MARKET OBSERVATION FOR DANUBE NAVIGATION: RESULTS IN 2022

DANUBE COMMISSION
BUDAPEST – 2023

MARKET OBSERVATION FOR DANUBE NAVIGATION: RESULTS IN 2022

The Danube Commission, Budapest 1068, Benczúr utca 25

Pyotr Semyonovich Suvorov – responsible for compilation and publication
Oana Florescu – responsible for editing

This activity was funded by European Union CEF funds under Subvention Agreement No. MOVE/D3/SUB/2019- 305/SI2.822021.

T a b l e of c o n t e n t s

Section 1.

Overview of the Danube navigation market

1.1. Initial state of the Danube transport market in 2022

The initial state of the main sectors of the Danube navigation market in 2022 was determined by the dynamics of the traffic volume in the fourth quarter of 2021 and the overall results of 2021, as well as by the forecasts of the recovery of the European inland navigation market in line with the forecast of growth of the gross domestic product of the Eurozone countries in 2022 by 4% compared to 2021.

Thus, the year 2022 was defined as the recovery period for Danube navigation after a drastic decline in the market of cargo and passenger transport in 2020-2021, connected with the pandemic.

The results of the first two months of 2022 in general formed a certain positive trend of stabilisation of cargo transport on the Danube and growth of its volumes during the year by the traditional market sectors.

The full-scale Russian military invasion of Ukraine, which began in February 2022, has led to the additional risks on the Danube navigation market, including due to the aggravation of the energy crisis, the shortage and rise in the price of iron ore raw materials, restrictions on the export of grain and other foodstuffs, as well as the hike in the cost of bunker fuel.

Therefore, as early as March 2022, the Danube freight transport market saw serious changes, a decrease in volumes in certain market sectors, due to Russia's military aggression against Ukraine. In addition, GDP growth of the European Union and the Eurozone for 2022 has been revised downwards. According to Eurofer's forecast, steel consumption is expected to decline by 1.9% in 2022 (data as of May 2022), *inter alia* due to the worsening energy crisis, significant fluctuations in the cost of raw materials and finished products.

In connection with the Russian blockade of Ukraine's seaports, the creation of new transport systems for the export of Ukrainian agricultural products and the import of necessary goods has become particular important. As a result, the need to develop a special logistics regime based on the Danube ports of Ukraine, the Republic of Moldova and Romania, as well as the Danube-Black Sea Canal links has become particular important.

The Danube Commission actively contributes to finding solutions to this problem within the framework of the EU-Ukraine Danube Solidarity Lanes initiative of May 2022 in support of the European Union's solidarity measures for Ukraine as set out in the "Action plan for EU-Ukraine Solidarity Lanes to facilitate Ukraine's agricultural export and bilateral trade with EU" (Brussels, 12.5.2022 COM (2022) 217 final).

The Danube Commission took the initiative to hold back-to-back coordination meetings with the participation of the representative of DG MOVE of the European Commission to promote a more active use of the transport potential of the Danube waterway for transport from the Danube ports of Ukraine based on the systematic analysis of the identified cargo flows, the port traffic capacity on the Lower Danube, including the port of Constanta, the traffic capacity of the Danube-Black Sea Canal links and the carrying capacity of the existing fleet.

During 2022, several coordination meetings were held with the competent authorities, port authorities and fleet operators of Ukraine, the Republic of Moldova and Romania. These activities undoubtedly contributed to solving many practical issues related to the organisation of exports from the Ukrainian Danube ports; it remains relevant for partial unlocking of three Ukrainian seaports (On 22 July 2022, in Istanbul, representatives of Ukraine, Türkiye, and the United Nations signed an initiative to ensure safe transport of grain and foodstuffs from Ukrainian ports, which allowed the export of agricultural products from the ports of Odessa, Chernomorsk and Pivdennyy in a special mode).

Accordingly, possibility of significantly increasing the number of sea and river-sea vessels passages through the Sulina Canal has been considered, thus raising the question of increasing its traffic capacity. As part of the solution to this problem, work has been carried out to improve the canal's traffic management system, as well as the regime of maritime traffic to and from the ports of Ukraine, the Republic of Moldova and Romania.

In 2020-2021, a certain balance of cargo transport on the Danube was ensured by the transport of significant volumes of grain cargo, primarily from the ports of the Middle Danube to the delta ports (Constanța). In 2022, despite optimistic forecasts for grain harvest in the EU (*Coceral* forecast, May 2022), severe drought in central areas led to restrictions on the export of grain cargoes, and there are concerns about sufficient stocks for 2022/2023.

In June 2021, with the easing of local pandemic restrictions, occasional voyages by passenger vessels with cabins on the main cruise lines began. In March 2022, more stable (and then sharply increasing) voyages started on the main cruise lines, as well as on the local transport lines. In July - August - September 2022, the number of voyages continued to increase, while the number of passengers carried on cruise vessels increased by 13% in the first half of the year (Q_1+Q_2) 2022 compared to the results for the whole of 2021.

Navigation conditions in 2022 should be regarded as extreme: the low water phase, which started at the end of June, was characterised as an extremely unfavourable hydrological situation, caused by extremely high temperatures and lack of precipitation in the Danube basin and in the tributary river basins. This situation led to a sharp drop in water levels along the entire Danube and, consequently, to a significant decrease in operating draughts in June and, to a large extent, in the third quarter, successively to 1.8/1.6 m and below. During this period, there were occasional long stops of convoys, organisation of special pilotage for barges, lightering of vessels to operating draughts, which led to a decrease in traffic volumes on the sections controlled by the Market observation system for Danube navigation.

1.2. Dynamics of the transport market in 2022

The capacity of freight transport in the first half of 2022 under stable navigation conditions, *i.e.,* in the absence of ice events and critical floods, traditionally creates a stable market base for the current year. The positive trend in freight transport, established in January-February, has already changed in March, due to changes in the balance of the freight transport sector caused by Russia's military aggression against Ukraine.

These circumstances have made significant adjustments to the Danube navigation market, in particular:

- due to the disruption of iron ore supplies to Ukraine's Danube ports and a drastic reduction of shipments from these ports, individual metallurgical enterprises in the

Danube basin were forced to work on finding alternative routes for the transport of raw materials; there was a partial shutdown;

- there were cases of restrictions on exports of grain and other food products;
- the price of bunker fuel for vessels increased significantly (*e.g.,* by 40-45% in April compared to March 2022);
- the volume of cargo handled in Danube ports in the first quarter (Q_1) of 2022 was only 16,980 thousand tonnes, making up 94.6% of the volume in Q_1 of 2021, at the same time the main decrease was caused by the drop in grain cargo volumes from the ports on the Middle Danube towards the ports in the delta (Port of Constanța).

Accordingly, the volumes of cargo transport in the first quarter (Q_1) of 2022 comprised:

- in cross-border traffic Germany / Austria (DE/AT): 735,7 thousand tonnes (in 2021 - 359 thousand tonnes);
- in cross-border traffic Hungary / Slovakia (HU/SK): 1,306 thousand tonnes, or 107 %of the volume in Q_1 of 2021;
- in cross-border traffic Hungary / Croatia/ Serbia (HU/HR/RS): 1,223 thousand tonnes, or 72,8 % of the volume in Q_1 of 2021;
- the volume of cargo transport on the Danube-Black Sea Canal came to 3,876 thousand tonnes, or 88.6% of the volume in Q_1 of 2021, while international cargo transport amounted to 2,132 thousand tonnes making up 72.4% of the volume in Q_1 of 2021, caused by a sharp decline in grain cargo transport from the ports on the Middle Danube towards the Port of Constanța.

Due to the blockade of Ukraine's seaports, only three Ukrainian ports on the Danube - Reni, Izmail and Ust-Dunaysk continued to operate as normal.

The volume of cargo handled in the Ukrainian ports on the Danube in June increased by 3.7 times compared to March with an increase in grain shipments, while shipments were made to river barges, mainly towards Constanța, as well as to sea and river-sea vessels.

As the additional impact of the critical low water period emerged particularly in the third quarter (Q_3), the volumes and the main elements of the Danube freight transport market for 9 months of 2022 were taken in order to study its dynamics; at the same time, the volumes are given in comparison with (Q_1+Q_2+Q_3) 2021:

- in cross-border traffic Germany / Austria (DE/AT), for 9 months (Q_1+Q_2+Q_3) of 2022, a total (upstream/downstream in total) of 1,745 thousand tonnes, or 101 % of the volume in the same period of 2021, were transported, while it should be noted that the volume in the third quarter (Q_3) amounted to 44% of the volume in the second quarter (Q_2) of 2022;
- in cross-border traffic Hungary / Slovakia (HU/SK) the total volume of cargo transport came to 3,456 thousand tonnes, making up 88% of the volume in the same period of 2021;
- in cross-border traffic Hungary / Croatia/ Serbia (HU/HR/RS) the total volume of cargo transport came to 3,153 thousand tonnes, making up 68.6 % of the volume in the same period of 2021;

- the volume of cargo transport on the Danube-Black Sea Canal for 9 months of 2022 came to 12,877 thousand tonnes, making up 95% of the volume in the same period of 2021. The volume of international cargo transport for 9 months of 2022 amounted to 113% of the volume in the same period of 2021, while domestic (cabotage) transport amounted to 72% of the volume in 2021.

The main drop, as compared to the same period in 2021, is caused by a decrease in the transport of the main market volumes - iron ore raw materials (upstream) and grain cargoes (downstream). The volumes of oil and chemical products (fertilisers) can be considered relatively stable.

1.2.1. Cargo capacity of ports for 9 months of 2022

The market conditions in the second quarter (Q_2) and especially in the third quarter (Q_3) of 2022, including the additional impact of the critical low water period, were determined by multi-directional changes in the cargo capacity of the Danube ports by quarter and in total for (Q_1+Q_2+Q_3) of 2022 (Table 1.1).

Table 1.1.

Cargo capacity of the Danube ports in 2020-2022

Ports (thousand tonnes)	2020	2021	2022 Q_1	2022 Q_1+Q_2	2022 Q_1+Q_2+ Q_3
Germany	3,511	2,999	615	1,370	1,859
Austria	6,050	6,356	1,669	3,252	4,239
Slovakia*	1,553	1,846	502	952	1,455
Hungary	6,742	5,715	1,222	1,356	3,232
Croatia	948	697	180	338,8	456,7
Serbia	8,164	13,610	3,055	6,366	8,788
Bulgaria	5,431	7,111	1,724	3,751	5,242
Romania	27,307	28,457	6,096	12,976	18,346
Republic of Moldova	1,185	1,819	486,2	1,140	1,610
Ukraine	4,055	5,505	1,431	5,102**	10,646**

* Ports of Bratislava and Komarno.

** Data received from Ukrainian Port Authority.

1.2.2. Peculiarities of port operations in the first 9 months of 2022:

The largest share in cargo handling in the Ukrainian Danube ports was due to the increase in the volume of agricultural exports.

In the third quarter (Q_3) (5,744 thousand tonnes) grain cargoes accounted for 49% in July, 41% in August and 33% in September respectively (Table 1.2). At the same time, the total volume (Table 1.2) (5.744 thousand tonnes) of grain cargoes accounted for 49% in July, 41% in August and 33% in September, respectively.

Table 1.2

Volume of cargo handled in the Ukrainian Danube ports in the third quarter of 2022 (months: VII/VIII/IX)*

Port/ month	Izmail	Reni	Ust-Dunaysk
2021 (VII/VIII/IX)	462/383/347	81/185,5/229	8,4/18,3/4,2
2022 (VII/VIII/IX)	763/985/1.026	877/990/631	94,1/82,6/95,7

*Data received from Ukrainian Sea Port Authority.

- the volume of cargo handled in the port of Constanța by inland waterway vessels amounted to 11,360 thousand tonnes, or 90.8% of the volume handled in the nine months of 2021; international cargo turnover came to 8,061 thousand tonnes, or 71% of total cargo volume (in 2021 - 7,493 thousand tonnes, or 59.9% of the cargo volume in 2020);

- 3,568 thousand tonnes of cargo from Ukraine were unloaded in the port of Constanța in the first nine months of 2022 (for the entire 2021, a total of 1,128 thousand tonnes), of which 2,310 thousand tonnes were agricultural products; 261 thousand tonnes were shipped to Ukrainian ports, of which 41% were oil products;

- The growth of the Giurgiulesti port cargo turnover by 34% compared to the same period of 2021 is due to the growth of grain exports (a total of 218 thousand tonnes were shipped via the port of Constanța) and oil product imports (248 thousand tonnes were unloaded).

Section 2.

Market observation for Danube navigation: traffic of fleet and cargo

2.1. Navigation conditions on the Danube in 2022

2.1.1 Navigation conditions in 2022

At the beginning of 2022, the snow reserves in mountainous areas of the Danube basin were below the multi-year average; the snow reserves in the plains and in the foothills of the Danube basin were practically non-existent. Under these conditions, the formation of the well-defined spring flood wave typical for the Danube could only be achieved with sufficient (normal or above) precipitation in the first spring months. However, during this period, precipitation was less than half of the statistical average.

During the first ten-day period in **January** 2022, water levels on the Upper Danube (Fig. 1) were above mean water levels (MWL); from the middle of the second 10-day period, water

levels started to fall and were consistently below MWL until the end of the month. On the Middle Danube (Fig. 2), at the beginning of the first 10-day period, water levels were above MWL with an amplitude that exceeded this value by 2.0 m; from the end of the 10-day period, water levels started to fall continuously and were below MWL until the end of the month. On the Lower Danube, during the first 10-day period, water levels were mostly above MWL and fluctuated close to the MWL value during the second and third 10-day periods, with occasional slight drops below this value.

From the middle of the second 10-day period in **February**, water levels on the Upper Danube began to rise steadily to MWL and remained above it until the end of the month. In the course of the month, water levels on the Middle Danube were consistently below MWL, and at the beginning of the third 10-day period, they intermittently exceeded it by 35-45 cm. On the Lower Danube, water levels were 1.4-1.8 m below MWL throughout the month.

In **March**, water levels on the Upper Danube fluctuated by 60 - 90 cm below the MWL values. On the Middle Danube, from the middle of the first 10-day period, water levels started to fall slowly and stabilised below the MWL value with fluctuations in the insignificant range (5 - 10 cm per day). On the Lower Danube, water levels were 1.4-2.0 m above MWL throughout the month.

In **April**, water levels on the Upper Danube fluctuated within the range below the MWL values by 40 - 70 cm, intermittently exceeding them at the end of the first 10-day period. In the course of the month, water levels on the Middle Danube remained steadily by 30-50 cm below the MWL values, intermittently exceeding them at the beginning of the second 10-day period. On the Lower Danube, water levels were 0.8-1.8 m below MWL throughout the month.

In **May,** water levels on the Upper Danube fluctuated within the range of values below the MWL values by 40 - 70 cm, exceeding them intermittently in the middle of the third 10-day period. On the Middle Danube, water levels were continuously 30 - 70 cm below the MWL values during the month, exceeding them intermittently at the end of the third 10-day period. On the Lower Danube, water levels were 0.8-1.4 m below MWL throughout the month.

In **June**, water levels on the Upper Danube fluctuated below the MWL values intermittently exceeding them at the end of the first 10-day period; at the beginning of the third 10-day period, levels fell below LNWL for 5-6 days. In the course of the month, water levels on the Middle Danube remained continuously 40-70 cm below the MWL values, exceeding them intermittently at the end of the first and the beginning of the second 10-day periods, after which a sharp drop to water levels by 80-90 cm below MWL was recorded. On the Lower Danube, water levels were by 1.2-2.1 m below MWL throughout the month, approaching LNWL at the end of the month.

In **July,** water levels on the Upper Danube fluctuated by 25-60 cm below the LNWL values intermittently exceeding them at the beginning of the first 10-day period. In the course of the month, water levels on the Middle Danube remained constantly below MWL, with a relatively stable drop below this level by 1.2-1.4 m in the third 10-day period. On the Lower Danube, water levels were 0.4-1.1 m below LNWL throughout the month and fluctuated within this range.

In **August**, water levels on the Upper Danube fluctuated around the LNWL value intermittently exceeding it at the beginning of the third 10-day period. In the course of the month, water levels on the Middle Danube fluctuated around the LNWL value, with a prolonged drop below LNWL

in the second 10-day period and leaving this range at the beginning of the third 10-day period. On the Lower Danube, water levels were below LNWL throughout the month; a decline by 0.8-1.2 below this level was recorded on some sections.

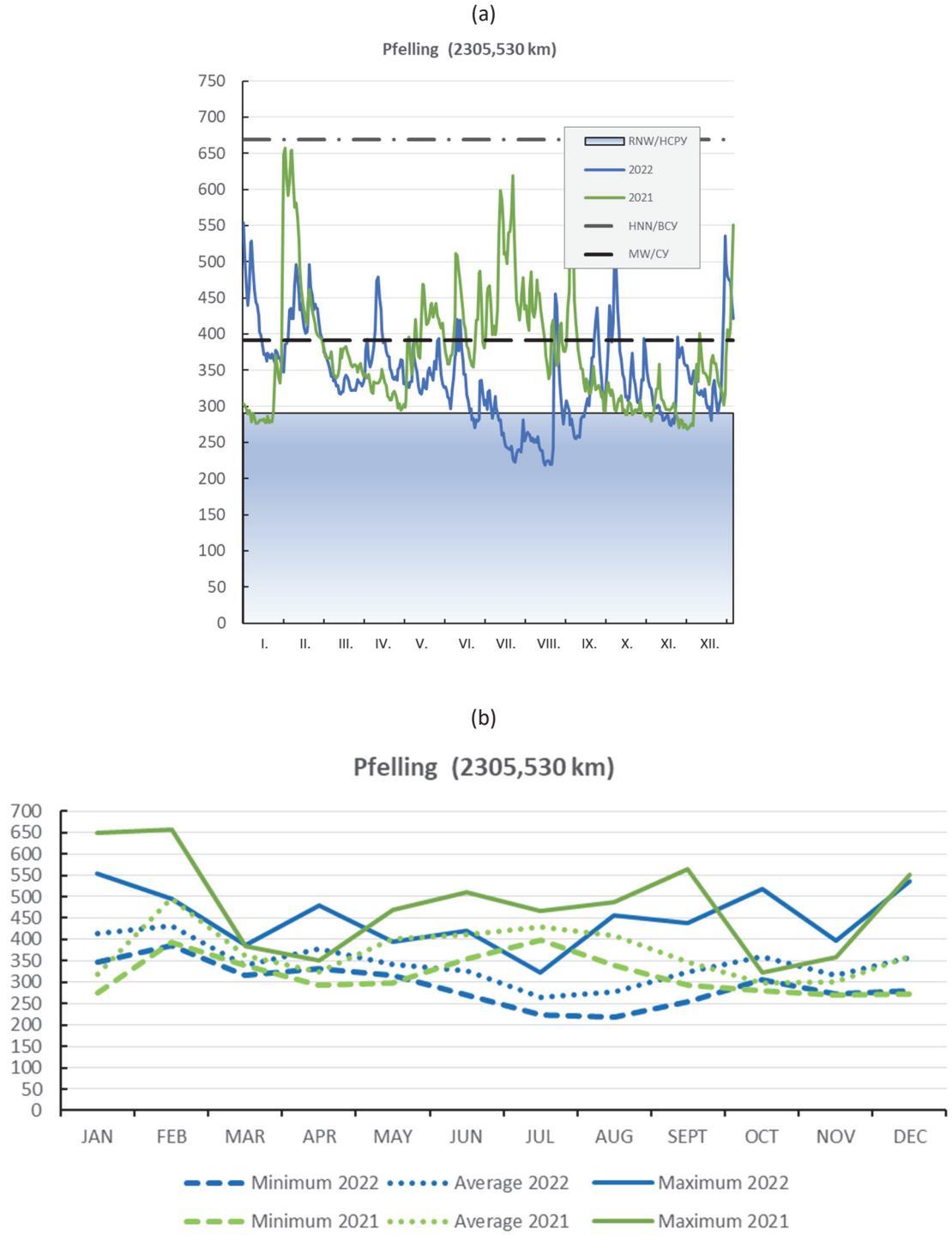
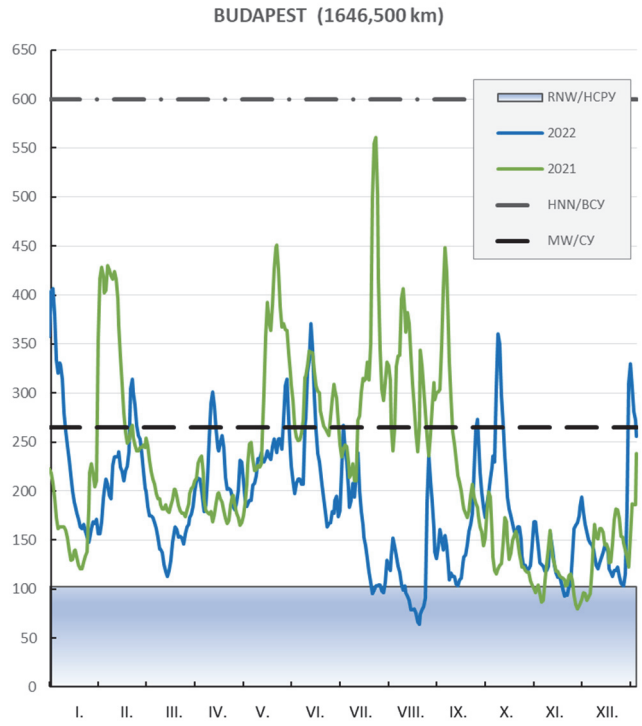


Fig. 1. Daily mean (a) and absolute (b) water levels at the gauging station Pfelling, in cm

(a)



(b)

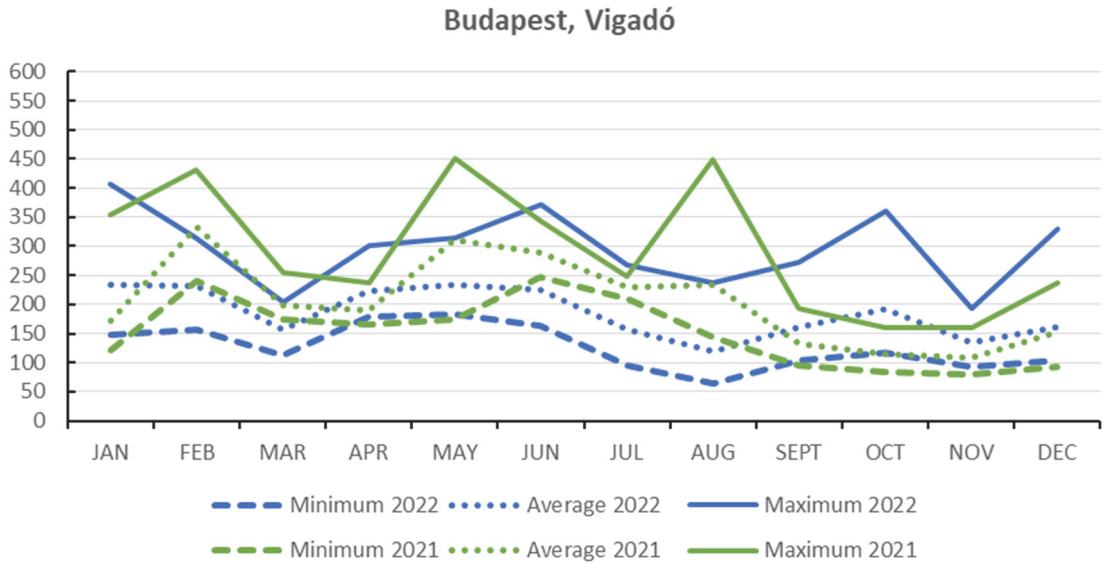


Fig. 2. Daily mean (a) and absolute (b) water levels at the gauging station Budapest, Vigado, in cm

In **September**, water levels on the Upper Danube fluctuated below the LNWL value in the first 10-day period; a sharp increase was recorded in the second 10-day period, with occasional rise of MWL (at the beginning of the third 10-day period), followed by the fluctuation within MWL. In the course of the month, water levels on the Middle Danube remained constantly below MWL; at beginning of the third 10-day period occasional rise was recorded. On the Lower Danube, water levels were below LNWL throughout the month, while there were slight (15-20 cm) intermittent rises in water levels.

In **October**, water levels on the Upper Danube were above MWL in the first 10-day period and fluctuated below MWL in the second and the third 10-day periods. At the beginning of the first 10-day period, a slight intermittent rise above MWL was recorded on the Middle Danube; later on, water levels remained continuously below MWL throughout the month. On the Lower Danube, water levels were below MWL throughout the month, while there were slight (15-20 cm) intermittent rises in water levels, which did not change the overall situation.

In **November**, water levels on the Upper Danube initially decreased to LNWL; in the second 10-day period, they started to rise towards the MWL value. On the Middle Danube, water levels fluctuated in the MWL range; in the middle of the 10-day period, they occasionally approached LNWL. On the Lower Danube, water levels were 1.2-2.1 m below MWL throughout the month; by the end of the month, water levels approached LNWL.

In **December**, water levels on the Upper Danube were below MWL in the first and the second 10-day periods; a sharp rise in levels began in the third 10-day period and continued until the end of the month. On the Middle Danube, water levels fluctuated below MWL; in the middle of the third 10-day period water levels started to rise to the MWL values. On the Lower Danube, water levels approached MWL by mid-month as a result of the increase in water level.

Based on the available data, it was observed that at many Danube gauging stations the number of days of non-attainment of LNWL was five times higher than the number of days of non-attainment of LNWL in a conventional standard year. It is very likely that the year 2022 is hydrologically extreme, primarily in terms of the duration of the summer-fall shallow phase.

2.1.2 Water flow and operating draught of vessels

The absence of freezing on the river and lack of ice phenomena ensured uninterrupted navigation in the first quarter of 2022.

Due to the absence of the traditional wave of the first spring flood, stable water flow for enabling efficient navigation was not ensured, which did not allow the usual loading of vessels at a maximum draught of 2.5-2.7 m in the first quarter.

At the same time, the navigation conditions in the first half of 2022 should be considered extreme: the low phase occurred at the end of June is characterised by an extremely unfavourable hydrological situation caused by extremely high temperatures and lack of precipitation in the Danube basin and the tributary river basins.

In the second quarter, precipitation in the basin was below average, and in June there were restrictions on the passage of vessels through critical sections, which led to a sharp drop in operating draughts and fleet stoppages at the end of the month (Table 2.1).

Table 2.1

Draughts of cargo vessels during navigation in 2022

Month	Loading, upstream (cm)	Loading, downstream, (cm)
January	230 (230)*	210 /200(210)
February	230 (250)	210/200 (210/220)
March	250/230 (250)	220/210 (220/210)
April	250 (250)	230/220 (250)
May	250 (250)	230/250)
June	220/210 (230)	210/220 (210/220)
July	190/180 (230)	200 (200/210)
August	190/180 (210)	190 (190 /200)
September	190/180 (190)	180/190 (180/190)
October	190/200 (190)	190/200 (180/190)
November	210/220 (190)	190/200(180/190)
December	240/250 (190)	220/230(180/190)

* Operating draughts of cargo vessels are indicated in parenthesis for the relevant period of 2021.

In July (and August), there were occasional long stops of convoys, organisation of special pilotage for barges, lightering of vessels to operating draughts on some critical sections, which led to a decrease in traffic volumes on the sections controlled by the Market observation system for Danube navigation:

- the transport volume in July came to: 78.8%, on the Upper Danube (data provided by the Gabčikovo lock), 93,2% on the Middle Danube (data provided by the Mohács checkpoint) of the volume in June;
- the average load of barges of pushed convoys (upstream/downstream) was 1,150 - 1,200 t; motorized cargo vessels of 110 m length: 950 – 1,100 t (motorized vessels of 135 m length did not operate on the Upper Danube in July);
- the transport volume on the Danube-Black Sea Canal amounted to 78.7% of the volume in June;
- the number of passages of passenger cabin ships towards the Danube delta came to 74.3% of the number of passages in June.

2.2. Observation of ship traffic and cargo transport in 2022

2.2.1. **Passenger transport**

2.2.1.1. Transport on the Upper Danube

Relatively stable passenger transport on cruise ships with cabins started in May.

"Short" trips lasting 5, 7 or 8 days on the Passau – Vienna – Bratislava – Budapest – Passau and Vienna – Bratislava – Budapest lines, as well as voyages to and from ports on the Rhine and the Main, as well as voyages to the Danube delta accounted for the largest share of passenger transport by cabin ships (Table 2.2):

Table 2.2

Passenger transport trends[1]
(in thousands)

Lines	Year				
	2018	2019	2020	2021	2022
Upper Danube	548,8	720,8	56,1	149,1	469,3
To the Danube delta	103,6	135,04	5,15	34,1	74,08

- A total of 3,838 passages were recorded at the Jochenstein lock (cross-border transport between Austria and Germany (AT/DE)), which corresponds to 305.8% of the figure for 2021, of which 64.7% are in the second half of the year.

- A total of 4,040 passages were recorded through the Gabčikovo lock (cross-border transport between Hungary and Slovakia (HU/SK)) (Fig. 3), of which 2,018 – upstream, 2,022 – downstream, (in 2019 – 5,141, in 2020 – 557, in 2021– 1,419).

- A breakdown of passenger numbers on the Upper Danube by flag state in 2015-2022 is shown in Table 2.3.

[1] As calculated by the Secretariat of the Danube Commission, based on data from Gabčikovo and Mohács (this refers to upstream/downstream totals).

Table 2.3

Breakdown of passenger numbers on the Upper Danube by flag state (2015-2022)

Flag state	2015	2016	2017	2018	2019	2022
Germany	17.4%	15%	18.9%	19.8%	18.1%	16.8%
Bulgaria	4.3%	6.9%	5.1%	5.3%	5.2%	4.2%
Ukraine	1.8%	3.9%	5.0%	4.5%	5.0%	3.9%
Non-members of the DC	74%	70.5%	68.5%	68.6%	68.9%	72.5%

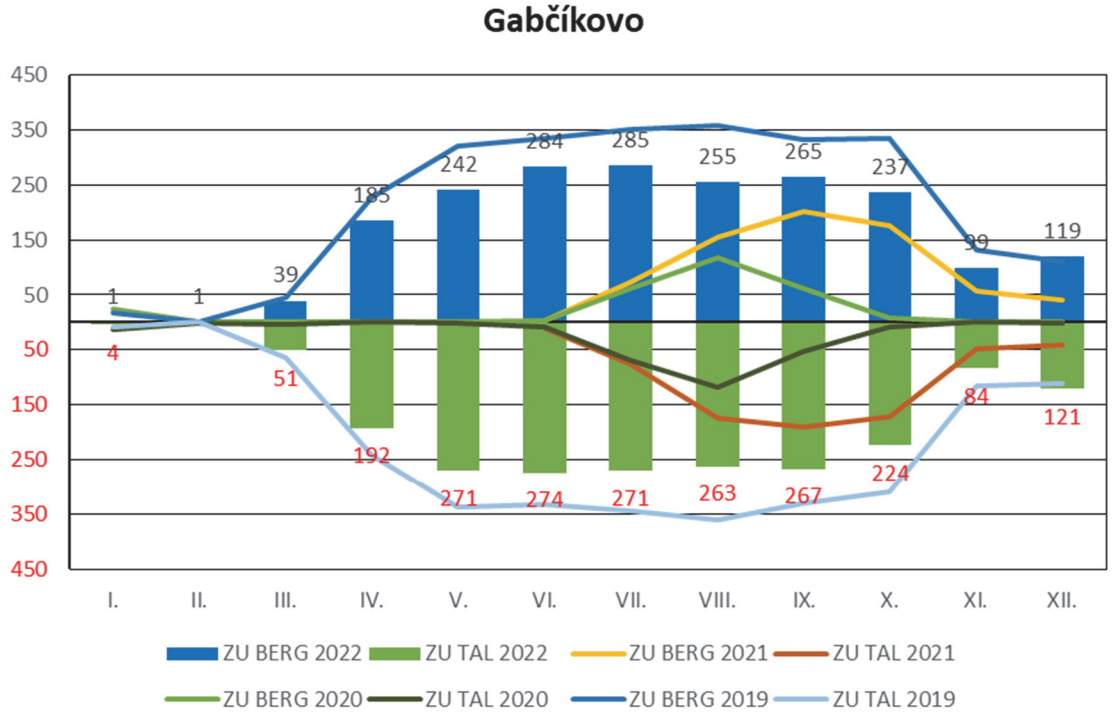


Fig. 3: Upstream and downstream passages of passenger cabin ships through the GABČIKOVO lock per month in 2019-2022

In total in 2022, out of 4,040 passages of passenger vessels through the Gabčikovo lock the following was recorded:

- vessels with the length of 110 m: 1,601 (in 2019 – 1,655, in 2020 – 343, in 2021 - 676) passages;
- vessels with the length of 135 m: 2,331 (in 2019 – 2,567, in 2020 – 181, in 2021 - 700) passages, out of them 1,978 vessels flying flags of countries that are not members of the DC;

Average capacity utilization in June was for the vessels with the length of:

- 110 m: 100-105 passengers (in 2019 – 130);
- 135 m: 115-120 passengers (in 2019– 158).

2.2.1.2. Transport on the Middle Danube: cross-border transport between Hungary, Croatia and Serbia (HU/HR/RS) (statistics of the Mohacs checkpoint).

Passenger transport on cabin ships (this transport is based on the lines from Passau and from Vienna to the Danube delta with duration of 14 – 15 - 16 days). There were 726 passages, of which 368 – upstream, 358 – downstream (in 2019 – 1,017, in 2020 – 58, in 2021 – 328) (Fig. 4), 74,08 thousand passengers were transported (Table 2.2).

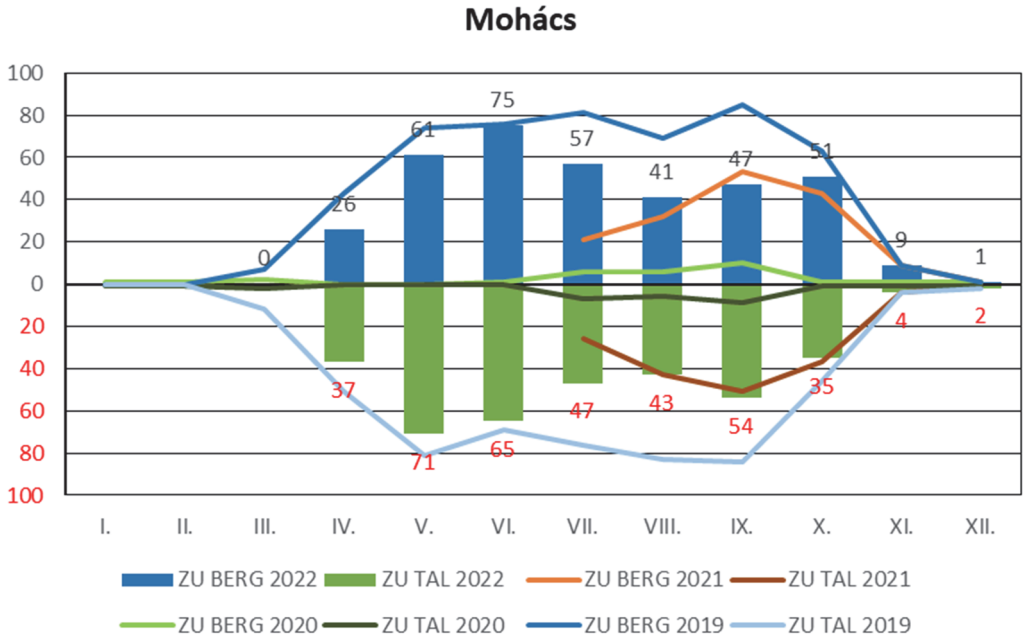


Fig. 4: Upstream and downstream passages of passenger cabin ships through MOHACS per month in 2019-2022

2.2.2. Cargo transport

2.2.2.1 Transport on the Upper Danube

Transport volume

a) The volume of cargo transported through the Jochenstein lock (cross-border transport between Germany and Austria (DE/AT)) in 2022 was 2,166 thousand tonnes, which is by 2.49% less than in 2021.

   At the same time, compared to 2021, there was a decrease in the volume of transport downstream *(Talverkehr)* by 0.42% and a decrease upstream *(Bergverkehr)* by 3.84%.

   The number of passages of loaded vessels in 2022 was 103.3% compared to those in 2021.

b) The volume of registered cargo transported through the Gabcikovo lock (cross-border transport between Hungary and Slovakia (HU/SK)) in 2022 was 4,342 thousand tonnes, which is 87.8% compared to the volume of 2021 (Fig. 5). Upstream transit was around 2,396 thousand tonnes, or 55.2% of the total volume (in 2018 – 65%, in 2019 – 63.3%, in 2020 – 65.8%, in 2021 – 58.9%).

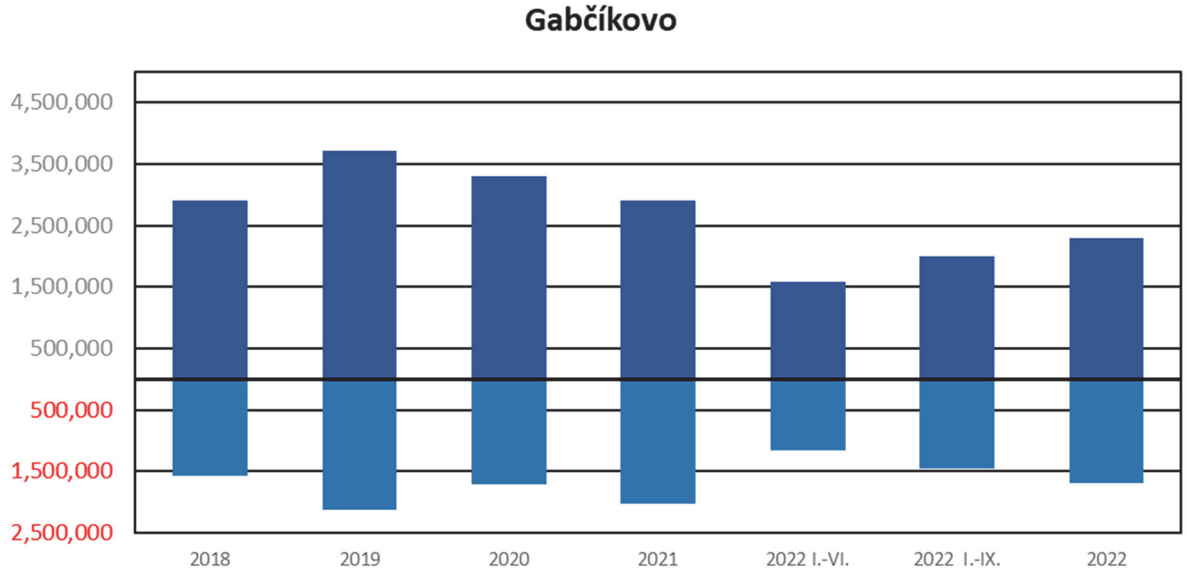


Fig. 5: Upstream and downstream cargo transport volume through the GABČIKOVO lock in tonnes per year

The volume of transported dry cargo *(trocken)* comprised 3,608 thousand tonnes, out of them:

- upstream *(zu Berg)* – 2,304 thousand tonnes;
- downstream *(zu Tal)* – 1,304 thousand tonnes, *i.e.* at ratio of 1,77: 1 (in 2018 – 2.6 : 1, in 2019 – 2.35 : 1, in 2020 – 2.74 : 1, in 2021 – 2.4 : 1).

Transported liquid cargo *(tank)* comprised 734 thousand tonnes, out of them:

- upstream – 92,1 thousand tonnes;
- downstream – 642 thousand tonnes, *i.e.* at ratio of 0,14 : 1 (in 2018 – 0.53 : 1, in 2019 – 0.33 : 1, in 2020 – 0.35 :1, in 2021 – 0.1 : 1).

Ship traffic

Transport by pushed convoys (statistics of the Gabcikovo lock)

In total, pushed convoys carried more than 2,068 thousand tonnes in 2022, which corresponds to approximately 84.4% of the volume transported in 2021 and 47.6% of the total volume of cargo carried through the Gabcikovo lock, including liquid cargo (in 2018 – 58.2%, in 2019 – 59.4%, in 2020 – 49.2%, in 2021 – 49.5%).

a) Pushed convoys carried a total volume of 1,836 thousand tonnes in dry cargo (Fig. 6):

- upstream – 1,050 thousand tonnes, making up 45.6% (in 2018 - 58.8%, in 2019 – 56.4%, in 2020 – 31.8%, in 2021 – 50.2%) of all dry cargo carried upstream;
- downstream – 786 thousand tonnes, making up 60% of all dry cargo carried downstream.

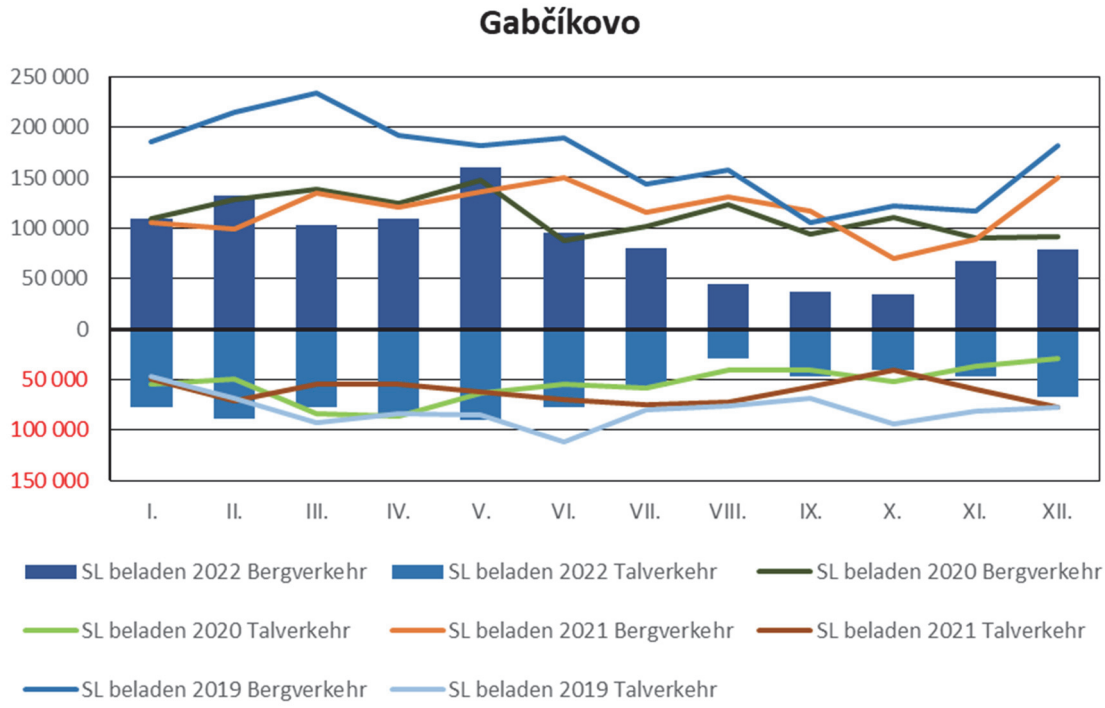


Fig. 6. Upstream and downstream cargo transport volume carried by dumb barges through the GABČIKOVO lock in 2019 - 2022 in tonnes per month

A total of 1,004 dumb barges in pushed convoys travelled upstream (in 2020 – 1,193, in 2021 – 1,250), out of them only 8% (in 2018 – 18.9%, in 2019 – 14.6%, in 2020 – 6%, in 2021 – 6%) carrying ballast. At the same time, out of 1,075 dumb barges travelling downstream, 17% – were ballasted (in 2018 – 45%, in 2019 – 33%, in 2020 – 34%%, in 2021 – 31.6%).

b) Tank barges in pushed convoys carried a total volume of 232 thousand tonnes of liquid cargo, out of them:

- upstream – 37 thousand tonnes;
- downstream – 194,3 thousand tonnes.

A total of 44 loaded tank barges and 174 ballasted tank barges travelled upstream in pushed convoys; while 187 loaded tank barges and 26 tank barges carrying ballast travelled downstream.

Cargo transport by motorized vessels

In 2022, motorized vessels carried a total of about 2,275 thousand tonnes of cargo, accounting for 52.4% (in 2018 – 41.8%, in 2019 – 40.6%, in 2020 – 50.5%, in 2021 – 50.5%) of the total volume of cargo, and 91% as compared to the volumes in 2021.

- upstream – 1,309 thousand tonnes,
- downstream – 966 thousand tonnes.

a) In total, motorized dry cargo vessels carried 1,772 thousand tonnes that account for 96.6% of the volume in 2021, out of them:

- upstream – 1,254 thousand tonnes;

- downstream – 518 thousand tonnes.

In total 1,454 motorized dry cargo vessels travelled upstream in 2022 (in 2019 – 1,642, in 2020 – 1,794, in 2021 – 1,492) (out of them 90% were loaded), downstream – 1,597 (in 2019 – 1,571, in 2020 – 1,875, in 2021 – 1,504) vessels (out of them 42% were loaded), indicating a balance in motorized dry cargo vessels on the Danube.

Traffic figures (ratio) of motorized dry cargo vessels are shown in Table 2.4 a).

Table 2.4 a)

Traffic figures (ratio) of motorized dry cargo vessels on the Upper Danube

Ratio	2017	2018	2019	2020	2021	2022
Loaded upstream/ downstream	2,16:1	2,45:1	2,7:1	2,81:1	2,51:1	1,96:1
Loaded/ ballasted upstream	16,3:1	10,9:1	13,8:1	16,3:1	11,9:1	8,6:1
Loaded/ ballasted downstream	0,76:1	0,6:1	0,57:1	0,47:1	0,57:1	0,71:1

Through the Gabcikovo lock 3,051 motorized dry cargo vessels travelled, out of them:

- vessels with a length of 110 m – 289 loaded units, out of them 91 – upstream, 198 - downstream (in 2019 – 246, in 2020 - 276, in 2021 - 330), which in total carried 321,6 thousand tonnes;
- vessels with a length of 135 m (a "large European vessel") – 44 loaded units (29 – upstream), which in total carried 44,6 thousand tonnes, and 20 ballasted units;
- specialised ships ("ro-ro" ships, container ships, et al.) – 118 vessels in total.

b) Motorized tankers carried in total 503 thousand tonnes in liquid cargo, out of them:

- upstream – 55,1 thousand tonnes;
- downstream – 448 thousand tonnes.

In 2022, in total, 455 motorized tankers travelled upstream, out of them 16% were loaded, downstream – 457, out of them 90% were loaded.

Ratios for transport by motorized tankers are shown in table 2.4 b).

Table 2.4 b)

Traffic figures (ratio) of motorized tankers on the Upper Danube

Ratio	2017	2018	2019	2020	2021	2022
Loaded upstream/ downstream	0,41:1	0,51:1	0,41:1	0,63:1	0,17:1	0,18:1
Loaded/ ballasted upstream	0,44:1	0,56:1	0,48:1	0,90:1	0,18:1	0,19:1
Loaded/ ballasted downstream	2,7:1	2,4:1	3,6:1	2,33:1	9,36:1	8,93:1

Nomenclature of goods (statistics of the Gabcikovo lock):

Food products, iron ore raw materials, liquid (oil products) cargo and grain cargo, chemical products and metal products accounted for the largest share of cargo transport volume through the Gabcikovo lock (Fig. 7). The percentage ratio of cargo volumes in upstream and downstream cargo transport (cross-border transport between Hungary and Slovakia (HU/SK)) is shown in tables 2.5 and 2.6.

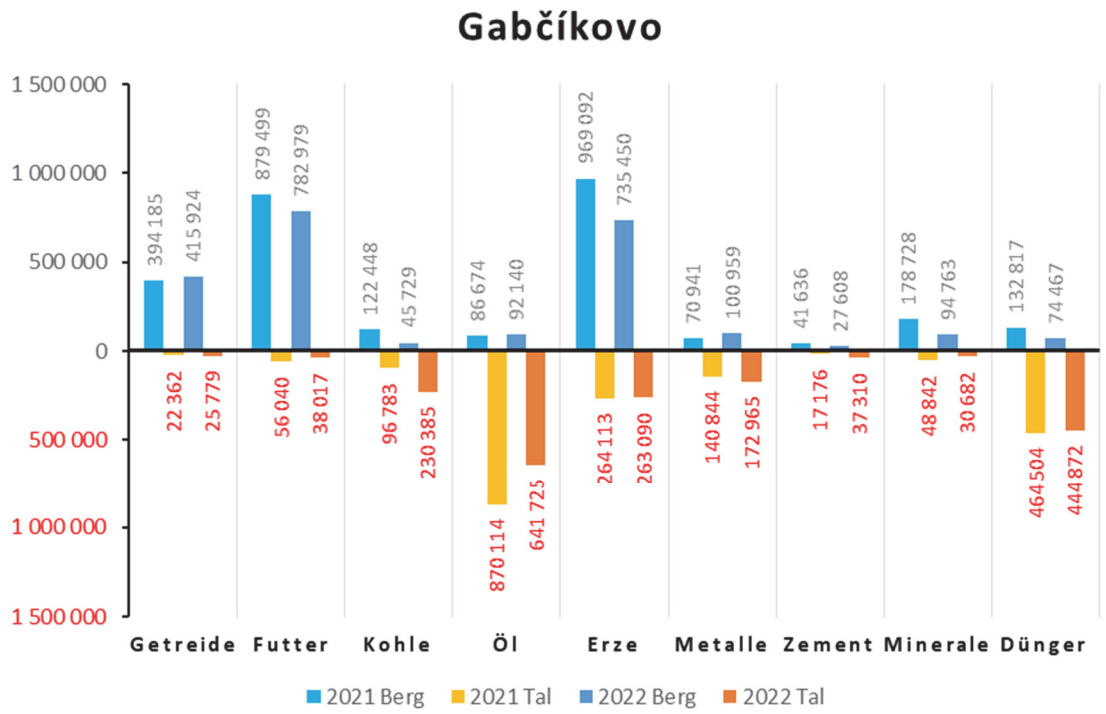


Fig. 7. Upstream and downstream cargo transport volume through the GABČIKOVO lock in tonnes by groups of goods in 2021 - 2022

Table 2.5

Cargo volumes in upstream HU/SK cross-border transport (by nomenclature)

Year, thousand tonnes / Commodity group	2017	2018	2019	2020	2021	2022
Food products and animal feed	1.389 38,7%	1.022 35,1%	1.774 48%	1.321	879	783
Iron ore raw materials	803 22,3%	669 23%	841 22%	948	969	735
Grain	308 8,5%	252 8,6%	271 7,3%	352	394	416
Metal products	473 13,1%	418 14,3%	340 9,2%	117	71	101
Petroleum products	286 7,9%	317 10,9%	241 6,5%	212	86,7	92,1
Organic and synthetic fertilizers	165 4,6%	86,2 3%	91,5 2,5%	75,2	132,8	74,5

Table 2.6

Cargo volumes in downstream HU/SK cross-border transport (by nomenclature)

Year, thousand tonnes / Commodity group	2017	2018	2019	2020	2021	2022
Organic and synthetic fertilizers	513 26,6%	317 20,1%	535 25%	505	464,5	444,9
Petroleum products	631 32,7%	585 37,1%	671,3 31,4%	578	870	642
Metal products	432 22,4%	435 27,6%	380,4 17,8%	96,5	140	173

2.2.2.2 Transport on the Middle Danube (statistics of the checkpoint at Mohacs), cross-border transport between Hungary, Croatia and Serbia (HU/HR/RS))

Transport volume

The volume of registered cargo transported through Mohacs in 2022 comprised around 3,972 thousand tonnes (Fig. 8), or 68.4% of the volume of cargo transported in 2021, out of them upstream transit – 2,287 thousand tonnes, that is 57,6% (in 2018 – 57.4%, in 2019 – 59.4%, in 2020 – 42.2%, in 2021 – 50%).

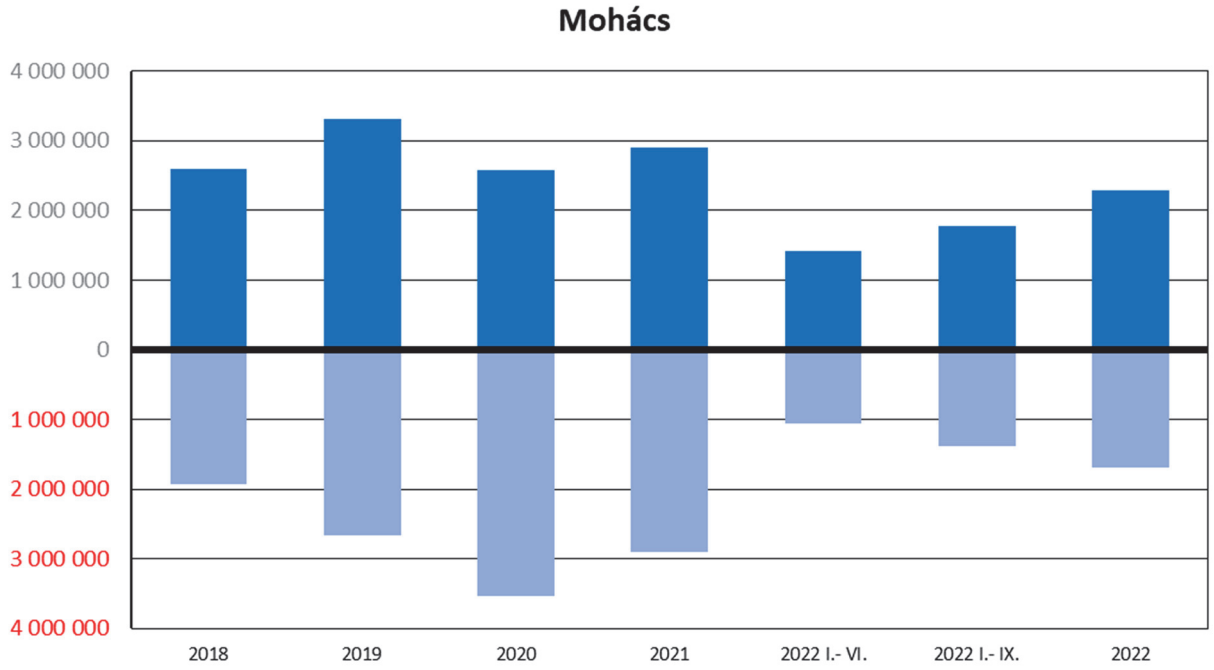


Fig. 8: Upstream and downstream cargo transport volume through MOHACS in tonnes per year

The volume of transported dry cargo comprised 3,398 thousand tonnes, out of them:

- upstream – 2,030 thousand tonnes,
- downstream – 1,368 thousand tonnes.

Transported liquid cargo 707,6 thousand tonnes, out of them:

- upstream – 251,9 thousand tonnes,
- downstream – 322 thousand tonnes.

Ship traffic

Transport by pushed convoys

In total, pushed convoys carried more than 2,899 thousand tonnes through the Mohacs checkpoint in 2022, which amounted to 73% of the total volume of cargo, including liquid cargo (in 2018 – 78.7%, in 2019 – 79.5%, in 2020 – 75.7%, in 2021 – 78%).

a) Pushed convoys carried in total 2,717 thousand tonnes in dry cargo (Fig. 9), making up 63% of the total volume of cargo in 2021, out of them:

   - upstream – 1,585 thousand tonnes, which makes 78% (in 2018 – 87.7%, in 2019 – 79.5%, in 2020 – 43.9%, in 2021 – 83.3%) of the total volume of dry cargo transported upstream;

- downstream – 1,132 thousand tonnes, which makes 82.7% (in 2018 – 84.8%, in 2019 – 82.3%, in 2020 – 56.1%, in 2021 – 85.3%) of the total volume of dry cargo transported downstream.

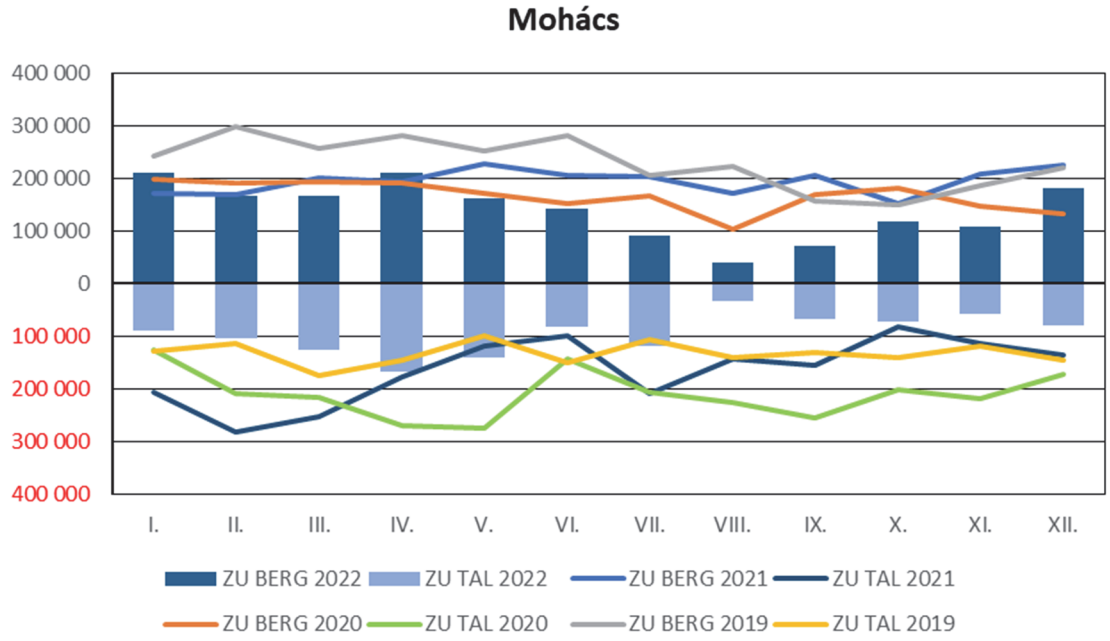


Fig. 9. Upstream and downstream dry cargo transport volume carried by pushed convoys through MOHACS in tonnes per month

In total, 1,540 dumb barges in pushed convoys travelled upstream in 2022 (in 2021 - 2,403), out of them 13% (in 2018 – 15%, in 2019 – 11%, in 2020 – 35.4%%, in 2021 – 35.4%) carrying ballast. At the same time, out of 1,661 (in 2021 – 2,271) dumb barges travelling in pushed convoys downstream 33% (in 2021 – 20.1%) of units were ballasted.

b) Tank barges in pushed convoys carried a total volume of 181,7 thousand tonnes in liquid cargo, out of them:

- upstream – 87,6 thousand tonnes;
- downstream – 94,1 thousand tonnes.

A total of 178 tank barges travelled upstream in pushed convoys, out of them 56% were loaded; while downstream 158 motorized tank barges travelled, out of them 49% were loaded.

Cargo transport by motorized vessels

In 2022, motorized vessels carried in total 1,073 thousand tonnes, accounting for 27% (in 2018 – 21.3%, in 2019 – 20.5%, in 2020 – 24.2%%, in 2021 – 22%) of the total volume transported through the Mohacs checkpoint, out of them:

- upstream – 608,7 thousand tonnes,
- downstream – 464,6 thousand tonnes.

a) Motorized dry cargo vessels (1,124 passages, out of them 67% loaded) carried 681 thousand tonnes, out of them:

- upstream – 444,4 thousand tonnes;

- downstream – 236,6 thousand tonnes.

b) Motorized tank barges (714 passages in total, out of them 72% loaded tank barges) carried 392,3 thousand tonnes of liquid cargo (Fig. 10), out of them:

- upstream – 164,3 thousand tonnes.
- downstream – 228 thousand tonnes.

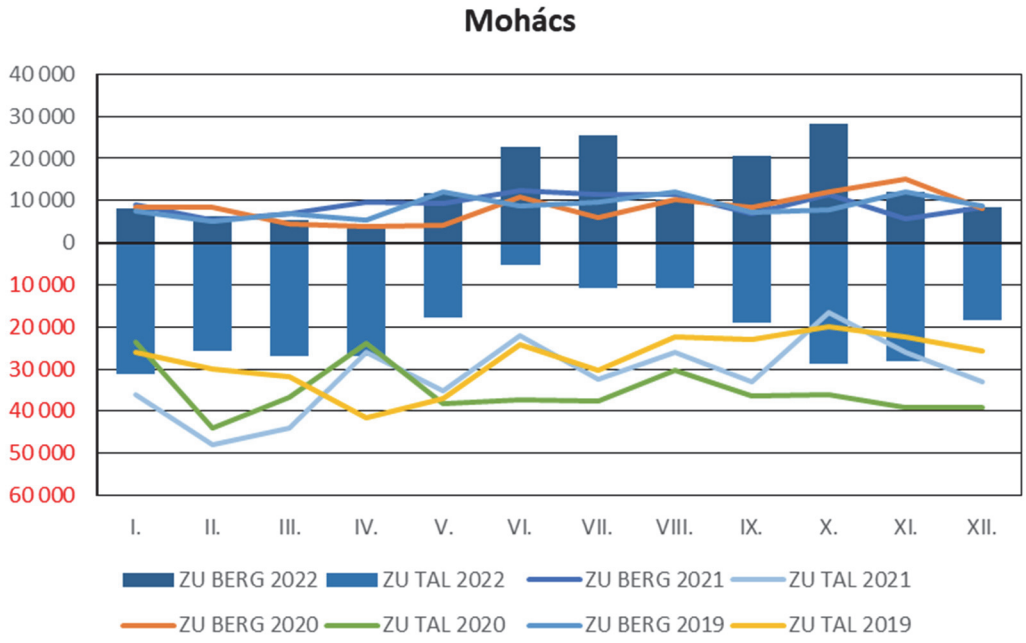


Fig. 10. Upstream and downstream cargo transport volume through MOHACS in 2019 - 2022 in tonnes per month

Nomenclature of goods

Iron ore raw materials – upstream, metallurgical products and chemical products (fertilizers) – downstream accounted for the largest share of cargo transport volume through the Mohacs checkpoint (Fig. 11). The percentage ratio of cargo volumes in upstream and downstream transport (cross-border transport between Hungary, Croatia and Serbia HU/HR/RS) is shown in tables 2.7 and 2.8.

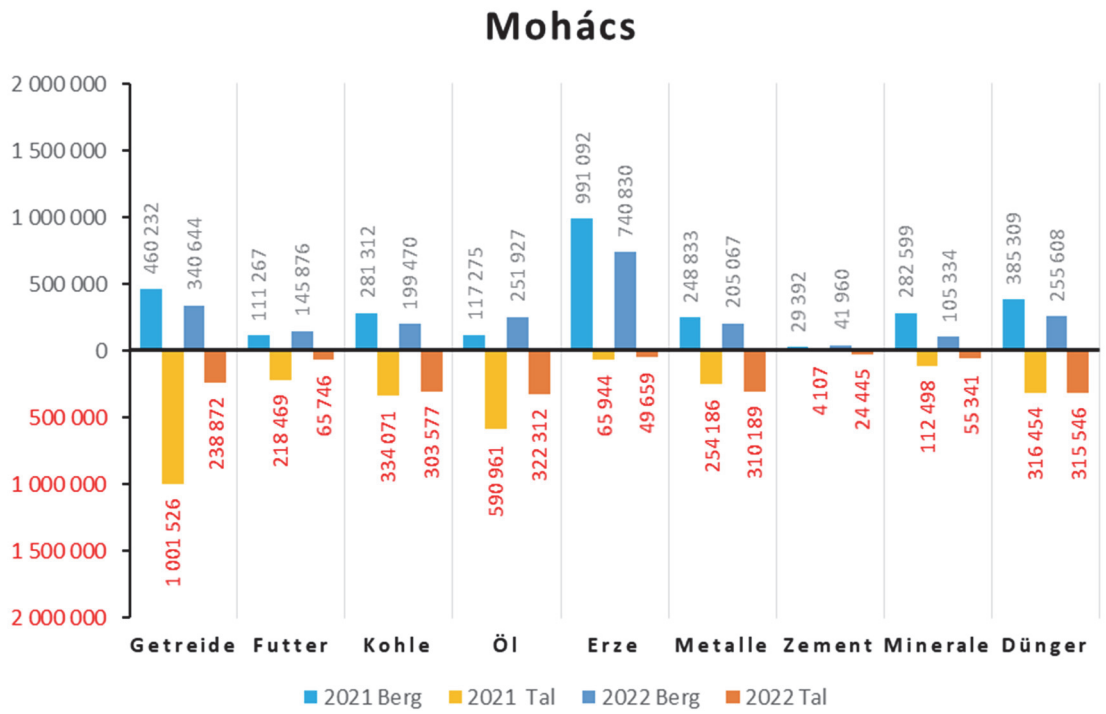


Fig. 11. Upstream and downstream cargo transport volume through MOHÁCS in tonnes by groups of goods in 2021-2022

Table 2.7

Cargo volumes in upstream HU/HR/RS cross-border transport (by nomenclature)

Year, thousand tonnes / Commodity group	2018	2019	2020	2021	2022
Iron ore raw materials	1.061 40.8%	1.247 37.6%	954	991	741
Coal (coke)	369 14.2%	479 14.4%	323	281	199,5
Fertilizers	362 13.9%	392 11.8%	436	385	255,6
Petroleum products	106 4.1%	109 3.2%	106	117	251,9
Metal products	297 11.4%	270 8.1%	243	249	205

Table 2.8

Cargo volumes in downstream HU/HR/RS cross-border transport (by nomenclature)

Year, thousand tonnes / Commodity group	2018	2019	2020	2021	2022
Grain	414 21.5%	479 21.1%	1.471	1.002	238,9
Petroleum products	509 26.4%	428 18.9%	528	591	322,3
Metal products	444 23.6%	316 13.9%	295	254	310
Food products and animal feed	179 3.3%	203 9%	520	218,5	65
Fertilizers	126 6.3%	272 12%	364	316	315,5

The peculiarity of the 2022 market is the significant volume of grain transport upstream – 340,6 thousand tonnes (in 2021 - 400 thousand tonnes) and a sharp drop in grain (by 4.2 times) and foods products (by 3.36 times) transport downstream.

2.2.3. Inter-basin transport

2.2.3.1 Transport on the Danube – Black Sea Canal

In 2022, the volume of transport on the Danube – Black Sea Canal amounted to 17,265 thousand tonnes[2], which makes it 99.8% of the similar period in 2021, out of them:

- international cargo transport: 11,991 thousand tonnes (131.7% of the figure for 2021);
- domestic cargo transport: 5,274 thousand tonnes (64.5% of the figure for 2021).

Monthly trends in cargo transport are shown in Figure 12. Transport trends by years are shown in Table 2.9.

[2] *www.acn.ro.*

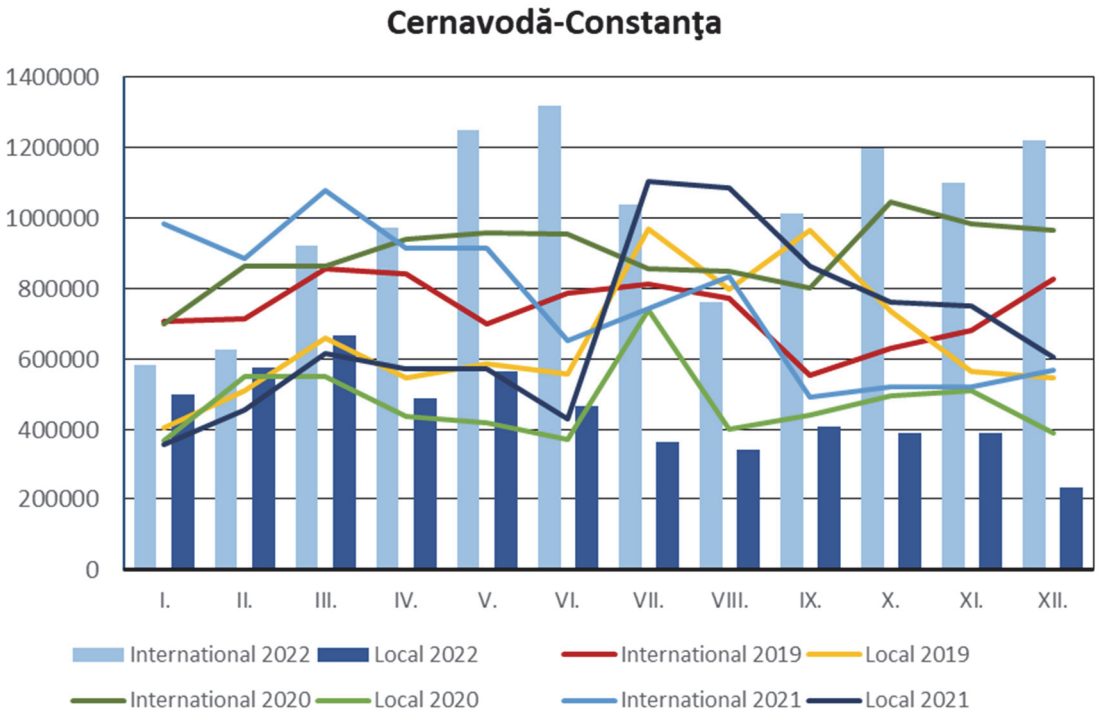


Fig. 12: International and domestic cargo transport volume on the CERNAVODA-CONSTANȚA Canal in 2019-2022 in tonnes per month

Table 2.9

Cargo transport volume on the Danube-Black Sea Canal by years

Year / mln. tonnes	2018	2019	2020	2021	2022
Total cargo transport	14,12	16,74	16,51	17,29	17,27
International cargo transport	6,42	8,89	10,60	9,11	12,0
Domestic cargo transport	7,7	7,85	5,91	8,18	5,27

2.2.3.2. Cargo transport on the Sulina Canal

In 2022 [3], cargo transport on the Sulina Canal comprised only 10,568 thousand tonnes, which accounts for 208.4.% of the similar figure for 2021 (Table 2.10).

[3] www.afdj.ro

Table 2.10

Cargo transport volume on the Sulina Canal by years

Year, thousand tonnes	2018	2019	2020	2021	2022
Cargo turnover	4.441	5.487	4.549	5.070	10.568
the Danube - Sea	3.670,3	4.331	2.872	3.389	7.217
Sea – the Danube	770,3	1.156	1.677	1.681	3.351

Section 3.

Overview of cargo handling in Danube ports

3.1 DANUBE PORTS IN GERMANY

3.1.1 The total volume of cargo handled in Germany's Danube ports in 2022 [4] came to 2,410 thousand tonnes, or 80.4% of the cargo volume handled in 2021 (Table 3.1).

Table 3.1

Year (thousand tonnes)	2018	2019	2020	2021	2022
Volume of cargo handled	2.585	3.274	3.511	2.999	2.410

3.1.2 Cargo turnover in Germany's major Danube ports is shown in Table 3.2.

Table 3.2

Ports (thousand tonnes)	Kelheim	Regensburg	Straubing-Sand	Deggendorf	Passau	Other
2018	258	1.169	430	169	369	190
2019	369	1.387	660	216	359	282
2020	361,5	1.553	660,8	144	473	312,6
2021	356,3	1.303	663,4	131,6	250,9	294
2022	301,6	1.083	551,6	82,9	229,4	162

Goods in 5 major groups according to NST 2007 accounted for 94.5% of the total volume of cargo turnover, taking into account the ports of Bamberg and Nuremberg (Table 3.3).

[4] www.statistik.bayern.de.

Table 3.3

Groups (thousand tonnes)	01	04	08	10	03
Unloaded	364,3	285,3	289	161,3	249
Loaded	467,6	269,2	28	82,7	81,8
2019	1.205	559,5	521	450,7	327
2020	1.504	656,7	418,8	323,6	412,6
2021	1.298	573,2	358,6	304,4	392,6
2022	831,9	554,5	317	244	330,8

3.1.3 The largest volumes of cargo by groups:

Agricultural products (group 01)

- accepted by ports: Straubing-Sand – 66.2%, Regensburg – 9.6% of the total volume of unloaded cargo of group 01;
- shipped: Regensburg – 33.4%, Straubing-Sand – 7.6%, Kelheim – 20,5 %, Passau – 5.7% of the total volume of loaded cargo of group 01.

Food products (group 04)

- accepted by ports: Regensburg – 60.6%, Passau - 7.4%, Kelheim – 12.5%;
- shipped: Straubing-Sand – 73.1%, Regensburg – 16.7%.

Chemical substances and products (group 08)

- accepted by ports: Regensburg – 42.5%, Kelheim – 15.5%, Straubing-Sand – 12.9%.

Finished metal items (group 10)

- accepted by ports: Regensburg – 57.3%, Deggendorf – 20.8%;
- shipped: Regensburg – 92.3%.

Iron ore raw materials (group 03)

- accepted by ports: Kelheim – 23,3%, Regensburg – 27,2%;
- shipped: Regensburg – 71%.

3.2 PORTS IN AUSTRIA

3.2.1 The total volume of cargo handled in Austria's Danube ports in 2022 [5] came to 5,363 thousand tonnes, or 84.4% of cargo volume handled in 2021 (Table 3.4).

[5] www.statistik.at.

Table 3.4

Year (thousand tonnes)	2018	2019	2020	2021	2022
Loaded	2.053	2.259	2.061	2.425	1.897
Unloaded	4.070	4.193	3.989	3.931	3.466
Volume of cargo handled	6.123	6.452	6.050	6.356	5.363

The total volume of cargo handled, carried in domestic transport, comprised 776 thousand tonnes; it corresponds to 14.5% of the total volume of cargo handled in the ports of the country.

3.2.2 The volumes of cargo handled in main ports in Austria in 2022 are shown in Table 3.5.

Table 3.5

Ports (thousand tonnes)	Vienna	Linz	Krems	Enns
Loaded	412	1.240	55,4	78,6
Unloaded	171	1.689	242,2	475
Volume of cargo handled in 2019	952	3.280	305	776
Volume of cargo handled in 2020	787	3.411	249	616
Volume of cargo handled in 2021	927	3.482	286	672
Volume of cargo handled in 2022	583	2.929	297,6	553,6

3.2.3 Shipped to ports of other countries (Table 3.6):

Table 3.6

Country (thousand tonnes)	Germany	Hungary	Romania	The Netherlands	Belgium	Serbia
2018	253	647	371	107	200	91
2019	361	784	466	155,5	200,5	135
2020	318,7	731	416	154,8	152,5	145
2021	400	896	413	123,4	256,8	104
2022	902	650	482,7	180,6	180,6	97

123,4 thousand tonnes were shipped to Slovakia's ports.

– 33.2% of loaded cargo was comprised of: metal products (group 10), out of which 98.2% were loaded in the port of Linz;

– 25.6% - petroleum products (group 07), 100% were loaded in the port of Vienna;

– 24.7% - chemical products (group 08), out of which 87.7% were loaded in the port of Linz.

3.2.4 Received from ports of other countries (Table 3.7):

Table 3.7

Country (thousand tonnes)	Slovakia	The Netheralnds	Ukraine	Hungary	Germany	Romania
2018	1.233	349	811	735	253	165
2019	1.108	539	832	679	285	215
2020	1.245	423	893	784	261	127
2021	1.225	467	847	574	295	244
2022	1.286	400	396,7	920	362	518

269,6 thousand tonnes received from Serbia's ports

– 54.1% of cargo unloaded by the ports in Austria was comprised of iron ore raw materials (group 03) in the amount of 1,876 thousand tonnes, out of which about 88.7% were accepted by the port of Linz;

– 12.8% were petroleum products (group 07), out of which 26.8% were accepted by the by the port of Vienna, 15.8% - by the port of Linz;

– 23.1% - agricultural products (group 01), out of which 22.5% were accepted by the port of Enns, 69.2% – other ports of Austria.

3.3 PORTS IN SLOVAKIA

3.3.1 The total volume of cargo handled by public ports in Slovakia is mostly determined by the volume of cargo handled by the ports of Bratislava and Komarno (Table 3.8), which in 2022 comprised 1,934 thousand tonnes, or 109.1% of cargo volume handled in 2021.

Table 3.8

Year (thousand tonnes)	2018	2019	2020	2021	2022
Loaded	1.464	1.515	1.443	1.674	1.769
Unloaded	78	149	110	172	165,2
Volume of cargo handled	1.542	1.664	1.553	1.846	1.934

3.3.2 The main volume of cargo:

- about 48% -iron ore materials;
- about 26% - petroleum products.

3.4 PORTS IN HUNGARY

3.4.1 The total volume of cargo handled in the ports in Hungary in 2022[6] came to 4,063 thousand tonnes, or 71.1% of cargo volume handled in 2021 (Table 3.9).

Table 3.9

Year (thousand tonnes)	2018	2019	2020	2021	2022
Loaded	2.785	3.204	4.489	3.109	1.924
Unloaded	2.415	2.860	2.253	2.606	2.139
Volume of cargo handled	5.200	6.064	6.742	5.715	4.063

3.4.2 The volumes of cargo handled in main ports in Hungary are shown in table 3.10.

Table 3.10

Ports (thousand tonnes/ year)	Baja	Csepel	Győr - Gönyű	Other
2018	347	918	105,6	3.829
2019	505	1.130	225,4	4.204
2020	845	1.192	280	4.424
2021	581	1.199	266,6	3.668
2022	305,7	985	270,6	2.501

3.5 PORTS IN CROATIA

3.5.1 The total volume of cargo handled in the river ports in Croatia in 2022[7] was 582,6 thousand tonnes, or 83.6% of cargo volume handled in 2021 (Table 3.11).

Table 3.11

Year (thousand tonnes)	2018	2019	2020	2021	2022
Loaded: - export	279,3	277	393,3	273,6	124,0
Unloaded: - import	239,9	472	463,1	394,3	420,4

[6] www.ksh.hu.
[7] www.dzs.hr.

Volume handled, incl. domestic transport	591,7	814	947,8	697,1	582,6

3.5.2 Agricultural products (group 01) accounted for 12.2% of the cargo volume handled, iron ore raw materials (group 03) accounted for 40.2% , hard coal and lignite (group 02) accounted for 33.9% , and metal products (group 10) accounted for 7.6%.

3.6 PORTS IN SERBIA

3.6.1 The total volume of cargo handled in the ports of Serbia[8] in 2022 came to 12,023 thousand tonnes, or 88.3% of cargo volume handled in 2021 (Table 3.12).

Table 3.12

Year (thousand tonnes)	2018	2019	2020	2021	2022
Loaded - export	2.321	3.593	3.752	3.707	1.918
Unloaded - import	4.020	5.061	3.207	5.182	4.992
Domestic cargo transport	1.088	1.081	1.205	4.721	5.113
Volume of cargo handled	7.429	9.735	8.164	13.610	12.023

- 33.9% of all cargo volumes are represented by construction materials (gravel and sand);[9]
- 9.8% - iron ore raw materials;
- 5.7% - grain;
- 16.1% - oil and petroleum products;
- 17.4% - coal.

3.6.2 The volumes of cargo handled in the major ports of Serbia are shown in Table 3.13.

Table 3.13

Ports (thousand tonnes)	Pancevo	Smederevo	Belgrade	Novi Sad	Prahovo
2018	1.390	3.563	160	1.047	1.053
2019	1.517	4.040	196	1.413	1.109
2020	2.051	2.612	167	1.632	1.198
2021	935	3.176	206	1.435	1.049
2022	1.589	3.053	112	979	933

[8] webrzs.stat.gov.rs
[9] Data by the Port Governance Agency, Serbia.

3.7 PORTS IN ROMANIA

3.7.1 The following ports contribute to the total volume of cargo handled in the Danube ports of Romania:
- ports located on the maritime Danube;
- ports located on the fluvial Danube;
- ports located on the Danube – Black Sea Canal and the port of Constanta.

3.7.2 The total volumes of cargo handled in the main ports of Romania located on the maritime Danube are shown in Table 3.14[10].

Table 3.14

Ports (thousand tonnes)	Braila	Tulcea	Galaţi
Cargo volume handled: – Inland waterway vessels			
2018	476	1.748	3.031
2019	397	1.660	3.077
2020	281	1.213	2.831
2021	512	1.329	3.350
2022	825	479	3.054
– Maritime vessels			
2018	481	56	1.320
2019	835	15	2.061
2020	327	12	2.425
2021	340	3	2.496
2022	278	10	2.119

The volume of cargo handled for maritime vessels forms the major volume of cargo transport on the Sulina Canal. In 2022, cargo transport on the Sulina Canal comprised 10,568 thousand tonnes, or 208.4% of the volume transported in 2021.

3.7.3 The total volume of cargo handled in the ports of Romania, including cargo carried by inland waterway vessels in the port of Constanta (15,393 thousand tonnes) amounted to 24,355 thousand tonnes, or 85.6% of the volume handled in 2021; it is shown in Table 3.15.

Table 3.15

Year (thousand tonnes)	2018	2019	2020	2021	2022
Loaded :					
– International cargo transport	4.008	5.609	5.112	5.203	5.641

[10] www.insse.ro

– Domestic cargo transport	7.549	8.190	6.602	7.108	3.857
Unloaded :					
– International cargo transport	4.532	5.674	8.217	7.121	8.900
– Domestic cargo transport	8.591	9.001	7.376	9.025	5.957
Volume of cargo handled	24.680	28.474	27.307	28.457	24.355

3.7.4 Main groups of goods handled:

- metal ores (group 03) – 35.2% of cargo volume handled, out of them 62.8% are domestic transport;
- agricultural products (group 01) – 34.5% of the volume of cargo handled, out of them 67.7% are international cargo transport;
- chemical substances (group 08) – 7.5% of the volume of cargo handled, out of them 87.4% - international cargo transport;
- coke and refined petroleum products (group 07) – 7.6% of cargo volume handled, out of them 67.8% - international cargo transport;
- metal products (group 10) – 5.1%, out of them 80.4% - international cargo transport;
- coal and lignite (group 02) – 5.3%, out of them70.5% - international cargo transport.

3.7.5 Main groups of goods exported through ports (loaded):

- group 08 – 24.6% of the volume of cargo loaded, out of them 80.7% dispatched to Serbia;
- group 07 – 20% of the volume of cargo loaded, out of them 12.8% dispatched to Bulgaria and 21.5% to Serbia;
- group 02 – 12.4% of the volume of cargo loaded, out of them 26% dispatched to Hungary and 38.3% to Serbia;
- group 03 – 28.5% of the volume of cargo loaded, out of them 62.6% dispatched to Serbia.

3.7.6 Main groups of goods imported (unloaded):

- group 01 – 62.4% of the volume of cargo unloaded, out of them 70% from Ukraine, 12.2% from Serbia, 4% from the Republic of Moldova, 9.5% from Bulgaria;
- group 03 – 17.8% of the volume of cargo unloaded, out of them 77.6% from Ukraine, 17.3% from Bulgaria;
- group 10 – 6.5% of the volume of cargo unloaded, out of them 39.1% from Austria, 39.4% from Ukraine;
- group 02 – 2.3% of the volume of cargo unloaded, out of them 23.9% from Ukraine, 54.1% from Serbia.

3.8 PORTS IN BULGARIA

3.8.1 The total volume of cargo handled in the ports of Bulgaria in 2022, including all terminals, came to 7,104 thousand tonnes[11], or 99.9% of cargo volume handled in 2021 (Table 3.16).

Table 3.16

Year (thousand tonnes)	2018	2019	2020	2021	2022
Loaded – export	2.142	2.485	2.823	3.707	3.354
Unloaded – import	1.933	1.830	1.799	2.666	2.979
Domestic cargo transport	848	1.070	809	738	771
Volume of cargo handled	4.923	5.385	5.431	7.111	7.104

The structure of export:

- granulated goods – 29.2%,
- general cargo – 3.2%,
- liquid goods – 4.06%,
- "ro-ro" cargo transport – 63.5%.

The structure of import:

- granulated goods – 3.8%,
- general cargo – 12.1%,
- liquid goods – 10.6%,
- "ro-ro" cargo transport – 39.4%.

3.9 PORTS IN THE REPUBLIC OF MOLDOVA

3.9.1 The total volume of cargo handled in the port of Giurgiulesti came to 2,144 thousand tonnes[12] in 2022, or 118% of cargo volume handled in 2021 (Table 3.17).

Table 3.17

Year (thousand tonnes)	2018	2019	2020	2021	2022
Volume of cargo handled	1.889	1.299	1.185	1.819	2.144

[11] Data by Maritime Administration of Bulgaria.
[12] Data by the Water Transport Agency of the Republic of Moldova.

3.9.2 Export cargo (grain, vegetable oil) represented 46.5% of the total volume of cargo handled in the port (997,4 thousand tonnes). While import (1,147 thousand tonnes) was mostly comprised of petroleum products, sand, crushed stone and coal.

3.9.3 As for groups of goods, they were as follows: grain – 34.8%, sand and crushed stone – 17.1%, petroleum products – 21.5%, coal (coke) – 7.35%, vegetable oil – 9.12%.

3.10 PORTS IN UKRAINE

3.10.1 The total volume of cargo handled in the Danube ports of Ukraine, including cargo transported by maritime vessels, came to 16,505 thousand tonnes [13] in 2022, or 300% of cargo volume handled in 2021. (Table 3.18), out of them grain – 6,623 thousand tonnes, or 40.1% of the total cargo volume.

Table 3.18

Year (thousand tonnes)	2018	2019	2020	2021	2022
Volume of cargo handled	6.067	5.629	4.055	5.505	16.505

3.10.2 The total volumes of cargo handled in the main ports of Ukraine are shown in Table 3.19.

Table 3.19

Ports (thousand tonnes)	Izmail	Reni
Volume of cargo handled		
2018	4.683	1.333
2019	4.283	1.275
2020	3.245	786
2021	4.071	1.370
2022	8.893	6.826

Breakdown of cargo volume:

- Port of Izmail – grain cargo – 3,059 thousand tonnes;
- Port of Reni – grain cargo –3,325 thousand tonnes;
- Port of Ust-Dunaysk – a total of 786 thousand tonnes, of which grain cargoes – 328,9 thousand tonnes.

[13] Data by the Ukrainian Sea Ports Authority.

Section 4

Conclusions

The year 2022 was defined as the period of possible recovery for Danube navigation after a drastic decline in the market of cargo and passenger transport in 2020-2021, connected with the pandemic.

In general, the results of the first two months of 2022 formed a certain positive trend of stabilisation of the Danube cargo transport and growth of the transport volume in the traditional market sectors.

4.1. The full-scale Russian military invasion of Ukraine began in February 2022 and already in March has led to a decrease in volumes in certain market sectors; there was a further destruction or transformation of separate logistics transport lines from the Danube ports of Ukraine.

It should also be noted that additional risks to the Danube navigation market have arisen in connection with Russia's military aggression against Ukraine, due to a decline in steel consumption (the European Metallurgical Association, *Eurofer,* forecasts that steel consumption is likely to fall by 3.5%[14]), rise in price of energy and iron ore raw materials, and restrictions imposed by individual countries on the export of grain and other food products. It is worth noting that the European Union and Eurozone gross domestic product growth for 2022 have been revised downwards.

In connection with the Russian blockade of Ukraine's seaports, the creation of new transport systems for the export of Ukrainian agricultural products and the import of necessary goods has become particular important. As a result, the need to develop a special logistics regime based on the Danube ports of Ukraine, the Republic of Moldova and Romania, as well as the Danube-Black Sea Canal links has become particular important.

The Danube Commission actively contributes to finding solutions to this problem within the framework of the EU-Ukraine Danube Solidarity Lanes initiative of May 2022 in support of the European Union's solidarity measures for Ukraine.

4.2. The absence of freezing on the river and lack of ice phenomena ensured uninterrupted navigation in the first quarter of 2022, meanwhile, the traditional spring flood phase was weak.

All in all, navigation conditions in 2022 should be regarded as extreme: the low water phase, which started at the end of June, was characterised as an extremely unfavourable hydrological situation, caused by extremely high temperatures and lack of precipitation in the Danube basin and in the tributary river basins. This situation led to a sharp drop in water levels along the entire Danube and, consequently, to a significant decrease in operating draughts in June and, to a large extent, in the third quarter, successively to 1.8/1.6 m and below. During this period, there were occasional long stops of convoys, organisation of special pilotage for barges, lightering of vessels to operating draughts, which led to a decrease in traffic volumes on the entire Danube.

[14] Data for October 2022.

At the same time, the measures taken (hydrotechnical and regulatory works) to ensure normal navigation on certain sections during this period are inadequate.

4.3. The capacity of freight transport in the first half of 2022 under stable navigation conditions, *i.e.,* in the absence of ice events and critical floods, traditionally creates a stable market base for the current year. The positive trend in freight transport, established in January-February, has already changed in March, due to changes in the balance of the freight transport sector caused by Russia's military aggression against Ukraine, and further – due to the low water phase, critical in terms of water depths and duration.

These circumstances have made significant adjustments to the Danube navigation market, in particular:

4.3.1. Cargo transport volumes in 2022 were as follows:

- in cross-border traffic Germany/Austria (DE/AT): 2,166 thousand tonnes, or 97.5% of the volume in 2021;
- in cross-border traffic Hungary/Slovakia (HU/SK): 4,342 thousand tonnes, or 87.8% of the volume in 2021;
- in cross-border traffic Hungary/Croatia/Serbia (HU/HR/RS): 3,972 thousand tonnes, or 68.4% of the volume in 2021, the main drop of cargo volumes was in the transportation of iron ore raw materials (upstream) (decrease by 35%), grain cargo (by 4.2 times) and food products (by 3.4 times) (downstream);
- the volume of traffic on the Danube – Black Sea Canal amounted to 10,508 thousand tonnes, or 208.4% of the volume in 2021, transport volume to the Danube – Black Sea was 213% and to the Black Sea – Danube – 199,3% of the corresponding figures in 2021.

It should also be noted that freight rates fluctuated during the year, depending on the balance of freight lines and the cost of bunker fuel (in the second, third and fourth quarters - Q_2, Q_3, Q_4 its cost was around 140%, 130%, 120% respectively compared to the first quarter).

4.3.2. Cargo capacity of ports in 2022 varied multidirectionally (see Section 3).

Particularly noteworthy is the positive development of cargo handling in the Danube ports of Ukraine, which was greatly facilitated by the DC initiative "Danube Solidarity Lanes EU-Ukraine" in support of the European Union's solidarity measures for Ukraine.

Accordingly, the increase of cargo turnover in the Danube ports of Ukraine in 2022 compared to the 2021 indicators was as follows:

- Port of Izmail – 218 %;
- Port of Reni – 500%;
- Port of Ust-Dunaysk – by 12.2 times.

4.4. In March 2022, voyages started on the main cruise lines of the freight transport market, as well as on the local transport lines. There was a further increase in the number of passages, while the increase in passenger traffic in 2022 compared to 2021 was as follows:

- on the Upper Danube lines – 315%;
- on lines to the Danube delta – 217%.

4.5. The main tasks within the market development activities for 2023 shall be the following:

- to continue to actively support the Ukrainian sector of Danube navigation,
- to implement the recommendations of the pan-European programmes for the development of inland navigation, and
- to maintain close cooperation between the DC Member States, both in conducting theoretical studies on forecasting hydrological conditions on the Danube and in implementing concrete hydrotechnical and regulatory projects in their areas of responsibility.

Prepared by the Secretariat of the Danube Commission

Cover photo: USPA / Ukrainian Sea Ports Authority
https://www.uspa.gov.ua
Printing: Multiszolg Bt.
http://www.multiszolgbt.hu
Publisher: Danube Commission
https://www.danubecommission.org/dc/en/extranet/e-library/