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Water transport in the European North of Russia: social significance, challenges and perspectives of development*

© Marina V. NENASHEVA, Cand. Sci. (Phil.), Associate Professor
E-mail: m.nenasheva@narfu.ru
Northern (Arctic) Federal University named after M.V. Lomonosov, Arkhangelsk, Russia
© Julia OLSEN, PhD Candidate
E-mail: julia.olsen@nord.no
Nord University, Bodø, Norway

Abstract. This article is devoted to the analysis of the water transport in the European North of Russia. Using the case of the Arkhangelsk Oblast, we present the main challenges and perspectives of river navigation development in light of the area's history and current situation. Our research shows that, historically, water transport has played an important role in the social and economic development of the Arkhangelsk Oblast and held a leading position in the transportation system. However, due to the transition to a market economy in the 1990s, river traffic lost its competitive advantages. The study presents statistical data showing the negative trends of the passenger inland water transport development. The lack of the state involvement in industrial management has led to the deterioration of the water transport quality and its infrastructure. Despite existing challenges, however, water transport still plays an important role in the socio-economic development of the Russian North. In recent years, various levels of government have discussed the revival of the river navigation and improvements in its use for regional development. The article discusses prospects for overcoming the existing negative trends in the development of water transport. The focus is made on its connection with the industrial development of the Arctic and the cultural potential of the region.

Keywords: *inland water transport, river navigation, social significance, the Arkhangelsk Oblast, European North.*

Introduction

One of the important conditions for social and economic development of the territories is the transport system availability. The leading transportation modes for passengers and cargos in Russia are road, rail, air and water. According to official data, more than 60% of cargo and passenger transportation is carried out by road, while water transport is no more than 2%[1]. Despite such low indicators, navigation plays an important role for those regions of Russia where the density of railways and roads is low, or they are completely absent, but the inland waterways network is well developed [1, Filatov N.N., p. 76]. E.g., the Arkhangelsk Oblast. Its geographical feature is a large distance between the settlements and highways and railway system. Many residents of this area agree that "water transport in the navigation period is still the only way of communication with regional and district centers and has no alternative for the transportation of passengers and car-

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[1] Rossiya v cifrah. 2017: Kratkij statisticheskij sbornik. [Russia in numbers. 2017. A Brief Statistic Collection] M., 2017. pp. 287-288. [In Russian]

go"[2]. The obvious advantages of water transport include low shipping costs and low cost of maintaining waterways. Despite its profitability, in terms of passenger traffic, water transport is significantly inferior to road and rail. The industry has accumulated a lot of problems, incl. the poor condition of waterways, old ships, and the lack of port infrastructure. In this regard, recently, at various levels of government, the issue of increasing competitive advantages and efficient use of water transport for the social and economic development of territories has been discussed[3].

A brief history of shipping in the Arkhangelsk Oblast

The geographical feature of the Arkhangelsk Oblast is the inextricable link between river and sea basins.[4] Due to the dense network of river arteries, called "God's roads" in the Middle Ages were [2, Ilina L.L., p. 114], and their links with the White and Barents Seas, both internal (river) and external (sea) waterways have been developed in this area.

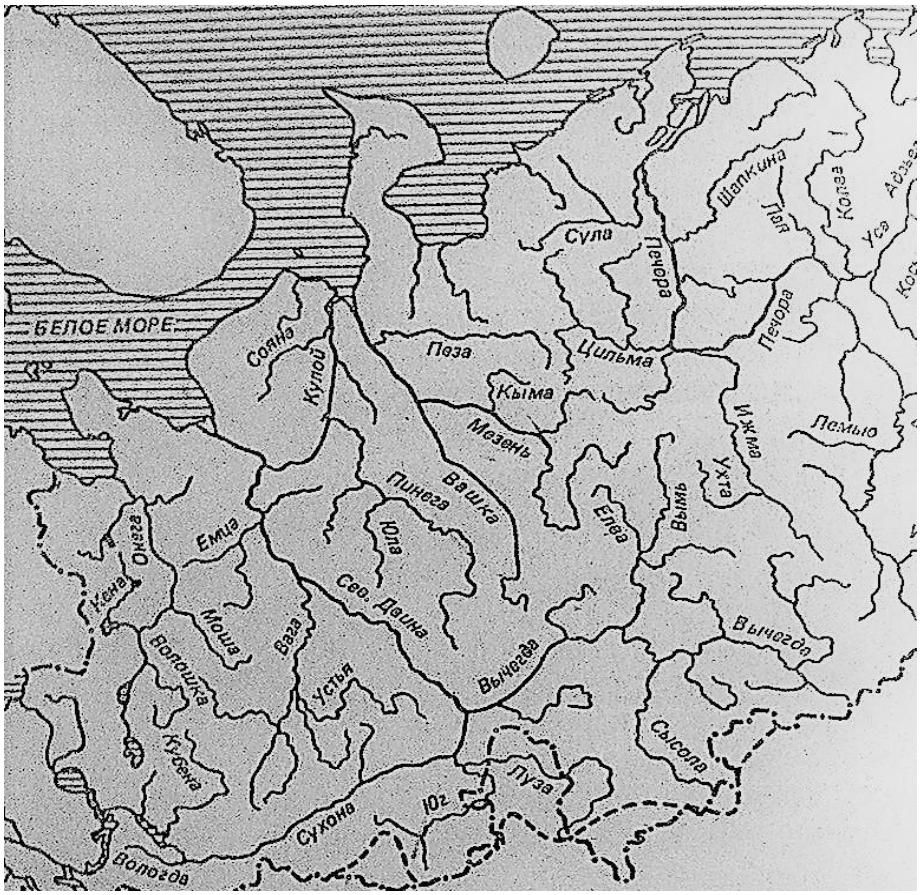

Fig. 1. Map of the river and sea basin of the Arkhangelsk Oblast [2].

[2] Deyatel'nost' vodnogo transporta. [Activity of water transport]. URL: http://www.transport29.ru/vodnyj-transport/27-deyatelnost-vodnogo-transporta (Accessed: 08 February 2018). [In Russian]

[3] Soderzhaniye 1 km vodnogo puti obkhoditsya v 30 raz deshevle, chem avtodorogi. [The maintenance of 1 km of the waterway is 30 times cheaper than road]. URL: http://www.rostransport.com/news/13384/?sphrase_id=37386 (Accessed: 03 May 2018). [In Russian]; Gubernator Arkhangel'skoy oblasti podnyal vopros obmeleniya rek. [The governor of the Arkhangelsk Oblast raised the question of shallowing rivers] URL: http://www.rostransport.com/news/8052/?sphrase_id=37386 (Accessed: 03 May 2018). [In Russian]

[4] Perevozki gruzov i passazhirov. [Transportation of goods and passengers] URL: http://www.morflot.ru/vvt/perevozki_gruzov_i_passajirov.html (Accessed: 15 April 2018). [In Russian]

The length of the inland waterways of the Arkhangelsk Oblast is 3 443 km[5]. The main river highways pass along the rivers Northern Dvina, Mezen, Onega, and Pechora. Shipping is carried out in the White Sea with access to the seas of the Arctic Ocean: the Barents Sea and the Kara Sea.

These waterways have been used for several thousand years. The developed water network allows to move from one river to another and use them as means of communication [3, Vaganov P.F., p. 4]. In ancient times, waterways had a great importance for people. The development and settlement of new territories was going on along the northern rivers and seas. In the Arkhangelsk Oblast, on the banks of rivers and sea coasts, the first permanent settlements appeared. Their residents were engaged in crafts, handicrafts and trade along the inland waterways [4, Lukin Yu.F., p. 77]. In the 15th century, a regular trade connection with England, Holland and Germany was set via the White Sea.

The first passenger steamship route in the Russian North was opened in the 1860s. [5, Popov G.P. et al., p. 9], and in 1858 the regular navigation of steam vessels began [6, Arkhangelsk Oblast ..., p. 335]. Before the railway (it was built in 1899), inland water transport was the main means of transportation for passengers and cargo. The development of shipping stimulated the development of shipbuilding. In 1825, the first paddle steamer built at the Solombala shipyard was launched [5, Popov G.P., p. 6].

The development of rail transport and the expansion of the road network could not diminish the value of water transport. In the basins of the Northern Dvina, Pinega and Pechora rivers, a large part of the local forests was concentrated, and logging industry was operating there. The rivers were used for wood transportation [6, Arkhangelsk region ..., p. 57]. The growth of the logging industry lead to appearance of new settlements and towns [3, Vaganov P.F., p.8]. At the same time, the transport significance of the White Sea, which was used for export, increased. Regular passenger traffic on the White Sea appeared in the 1870s., but it was developing very slowly due to the small population of the seacoast [6, p. 340].

In the 1930–1990s, a modern water transport infrastructure was fully developed in Russia [7, Mustakaeva E.A., p. 140]. Regular shipping routes for passengers was carried out on sea and river vessels from the regional center and the main port – the city of Arkhangelsk — to the main settlements of the area. The delivery of goods was also carried out by the state on a regular basis through inland waterways in the navigation period and by sea transport throughout the year [8, p. 8, pp. 80–87]. Several shipyards in the area produced river-sea vessels. Volumes of freight transportation increased all the time. Most cargoes were logging industry products.

In many respects, the stable work of water transport was promoted by the state support of sea and river navigation and shipbuilding, which existed in the Soviet Union. After its collapse and the transition to a market economy, a sharp decline in traffic volumes was caused by a general decline in the production and consumption of industrial products. Many shipbuilding enterprises

[5] Protyazhonnost' vnutrennikh vodnykh putey. [The length of inland waterways] URL: http://opendata.morflot.ru/7707516988-ProtjagonnostVVP2012 (Accessed: 15 April 2018). [In Russian]

went bankrupt. Governmental regulation of passenger transportation and the export of industrial and food products was significantly reduced [8, pp. 8, 87, 222]. The dominant position in the water transportation was taken by the non-state sector.

Now, regular forms of vessel traffic are used for the shipping in the Arkhangelsk Oblast. This includes linear shipping, i.e. established directions of transportation and compliance with a certain mode of movement [9, Alekseeva E.S., p. 196]. The main inland waterways transport operator of the Arkhangelsk Oblast is OJSC "Arkhangelskiy Rechnoy Port". The largest cargo delivery companies in the areas are OJSC "Northern Sea Shipping Company" and OJSC "Northern River Shipping Company", which uses "river — sea" vessels[6].

One river and five seaports operate in the Arkhangelsk Oblast: in the towns of Arkhangelsk, Onega, Mezen, and Naryan-Mar and in the village of Varandey [7]. River navigation is seasonal and limited to the period from May to October. In winter, navigation is carried out in the White Sea with the use of icebreaking assistance.

Challenges of the inland water transport in the Arkhangelsk Oblast

Years of market reforms and a decrease in state support led to a degradation of the water transport quality and a weakening of its competitive position in the country's transport system[8]. The industry has many problems.

First, the poor condition of the waterways. Northern rivers often form shoals and river sediments due to the deposition of sand and clay particles [6, p. 54]. Regular dredging is necessary to maintain stable navigation and increase water depths. Funding for these works is insufficient, despite the fact that water routes pass through natural river routes. Their construction requires fewer capital costs than the construction of railways and roads[9].

Secondly, underdeveloped port infrastructure. Since the end of the 1980s, the modernization of the northern ports has not been carried out, and the bottom-deepening works have been significantly reduced [8, pp. 66–67]. As a result, most of the piers and wharfs are destroyed or require repairs to serve passenger and cargo ships. Passengers are disembarked to and embarked from unequipped shores[10]. It is worth noting that the underdeveloped port infrastructure is typical not only for Russia but also for other Arctic countries, e.g., Canada [10, Pashkevich A. et al., p. 236].

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[6] Deyatel'nost' vodnogo transporta. [Activity of water transport] URL: http://www.transport29.ru/vodnyj-transport/27-deyatelnost-vodnogo-transporta (Accessed: 08 February 2018). [In Russian]

[7] Infrastruktura vodnogo transporta. [Infrastructure water transport] URL: http://www.morflot.ru/glavnaya/intmap.html (Accessed: 21 March 2018). [In Russian]

[8] Gladkov G.L. Obespecheniye usloviy sudokhodstva na vnutrennikh vodnykh putyakh. [Gladkov G.L. Ensuring shipping conditions on inland waterways]. URL: http://www.rostransport.com/themes/16852/?sphrase_id=37386 (Accessed: 21 March 2018). [In Russian]

[9] Soderzhaniye 1 km vodnogo puti obkhoditsya v 30 raz deshevle, chem avtodorogi. [The maintenance of 1 km of the waterway is 30 times cheaper than road]. URL: http://www.rostransport.com/news/13384/?sphrase_id=37386 (Accessed: 03 May 2018). [In Russian]

[10] Deyatel'nost' vodnogo transporta. [Activity of water transport]. URL: http://www.transport29.ru/vodnyj-transport/27-deyatelnost-vodnogo-transporta (Accessed: 08 February 2018). [In Russian]

Fig. 2. Landing of passengers in one of the villages of the Arkhangelsk Oblast (Photo: Julia Olsen).

Thirdly, the “aging” of the fleet. The average age of the vessels is about 25 years. The river fleet built and existed since Soviet times is outworn significantly and often is not able to solve the transport problems of the population in some municipalities [8, p. 68]. In the Soviet Union, more than 40,000 vessels were registered in the Russian River Register, while today there are only 13,022[11]. The renewal and expansion of the river fleet is not carried out almost. Ship automation systems do not meet modern requirements, and maintenance of ship mechanisms requires a large number of personnel [12].

Fourth, the seasonality of transportation and its availability only in the navigation period. The main problem for shipping in the North has always been the ice cover. Traditionally, the navigation period on the Northern Dvina River lasts 6 months, and on its tributaries, it is much less [11, p. 16]. In recent years, climatic changes have been observed. They affect the decrease in ice formation [12] and, as a consequence, an increase in the navigation period. In connection with the warm winters

[11] Krivoshey V. Vnutrenniy vodnyy transport: kak govoritsya, «priplyli»… [Krivoshey V. Inland water transport: as they say, “swam up” ...] URL: http://www.rostransport.com/article/16758/?sphrase_id=37386 (Accessed: 22 March 2018). [In Russian]

[12] Gladkov G.L. Obespecheniye usloviy sudokhodstva na vnutrennikh vodnykh putyakh. [Gladkov G.L. Ensuring shipping conditions on inland waterways]. URL: http://www.rostransport.com/themes/16852/?sphrase_id=37386 (Accessed: 22 March 2018). [In Russian]

and the late onset of the ice, there were cases when people were cut off from the "mainland"[13]. On the one hand, a change in the navigation time may contribute to the development of shipping and an increase in the volume of cargo and passenger traffic. On the other hand, the late onset of ice shortens the period of cargo delivery to remote areas along winter roads — roads that are laid on frozen rivers. In addition, climate changes adversely affect the coast and shoreline, leading to their degradation.

Fifth, the decline in state regulation of traffic and water transport management. In the Soviet years, there was a distribution of freight and passenger traffic, which allowed balancing the volumes of cargo-passenger traffic between all types of transport. Today, due to the lack of state regulation, water transport has been superseded by road and rail and it is used ineffectively. In addition, the decline in state participation in the management of the industry led to the transfer of half of the river infrastructure to private ownership, which led to problems of their maintenance and further development [13, Davydenko A.A., pp. 7–12]. E.g., the number of offices responsible for regulation and control of tourist transportation in the European North of Russia is 30 national, regional and local services. It affects the obtaining the necessary permits [10, Pashkevich A. et al., p. 232].

Social significance of the inland water transport

Economic reforms of the 1990s had a negative impact not only on the water transport itself, but also on the volumes of passenger-and-freight transportation. It was a result of a slowdown in the social and economic development of the Arkhangelsk Oblast. In the Soviet years, the logging was the basic industry of the areas. It provided jobs for the rural population and guaranteed a constant volume of passengers and cargo carried by water transport. In time of market reforms, most of the industrial enterprises of the area went bankrupt. It led to job cuts and a sharp decline in traffic volumes. The transition to a market economy and the absence of state regulation made the price for foodstuffs increase significantly [8, p. 62]. The delivery of goods was no longer carried out by the state, but by private entrepreneurs who set prices for their own benefit. The lack of developed industry and unemployment made the population to leave for large cities and regional centers. The demographic situation worsened. According to official data, since the late 1990s, the rural population has been constantly decreasing.

Negative demographic dynamics affected the volume of passenger traffic. Statistics show that the number of passengers transported by river had been decreasing annually.

Maritime transport is not in a better situation. In the Soviet years, the maritime transportation of passengers was carried out from the port of Arkhangelsk by the vessels "Tatariya", "Bukovina", "Ushar" and "Claudia Elanskaya" weekly. Currently the only company licensed for passenger transportation along the coast of the White sea is the company "Articreid". Passenger transporta-

[13] Karpovich P. Ledostav v Pomor'ye zaderzhivayetsya na 20 dney. [Ledostav in Pomerania is delayed for 20 days]. URL: https://29.ru/text/gorod/378068158193664.html (Accessed: 19 December 2017). [In Russian]; Agapov S. Toplaya zima izmenila zhizn' naseleniya ostrovnykh territoriy Arkhangel'ska. [The warm winter changed the life of the population of the island territories of Arkhangelsk]. URL: http://нд29.рф/?p=140706 (Accessed: 15 January 2018). [In Russian]

tions are carried out to 11 settlements of the Arkhangelsk Oblast and Solovki islands with an interval of two weeks[14].

Table 1

Information about the number of rural population of the Arkhangelsk Oblast [15]

Year	Number of rural population (thousand people)
1998	368,5
1999	359,9
2000	351,2
2001	343,3
2002	335,1
2003	334,5
2004	333,0
2005	322,6
2006	337,1
2007	327,7
2008	320,4
2009	313,7
2010	307,1
2011	297,3
2012	288,9
2013	281,5
2014	279,9
2015	272,5
2016	265,2
2017	259,3

Despite the existing problems for the Far North territories and equated areas, inland water transport still plays an important social role.

Table 2

Information about the passenger carriage by inland water transport of the Arkhangelsk Oblast [16]

Year	Number of passengers
2013	1,042,134
2014	925,354
2015	876,064
2016	861,414
2017	841,195

The research results show that 84% of the local population of the Arkhangelsk Oblast has been living on the coast for many decades [14, Podoplekin A.O., pp. 27–38]. Due to the geographical remoteness of many settlements and the lack of rail or road communications, water transport is the cheapest and most affordable way to deliver industrial goods, food and passengers. Today, regular inland passenger river transport covers 16 of the 19 districts of the Arkhangelsk Oblast: Velsky,

[14] Ob utverzhdenii Transportnoy strategii Arkhangel'skoy oblasti do 2030 goda. Rasporyazheniye Pravitel'stva Arkhangel'skoy oblasti ot 15.12.2009 № 319-rp. [On approval of the Transport Strategy of the Arkhangelsk Oblast until 2030. Order of the Government of the Arkhangelsk Oblast, December 15, 2009 No 319-rp]. [In Russian]

[15] Chislennost' i sostav naseleniya Arkhangel'skoy oblasti. [Population size and composition of the Arkhangelsk Oblast] URL: http://arhangelskstat.gks.ru/wps/wcm/connect/rosstat_ts/arhangelskstat/ru/statistics/population (Accessed: 15 March 2018). [In Russian]

[16] The data provided by OJSC “Arkhangelsk River Port”.

Verkhnetoemsky, Vilegodsky, Vinogradovsky, Kargopolsky, Kotlasky, Krasnoborsky, Lensky, Leshukonsky, Mezensky, Onezhsky, Pinezhsky, Plesetsky, Primorsky, Kholmogorsky and Shenkursky[17].

In recent years, in a number of districts of the Arkhangelsk Oblast, increase in the demand for passenger transportation by sea have been observed. First of all, we are talking about areas with high recreational potential and tourism industry development prospects. On the territory of the Arkhangelsk Oblast, it is the Solovetsky Archipelago and its unique natural landscape, cultural, historical and spiritual sights. The Archipelago attracts a large number of Russian and foreign tourists. According to statistics, the number of people visiting Solovki by sea is constantly increasing. The exception was the summer season of 2017. Most of the passengers got to the village of Solovki from Karelia by sea vessels, based in the town of Kem. However, there is also a problem with the irregularity of sea transport. It is worth noting that the consequences of increased shipping and the number of tourists are both positive and negative. In scientific literature, these effects are considered on the example of the Canadian territories [15, Stewart E. et al.] and the Russian Arctic [16, Davydov A.N., Mikhailova G.V.].

Table 3

Information about the number of passengers transported [18]

Year	Number of passengers
2013	59,220
2014	62,678
2015	78,371
2016	74,427
2017	61,093

Prospects for the development of water transport in the Arkhangelsk Oblast

The problems of water transport are typical not only for the Arkhangelsk Oblast, but also for all Russia. The further social and economic development of the region largely depends on their decision.

Recently, at the state level, a number of long-term strategies have been adopted. They are aimed at a qualitative change in the water transport and lay the foundations for its effective development and its competitiveness. E.g., the Transport Strategy[19] and the "Strategy for the Development of Inland Water Transport until 2030". According to these documents, the strategic tasks are: solving systemic problems of the water transport, improving the quality of the waterways and technical conditions of shipping facilities, building new ships, increasing passenger traffic, incl. on

[17] The data provided by OJSC "Arkhangelsk River Port".

[18] The data provided by the Agency for the Development of the Solovetsky Archipelago, Government of the Arkhangelsk Oblast.

[19] Ob utverzhdenii Transportnoy strategii Rossiyskoy Federatsii na period do 2030 goda [On approval of the Transport Strategy of the Russian Federation for the period up to 2030 [Electronic resource]: approved by the order of the Government of the Russian Federation 22.11.2008. No. 1734-p. Access from referral-legal system "Consultant Plus". [In Russian]

socially important routes, and developing freight transportation by internal and external waterways[20].

It is obvious that the future of strategic tasks and competitive advantages of water transport largely depend on economic and the social development of the region. Historically, rivers and seas have been used to develop natural resources of the North and trade relations with other areas of Russia and foreign countries. In the Soviet years, the transportation of passengers and cargo in the Northern Dvina and White Sea basins was carried by hundreds of different vessels and a single deep-sided water transport system was operating as well [6, pp. 335–341].

Today, the future development of the Arkhangelsk Oblast and the revival of sea and river shipping are largely related to the natural resource development and infrastructural development of the Arctic. It is assumed that the industrial development of the Arctic will lead to an increase in cargo turnover and shipping along the Northern Sea Route, incl. transit between Asian and European countries [17, Farre A. et al.]. In this regard, a promising idea is the creation of the Arctic Sea Highway of a year-round operation, which will include the Northern Sea Route and river communications[21]. In addition, recent climatic changes have contributed to the development of national and international shipping in the Russian Arctic [18, Meier W.N. et al., pp. 185–217]. This may cause an increase in the length of inland waterways, extension of navigation periods, establishment of regular sea and river traffic and, as a result, social development of coastal territories [19, Afonin A.B.].

One more promising idea is the development of river and sea tourism. In the North of Russia, culture is historically associated with the waters of the northern rivers. Historical places with great recreational potential are located along the rivers and seas of the Arkhangelsk Oblast: Solvychegodsk, Kargopol, Kholmogory, Voznesenie, the Solovetsky Archipelago, the Russian Arctic National Park, etc. The growing interest in the Arkhangelsk Oblast in Russia and among foreign tourists may increase the demand for the vessels and push the construction of new passenger vessels for tourist purposes [20, Grushenko E.B., pp. 1–6].

However, promising economic projects are not enough for the revival of the inland water transport in the area. According to the researchers, a complex social and economic assessment of the passenger transportation efficiency, the development of specific recommendations for solving problems of regulating the prices, fleet construction and the development of coastal infrastructure is necessary [21, Isaeva A.A., pp. 5, 26]. Solving these problems is not possible without state support, appropriate regulatory framework, regional and municipal water transport development

[20] Utverzhdena Strategiya razvitiya vnutrennego vodnogo transporta do 2030 goda. [The Strategy for the Development of Inland Water Transport until 2030 is approved]. URL: http://www.rostransport.com/news/11808/?sphrase_id=37386 (Accessed: 01 May 2018). [In Russian]

[21] Strategiya razvitiya Arkticheskoy zony Rossiyskoy Federatsii [Development Strategy of the Arctic zone of the Russian Federation [Electronic resource]: approved by President of the Russian Federation 20.02.2013. Access from referral-legal system “Consultant Plus”. [In Russian]

programs, federal funding for the maintenance of inland waterways, infrastructure and fleet, and state participation in various investment projects [22, Mustakaeva E.A.].

Conclusion

The development of water communications as a part of a single transportation system is an important condition for the social and economic development of the Arkhangelsk Oblast and improving the quality of life of the local population. Analysis of the inland water transport in the region has shown that today, both at the state level and at the level of the shipping companies, it is necessary to work on the improvement of the inland water transport, so it will correspond the current standards [23, Smirnov N.G., pp. 9–10]. This requires the implementation of existing strategies for the development of shipping, an increase in financing the maintenance of waterways and investments in the development of water transport infrastructure, which is possible by combining the efforts of the state and private business through public-private partnership.

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