Market Observation for Danube Navigation: Results for period January-July 2023

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1 Overview of the Danube navigation market

1.1 Initial state of the Danube transport market in 2023

By the beginning of 2023, the initial state of the main market sectors in the Danube navigation market, was determined by the overall negative results in terms of transport volumes in 2022, which was primarily caused by the impact of Russia's full-scale military invasion of Ukraine, which started in February 2022, and the emergence of significant risks in the Danube navigation market, including direct military threats to the safety of navigation on the Lower Danube.

During the first half of 2023, the Danube Commission (DC) continued its active work to support new logistics schemes for export of Ukrainian products from the agrarian sector, as well as import of goods required by Ukraine, on the basis of the Danube ports of Ukraine within the framework of the *Danube Solidarity Lane EU-Ukraine* initiative, adopted in May 2022 in support of the European Union's solidarity measures with Ukraine.

It should be noted that with the support of the European Commission, state authorities of Romania, the Republic of Moldova and other member states of the DC, opportunities have been created to export through Ukrainian ports more than 2 million tonnes of grain and liquid bulk cargo (oil) per month. At the same time, the cargo turnover of the Danube ports of Ukraine in 2022 was 16,505 million tonnes, or 300 % in relation to the indicator of 2021. Accordingly, in comparison with the indicators of 2021, the cargo turnover of the ports amounted to:

- Port of Izmail: 218 %;
- Port of Reni: 500 %;
- Port of Ust-Dunaysk: 12 times growth.

On May 17, 2023, the UN extended the Black Sea Grain Initiative (*BSGI*) forming the so-called "grain corridor" (primarily shipments from Ukrainian seaports), however, on July 17, Russia announced its withdrawal from the initiative and effectively organized a military blockade of Ukrainian seaports.

On the night of July 24, and again in August and September, Russia attacked Ukrainian port infrastructure on the Danube River with drones, resulting in destruction and damage to the ports, destruction of grain hangars, tanks, warehouses, administrative buildings, and damage to significant amounts of grain cargo.

The attack on Ukrainian port infrastructure undermines the implementation of the *Danube Solidarity Lanes EU - Ukraine* initiative in support of the European Union's solidarity measures with Ukraine according to the *"Action Plan for EU-Ukraine Solidarity Lanes to facilitate Ukraine's agricultural exports and bilateral trade with EU"* European Union Action Plan to facilitate Ukraine's agricultural exports and bilateral trade with EU (*Brussels, 12.5.2022 COM (2022) 217 final*), which will undoubtedly affect the market dynamics and safety of shipping on the Danube.

The Danube navigation market, in the period under review, was additionally affected by the decline in steel consumption (according to *EUROFER* forecasts (July 2023), a 3% drop in demand is expected this year), especially in the construction and automotive industries, a corresponding decrease in iron ore and metallurgical coal supplies, rising energy prices and the restriction of exports of grain and other food cargo by certain countries.

The decreasing trend in freight transport volumes, especially on the Upper and Middle Danube, continued in the first half of 2023.

1.2 Dynamics of the transport market in the first half of 2023

1.2.1 In the first quarter (Q_1) of 2023, the Danube River freight transport market was shaped by the main factors listed in 1.1.1, primarily due to the continuing negative impact of Russian aggression on the main industries and the agricultural sector of the economy in the Danube and adjacent basins.

Accordingly:

- The volumes of cargo transport through the Gabcikovo hydro-power system (cross-border connection Hungary/Slovakia) in Q_1 2023 amounted to 985,2 thousand tonnes (75.4% of Q_1 2022 volumes). The main decrease in volumes in Q_1 2023 in relation to the volumes transported on this section of the Danube River in 2022 is accounted for by the upstream transport of food products and iron ore raw materials;
- the volumes of cargo transported through Mohács (cross-border connection Hungary/Croatia/Serbia) in Q_1 2023 made up 882,8 thousand tonnes, or 67.3% of the volume of cargo transported in Q_1 2022. The main decrease in volumes in Q_1 2023 is accounted for by the transport of metallurgical coals (practically not carried out) and iron ore up the Danube, as well as grain cargo towards the river delta;
- transport volumes through the Danube-Black Sea canal in Q_1 2023 amounted to 5,132 thousand tonnes (132.4% compared to the same indicator in Q_1 2022), of which:

- international traffic: 4,474 thousand tonnes, 210 % compared to Q_1 2022;
- domestic traffic: 658 thousand tonnes, which is 37.7 % by Q_1 2022.

1.2.2 Cargo turnover of the Danube ports in the first quarter of 2023 varied multi-directionally (Table 1.1).

Table 1.1 Cargo turnover of the Danube ports in the first quarter (Q_1) 2019-2023

Ports (thousand tonnes)	2019 Q_1	2020 Q_1	2021 Q_1	2022 Q_1	2023 Q_1
Germany	899	765,4	821	615	453
Austria	2,016	1,709	2,050	1,669	1,232
Slovakia	533,1	390	443	502	370,8
Hungary	1,526	1,597	1,540	1,222	840
Croatia	137,2	210,5	175	180	79,6
Serbia	2,655	1,843	3,703	3,055	3,426
Bulgaria	1,192	1,212	1,374	1,724	2,001
Romania	6,212	6,668	6,553	6,096	6,012
Republic of Moldova	284	296,4	239	486,2	611
Ukraine	1,569	1,281	1,047	1,431	8,806

Cargo turnover of the Port of Constanța by river vessels was 4,568 thousand tonnes, or 128.8% of the cargo turnover in Q_1 2022; at the same time, 2,281 thousand tonnes of cargo from Ukrainian ports were unloaded in Constanța (263 thousand tonnes in Q_1 2022).

1.2.3 In the passenger transport market, voyages on the main cruise lines resumed in March 2022; the following months saw further growth in ship passages on the Upper Danube lines only.

2 Market observation for Danube navigation: traffic of fleet and cargo

2.1 Navigation conditions on the Danube in 2023

2.1.1 Navigation conditions in the first half of 2023

At the beginning of 2023, snow accumulations in the mountainous areas of the Danube basin were estimated to be below the multiyear average, but exceeded those at the beginning of 2022. Under these conditions, the maximum water levels at the formation of the spring flood wave characteristic of the Danube River were also close to the long-term averages.

In **January** 2023, water levels on the Upper Danube (Pfelling gauging station, Fig. 1) fluctuated between 30 and 70 cm above the mean water level (*MWL*). On the Middle

Danube (Gauging station Vigado, Budapest, Fig. 2), water levels at the beginning of the first ten-day period were 30-80 cm below MWL; subsequently, two consecutive increases in water levels within 40-60 cm above the MWL were observed during the month, followed by a drop below the MWL by the end of the month. On the Lower Danube in January, water levels were 2.5-3.2 m above the MWL in the first decade, then 2.6-4.2 m higher until the end of the month.

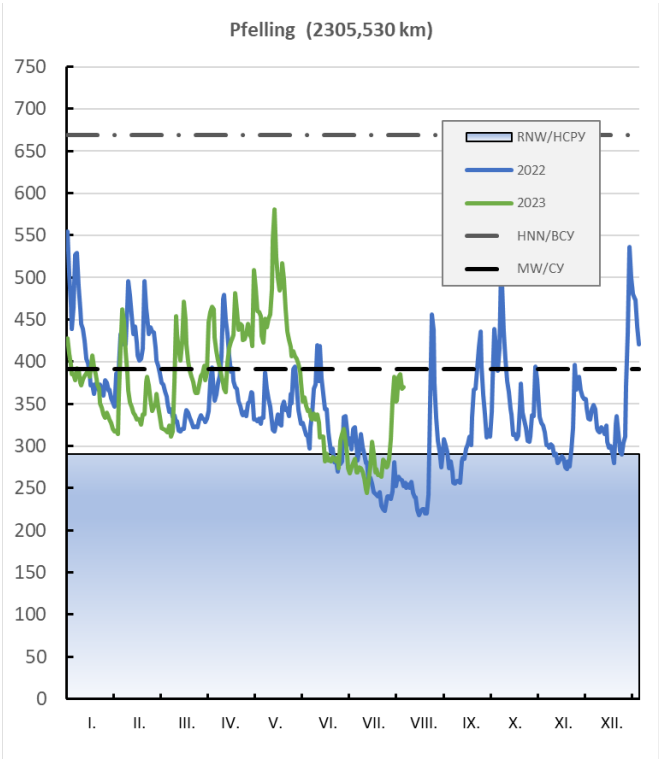
In the middle of the first 10-day period of **February**, the Upper Danube experienced a short-term rise in water levels by 50-60 cm above MWL, followed by a drop below MWL until the end of the month. On the Middle Danube, water levels during the month were consistently below the MWL with occasional exceedances of 35-45 cm at the beginning of the third decade. On the Lower Danube, water levels were 2.5-3.2 m above the MWL throughout the month.

During the second 10-day period of **March**, water levels on the Upper Danube exceeded MWL by 70-80 cm, then fluctuated between 60-90 cm below MWL until the end of the month. On the Middle Danube, water levels were consistently 40-80 cm below the MWL during the month. On the Lower Danube, water levels were 2.5-3.3 m above the MWL during the first 10-day period, with subsequent exceedance of the MWL by 3.5-4.0 m.

In **April**, water levels on the Upper Danube fluctuated within the range of the MWL, with occasional exceedance at the beginning of the first 10-day period, and a sharp increase above the MWL from the middle of the second 10-day period. On the Middle Danube, water levels fluctuated near MWL during the first 10-day period; from the middle of the second 10-day period, a sharp increase with an amplitude value of 1.6-1.7 m above the MWL was observed, followed by a decrease to the MWL level by the end of the month. On the Lower Danube, water levels throughout the month were 3.2-4.2 m above MWL.

In **May**, water levels on the Upper Danube fluctuated in the range above the MWL, with occasional maximum exceedance by 1.5-1.8 m in the second 10-day period; by the end of the third 10-day period, a decline to the MWL level began. On the Middle Danube, levels remained consistently above the MWL with occasional maximum exceedance of 2.0-2.4 m during the second ten-day period; by the end of the third 10-day period, a decline to the MWL level began. On the Lower Danube, water levels were 3.5-4.2 m above MWL throughout the month.

(a)



(b)

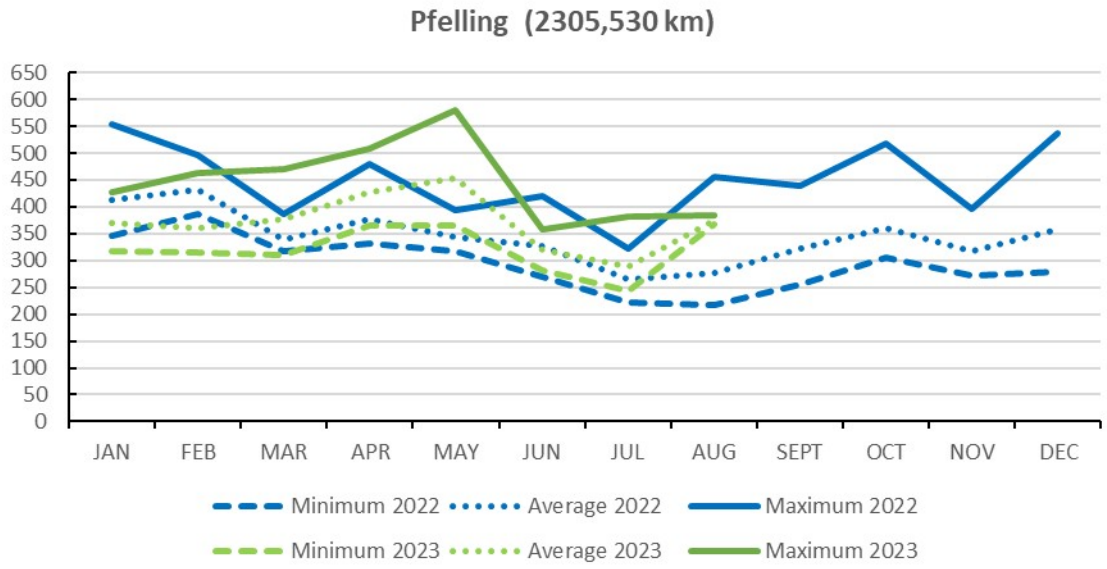
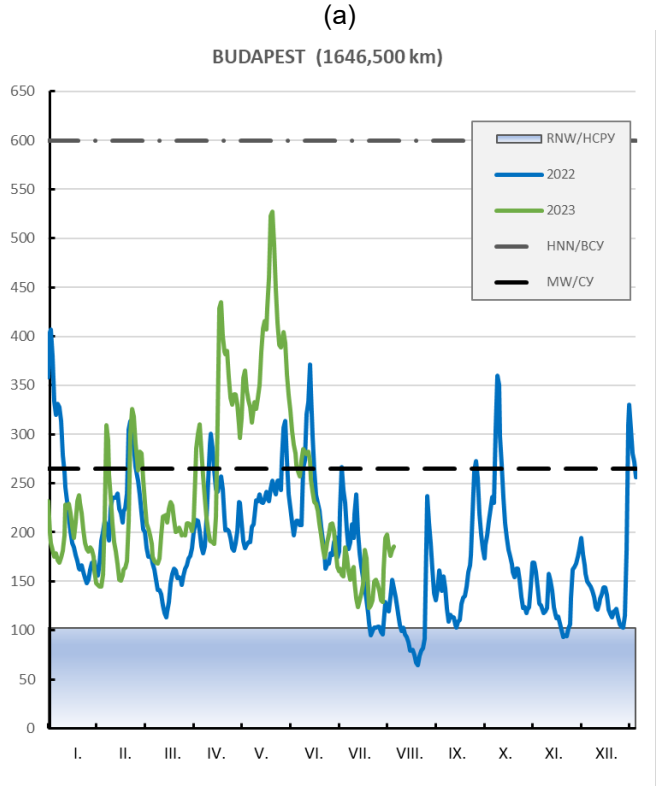


Fig. 1. Average daily (a) and absolute (b) values of water levels for the Pfelling water gauge, in cm

(a)



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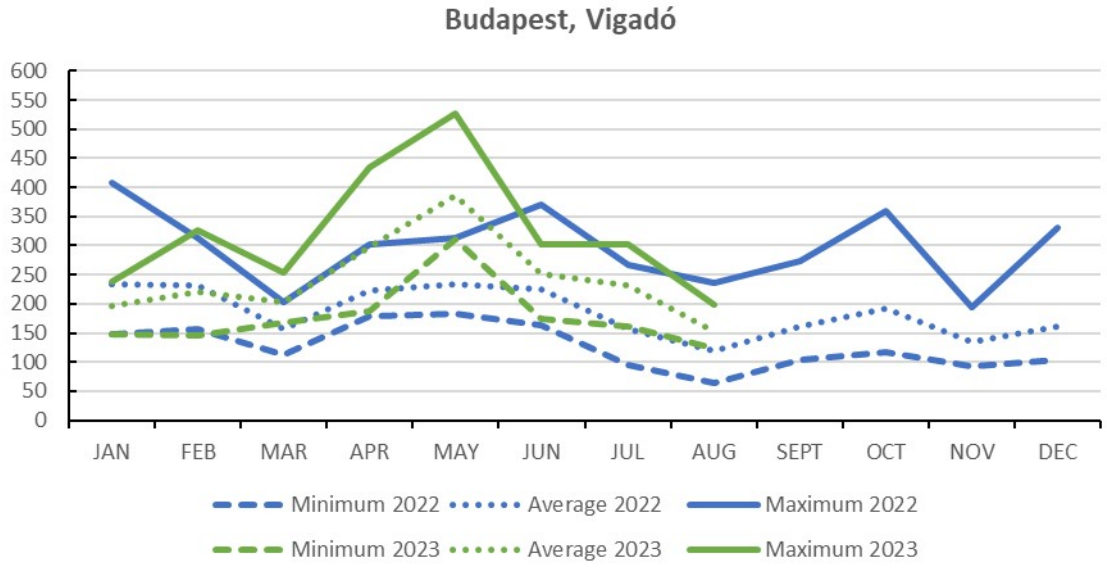

Fig. 2. Average daily (a) and absolute (b) values of water levels for the Budapest Vigado gauging station, in cm

In **June**, the Upper Danube began a successive decline in water levels and from the middle of the second 10-day period, levels dropped below the MWL multi-year average, with subsequent fluctuations near this value until the end of the month. On the Middle Danube, levels during the first and partly the second 10-day period remained fluctuating close to the MWL; from the middle of the second 10-day period, a stable drop below the MWL by 0.8 0.9 m began. On the Lower Danube, water levels during the first two 10-day periods remained at a level above or close to the MWL; by the end of the third 10-day period, a sharp drop in levels began.

2.1.2 Water flow and operating draught of vessels

Absence of river freezing and ice phenomena ensured continuous navigation in the first quarter of 2023. Stable water-bearing capacity for efficient navigation throughout the whole half-year was ensured, which allowed loading of vessels up to the maximum draught during upstream movement of 2.7-2.5 m (Table 2.1).

Table 2.1 Draughts of cargo vessels during navigation in 2023

Month	Loaded, going upstream (cm)	Loaded, going downstream (cm)
January	250 (230*)	220/230 (200/210*)
February	270 (230)	230 (200/210)
March	270 (230/250)	230/240 (210/220)
April	270 (250)	230/240 (220/230)
May	270 (250)	230/240 (230)
June	250 (220)	220 (210)

* Indicators for the corresponding period of 2022 are given for comparison

2.2 Observation of ship traffic and cargo transport

2.2.1 Passenger transport

2.2.1.1 Transport on the Upper Danube

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

Table 2.2 Passenger transport trends[1] (in thousands)

Lines	Year						
	2018	2019	2020	2021	2022	2022 Q_1+Q_2	2023 Q_1+Q_2
Upper Danube	548,8	720,8	56,1	149,1	469,3	167,8	209,9
To Danube Delta	103,6	135,04	5,15	34,1	74	33,8	17,03

Majority of passenger transportation on cabin vessels is made up of "short" voyages of 5-7-8 days Passau - Vienna - Bratislava - Budapest - Passau, Vienna Bratislava - Budapest, voyages from/to the ports of Rhine and Main, as well as in the direction of the Danube Delta (Table 2.2):

- A total of 1,332 ship passages were recorded through the Jochenstein lock (cross-border connection Austria/Germany (AT/DE)), which is 100% of the number in the first half of 2022.
- A total of 1,548 (1,550 in 2022) vessel passages were recorded at the Gabcikovo lock (cross-border connection Hungary/Slovakia (HU/SK)), conditionally "Upper Danube" (Figure 3), of which 31.5 % occurred in May and 34.8 % in June.

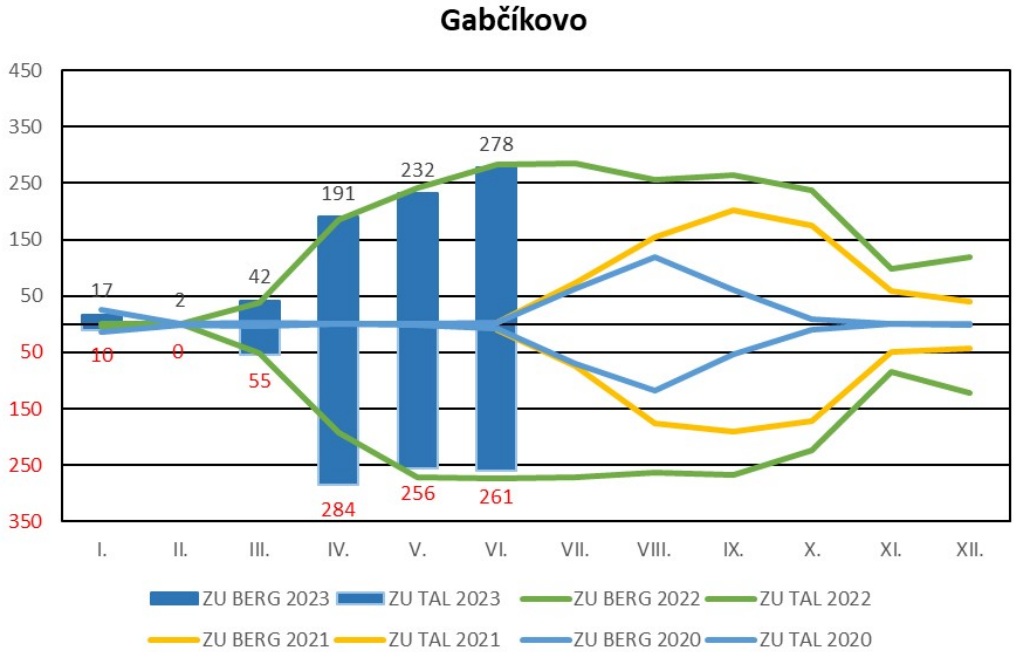

Fig. 3. Passages of passenger cabin ships upstream/downstream the Danube through the GABCIKOVO lock by month

[1] Calculation done by the Secretariat of the Danube Commission, based on data from Gabcikovo and Mohacs.

2.2.1.2 Transport on the Middle Danube: cross-border traffic Hungary/Croatia/Serbia (HU/HR/RS) (statistics from the Mohács checkpoint)

Passenger transport on cabin ships (based on lines from Passau and from Vienna towards the Danube Delta with a duration of 14-15-16 days). 131 (335 in 2022) ship passages were made (Figure 4). 17,03 thousand passengers were carried (Table 2.2); the highest number of ship passages (47) was recorded in June.

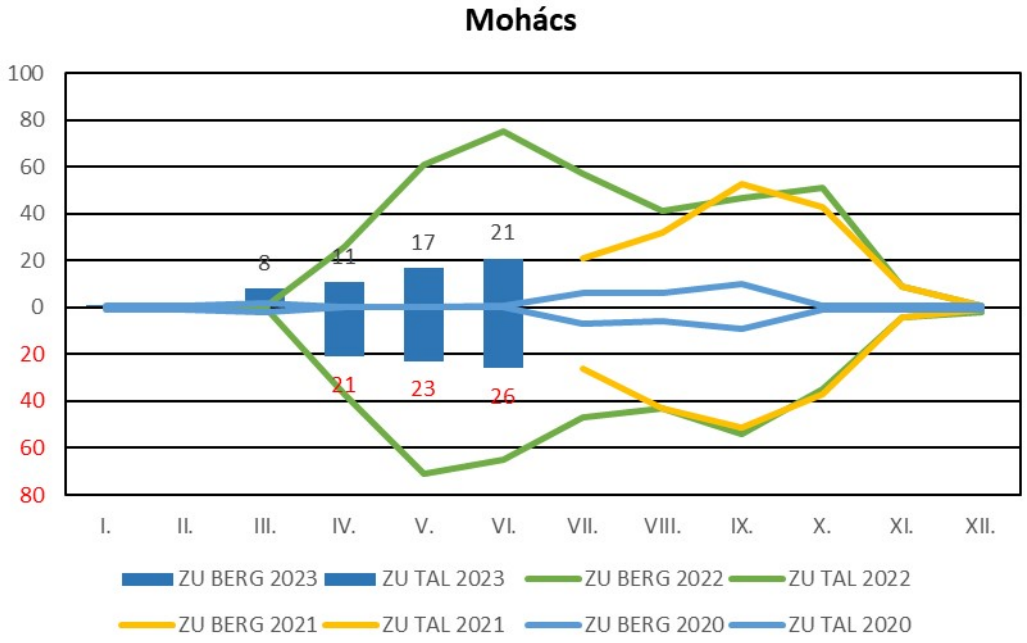

Fig. 4. Passages of passenger cabin ships upstream/downstream the Danube through MOHACS by month

2.2.2 Cargo transport

2.2.2.1 Transport on the Upper Danube

Transport volume

a. The volume of cargo transported via the Jochenstein lock (cross-border connection Germany/Austria (DE/AT)) in the first half of 2023 amounted to 1,091 thousand tonnes, which is 76% of the volume in 2022.

b. The volume of registered cargo transported through the Gabcikovo lock (cross-border connection Hungary/Slovakia (HU/SK)) in the first half of 2023 amounted to 2,087 thousand tonnes, which is 76.1% of the volume in 2022 (Figure 5). Upstream transit amounted to about 1,074 thousand tonnes, or 51% of the total volume.

   Dry *(trocken)* cargo transported came to 1,737 thousand tonnes, of which:

   - upstream (*zu Berg*) - 1,046 thousand tonnes;
   - downstream (*zu Tal*) - 691 thousand tonnes.

   Bulk *(tank)* cargo transported totalled 344 thousand tonnes, of which:

- upstream – 27,5 thousand tonnes;
- downstream – 316,5 thousand tonnes.

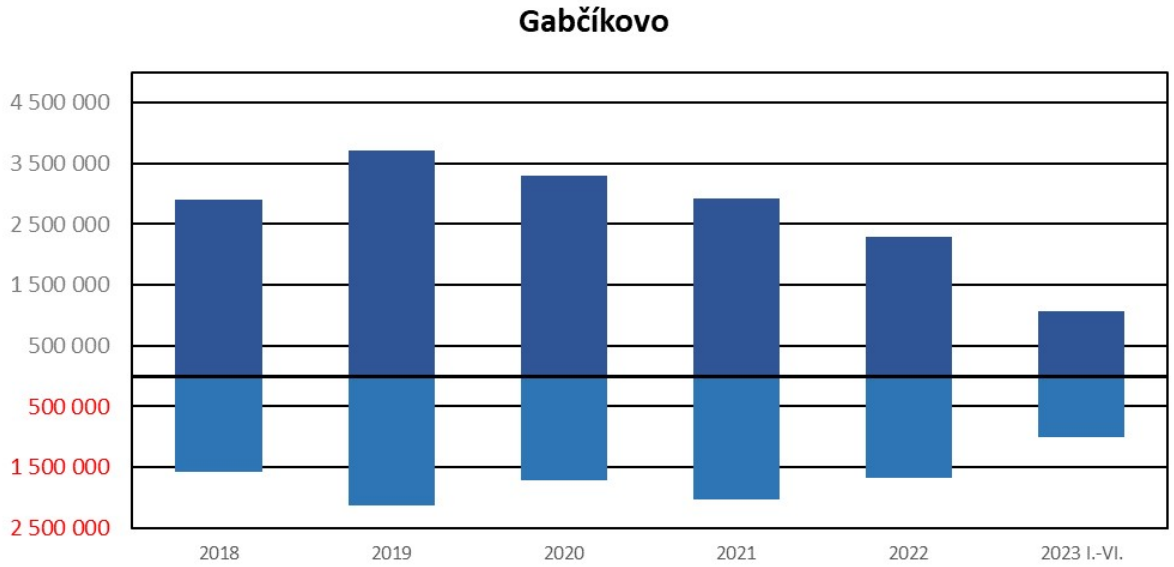

Fig. 5. Cargo transport volume upstream/downstream the Danube through the GABCIKOVO lock by years, in tonnes

Ship traffic

Transport by pushed convoys (statistics of the Gabchikovo lock)

A total of 1,097 thousand tonnes were transported by pushed convoys in the first half of 2023, which is 80% of the volume in 2022 and 53% of the total volume of cargo passing through the Gabcikovo lock, including liquid cargo.

a. In terms of dry cargo transport volumes, 969,6 thousand tonnes were transported by pushed convoys, of which (Fig. 6):
   - upstream - 552 thousand tonnes, which is 53% of the volume of dry cargo transported upstream;
   - downstream – 417,6 thousand tonnes, which is 60% of the volume of dry cargo transported downstream.

b. In terms of liquid cargo volumes, 127,8 thousand tonnes were transported by non-motorized barge-tankers as part of convoys, of which:
   - upstream – 9,1 thousand tonnes;
   - downstream – 118,7 thousand tonnes.

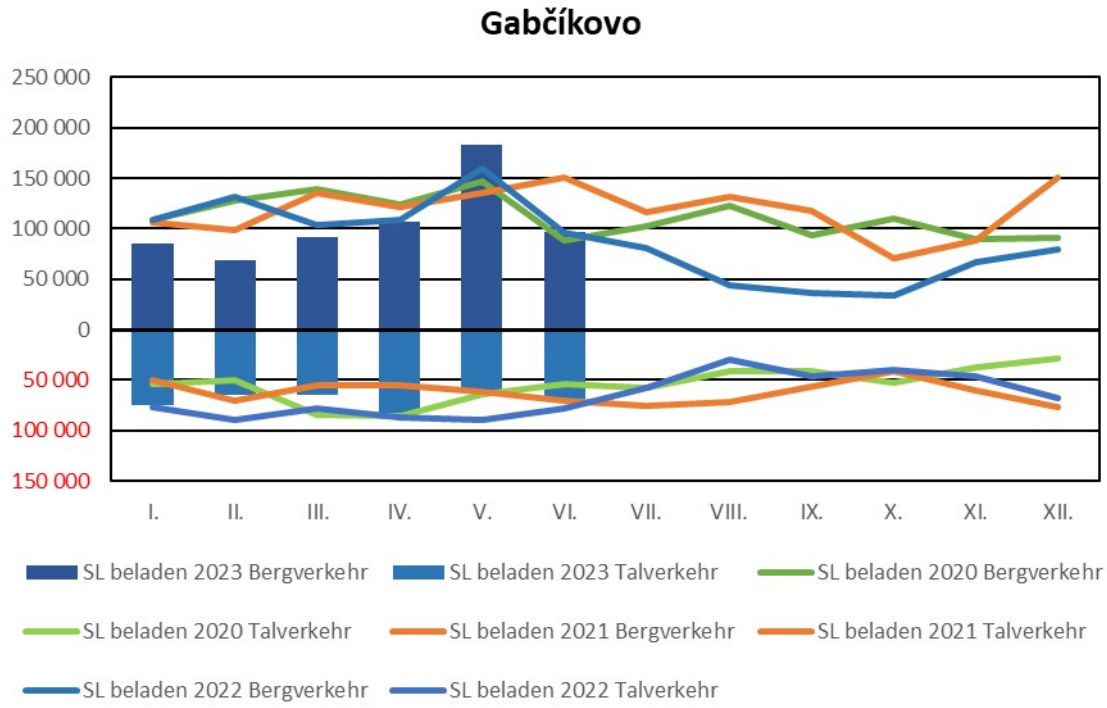

Fig. 6. Cargo transport volume upstream/downstream the Danube carried by non-motorized dry cargo barges through the GABCIKOVO lock by months, in tonnes

Transportation by motorized vessels

In total, in the first half of 2023, motorized vessels transported about 990 thousand tonnes, of which:

- upstream – 512,4 thousand tonnes;
- downstream – 447,6 thousand tonnes.

a. Motorized dry cargo vessels carried a total of 767 thousand tonnes, which was 70% of the volume in 2022, of which:
   - upstream - 494 thousand tonnes;
   - downstream – 273,4 thousand tonnes.

b. Motorized tankers transported a total of 223 thousand tonnes of liquid cargo, of which:
   - upstream – 18,4 thousand tonnes;
   - downstream – 204,6 thousand tonnes.

Nomenclature of goods (statistics of the Gabcikovo lock):

The percentage ratio of cargo volumes in upstream and downstream direction (cross-border traffic Hungary/Slovakia (HU/SK)) is presented in Tables 2.3 and 2.4.

With an overall drop in volumes compared to the first half of 2022, the market features of the first half of 2023 (Figure 7) consist of:

a. decline in <u>upstream</u> iron ore (87% of 2022 volumes) and food products (50% of 2022 volumes);

b. in the relative stability of <u>downstream</u> volumes of fertilizers and petroleum products.

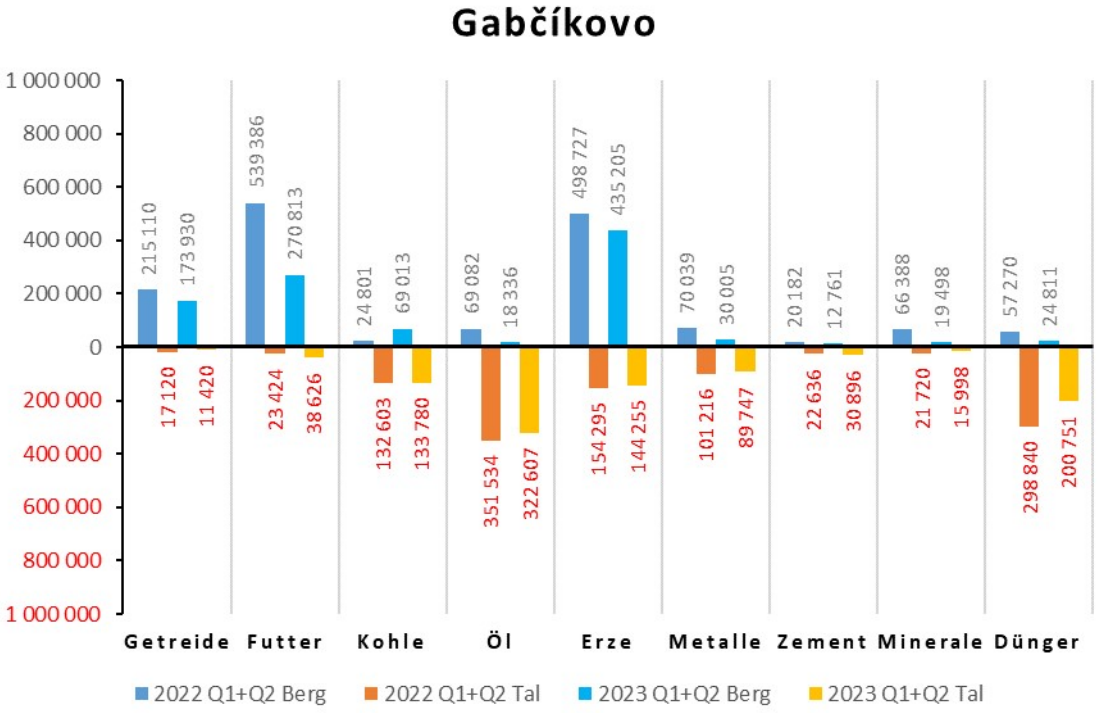

Fig. 7. Cargo transport volume upstream/downstream the Danube through the GABCIKOVO lock by groups of goods, in tonnes

Table 2.3 Cargo volumes in upstream HU/SK cross-border transport (by nomenclature)

Year, thousand tonnes / Commodity group	2019	2020	2021	2022	2022 Q_1+Q_2	2023 Q_1+Q_2
Food products and animal feed	1.774 48%[2]	1,321	879	783	539	270,9
Iron ore raw materials	841 22%	948	969	735	499	435,5
Grain	271 7.3%	352	394	416	215	173,8
Metal products	340 9.2%	117	71	101	70	30
Petroleum products	241 6.5%	212	86,7	92,1	69	18,4
Organic and synthetic fertilizers	91,5 2.5%	75,2	132,8	74,5	57,3	24,9

[2] From the volume of freight moved upstream

Table 2.4 Cargo volumes in downstream HU/SK cross-border transport (by nomenclature)

Year, thousand tonnes / Commodity group	2019	2020	2021	2022	2022 Q_1+Q_2	2023 Q_1+Q_2
Organic and synthetic fertilizers	535 25%	505	464,5	444,9	298,8	200,8
Petroleum products	671,3 31.4%	578	870	642	351,5	322,7
Metal products	380,4 17.8%	96,5	140	173	101	89,7

2.2.2.2 Traffic on the Middle Danube (statistics from Mohács checkpoint), cross-border traffic Hungary/Croatia/Serbia (HU/HR/RS)

Transport volume

The volume of registered cargo transported through Mohács in the first half of 2023 amounted to 1,619 thousand tonnes (Figure 8), or 66% of the volume of cargo transported in 2022, of which upstream transit was 684 thousand tonnes, i.e. 42%.

Dry cargo transported came to 1,339 thousand tonnes, of which:

- upstream - 626.8 thousand tonnes,
- downstream - 712.2 thousand tonnes.

Bulk cargo transported totalled 280.1 thousand tonnes, of which:

- upstream - 57.3 thousand tonnes,
- downstream - 222.8 thousand tonnes.

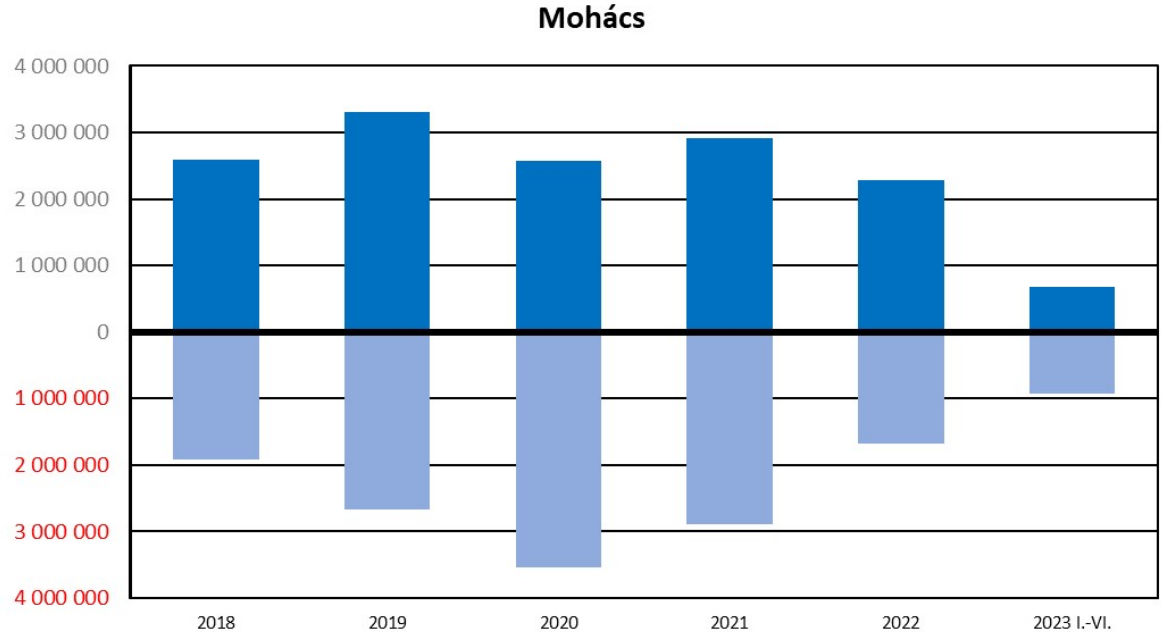

Fig. 8. Cargo transport volume upstream/downstream the Danube through MOHACS by years, in tonnes

Ship traffic

Transport by pushed convoys

In total, in the first half of 2023, over 1,130,000 tonnes were transported by pushed convoys through Mohacs control point, which is 70% of the total cargo volume, including liquid cargo.

a. In terms of dry cargo transport, pushed convoys carried 1,044 thousand tonnes (Fig. 9), of which:

   - upstream - 495 thousand tonnes;

   - downstream - 549 thousand tonnes.

b. In terms of liquid cargo volumes, non-motorized tank barges in caravans transported 85,9 thousand tonnes, of which:

   - upstream – 7,0 thousand tonnes;

   - downstream – 78,9 thousand tonnes.

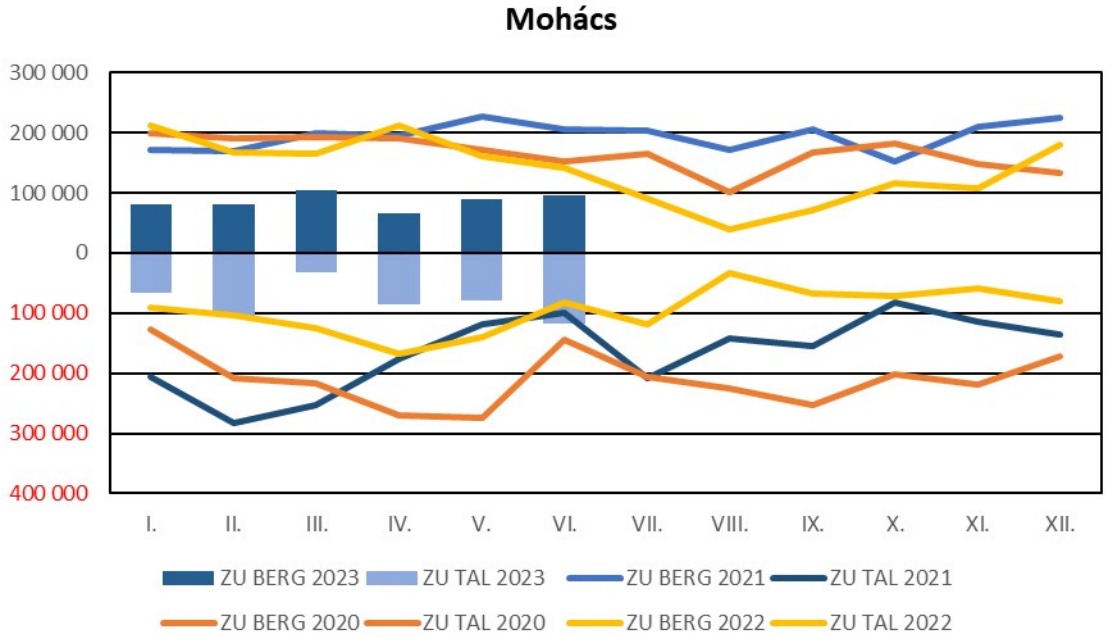

Fig. 9. Cargo transport volume upstream/downstream the Danube carried by pushed convoys through MOHACS by month, in thousands of tonnes

Transport by motorized vessels

A total of 489 thousand tonnes were transported by motorized vessels in the first half of 2023, which is 81% of the total volume transported through the Mohács control point in 2022, of which:

   - upstream - 180 thousand tonnes,

   - downstream - 309 thousand tonnes.

a. Motorized dry cargo vessels transported 295 thousand tonnes, of which:

   - upstream – 131,8 thousand tonnes;

- downstream – 163,2 thousand tonnes.

b. Motorized tankers transported 194,1 thousand tonnes of liquid cargo (Fig. 10), of which:

- upstream – 48,1 thousand tonnes.
- downstream - 146 thousand tonnes.

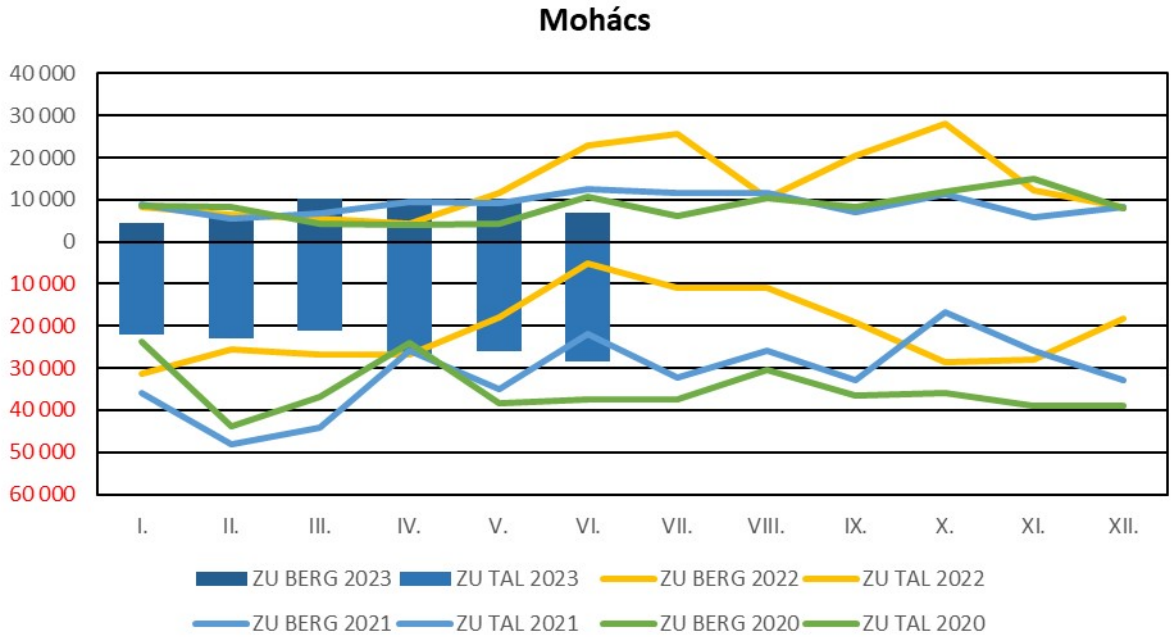

Fig. 10. Cargo transport volume upstream/downstream the Danube carried by motorized tankers through MOHACS by month, in tonnes

Nomenclature of goods

The features of the market in the first half of 2023 (Fig. 11) consist of:

a. Lower volumes of iron ore upstream (72% of the volume in 2022);

b. lack of upstream coal shipments;

c. downstream decline in grain cargo volumes (36% of the volume in 2022);

d. downstream increase in volumes of metal products and oil products.

The percentage ratio of upstream and downstream cargo volumes (cross-border traffic Hungary/Croatia/Serbia HU/HR/RS) is presented in Tables 2.5 and 2.6.

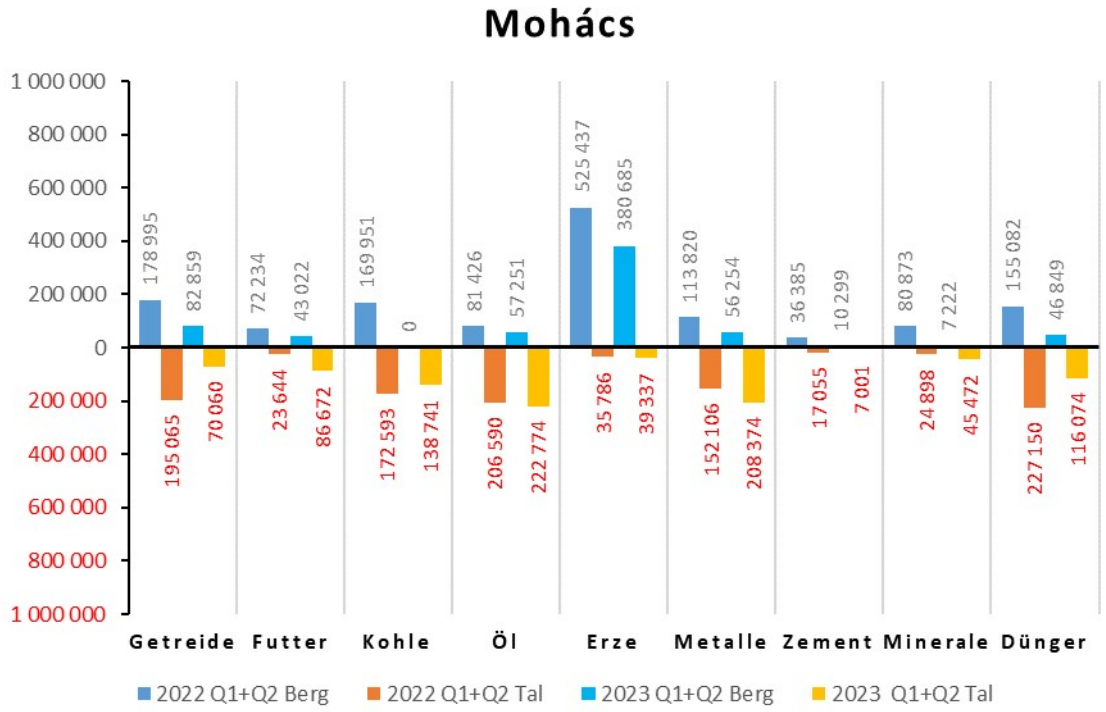

Fig. 11. Cargo transport volume upstream/downstream the Danube through MOHACS in tonnes by groups of goods

Table 2.5 Cargo volumes in upstream HU/HR/RS cross-border transport (by nomenclature)

Year, thousand tonnes / Commodity group	2019	2020	2021	2022	2022 Q_1+Q_2	2023 Q_1+Q_2
Iron ore raw materials	1,247 37.6%	954	991	741	525	380,6
Coal (coke)	479 14.4%	323	281	200	170	0
Fertilizers	392 11.8%	436	385	255,6	155	46,9
Petroleum products	109 3.2%	106	117	252	81,5	57,2
Metal products	270 8.1%	243	249	205	113,8	56,3

Table 2.6 Cargo volumes in downstream HU/HR/RS cross-border transport (by nomenclature)

Year, thousand tonnes / Commodity group	2019	2020	2021	2022	2022 Q_1+Q_2	2023 Q_1+Q_2
Grain	479 21.1%	1.471	1.002	238,9	195	70,1
Petroleum products	428 18.9%	528	591	322,3	206,5	222,6
Metal products	316 13.9%	295	254	310	151,2	208,3
Food products and animal feed	203 9%	520	218,5	65	23,7	86,7
Fertilizers	272 12%	364	316	315,5	227,2	116,1

2.2.3 Inter-basin transport

2.2.3.1 Transport on the Danube-Black Sea Canal

In the first half of 2023, the Danube-Black Sea canal transport volume amounted to 10,528 thousand tonnes[3], which is 118% of the same indicator in 2022, including:

- international transport: 8,826 thousand tonnes (156% compared to 2022);
- domestic transport: 1,072 thousand tonnes (33% compared to 2022).

Transportation volumes by month are shown in Fig. 12.

[3] *www.acn.ro*

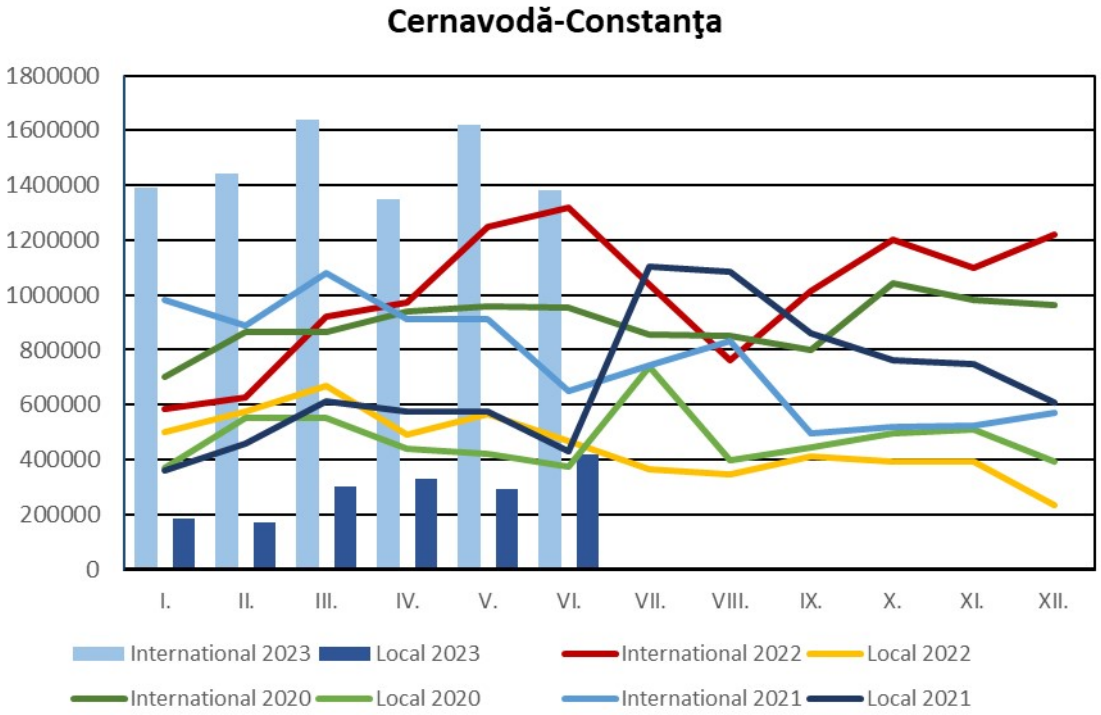

Fig. 11. International and domestic cargo transport volume through the CERNAVODA-CONSTANTA Canal by month, in tonnes

3 Overview of cargo handling in Danube ports

The cargo handling of Danube ports in the first quarter (Q_1) of 2023 was only 23,852 thousand tonnes, which is 140% of the volume in Q_1 2022 (Table 3.1).

The cargo handling of Danube ports in the first half of (Q_1+Q_2) 2023 compared to the same period in 2022 varied differently (Table 3.1).

The significant increase in the cargo turnover of the Danube ports of Ukraine is a logical consequence of the decisive measures taken by the Government of Ukraine with the support of the European Union and the Danube Commission, and significant actions to organize exports through the ports of Reni, Izmail and Ust Dunaysk of products of the agricultural sector of the country's economy.

Table 3.1 Cargo turnover of ports of the Danube countries in 2019-2023

Ports (thousand tonnes)	2019	2020	2021	2022	2022 Q_1+Q_2	2023 Q_1+Q_2
Germany	3,274	3,511	2,999	2,410	1,370	1,047
Austria	6,452	6,050	6,356	5,363	3,252	2,506
Slovakia	1,664	1,553	1,846	1,934	952	810*
Hungary	6,064	6,742	5,715	4,063	1,356	1,746
Croatia	814	948	697	582	338,8	186,4
Serbia	9,735	8,164	13,610	12,023	6,366	6,628
Bulgaria	5,385	5,431	7,111	7,104	3,751	4,004
Romania	28,474	27,307	28,457	24,355	12,976	13,053
Republic of Moldova	1,299	1,185	1,819	2,144	1,140	617,5
Ukraine	5,629	4,055	5,505	16,505	5,102	15,146

* Ports of Bratislava and Komarno

4 Conclusions

4.1. In the first half of 2023, the impact of full-scale Russian aggression in Ukraine not only exacerbated economic risks in the Danube shipping market, affecting virtually all major market sectors, but also created real threats to the safety of navigation on the Lower Danube.

4.2. Taking into account the above factors, in spite of rather favourable navigation conditions, there was a significant reduction in the volume of traffic and certain changes in the nomenclature of goods on the Upper and Middle Danube. Operational data for the first 7 months of 2023 show a continuation of this trend.

4.3. The Danube Commission follows up on special coordination activities:

- in order to make more active use of the transport potential of Danube navigation in traffic from the Danube ports of Ukraine in the framework of the Danube Solidarity Lanes EU - Ukraine initiative adopted in May 2022, as well as to stabilize the operation of canal connections between the Danube and the Black Sea (considering that up to 100 vessels are at anchorage at the canal entrances every day);
- as well as to ensure all safety measures for navigation.

4.4. The priority short-term actions undertaken by the Danube Commission to stabilize the market and to ensure safety of navigation are coordinated in joint projects with the European Commission.