The Strategic Significance of the Russian Volga River System

Jaghdani, Tinoush Jamali; Ketabchy, Mehdi

Veröffentlichungsversion / Published Version
Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:
Jaghdani, T. J., & Ketabchy, M. (2023). The Strategic Significance of the Russian Volga River System. *Russian Analytical Digest*, 304, 22-27. https://doi.org/10.3929/ethz-b-000643679

ANALYSIS

The Strategic Significance of the Russian Volga River System

Tinoush Jamali Jaghdani (Leibniz Institute for Agricultural Development in Transition Economies (IAMO), Germany) and Mehdi Ketabchy (University of Maryland, College Park, USA)

DOI: 10.3929/ethz-b-000643679

Abstract

The Volga River constitutes the primary component of the Unified Deep-Water System (UDWS) of European Russia, which connects the Caspian Sea and the Sea of Azov. Following the Russian invasion of Ukraine, the significance of the Volga River in this waterway shifted. Concurrently, the efforts of states bordering the Caspian Sea to expand their trade routes increased. In this article, we analyze the role of the Volga River in transporting grain and other goods for export via Black Sea and Caspian Sea ports; military uses of the waterways; and the implications of the ongoing war in Ukraine for Russia's short- and medium-term river transport. We further evaluate the climatic risks posed to the Volga River and Caspian Sea as a result of anthropogenic global climate change, which has the potential to limit transportation via the Volga River. The overall goal of the article is to understand the strategic significance of the Volga River system for Russian commerce, logistics, and security.

The Caspian Sea is the world's largest endorheic inland water body and is shared among Russia, Kazakhstan, Turkmenistan, Iran, and Azerbaijan. The Caspian Sea is a major Eurasian logistic hub with a broad network of navigable waterways (Pritchin, 2019). Indirectly, the Caspian Sea is connected to international waters through the Unified Deep-Water System of European Russia (UDWS). UDWS is a system of inland waterways of Russia, connecting the White Sea, the Baltic Sea, the Caspian Sea, and—via the Sea of Azov—the Black Sea through the Neva River, Lake Ladoga, the Svir River, Lake Onega, the White Sea-Baltic Canal, the Volga–Baltic Waterway, the Moscow Canal, the Volga River, the Kama River, the Volga–Don Canal, and the Don River. Russia owns 16% of global navigable inland waterways, second only to China's 18%. On average, UDWS is responsible for 70% to 75% of all domestic cargo and transports via Russian inland waterways. The Volga River, stretching over 3,500 km, is the longest river in Europe and a major element of UDWS. With an average discharge of 8,100 m^3 per second at Volgograd, the river is also the primary source of water for the Caspian Sea (Leummens, 2016). The Caspian Sea has, however, experienced a significant decline in its water level in recent years, threatening the transport capabilities of Russia and Kazakhstan.

In August 2023, Ali Salajegheh, the chief of Iran's Department of Environment (DOE), attributed the decline in Caspian Sea water levels to Russia intentionally reducing the water flow from the Volga River into the Caspian Sea (Sharghdaily, 2023). He subsequently reversed his position, attributing the phenomenon instead to global climate change. This shift in perspective sparked discussions among Iranian policymakers, researchers, journalists, activists, and Iranians in the diaspora, leading to broad debate about the causes of the Caspian Sea's shrinking water levels. Part of this debate followed Salajegheh's original line in accusing the Russian Federation of intentionally reducing water flow from the Volga into the Caspian Sea. This prompted an evaluation of the importance of the Volga for domestic waterways in Russia and the countries bordering the Caspian Sea. The Caspian Sea's retreating coastlines and shrinking water coverage may have considerable environmental, economic, and geopolitical consequences for the region (Barale & Gade, 2018; Prange et al., 2020).

In this brief analysis, we examine the structure of Russia's inland waterways, particularly their connection to the Caspian Sea and the Black Sea. We then evaluate the significance of inland waterway transport, focusing on grain transportation to export points in the Black Sea and Caspian Sea regions. Additionally, we explore the military applications of these waterways, as well as the impact of climatic changes on water levels in this river—and, consequently, the Caspian Sea. Finally, we analyze the role of water transport in Russia during the short and medium term, considering the ongoing conflict in Ukraine and potential future variations in water levels due to changes in precipitation and evaporation patterns.

Russia's Internal Waterways, the Importance of UDWS, and the Role of the Volga River

As of 2019, Russia had 101,500km of registered inland waterways, of which 50,000 km were navigable. Due to underinvestment and insufficient funding in waterway infrastructure, the standardized shipway dimensions shrank by 30% between 1990 and 2019. In 2019, the inland fleet consisted of 11,700 self-propelled and 5,300 non-self-propelled vessels. The avail-

Figure 1: Unified Deep Water System (UDWS) of European Russia

Source: map created by Wikipedia author "Hellerick" (https://de.m.wikipedia.org/wiki/File:United_Deep_Waterway_System_of_European_Russia.svg), available under a Creative Commons Attribution-Share Alike 3.0 Unported license (https://creativecommons.org/licenses/by-sa/3.0/deed.en); the map was modified by the Research Centre for Eastern European Studies at the University of Bremen.

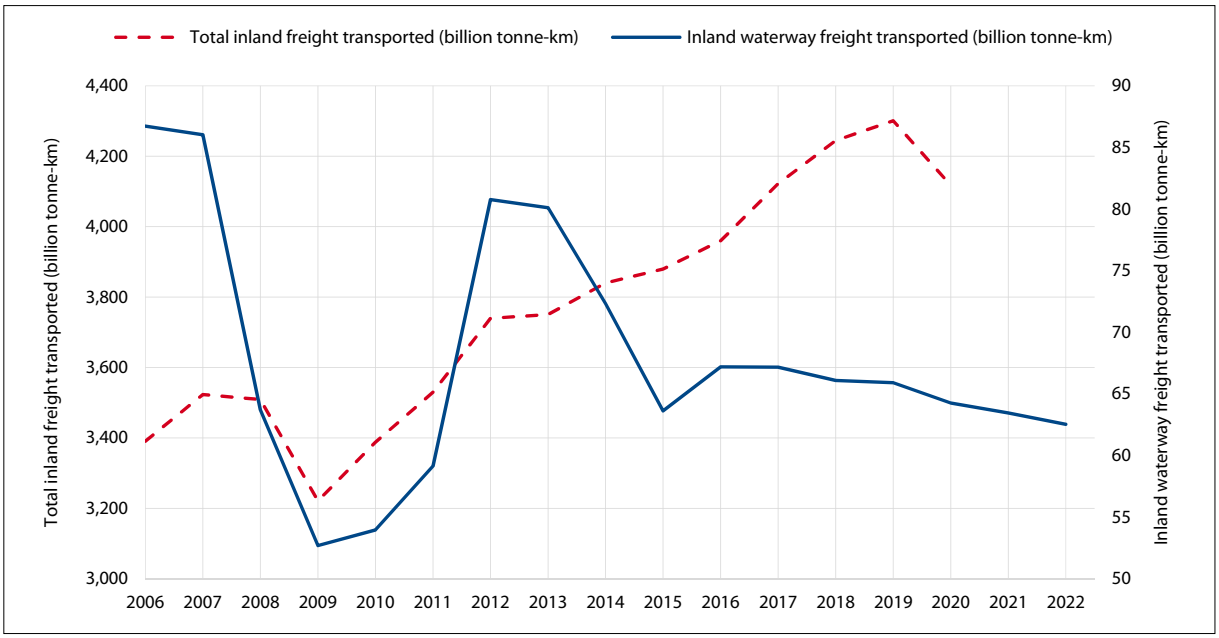
able information shows that these significant declines compared to 2019—by 17.4% among self-propelled vessels and 34% among non-self-propelled vessels—are likewise due to underinvestment in this sector (Rostislav & Ponomarev, 2020).

The UDWS, which is the most important part of Russia's inland waterways, connects major Russian cities, including St. Petersburg, Moscow, Kazan, Nizhny Novgorod, Volgograd, Rostov-on-Don, and Astrakhan (see Figure 1 on p. 23). UDWS is estimated to be as long as 6,500 km. The theoretical guaranteed depth throughout the UDWS ranges between 4.0 meters and 4.5 meters, allowing not only river vessels and river-sea class vessels, but also sea-going vessels, warships, and even (surfaced) nuclear submarines to pass through it.

One of the major components of the UDWS is the Volga–Don Canal. Constructed by the Soviet Union between 1949 and 1952, it connects the Volga River and the Don River, thus facilitating the connection between the Caspian Sea, the Sea of Azov, and the Black Sea. It spans 101 km and comprises thirteen canal locks, three pumping stations, 22 navigation channels, and two bulkhead gates. Since the Don River is at an elevation 44 meters higher than the Volga River, vessels must make this change when traveling up or down. Theoretically, the canal can support vessels up to 5,000 tons. However, some shallow parts of both rivers are currently limited to 3,000 tons, although this could be improved to 6,000 tons with additional investment (Tirone & Motevalli, 2022). The Volga–Don Canal is navigable for around 200 days a year, as it is usually frozen from November to April.

The internal waterways of Russia, of which the UDWS represents a significant component, have historically played a relatively minor role in Russia's overall inland transport, especially since the collapse of the Soviet Union. According to Russian government data, the volume of cargo transported along the country's inland waterways in 1988 was 582 million tons, a figure that fell to 100 million tons in 1996. The transport volume improved steadily from 1999, reaching 136 million tons and 30 million passengers in 2004. Since then, inland water transport volumes have fluctuated between 110 and 150 million tons. The fluctuations in total transport inside Russia and inland water transport (primarily conducted via the UDWS in 2006–2022) are shown in Figure 2 below and in Table 1 on p. 27.

Figure 2: Total Inland Freight Transport and the Share of Waterways, 2006–2022



Note: Data for 2021 and 2022 are estimates.
Source: OECD, ITF, Statista, reportlinker.com *(see also Table 1 on p. 27).*

The volume of waterway transport has fluctuated through the years. The jump in 2011–2013 can be attributed to higher government investments in waterways during this period. In 2006–2022, inland waterway transport accounted for between 1.5% and 2.5% of total transport inside Russia. Returning to official statistics, 118.53 million tons of cargo were transported by inland waterways in 2017, of which 10.3 million tons were grain and mixed feed. As mentioned, 70–75% of Russia's inland waterway cargo transport takes place within the UDWS, which also carries more than 12 million passengers annually.

Access of foreign fleets to Russia's inland waterways: Since 1994, Russia has gradually loosened the tight Soviet regulations (established in 1936) that banned any vessels with foreign flags from entering Russian inland waterways. How-

ever, these changes are very specific and apply to a limited number of countries. At the moment, there are more than 130 ports on the inland waterways and only 40 of them are listed as open ports for foreign vessels (Nikiforov & Burkov, 2020). Since 2013, Russia has allowed sports sailing vessels and leisure craft flying foreign flags to enter some sections of its inland waterways. Further changes in the regulations now permit commercial vessels under the flags of foreign countries to navigate inland waterways on the basis of international contracts and special decisions of the government. Specifically, the Russian government allows ships sailing under the flags of Eurasian Economic Union (EAEU) member-states to pass through the country's inland waterways. However, these countries do not have significant merchant fleets and therefore hardly compete with the Russian fleet (Smirnov, 2022). There are also some indications of discrimination on the basis of origin when it comes to permission to pass through Russian inland waterways and the charges for doing so. The available information suggests that whereas Russian vessels typically pay around US$5,000–6,000 to pass through the Volga–Don Canal, Azerbaijani and Iranian vessels are usually charged approximately US$20,000–25,000 and US$30,000, respectively. It is also uncertain whether the Russian authorities will grant passage to any given vessel, as they evaluate each vessel individually.

Military usage: Following Russia's invasion of Ukraine and Turkey's closure of the Bosporus Strait to the Russian navy under the 1936 Montreux Convention (Pedrozo, 2023), the Russian military flotilla in the Caspian Sea became more important. It is the only combat-ready flotilla in the Caspian Sea region and its military capabilities extend beyond the Caspian region (Pritchin, 2019). The Caspian Flotilla comprises 27 warships, including gunboats, landing craft, minesweepers, and cruise-missile-capable corvettes. Months prior to the Russian invasion of Ukraine, several ships were transferred from the Caspian Flotilla to the Azov Sea to join the Black Sea Fleet in conducting naval maneuvers in the Black Sea (Pedrozo, 2023). The Russian authorities' exclusive control of the Volga–Don Canal, which facilitates the movement of warships between the Caspian Sea and the Black Sea during the ice-free seasons of spring and summer, has empowered Moscow to deploy military forces in a strategically vital region.

Future plans for inland waterways: The Russian government has long known that the country's inland waterways lack infrastructure investment and function poorly. The expansion of inland water navigation has been on the government's agenda in recent years, and the country has made investments to strengthen and expand this system, especially in the UDWS. Following Russia's invasion of Ukraine, which has necessitated trade via less risky trade routes, the Russian government's interest in improving transport via the Caspian Sea region increased. Shortly prior to the beginning of the war, in February 2022, a plan to reconstruct the Volga–Caspian Seaway Canal by 2028 was announced. The preliminary dredging operation was estimated at 15 million cubic meters (cbm). The available information shows that over five million cbm of spoils and materials were dredged in 2022, ensuring a navigation depth of 4.2 meters in the Volga–Caspian Shipping Canal; 12 million cbm in dredging operations are planned for 2023 to increase this to 4.5 meters.

Grain transport through Russia's inland waterways: Although the Volga–Don waterway ends at Taganrog Bay in the Sea of Azov, this route plays a minor role in Russia's grain transport. The export data show that approximately 30% of Russian grain is exported through the shallow seaports of the Sea of Azov, while 60% is exported through the deep seaports of the Black Sea, such as Novorossiysk. In 2017, a year in which Russia exported approximately 33 million tons of wheat, around 7.5 million tons of grain and feedstuffs were exported via Russia's inland waterways (Egorov, 2021).

Corridors and Alternative Transport Options

The Caspian Sea serves as the only waterway for countries like Kazakhstan, Turkmenistan, and Azerbaijan, giving them limited connections to global waters via the Volga–Don River. This situation has enhanced the interest in expanding trade routes in the region through the Caspian Sea. Furthermore, such factors as (1) the economic growth of Central Asia; (2) the abundance of natural resources in several Central Asian countries and Azerbaijan, which could potentially be exported; (3) China's Belt and Road Initiative (BRI), which planned to pass through the Caspian Sea region; and (4) Russia's interests in creating a North–South corridor that would connect the Caspian Sea to the Indian Ocean via rail and Iranian roads have increased geopolitical interest in the Caspian Sea region and efforts to expand trade routes. Several ongoing initiatives aim to establish connections between the Caspian Sea and global seas and oceans; they include the North–South Corridor (connecting Russia to the Indian Ocean), the Eurasia Canal (waterways to connect the Caspian Sea and the Sea of Azov), the Middle Corridor (East–West corridor through the South Caucasus), and the Zangezur Corridor (East–West corridor through the South Caucasus).

As such, it can be said that the significance of the Caspian Sea and Russia's inland waterways has grown. The Caspian Sea serves as a central hub for all the current and planned water routes for the nations bordering this sea. Consequently, any fluctuations in its level may influence the future of transportation in the region. The following section evaluates recent and anticipated changes.

Climate Change and Water-Level Variations in the Caspian Sea

The Caspian Sea, as an endorheic water body, is susceptible to shifts in precipitation and evaporation patterns. Over the past three decades, the Caspian Sea has experienced a significant drop in its water level. Based on observational data, as of 2022 the sea level had fallen by more than two meters compared to the mid-1990s (Umarov, 2023). This dramatic shrinking of the world's largest lake could have serious implications both for the regional environment and for the economies of the states of the Caspian basin.

Research has shown that the declining level of the Caspian Sea may be driven by natural variation, intensified significantly by anthropogenic global climate change. Rising air temperatures caused by global warming have led to increased evaporation from the sea surface (Wesselingh & Lattuada, 2020). Studies have found that cumulative evaporation rates over the Caspian have been increasing faster than precipitation and runoff rates, closely tied to steadily climbing regional and global surface temperatures (Chen et al., 2017). This evaporative water loss exacerbates the decreasing inflow of freshwater from rivers flowing into the Caspian, particularly the Volga River. As a result, the total water budget of the Caspian Sea has been severely impacted.

Looking forward, projections indicate that the Caspian Sea's water level will likely continue to fall substantially through the twenty-first century, especially under high greenhouse gas emissions scenarios. Models suggest that the level could decline by a further 9–18 meters by 2100 (Koriche et al., 2021). Without concerted global action to reduce emissions and limit further warming, an ecological catastrophe in the Caspian basin appears imminent. Adaptation policies for the region, from wetland restoration to improved water-management infrastructure, will be critical to increasing resilience. However, reducing global greenhouse gas emissions remains essential to mitigating long-term Caspian Sea level loss by limiting evaporation and mitigating the effects of climate warming. The looming environmental catastrophe in the Caspian Sea is emblematic of the risks climate change poses to inland water bodies.

Conclusion

An August 2023 allegation by Iran's DOE chief that Russia had reduced the water allocation from the Volga River to the Caspian Sea prompted us to evaluate various environmental, economic, and geopolitical aspects related to these two water bodies. As we have demonstrated, the flow of water in the Volga River is the heart of the Russian UDWS, which connects the Baltic Sea, the Caspian Sea, and the Black Sea. This has significant transport importance, particularly for Russia's major cities. It also has military importance, especially since Russia's invasion of Ukraine in 2022, as the Volga–Don Canal allows parts of the Russian flotilla to move from the Caspian Sea to the Sea of Azov. This supports Russian troops in those occupied regions of Ukraine that surround the Sea of Azov, including Crimea, Donetsk, Kherson, and Zaporizhzhia. We have not discovered definitive evidence indicating that Russia is undertaking the construction of substantial and noteworthy new dams on the Volga River; on the contrary, there are plans to expand inland water transport in Russia, which relies on high water flow in rivers and canals, including the Volga. However, anthropogenic global climate change could limit the capacity to expand inland water transport, primarily by exacerbating a decline in water levels in the Caspian Sea. Overall, the ongoing military invasion in Ukraine, coupled with Russian's dependency on the Russian flotilla in the Caspian Sea, as well as the expanding trade relationship and potential agreements with countries like Iran, has considerably elevated the military and geopolitical significance of the UDWS; it seems crucial for Russia to maintain this system to facilitate a wide range of transportation purposes.

About the Authors

Tinoush Jamali Jaghdani has been a research associate at the Leibniz Institute of Agricultural Development in Transition Economies (IAMO) in Germany since October 2016. He received his PhD in agricultural economics with a minor in applied statistics from the University of Göttingen (Germany) in 2012. His current research focuses are agricultural markets and the food supply chain, specifically trade duration, price volatility, governance, and market power in food supply chains, with a particular interest in transitional countries and Europe. He also studies issues of water economics in the Middle East.

Mehdi Ketabchy is a licensed water engineering consultant (P.E.) in Maryland, USA. Concurrently, he is a Ph.D. candidate at the University of Maryland, College Park. His consulting and research expertise focuses on green infrastructure, enhancing water resource resilience, adapting to the challenges posed by climate change, and water governance. He obtained his second M.Sc. degree in Biological Systems Engineering from Virginia Polytechnic Institute and State University in the USA and completed his first M.Sc. degree in Environmental Engineering at Sharif University of Technology in Tehran, Iran. You can follow him on X (Twitter) at @MehdiKetabchy.

Further Reading

- Barale, V., & Gade, M. (2018). Remote sensing of the Asian seas. In *Remote Sensing of the Asian Seas*. Springer International Publishing. https://doi.org/10.1007/978-3-319-94067-0
- Chen, J. L., Pekker, T., Wilson, C. R., Tapley, B. D., Kostianoy, A. G., Cretaux, J. F., & Safarov, E. S. (2017). Long-term Caspian Sea level change. *Geophysical Research Letters*, *44*(13), 6993–7001. https://doi.org/10.1002/2017GL073958
- Egorov, G. (2021). *Main question (originally in Russian)*. Marine News of Russia (Originally in Russian). https://morvesti.ru/analitika/1692/89761/
- Koriche, S. A., Singarayer, J. S., & Cloke, H. L. (2021). The fate of the Caspian Sea under projected climate change and water extraction during the 21st century. *Environmental Research Letters*, *16*(9), 094024. https://doi.org/10.1088/1748-9326/AC1AF5
- Leummens, H. J. L. (2016). Volga River Basin (Russia). In C. M. Finlayson, G. R. Milton, R. C. Prentice, & N. C. Davidson (Eds.), *The Wetland Book* (1st ed., pp. 1–11). Springer, Dordrecht. https://doi.org/10.1007/978-94-007-6173-5_88-7
- Nikiforov, V., & Burkov, A. (2020, October 6). *Management of Inland Waterway System of Russia – Admission for Foreign Flag Vessels*. Association of Finnish Waterways. https://www.vesitiet.org/post/management-of-inland-waterway-system-of-russia-admission-for-foreign-flag-vessels
- Pedrozo, R. (Pete). (2023). Russia-Ukraine Conflict: The War at Sea. *International Law Studies*, *100*(1). https://digital-commons.usnwc.edu/ils/vol100/iss1/1
- Prange, M., Wilke, T., & Wesselingh, F. P. (2020). The other side of sea level change. *Communications Earth & Environment 2020 1:1*, *1*(1), 1–4. https://doi.org/10.1038/s43247-020-00075-6
- Pritchin, S. (2019). Russia's Caspian Policy. *Russian Analytical Digest (RAD)*, *235*. https://doi.org/10.3929/ethz-b-000339658
- Rostislav, K., & Ponomarev, Y. (2020). The Transportation Complex in Russia in 2019. *Russian Economy in 2019. Trends and Outlooks*, *41*, 239–261. https://doi.org/10.2139/SSRN.3688290
- Sharghdaily. (2023, August 7). Russia cut the water quota of Caspian. *SHARGH (Title Originally in Persian)*. https://www.sharghdaily.com/fa/tiny/news-891455
- Smirnov, A. (2022). Development of international cargo transportation in Russia. *Transportation Research Procedia*, *63*, 1979–1983. https://doi.org/10.1016/J.TRPRO.2022.06.219
- Tirone, J., & Motevalli, G. (2022). Russia, Iran Defy Western Sanctions By Building New Trade Route. In *Bloomberg*. Bloomberg. https://www.bloomberg.com/graphics/2022-russia-iran-trade-corridor/#xj4y7vzkg
- Umarov, T. (2023, July 27). *Caspian Sea Passes Critical Shallow Point. What is the Reason Behind a Sharp Decline in Water Level in Largest Inland Body of Water? – CABAR.asia*. Central Asian Bureau for Analytical Reporting. https://cabar.asia/en/caspian-sea-passes-critical-shallow-point-what-is-the-reason-behind-a-sharp-decline-in-water-level-in-largest-inland-body-of-water
- Wesselingh, F., & Lattuada, M. (2020, December 22). *The Caspian Sea is set to fall by 9 metres or more this century – an ecocide is imminent*. The Conversation. https://theconversation.com/the-caspian-sea-is-set-to-fall-by-9-metres-or-more-this-century-an-ecocide-is-imminent-152229

Table 1: Total Inland Freight Transport and the Share of Waterways, 2006–2022

Year	Total inland freight transported (billion tonne-km)	Inland waterway freight transported (billion tonne-km)
2006	3390.146	86.727
2007	3523.107	86.027
2008	3509.073	63.705
2009	3220.929	52.686
2010	3387.568	53.955
2011	3529.942	59.144
2012	3739.64	80.762
2013	3750.303	80.101
2014	3840.075	72.317
2015	3879.612	63.62
2016	3960.122	67.194
2017	4121.679	67.165
2018	4244.479	66.089
2019	4300.741	65.906
2020	4117.41	64.2594
2021		63.45
2022		62.53

Note: Data for 2021 and 2022 are estimates.
Source: OECD, ITF, Statista, reportlinker.com.