucu elaborated the “project sketch” for the construction of the Bucharest - Oltenița waterway, in 1880.

After the First World War and after the Romanian Unification, in the country, elite of specialists is trained in all technical and scientific fields.

The economic and strategic importance of a waterway between the country's capital, Bucharest and the Danube became more and more obvious.

As a result, Alexandru Davidescu published in Buletinul AGIR no. 4, April 1927, the study “*The Bucharest - Danube Canal*”, where he showed the way to accomplish this work and the beneficial consequences.

The scientist Dimitrie Leonida demonstrated “*the technical possibility of carrying out the Argeș-Bucharest-Danube Channel in good economic conditions*”, in the study “*The Channel Argeș-Bucharest-Danube*”, published in the journal „Energia”, no. 11-12, April 1927. The navigation facilities of this channel were: length of 70 km, width of 10 - 30 m, depth of 3 m, and 4 locks on the route. As a result, in August 1929, the Romanian Parliament passed the “*Law for the construction of the Argeș-Bucharest-Danube Canal and for the electrification of the Bucharest-Brașov railway line*” no. 2749/1929.

The project has no financial conditions to fulfill because of the economic recession of 1929-1933. But Dimitrie Leonida will not abandon this work, for which he will study for 40 years. (Avădanei, 2012).

Another proposal is launched in 1930, when engineer P. Bejan publishes the “*Study of the Argeș-Bucharest-Danube Canal*”. It is envisaged to make the navigable canal by deflecting the Argeș River in the Buda point, up to Bucharest, on a length of 17 km. Then, the route continues with a fall of 18 m near the Bellu cemetery, fall that is capitalized by the location of a hydroelectric power station in the Valley of Complaint. From here, the canal is navigable up to the Danube, having several hydropower stations on the route. Engineer Bejan failed to complete the project because of the general economic crisis that began during this period.

In 1932, Cincinat Sfințescu published an extensive work on the Bucharest modernization “*For Bucharest - New Urban Studies*” where, in the 3rd volume “*The communication and transport ways in Bucharest*”, he shows the need for the Bucharest-Danube waterway and presents various solutions studied. (Avădanei, 2012).

In 1933, Dorin Pavel drew up the project for “*The Argeș-Bucharest-Danube Navigable Canal*” with 4 locks of 42 m wide and 3 m deep. Neither this project will be carrying out because of the difficult historical events that follow.

In 1940, Prof. Dorin Pavel coordinates the study „*Hydraulic arrangement of the Bucharest Region from the mountain to the Danube*” according to which, after draining the lakes in northern Bucharest, the Dâmbovița and Argeș rivers will allow the access of the 1,000-ton barges from Danube River. (Avădanei, 2012).

In July 1984, following the studies and analyzes, it was decided that Bucharest would be linked to the Danube both through Argeș and Dâmbovița.

6. Conclusions

The navigation evolution on the Romanian rivers, both by historical stages, as well as on hydrographic basins, leads us to some conclusions.

The main advantage of the transport on the Romanian rivers is that all reach the Danube, being part of its watershed. Thus, the river shipping in this Carpathian-Danubian-Pontic area is a link in the extensive activity carried out on the European hydrographic network.

The indigenous population used, always, the rivers in peaceful purposes, for the needs of the community and for trade.

The amplitude and diversification of the navigation facilities on the inland rivers have evolved with the commercial and strategic interests of the time's powers, for the various wealth available on Romania territory; reliable data begin from the period of the Roman Empire domination.

Until the Modern Era, most of the hydrographic network was used for navigation, in natural regime, because the hydrological regime was more regular due to the high degree of afforestation of land at that time.

In the twentieth century, the changes in the hydrological regime, the development of terrestrial and air transport, as well as the economic priorities reduced the national interest for inland shipping in our country. However, the economic and strategic importance of a waterway connection between the country's capital, Bucharest, and the Danube, has become increasingly evident and, as result, numerous technical and economic studies and projects have been carried out.

The inland waterways transport provides an inexpensive, bulky, safe and fast transportation of materials and goods. And, moreover, is the most environmentally friendly mode of transportation, today.

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AMENAJĂRI PENTRU NAVIGAȚIE PE RÂURILE DIN ROMÂNIA Periplu istoric

(Rezumat)

Se prezintă situația navigației pe râurile de pe teritoriul României, în decursul istoriei, după documentele și datele accesibile. Informațiile sunt sistematizate după: epocile istorice ale Europei: (Antichitatea, Evul Mediu, Epoca modernă), regiunile istorice ale României (Transilvania, Banat, Valahia, Moldova), râurile pe care s-a practicat transportul continuu, de lungă durată, cu ambarcațiuni de deplasament semnificativ pentru epoca respectivă (Mureș, Tisa, Someș, Crișul Alb, Bega, Jiu, Olt, Argeș, Dâmbovița, Ialomița, Bistrița, Siret, Prut).

Dezvoltarea transportului pe râurile României s-a bazat pe avantajul esențial că toate aceste râuri ajung la Dunăre.

Se prezintă studiile și amenajările pe căile navigabile interioare, propunerile sau realizările de sisteme de navigație complexe precum și evoluția legislației la scară națională.

Transportul pe căi navigabile este mai ieftin, mai sigur și mai voluminos, conduce la dezvoltarea socio-economică a zonei, poluează mediul într-o măsură ne semnificativă.