Geo-economic Perspectives for the Lower Danube Region in the Context of European Integration

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Abstract. This article focuses on the emerging challenges facing the lower Danube regions. The author assumes that the Danube can be considered two parts, the Upper Danube and the Lower Danube. This division is linked to the ongoing transformation in Eastern Europe, with the river flowing through six countries and lagging in terms of socio-economic development. The article focuses on the scope of the Lower Danube region by designating the main settlements of a frequent part of the river. The problems facing the regional development of the Lower Danube region are presented. The methodology is outlined, and the development potential is analysed. The measures that can be taken to enable the Lower Danube region to develop ahead of schedule are outlined. It is proposed to implement Pan-European policies and measures to develop the region's potential. Finally, a comprehensive assessment was made of the potential and opportunities for the development of the Lower Danube region and its integration into European policy.

Keywords: development, resources, region, water management, assessment, analysis, territory, river.

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1. INTRODUCTION

Thus, our focus is on the role of the Danube River as an essential part of the European infrastructure corridor №7 as a prerequisite for cross-border cooperation between the countries through which the river flows. With an approximate length of 2,850 km, the Danube is the second-longest river in Europe, connecting the Black Forest with the Black Sea and passing through the territories of ten countries, with four other countries in its basin. Thus, our focus is on the role of the Danube River as an essential part of the European infrastructure corridor №7 as a prerequisite for cross-border cooperation between the countries through which the river flows. With an approximate length of 2,850 km, the Danube is the second-longest river in Europe, connecting the Black Forest with the Black Sea and passing through the territories of ten countries, with four other countries in its basin. We need to consider that the European Union recognizes that in the period 2021-2027, cohesion policy will be linked to supporting the growth of countries. This also predetermines the focus of targeted impact on regions in difficulty. This means that in the coming years, we will pay more attention to those parts of the Danube that need support and investment attraction (Baranyi, 2005). Thus, the focus on parts of the Danube area largely coincides with the set of several strategic goals in the European Union for more competitive and more thoughtful development of the European space. This means improving regional development through additional efforts for a more connected Europe. In the medium term, it can be expected that the measures taken will, in practice, increase mobility. In addition, the view is accepted that the European Union must be closer to its citizens by promoting sustainable and integrated development in all types of territories. All this must be in line with the goals of a greener, low-carbon transition to a net zero-carbon economy and a more social and inclusive Europe. The policies presented show that for countries such as Bulgaria and Romania as members of the European Union and for countries such as Serbia, Moldova and Ukraine, they coincide with their understanding of improving regional connectivity and promoting socio-economic development. In this direction, the removal of the Lower Danube region as a vast territory with pronounced regional differences and imbalances is an essential incentive for individual countries to set new priorities for better development and attract new investments. We can assume that the Danube region is inextricably linked with Central and Western Europe with the large Rhine-Main-Danube canal, which connects the Black Sea with the Atlantic Ocean. According to the Committee of the Regions, the Danube area is divided into two - partly overlapping - transnational areas of EU assistance: Central Europe and South-East Europe (Potts, 2010).

Fig. 1. Image of the Danube river and the territories it passes through

Source: (EU Council, 2021)

The division of the once common Central and South-Eastern Assistance Area between the Baltic and Aegean Seas (CADSES) may create a situation, especially in the Danube area, which will have a long-term negative impact on territorial, social and economic cohesion. Due to the unique geographical and cultural-historical significance of the Danube area, especially for the rapprochement between Eastern and Western Europe, the Danube area acquires even a remarkable political and strategic territorial dimension. In this direction in the Lower Danube region, many of its problems and energy connections, environmental protection and security challenges call for a common approach. The challenges of economic disparities and insufficient investment in infrastructure can be overcome. Migration, climate change and security could also have a particularly intense impact on the region due to its sensitivity to various factors of a political and geographical nature (Deimel, 2010). Resolving environmental issues is also not delayed, both for biodiversity and for the protection of cultural heritage.

The most important settlements in the lower part of the Danube River

Geographically, the Danube basin differs in three sections. The upper reaches extend from the spring to the gorge, called the Hungarian Gates, in the Austrian Alps and the Western Carpathians. The middle course runs from the Hungarian Gates Gorge to the Iron Gates in the southern Romanian Carpathians. The lower course of the river starts from the Iron Gates to the delta of the river, through which it flows into the Black Sea. Our overview aims to show the settlement network of the Danube River from Croatia to the Black Sea Delta. In practice, the river crosses the great and vast Great Alfold Plain, crossing Croatia, Serbia and Romania until it reaches the Iron Gate Gorge. The riverbed is shallow and swampy, and low terraces stretch along both banks. Beyond the Iron Gates, the lower Danube flows through a broad plain. The river becomes shallower and broader in these parts, and its flow slows down. To the right, above steep banks, stretches the Danube plain of Bulgaria. The low Romanian plain is separated from the mainstream by a strip of lakes and swamps to the left. The inflows in this section are relatively small and report only a moderate increase in the total outflow. These include the Olt, Sirte and Prut rivers. A number of islands again hampers the river. After Silistra, the river heads to Cherna Voda, where the Danube heads north, until it reaches Galati, where it turns sharply east. Its left bank briefly passes through Moldovan territory. Near Tulcea in Romania, about 80 km from the Black Sea, the river spreads in its delta. We can summarize that the river passes through Croatia, Serbia, Romania, Bulgaria, Moldova, and Ukraine in this part.

Fig 2. The most important settlements in the Danube region

Source: (EU Council, 2021)

In addition, we can note that the settlements that are part of the Danube River have their geo-economic potential and the opportunity to promote their development through their connection with the river (European Environment Agency, 2018). In Croatia, the city of Osijek (population 121,000), which is located on the right bank of the Drava River, near the confluence with the Danube, is important for its connection to the river. The city of Osijek is of great regional and economic importance, but the city of Vukovar is Croatia's largest port on the Danube. Vukovar is a smaller city with 26,468 people and is located at the confluence of the Vuka River and the Danube River. This port is of strategic importance for Croatia's trade with Hungary, Austria, Germany and other countries. In Serbia, the river passes through the smaller towns of Apatin (17,411 inhabitants), Backa Palanka (29,449 inhabitants) to reach Novi Sad (245,439 inhabitants). Novi Sad is the second-largest city in Serbia and an important geo-economic and administrative centre in the Vojvodina region. The next important town near the river is the town of Pancevo (78,234 inhabitants), which is the largest river port on the Timis River, which flows into the Danube. The largest nitrogen fertilizer plant in Southeast Europe, a large oil refinery, a glass plant, or 19 industrial enterprises with more than 1,000 employees have been built in Pancevo. This makes it one of the most important economic centres in Serbia and within the lower reaches of the Danube. Next is the city of Belgrade (1,201,763 inhabitants), which is located at the confluence of the Sava River and the Danube. In fact, it is the largest city in the lower reaches of the river to its confluence with the Black Sea. Belgrade is an important geo-economic, scientific and cultural centre of European importance. The Danube River enters the Iron after a few more small ports with peripheral functions. The natural phenomenon Iron Gate is over 100 kilometres long and stretches between the Romanian port of Moldova Veke and the town of Drobeta - Turnu Severin. The town of Turnu Severin (102,210) is important in this area, where there is a large shipyard in which sea and river ships are built. The city also has factories for wagons, pulp, wood processing, candy factory and others. Then the Danube River divides Bulgaria and Romania and practically determines the border between the two countries (Hohenblum, 2016). In recent years, the most important cities and ports in Bulgaria are not in good socio-economic condition. An important port over the years is the town of Vidin (45,321 inhabitants). Today, the city has a significant negative population growth due to population migration resulting from unemployment in the city and the region. As a result, there are almost no specialists left in the city in any field of economy. This creates serious difficulties for companies that intend to invest. Positive for the city is constructing a bridge over the Danube, which connects Vidin with Calafat. Important in Bulgaria is the town of Lom, which is located along the Danube. The population of the city at the end of 2020 is 21,300 inhabitants. The port of Lom is of national strategic importance as an intersection of the two Pan-European Corridors №4 and №7, defined by the European Union for priority development. It is located at kilometres 742 - 743 on the Danube River and is a multifunctional port for handling bulk, general and other cargo. The port covers five piers and 13 berths. The port cities of Kozloduy (13,771 inhabitants), Oryahovo (5007 inhabitants), Belene (7,478 inhabitants), Nikopol (3,629 inhabitants), Somovit (1,110 inhabitants) and Svishtov (35,435 inhabitants) are also important for the Bulgarian state. The most important Danube port in Bulgaria is the city of Ruse (148,765 inhabitants). given the geographical location of Ruse, its established role as an important industrial centre, and the presence of the country's first road and railway bridge over the Danube - Danube Bridge. The river also connects the city to Pan-European Transport Corridors 7 and 9, creating conditions for trade and river navigation and north-south connectivity on a pan-European scale. The ports of Tutrakan (14,201 inhabitants) and Silistra (41,543 inhabitants) can also play an important role in the eastern part of the Bulgarian Danube basin. Near the town of Tutrakan, it is necessary to build a completely new port, while in Silistra, there is a relatively well-preserved infrastructure to develop the potential of the settlement. On the Romanian coast, the ports start with the town of Calafat (20,000 inhabitants), left bank, km 795. It is located on the great bend of the Danube among a vast and fertile area against the

Bulgarian Golden Horde. It has industrial enterprises for fabrics, sugar, canned food, table wines, biosynthesis, milk powder, ship repair. The fish farm has five fish farms in the swamps in Chetete, Dunareni, Bistrets, Salchia and Dragoshan. To the east is the village of Rast (3 km from the left Romanian coast), which is possible to build a ferry complex that connects the Romanian coast with the port to the town of Lom. Further downstream in the last 15 years is the port city of Beckett (4393 inhabitants), where a ferry complex has been built to cross the Danube heavy cargo traffic to the port of Oryahovo, and from there to Turkey and Greece. The next important port is the city of Korabia (21,932 inhabitants). The city has a sugar factory, vegetable oil and flour factories. Cereals are loaded from the port. In this part of the Danube, the port of Turnu Magurele (29,780 inhabitants) is of great strategic importance. The electro-industrial enterprise ElectroTurris (plant for diesel engines) and ConservTurris (plant for canned products). Many of the established enterprises in agriculture, food industry, fertilizer production as well as the production of textile industry, chemistry and energy production were established during the socialist era. A ferry runs between the ports of Turnu Magurele and Nikopol. The next important port is the city of Giurgiu (Giurgiu), which is located on the left bank of the Danube, on the border with Bulgaria. Opposite Giurgiu on the Danube in the city of Ruse. A Danube bridge connects the two cities. There are three small islands in front of the city, and one larger one shelters the port. North of Giurgiu is the railway line connecting it with the Romanian capital, Bucharest. Giurgiu is connected to Campina by an oil pipeline. Danube tankers are loaded from a special port with liquid fuel intended for export. There are also three cargo port sections - Ramadan, Charoy and Plantelor. There are also large wintering grounds for ships. There is a sugar factory in the city, built with the Belgian capital, together with the Ruse factory, a shipyard, a cannery and two large plants - chemical "Verahim" and heavy machinery. Along with the Romanian, Danube bank follows the towns of Oltenica (24,822 inhabitants) and the town of Calarasi (65,200 people). Oltenia is located opposite Tutrakan, and Calarasi is located opposite the Bulgarian town of Silistra.It is important to note that the city of Calarasi is a regional centre of the wood processing, food, glass and textile industries. On the very bank of the Danube is the large metallurgical plant "Siderka", which for 15 years is the main source of gassing the city of Silistra with phenol. There is a large port, which is connected to the Danube by a canal. The Romanian part of the ferry complex Silistra-Calaras is built on the bank of the river opposite Silistra. In recent years, opportunities have been seeking to build a bridge between Silistra and Calarasi. The Danube then flows entirely into Romanian territory. The town of Cherna Voda (19,759 inhabitants) plays an important role in the current situation. This port city became very famous for its canal connection to the Black Sea and the nuclear power plant. Its port has greatly increased in importance [5]. Over the years, the canal's construction, Cherna Voda, has grown significantly. New residential neighbourhoods, a shipyard, a dredging unit and others have sprung up. The next town, Harshova (11,198 inhabitants), is located on the right bank of the Danube. Harshova is a city with historical traditions, but the city's economy is developing slowly. In the area of Harshova, there are conditions for the extraction of construction materials such as clay and limestone, thermo-sulfur waters upstream, excellent in rheumatic diseases, as well as a large number of historical monuments that can be a solid foundation for cultural tourism and a positive experience in building a marina. Further on, the river takes us to the town of Machin (9,678 inhabitants), located on the right bank at a distance of 168.7 kilometres. The city is located in the eponymous Danube arm, where is the great wintering ground for ships Smrdanu Nou (Gichetul). The Prikopan hill has an impressive mountain view due to the flat surrounding relief. The highest peak is Suluku (364 m). To the southeast are the ruins of the Roman castle of Arubium. The bed of the Danube River winds to the north, and on its left bank is the town of Braila (180,302 inhabitants). In practice, Braila is an important socio-economic centre in Romania and an important trading port on the Danube. Its proximity to the town of Galati (286,324 inhabitants) only 20 km by water creates conditions for the construction of a large agglomeration area of the Danube River

of great geo-economic importance. As determined by Eurostat, as of 2015, the functional urban area of Galati has a population of 322,501 inhabitants, while the functional urban area of Braila has a population of 217,645 inhabitants or the agglomeration area has a total of 540,246 inhabitants. Galati is 33 km by road from Braila. On the quays of the port of Galaţi, as well as at an anchor in the river, at any time can be seen beside river and many sea ships that travel to Braila. Galati grew between the mouths where the Prut rivers above the city and the Seret below the city flow into the Danube. That is why it is deservedly called the "city of waters". The coastal park Brateš is also attractive. An 87-meter TV tower with a panoramic café-bar rises along the Danube. Impressive is the large residential complexes of Ciglina and the new residential areas erected along the river, where Romanian architects demonstrate a beautiful and skilful interweaving of national and folklore elements in modern architecture. The metallurgical plant was built along the great river in order to use the Danube water and the cheap Danube road to transport the ore. The Danube countries, except for Bulgaria, have large metallurgical plants along the Danube. Opposite Galati is the Ukrainian city of Izmail. It is a city of regional significance, the administrative centre of the Izmail region, Odesa region in Ukraine. Izmail is the largest city in Ukraine (and the former Soviet Union), located on the Danube River. Seagoing vessels also dock at its port. According to the 2001 census, its population is 85,098. According to estimates of the State Statistical Service, as of July 1, 2017, its population at the current address is 71,259 people, and at the permanent address is 71,599 people. Izmail is a large river and seaport. The cargo port of Izmail is among the largest Danube ports in terms of cargo turnover and mechanization. Since 1944, Izmail has been the seat of the Soviet Danube Shipping Company, and today - of the Ukrainian Shipping Company. Izmail is an important economic centre with 35 large industrial, transport and construction companies. The pulp and paper mill, shipyards, enterprises for bricks, reinforced concrete products, ready-made clothes, furniture, dairy products. The fish cannery annually puts over 20 types of fish on the market - canned, smoked, salted, dried, etc. The cannery produces over 200 million cans. The Izmail winery produces many well-known wine brands: Bolgrad-Dnestrovski, Shtabsko, Muscat, Ukrainsko, Jubileyno, Fetyaska, Neuburger, Rkatsiteli and the noisy Pop. After these cities, 8 km west of the town of Tulcea (91,342 inhabitants), the Danube River is divided into two branches - Kiliyski and Tulchanski. To the east, 11 km away, the Tulcea arm is divided into Sulinski and Sveti Georgievski (Georgievski crotch). The Sulina arm is the deepest, accessible to ocean-going ships to Tulcea and Galati, and is rightly called the "Main Street of the Delta". The town of Tulcea is a major centre of shipbuilding, food and textile industry, as well as fishing.

Fig. 3. Natural map of the Danube region (spatial aspect)

Source: https://bit.ly/3tGKInA (accessed on 18 December 2020)

On the site of the oriental town of Tulcea today, we find a typical quiet post-socialist medium-sized city with a well-developed centre, railway and bus station, port, garden square with a monument to Mircho Stari, older residential areas and the airport. After the development of the Danube delta, it is assumed that the town of Sulina (4629 inhabitants) is the last point of the Lower Danube, after which the river flows into the Black Sea. The town is located in the Danube Delta, at the mouth of the Sulina arm, about 10 km from the last pieces of land at its confluence with the Black Sea and about 60 km from the municipal centre of Tulcea, with which the only permanent connection is shipped on the river. It is considered the easternmost port in the EU. The commodity port of the city is a free economic zone. In the middle of the large, but only about 1.5 m deep Sulina Lake-Lagoon, separated by a narrow strip of land from the deep navigable even for ocean-going Sulina arm of the Danube, passes the border with Ukraine.

Features and specific aspects in the development of the Lower Danube region

Chronologically, the geo-economic importance of the Lower Danube region is excellent. This is a region of Europe where, thanks to the Danube, a regional economy is developing based on production, trade and fishing. The construction of the connection between the Atlantic Ocean and the Black Sea through the water corridor № 7 "Rhine-Main-Danube" provides severe opportunities for socio-economic development based on river transport between the countries of Serbia and Bulgaria, Romania, Moldova and Ukraine. It is expected that in geo-economic terms, the individual countries will make additional efforts for the pulling economic development of the Danube regions, and areas have not been fully justified. In recent years, the problem of the conservation of water resources has been brought to the fore. This further brought to the fore problems with the management of geo-economic processes. It has been found that the reduction of the economic development of the Lower Danube region has also harmed many social, environmental, economic, geopolitical and industrial processes (Committee of the Regions, 2010). The leading importance of transport on the Lower Danube, including river freight transport, accounts for only 10% of the total volume of freight transport in the countries of the Danube region. It should also be borne in mind that building effective connections within the Lower Danube is not a priority, and this can be an essential condition for promoting the development of transport, energy, culture and tourism. This finding requires us to see what models for promoting mobility and multimodality (including land, rail and air transport) can be implemented within the region. In the first place, this increases the role of inland waterway transport. This means paying special attention to improving the infrastructure and the port network in the Lower Danube area. Accordingly, examine the extent to which more sustainable energy projects (including energy infrastructure, markets and clean energy) can be stimulated by creating interstate energy capacities. Next, it is good to check whether it is possible to achieve the development of culture and tourism between the different regions and interpersonal contacts. These goals can be achieved through improved coordination in the field of infrastructure and transport and energy systems, exchange of best practices in the field of clean energy and promotion of culture and tourism in the Lower Danube region. However, we must be aware that there are several social, demographic, natural and industrial risks in the Danube region, which, in addition to the challenges of climate change, mean that the analysis of risk potential, preparedness and rapid response mechanisms are key to the regional development of its territory (Potts, 2010). A necessary clarification is that the Lower Danube region is extremely diverse - geographically, ecologically, culturally and economically. What unites the whole area is water, and I am particularly interested in the quality of the waters of the Danube River and its tributaries after 2022. Adequate waste treatment in all communities, not the use of phosphates in detergents and other detergents, water-saving agriculture, the construction of fish bypass canals around hydroelectric power plants and other hydro-technical facilities will play a positive role, but they must be based on consensus from all countries using the Danube.

Data and methods for research of the Lower Danube region

In practice, they are exploring a region such as the Lower Danube requires an interdisciplinary approach. This requires us to use a compilation of chronological, geographical, demographic, statistical and economical methods to explore this area. In addition, we can note that the assessment and analysis of the infrastructure corridor №7 places additional focus on the spatial configuration of the European transport corridors and determines the approval of the connectivity of the regions and their socio-economic development. In this respect, the model of space exploration is "Lower Danube". In addition, the construction of the Pan-European Transport Corridors can essentially be a major prerequisite for the formation of basic spatial and urban axes of development of the European continent. To indicate the ongoing processes in the present study, we use the Logistics Efficiency Index - LPI, created by the World Bank, which includes data for 160 countries. According to the World Bank methodology, LPI is an interactive benchmarking tool designed to help countries identify the challenges and opportunities they face in implementing trade logistics and what they can do to improve their results (Petrov, 2015). The International LPI is a summary indicator for the logistics sector, combining data on six main productivity components into a single aggregate measure.

The LPI index's six main components are the efficiency of customs and border services (speed and quality of service). Secondly, the quality and quantity of trade and transport infrastructure (condition and amount of ports, roads, stations, hubs, information technology, etc.). Thirdly, planning and organizing the logistics process and shipments at competitive prices. Next level of quality of logistics services and competence of the transport operator. The following is the indicator that indicates the ability to track shipments. Thus we reach the sixth indicator of timeliness with which the shipments reach the recipients within the planned or expected delivery times. The information and data are collected from surveys. The respondents are international and local (in the respective country) trade and logistics companies, providing qualitative and quantitative information about the logistics environment in the country and abroad (Samecki, 2009). Based on the collected data, the LPI index is calculated, and the values range from 1 to 5. The leading country in this ranking is Germany has the highest value with an index of 4.2 with average values for EU countries - 3.7. In Eastern and South-Eastern Europe, they have values below the EU average. In this regard, it is important to note that the logistics model shows the country's state, and it is good that this model is applied at the level of municipalities or settlements. Of course, especially in the Lower Danube region, such statistics are difficult to measure, but this is a sufficient reason for the public sector and the cross-border cooperation programs to bet on implementing such a project. Through the derivation of this classification, other problematic areas of socio-economic nature will be outlined. Such an analysis identifies the Lower Danube region as an essential element for achieving connectivity within the European Union. Thus, the territory of the Lower Danube becomes a vital territory in terms of transport and logistics directions on the European continent.

Table 1. Aggregated LPI 2012-2018

Country	LPI Rank	LPI Score	Customs	Infrastructure	International shipments	Logistics competence	Tracking & tracing	Timeliness
Germany	1	4.19	4.09	4.38	3.83	4.26	4.22	4.40
Croatia	48	3.12	3.01	3.02	2.99	3.10	3.08	3.51
Romania	50	3.10	2.73	2.86	3.15	3.01	3.19	3.61
Bulgaria	57	3.00	2.77	2.71	3.16	2.96	2.93	3.43
Serbia	68	2.83	2.53	2.59	2.89	2.78	2.86	3.32
Ukraine	69	2.46	2.77	3.08	2.83	2.38	2.76	3.45
Moldova	113	2.52	2.31	2.21	2.69	2.36	2.36	3.10

Source: https://lpi.worldbank.org/international/aggregated-ranking

The evaluation of the table shows that the majority of countries are between 48th place (Croatia), 50th place (Romania), 57th (Bulgaria), 68th place (Serbia) and 69th place (Ukraine), with Moldova alone in 113th place. In this component, the close points of the countries show that they can unite around shared priorities and opportunities for the development of the Lower Danube region. All components of the logistics index show that the countries of the Lower Danube lag behind the EU average. The immense lag is in the infrastructure component, and the biggest deficit is along the Danube. The problem for all countries is the low quality and quantity of transport infrastructure sites (Sielker, 2012). The lack of a sufficient number of large infrastructure sites of national and international importance hinders the planning of global logistics processes and activities on the territory of the Lower Danube. The connection of the national transport infrastructure network with neighbouring countries also causes significant difficulties and essentially affects the gross domestic product of the Lower Danube countries.

Table 2. Gross domestic product of the Lower Danube countries

Countries	GDP (Billions of euros)		
	2018	2019	2020
Croatia	52,688.8	55,571.4	50,189.6
Serbia	42,892.2	46,005.4	46,796
Bulgaria	56,224.7	61,558.0	61,331
Romania	204,496.9	223,162.5	218,165.2
Ukraine	110,7	137,3	133,4
Moldova	9,7	10,7	10,3

Source: Eurostat

Countries lead gross domestic product with larger populations such as Romania (19.8 million) and Ukraine (42 million), but they are countries with a population many times larger than Bulgaria (6.8 million), Serbia (6,9 million), Croatia (4.047 million), and Moldova's relatively small population (2.68 million). According to Eurostat, the municipalities in the Lower Danube region are losing population, and this trend is expected to continue. The development of the region requires more efforts on the part of the European Union and national governments to keep the population in these regions and enable it to develop regionally. Where can the reserves for promoting regional development and higher population employment be sought in more efficient water management? The preparation of qualitative environmental assessments with subsequent water management can create a new regional economy focused on the three categories of measures (wastewater treatment, reduction of agricultural diffuse pollution and mitigation of hydro-morphological changes). The issue of water is essential because, in the Lower Danube region, water use is shared between energy production (44%), agriculture and livestock (26%), industry (17%) and domestic water use (13%).

Moreover, in the assessment and analysis of the Lower Danube, quality climate monitoring must be carried out. Climate change is expected to affect the water cycle of the Danube significantly. The climate models that are presented to the general public make us expect a general increase in temperature with increasing precipitation, and the average annual temperatures may increase by 5° C, especially in the southeastern part. An important and essential part of the spatial analysis is the assessment of the geo-economic potential of the region and the derivation of the reasons for its poor development (Stoilov, 2014). This direction, based on comparative analysis and statistical information in chronological terms, shows the trends in the region's development. Thus, in addition to the findings, it is normal to look for opportunities to solve the problems that have become chronic in the last 40 years.

2. MAIN RESULTS FOR THE IMPACT ON THE LOWER REACHES OF THE DANUBE

In practice, it was not until 2000 that some of the Lower Danube countries, namely the governments of Bulgaria, Romania, Ukraine and Moldova, committed themselves to work together to solve the problems in the region

with the signing of the Lower Danube Green Corridor Agreement. This is a document aimed at creating a green corridor. In practice, the entire length of the Lower Danube should be increased in these sections through Serbia and Croatia, including nearly 1,400 km of waterways. The 2000 agreement between the four countries on a green corridor along the Danube aims to protect and restore wetlands along the river and reconnect the river with its natural floods, reducing the risks of major floods in areas with human settlements and offering benefits and, for local economies - for example, through fisheries, tourism - and for river eco-systems. The restoration of the floodplains along the green corridor between Bulgaria, Romania, Moldova and Ukraine is estimated at 183m euros. During this period, the idea of the European Union to launch "macro-regional strategies" arose. In practice, these are opportunities between individual countries to implement educational regional cross-border projects develop of better national policies at the regional level. Thus, the Lower Danube region is the subject of increased interest in development plans and programs (Smith, 2015). The expected annual revenues from eco-system services (flood control, water treatment, groundwater recharge, sludge and nutrient retention, biodiversity reservoirs, recreation, tourism, etc.) from restored floodplains are estimated at 111,8 million euros per year. Support for the region should overcome budgetary constraints in the Lower Danube region by promoting greater integration and coordination, tackling inequalities and promoting cohesion in macro-regions, fostering multilevel governance and, finally, strengthening cooperation with neighbouring countries. The European Union Strategy plays such a role for the Danube Region (EUSDR), which is one of the EU's macro-regional strategies and is built on four pillars - "connecting the region", "protecting the environment", "strengthening the region" and "building prosperity". This strategy is supported by the Interreg V Fund and the Danube Transnational Program (Zuser, 2010). The strategic bottom-up approach adopted by the European Union means that the countries of the Danube region can identify the activities of most significant interest to them and propose projects according to their priorities. Priority areas are always coordinated between the Member States, often together with non-member countries of the European Union. Thus, Moldova, Ukraine and Serbia can join the macro-regional development model supported by the European Union for the withdrawal development in the lower reaches of the Danube. An important contribution to the development of the Lower Danube Region is the Convention on Cooperation for the Protection and Sustainable Use of the Danube River, adopted in Sofia in 1994. However, all these activities are still insufficient to overcome the region's political and infrastructural problems due to the events of 1990. Neutral organizations, including the Danube Tourism Commission, play an invaluable role in bringing together various stakeholders and tourism industry organizations for open discussions on issues and lobbying governments for policy change (Vlachopoulou, 2014). The added value of the EU Strategy for the Danube Region also confirms the support for the ongoing work to build a tourism industry in the segment of river travel by ship. However, much more needs to be done at the national and local levels to solve real problems and strengthen river navigation in the Lower Danube.

3. NEED FOR DISCUSSIONS TO SET PRIORITIES AND THE PROGRAMMING PROCESS

After 2020, the interconnection processes in the North-South and East-West directions intensified within the European area, which brought to the fore a new vision for the development of the Danube region. This implies that the countries must discuss common problems and seek joint solutions and support to overcome the deficits in developing the areas around the Danube. First of all, how to overcome the lag in the development of the lower part of the river remains open. This may also bring the need to define two regions to be targeted by targeted policies. These are the Upper Danube, which includes Hungary, Slovakia, Austria and Germany, on the one hand, and the Lower Danube on the other, including Croatia, Serbia, Bulgaria, Romania, Moldova and Ukraine. Thus, investment policies must focus on the lower reaches of the Danube in order to achieve renewal and the appropriate use of Danube transport (Zuser,

2010). This demarcation may have relevant problematic aspects because it may prove ineffective and may not play an essential role in the current regional development of the adjacent territories in the Lower Danube region. However, I assume that if conditions are created for the development of river transport and the port infrastructure is built in the settlements in the gravity of the Danube River after Croatia. This will create good conditions for the development of many of the settlements. In addition, a river transport network can be developed, providing an optimal number of connections for all residents of the Lower Danube region, which could be economically viable. It must be explicitly supported - especially by the European institutions and regional authorities from all countries part of the Lower Danube region. This means identifying policies in the period 2022-2032 that reflect different trajectories of possible development. Next, the European Commission, on the basis of the green deal, can provide funding opportunities (preference for large or small projects) in the Lower Danube region of the order of 5 billion euros. At the same time, the funds for economic redistribution and solidarity to ensure the operational program "Lower Danube" aimed at small and medium-sized businesses in settlements with access to the Danube. The possibility of setting up a state agency, the National Management and Development of the Danube, to engage the community in the development of the adjacent regions with a gravity zone of about 40 km from the river should be carefully considered. It is also important to note that there are several cities with more than 100,000 inhabitants, such as Novi Sad, Turnu Severin, Ruse, Braila and Galati, and the capital of Serbia, Belgrade, which has a population of over one million. In practice, Belgrade is important as the Danube River is a national centre, with Vienna and Bratislava playing a similar role. Still, they are in the upper reaches of the river. It is clear that urbanization processes need to be improved, which means new investments and electronification of the regions in the Lower Danube. It is also necessary to create preconditions for facilitating multimodality. It is time to overcome the deficit of optimization of the state borders in the region, which has undergone correction (Deimel, 2010). This has led to a decline in investment in connecting border infrastructure, especially land and railway elements and has negatively affected river navigation on the **D**anube. It is necessary to create new economic zones for regional development and new technological productions. The Lower Danube region still has opportunities and reserves in energy. At the time of the crisis, for example, in 2020, they showed that energy supplies were uncertain and that the methods currently used to extract energy were significant sources of pollution. Nevertheless, the region is rightly proud of its know-how in energy efficiency and renewable energy sources, which can be promoted and shared (EU Council, 2021).

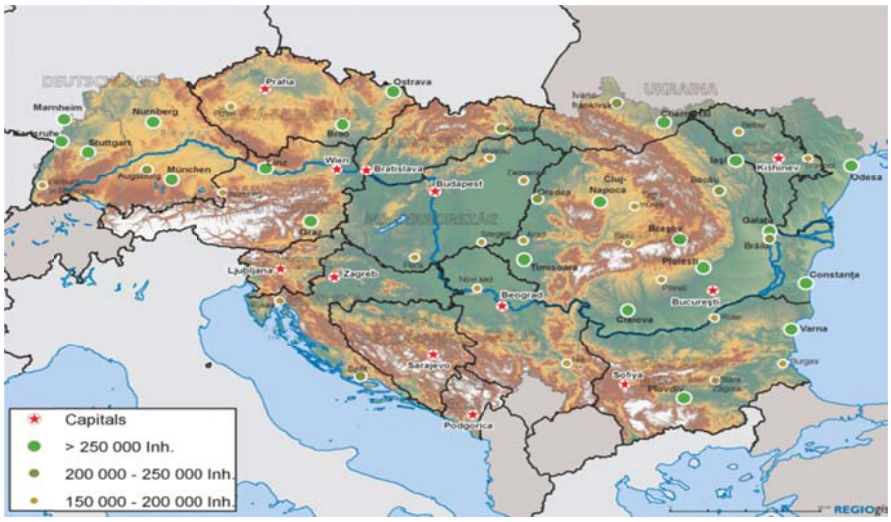

Fig. 4. Geographical and spatial coverage of the Danube region (as of 2020)

Source: DG Regio, EU

One of the problems facing shipping on the river is that, for the time being, a navigable depth of 2.5 m cannot be ensured for 300 days a year, although this requirement is enshrined in the Danube Strategy. The lack of locks in the Bulgarian section, in this case, reduces the transport of goods, but the construction of such hydraulic facilities is costly. So far, the only option is a public-private partnership, as there is interest from business, commented the project experts. One of the problems facing shipping on the river is that, for the time being, a navigable depth of 2.5 m cannot be ensured for 300 days a year, although this requirement is enshrined in the Danube Strategy. The lack of locks in the Bulgarian section, in this case, reduces the transport of goods, but the construction of such hydraulic facilities is costly, and so far, the only option is a public-private partnership, as there is interest from business, commented the project experts. According to them, if the goal of 300 sailing days is achieved, the cargo flow will undoubtedly increase, as water transport is currently the cheapest and most environmentally-friendly (Committee of the Regions, 2010). The participants in the project have developed strategies for developing the infrastructure of the Danube ports, as some of them do not have a good connection with road and rail transport or in some places the facilities are outdated - or do not have cranes or have old machines. It is important to have customs and logistics companies in ports. The region's unique natural and cultural heritage will be promoted more actively and sustainably (Potts, 2010). The issues of restoring and maintaining water quality also remain open. An important point is the management of risks to the environment, conservation of biodiversity, the environment and air and soil quality. These objectives need to be integrated with other policies. For example, transport infrastructure has a positive impact on growth, but it can harm biodiversity and air and water quality (Samecki, 2009). Challenges include reducing pollution with biological, nutrient and other hazardous substances and eliminating or adapting to the drying up of waterways.

Opportunities for improving the regional development of the Lower Danube region

In recent years, it can be said that thanks to the European Union, measures have slowly begun to be taken to develop the Lower Danube region. In this direction, several pilot projects have been implemented in recent years, which offer better environmental conditions by restoring water flow between tributaries and the main river by rebuilding gravel river banks and flat-bottomed water areas where artificial ones have been created in the past shores. In another project, tests are being conducted to determine whether erosion can be curbed by adding larger gravel to the riverbed. This is necessary to restore groundwater levels and strengthen the link between the river and its floodplains (Petrov, 2015). The regional development of the Danube region cannot pass without an integrated river engineering project, which includes measures, including the redesign of breakwaters along the entire section. This is important so that the river can be used all year round. Maintaining the flow of shipping during periods when river levels are low and reducing maintenance costs help meet growing commercial demand and lower tariffs. This makes the river more competitive than other modes of transport and responds to growing trade opportunities. The environmental benefits are that the new sustainable approach to river engineering includes gravel river banks and flat-bottomed water areas, which will allow the reconnection of tributaries that are today detached from the Danube (Samecki, 2009). These natural conditions protect and create new habitats for plant and animal species and create a more attractive environment for all people who use the river. A real example of cooperation It is also necessary to design and build tourist infrastructure and new urban planning that protects the Danube. There are undoubtedly many more challenges and conceptual frameworks for tackling the river. Still, they require cooperation and investment in these peripheral areas, which could become the core of Europe's economic development in the next 50 years. Connected by the main canal of the Danube, the Rhine and the Danube connect 11 countries from the north to the Black Sea, which forms the backbone of

Europe, and from there offer socio-economic solid development and prosperity to the Danube peoples.

4. CONCLUSION

In the coronavirus crisis, Europeans needed more targeted regional development policies. These measures must lead to a balanced development of the space and to overcoming the emerging significant regional disparities between cities and regions in Europe. Targeted regional development policies are needed to renew entire areas that can develop using more energy-efficient resources**.** This brought the possibility of geo-economic development of the lower part of the Danube coast. In search of renewal and renaissance of sustainable development, it is necessary to assess the special role of the Danube River as a promising Pan-European transport and waterway. In practice, the Danube can decisively unload other European transport routes in the new conditions. Infrastructure development - both by water and by land - helps the whole region take advantage of its role as a link between the West and the East, between the North and the South, and above all, to improve its own competitiveness. In addition, increased coherence and integration of policies for the development of the Danube region can lead to the development of industry, tourism, transport, energy, recognizing the benefits of action across the river basin, which will undoubtedly lead to synergies between countries. from the Danube region. The EU Strategy for the Danube Region will bring together economic and tourism organizations to optimize travel opportunities and discover new places within different cultures and religions and in different capitals and language environments.

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