Springer Geography

Radomir Bolgov · Vadim Atnashev ·
Timo Duile · Yuriy Gladkiy ·
Sergey Pogodin · Alexey Tsyb ·
Andrei Znamenski *Editors*

Proceedings of Topical Issues in International Political Geography (TIPG 2023)

Springer

Springer Geography

The Springer Geography series seeks to publish a broad portfolio of scientific books, aiming at researchers, students, and everyone interested in geographical research.

The series includes peer-reviewed monographs, edited volumes, textbooks, and conference proceedings. It covers the major topics in geography and geographical sciences including, but not limited to; Economic Geography, Landscape and Urban Planning, Urban Geography, Physical Geography and Environmental Geography.

Springer Geography — now indexed in Scopus

Radomir Bolgov • Vadim Atnashev
Timo Duile • Yuriy Gladkiy
Sergey Pogodin • Alexey Tsyb
Andrei Znamenski
Editors

Proceedings of Topical Issues in International Political Geography (TIPG 2023)

Springer

Editors
Radomir Bolgov
St. Petersburg State University
Saint Petersburg, Russia

Timo Duile
Department of Southeast Asian Studies
University of Bonn
Bonn, Germany

Sergey Pogodin
Peter the Great St. Petersburg Polytechnic University
Saint Petersburg, Russia

Andrei Znamenski
Department of History, Mitchell Hall
University of Memphis
Memphis, USA

Vadim Atnashev
Bolu Abant İzzet Baysal University
Bolu, Türkiye

Yuriy Gladkiy
Herzen State Pedagogical University
Saint Petersburg, Russia

Alexey Tsyb
Peter the Great St. Petersburg Polytechnic University
Saint Petersburg, Russia

International Conference on Topical Issues of International Political Geography, 2022, St. Petersburg, Russia, 23/12/2022, 24/12/2022

ISSN 2194-315X ISSN 2194-3168 (electronic)
Springer Geography
ISBN 978-3-031-70885-5 ISBN 978-3-031-70886-2 (eBook)
https://doi.org/10.1007/978-3-031-70886-2

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

The Northern Sea Route as a Driver of Russia's Arctic "Blue Economy"

Nikolai Bobylev, Maria Lagutina, Anastasiya Sboichakova, and Alexander Sergunin

1 Introduction

The NSR is a key component of Moscow's Arctic strategy. Along with Moscow's economic interests, there are some geopolitical and security factors that affect the NSR's development and should be paid attention to by the Russian decision-makers [1]. The Russian leadership points out the significance of the NSR's economic and environmental security aspects and the role it plays in ensuring transport and social cohesiveness of the Arctic Zone of the Russian Federation (AZRF).

The NSR performs a number of very important functions, including ensuring the so-called "Northern supply"—supply of fuel, construction materials, food materials, and other consumer goods—to the remote local communities; shipping of the products (hydrocarbons, metals, and other natural resources) originated from Russia's Far North to other Russian regions and abroad; providing international transit of cargo from East Asia to Northern Europe and vice versa; ensuring reliable search and rescue (SAR) operations system in its water area; securing border control over the vast territory, which became more accessible because of melting polar ice; and guaranteeing quick redeployment of the Northern Fleet forces to various parts of the Arctic Ocean and adjacent seas [2].

N. Bobylev
Saint Petersburg State University, St. Petersburg, Russia

M. Lagutina · A. Sboichakova (✉)
Saint Petersburg State University, St. Petersburg, Russia

Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia

A. Sergunin
Saint Petersburg State University, St. Petersburg, Russia

Nizhny Novgorod State University, Nizhny Novgorod, Russia

R. Bolgov et al. (eds.), *Proceedings of Topical Issues in International Political Geography (TIPG 2023)*, Springer Geography, https://doi.org/10.1007/978-3-031-70886-2_45

Given the significance of the NSR, Russia is constantly updating its policies on this maritime route by changing legal regulations, improving its management system and icebreaker and pilot services, and modernizing NSR port infrastructure, navigation and SAR systems, telecommunications, and so on.

But only quite recently Moscow started to pay serious attention not only to the economic and strategic aspects of the NSR but also to its ecological dimensions. Specifically, the Kremlin acknowledged the fact that the NSR should be further developed on the basis of the "blue economy" (BE) concept in order to protect the Arctic's fragile marine environment and be in line with high international ecological standards.

In this study, we follow the BE definition made by the European Commission: BE is "all economic activities related to oceans, seas and coasts. It covers a wide range of interlinked established and emerging sectors" [3, p. 5]. This definition includes maritime routes and port infrastructure, which makes it applicable to the NSR situation.

This study aims to examine how Russia views the NSR's development on the BE principles and use this maritime route as a driver for the sustainable development of the entire region. The chapter starts by examining the NSR legal framework and Russia's conceptual discourse on the future development of this strategically important maritime route. The second section discusses the role of the Polar Code (PC) adopted by the International Maritime Organization (IMO) in 2014–2015 in the NSR's integration into Russia's emerging BE. The next section discusses the problem of reorganization of the NSR port infrastructure on the BE principles. Finally, the special section explains why establishing marine protected areas (MPAs) is conducive to the BE development in the AZRF.

2 Russia's NSR Development Strategies: Past and Present

Initially, Russia was keen on opening up the NSR to international shipping because of economic reasons. The NSR's sustainable development and marine environment protection were not on Moscow's agenda at all. The USSR first suggested to open the northeast passage to international navigation in 1967, when the détente between the USA and Soviet Union began, but this offer got the cold shoulder from Western partners and was never implemented. The Soviet leader Mikhail Gorbachev sounded this idea again in his famous Murmansk speech of 1987, but this initiative was not heard by the world's largest maritime nations too. Only in mid-1991, a few months before the dissolution of the USSR, the NSR was officially opened to international exploitation. Several normative acts such as the Regulations for Navigation on the Seaways of the NSR (1991), the Guide for Navigation through the NSR, and the Regulations for the Design, Equipment and Supply of Vessels Navigating the NSR (1995) established basic rules for using this maritime route as well as technical standards for ships exploiting this seaway.

In the 2000s, conceptual discussions on the NSR developmental strategies unfolded in Russia. One of the draft documents, which designed such a strategy until 2015, contained the idea of the NSR's integrated development and its use on a commercial basis. According to this paper, a self-supporting, cost-effective Arctic Sea Transport System under state control should be created by 2015 [4]. The discussions lasted for several years, but no real measures to develop the NSR were taken.

On 22 November 2008, the Russian Transport Strategy until 2030 was approved by the government. This strategy aimed to integrate Russia's transport system into the world one, including the full use of the country's transit potential, which is fully related to the NSR. It was planned to reconstruct old and build new terminals that could ensure the NSR's effective operation [5]. The main idea was to make the NSR more efficient and integrate it into the world's maritime transport system. The sustainable development concept was not given due attention in this document.

The situation started to gradually change in 2011–2012 when the Kremlin decided to further internationalize the NSR and simultaneously, increase the safety of the traffic by launching a number of investment projects to modernize the NSR infrastructure. In 2011, Vladimir Putin said that 38 billion rubles would be allocated to increase the icebreaker fleet by 2014, and three universal nuclear icebreakers and six diesel-electric ones would be built by 2020. He also recalled the state decision on the creation of ten integrated emergency rescue centers in the Russian Arctic [6]. All in all, in 2012–2014, more than 21 billion rubles were spent on the modernization of the NSR infrastructure [7].

In 2012, a new Russian law on the NSR [8] was signed by President Putin and the next year, the Ministry of Transport issued the new Rules of Navigation via the NSR [9]. First of all, the 2012 law established geographical parameters of the NSR and its water area (see Map 1). Both the new law and Rules of Navigation established rules of transit via the NSR and introduced new insurance requirements, which made ship owners responsible for possible environmental damage and pollution. These documents also set new tariffs for icebreaker and pilot services as well as meteorological and logistical information. Along with two state agencies, Rosatomflot (nuclear icebreakers) and Rosmorport (diesel icebreakers), several private companies, including the Murmansk Shipping Company, Far Eastern Shipping Company, Norilsk Nickel (metallurgy), Lukoil (oil), and Ice Pilots Ltd. provided icebreaker and pilot escort, radio communication, and hydrographic information. In March 2013, the NSR Administration was reestablished and made responsible for issuing permissions to transit the NSR and overseeing navigation safety.

It should be noted that the 2013 rules aimed not only to ensure the safety of navigation but also to reduce pollution from ships. Specifically, it was required:

To make ship tanks capable of collecting oil residues—depending on the type of ship power plant and duration of the trip via the NSR

To have on the ship storage tanks of sufficient capacity for the collection of waste generated by the vessel during its trip through the NSR

To have on the ship a sufficient amount of fuel, freshwater, and provision for navigation via the NSR

Map 1 The Northern Sea Route water area and Arctic ports. (Sources: Center for High North Logistics; Northern Sea Route Administration. Copyright Stratfor 2019)

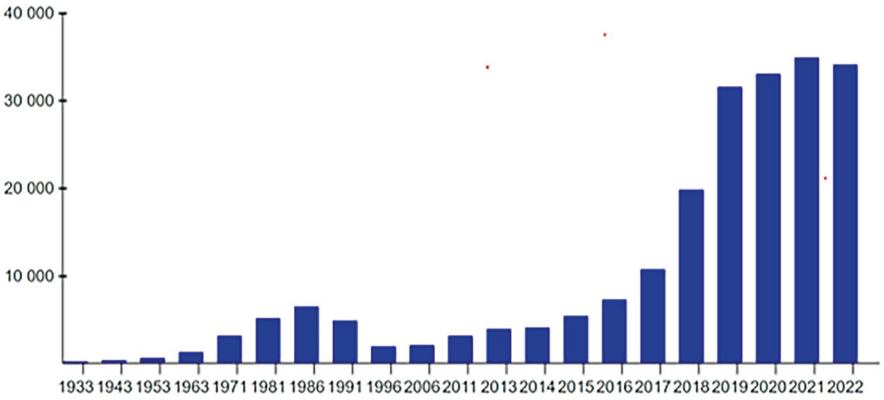


Fig. 1 The NSR cargo traffic (1933–2022), thousand ton. (Sources: Refs. [10–12])

To heat ballast tanks adjoining the external side above the operating waterline during the cold period from November to June [9]

Anyway, these requirements were still far from the BE principles.

The launch of Novatek's Yamal liquefied natural gas (LNG) plant in late 2017 created a principally new situation in the region by requiring the organization of all-year-round LNG shipments to East Asian and European customers. The volume of the NSR cargo traffic has grown sharply over the past decade from 0.1 million tons in 2010 to 34 million tons in 2022 [10, 11] (see Fig. 1).

In December 2018, a new version of the NSR law was approved by both the Russian Parliament and the President. This act changed the NSR management system by making the Rosatom (more specifically, its subsidiary—Rosatomflot) a key NSR operator. Rosatomflot also shared the responsibility for issuing permission to navigate this sea route with the NSR Administration (part of the Ministry of Transport). The latter remained responsible for international cooperation, including the Polar Code implementation. But what was especially important, the new law introduced the concept of sustainability to the development of both the NSR waters and port infrastructure [13]. This was one more step toward the BE principles.

Responding to the growth of the NSR cargo traffic, a special action plan on the NSR development until 2035 was approved by the Russian Cabinet of Ministers in December 2019. It foresaw renovation of the NSR ports, building of new icebreakers (nuclear and conventional), research vessels, SAR, and auxiliary fleets, improvement of hydrographic and navigational services, further expansion of a satellite group servicing navigation and communications in the NSR waters, encouraging cargo shipments and international transit via the NSR, development of local energy supply, stimulating domestic shipbuilding, and ensuring environmental safety [14].

The plan's main goal was to create by 2023 all the necessary conditions for ensuring all-year-round shipments of cargo and passengers via the NSR. The document consisted of 84 points divided into 11 categories and listed concrete measures to be implemented by federal authorities, regional governments, and the largest state corporations operating in the AZRF [14].

Along with the developmental strategies and safety requirements, the plan envisaged some measures to ensure the NSR's environmental security, including:

- Preparation of proposals for the mandatory use of the best available technologies to reduce pollution in the AZRF seas
- Preparation of proposals for the development of integrated monitoring of the AZRF lithosphere, biosphere, hydrosphere, and atmosphere
- Creation of local monitoring systems to control pollution produced by loading and unloading operations in the NSR seaports
- Development of local observational meteorological networks in the AZRF seaports to provide hydrometeorological support for transport operations in the NSR waters
- Regular update of legal regulations aimed to prevent pollution from ships in line with the 1973 International Convention on the Prevention of Pollution from Ships (MARPOL 73/78) and the IMO's Polar Code [14, pp. 18–19].

According to Alexey Likhachev, the head of Rosatom, this plan required 735 billion rubles ($11.7 billion) in investments, with the state budget to provide a third and the rest to come from public and private companies, such as Rosatom itself, Rosneft, Novatek, Gazpromneft, Gazprom, Nornickel, and some banks [15].

Along with the above measures, the Ministry of Transport tried to chart high-altitude routes for large-capacity vessels. First, two-mile-wide main and alternative lanes should be established. Then 20-mile-wide lanes should be created (see Map

Map 2 High-a NSR lanes. (Source: http://www.hydro-state.ru/kage.html)

2). To chart these routes, the Federal Hydrographic Department (part of the Ministry of Transport) sent three hydrological ships to the Arctic Ocean.

In September 2020, the Russian Government issued new navigational rules for the NSR that took into account the changes in the NSR management system introduced by the 2018 law on the NSR. However, these rules did not establish any new requirements for marine environment protection or promote the BE principles [16].

In October 2020, President Putin approved a new Russian Arctic strategy until 2035. A number of the BE-related measures were planned:

- Encouraging shipping companies to use LNG and other kinds of light fuel for sea and river ships operating in the NSR waters and adjacent rivers
- Introduction of engineering and technical innovations that could ensure the NSR infrastructure's sustainability with regard to climate change
- Creation of specially protected land and marine areas in the AZRF, including the NSR water area
- Adaptation of Russia's Arctic economy and infrastructure to climate change
- Identification of objects and zones of accumulated environmental damage and taking measures to eliminate accumulated environmental damage
- Development of a state environmental monitoring system in the Russian Far North on the basis of cutting-edge information and communication technologies
- Based on the recommendations of the World Meteorological Organization, increasing the density of the observation network in the AZRF and improvement of the technical equipment of environmental monitoring systems
- Reduction of air and water emissions by the AZRF industries on the basis of the best available technologies
- Development of a unified state system to prevent and cope with emergency situations, including oil spills in the NSR water area
- Development of a network of SAR centers in the region
- Regular assessment of the anthropogenic impact on the AZRF environmental and socioeconomic systems, including the impact of transborder pollution from North America, Nordic Europe, and Asia

- Regular assessment of the impact of the AZRF nuclear energy facilities on the local environment and population
- State support for the creation of a waste management system in the AZRF, including the NSR waters and coastal zone
- Solving the problem of spent nuclear fuel and radioactive waste dumped in the Barents and Kara seas
- Modernization of the AZRF fishery complex on the basis of advanced technologies and high environmental standards as well as the development of aquaculture in the region [17]

With the start of Russia's special military operation in Ukraine in 2022, the NSR development strategy was changed. In August 2022, the Russian Government published a new, corrected NSR development plan. The BE-related priorities of this plan included:

- Establishing a state environmental monitoring system in the NSR water area
- Developing a long-term program for the removal of radioactive objects dumped in the Arctic seas
- Removal of six most dangerous sunken radioactive objects, including the nuclear submarines K-27 and B-159 with spent nuclear fuel aboard
- Organizing an environmental monitoring system to control air and water pollution caused by transshipment of dusty bulk cargo in the NSR ports
- Systemic monitoring and reducing environmental risks from cargo traffic along the NSR [18, pp. 45–47]

To sum up, in Russia, there is no integral BE concept related to the NSR or the AZRF at large. However, some elements of the BE concept are present in the legislation and conceptual documents on the NSR. This concerns, inter alia, environmental monitoring in the region, preparedness to fight oil spills, and cleaning of the Arctic seas from radioactive waste. At the same time, if Moscow seeks to implement the BE principles in the AZRF, it needs to develop a special conceptual document for these purposes and integrate it into Russian legislation on the NSR.

3 Polar Code Implementation

The PC (adopted in 2014–2015 and entered into force in 2017) plays an important role in increasing maritime safety and preventing marine pollution in the NSR waters. This document suggested some risk-mitigation strategies and concrete measures to deal with various challenges to Arctic shipping, including its environmental aspects.

Many environmental standards established by the PC are very close to the BE principles and in fact, the Code implementation is the right way to the creation of BE in the Arctic. Particularly, the PC prescribes:

1. Prohibition of any discharge into the sea of oil or oily mixtures from any ship traveling in Arctic waters.
2. For ships with large oil fuel capacity, all fuel tanks should be detached from the outer shell by a distance of not less than 0.76 m.
3. For large tankers, the double bottom tanks are mandatory.
4. For most ships' categories, all oily bilge water holding tanks and oil residue tanks shall be detached from the outer shell by a distance of not less than 0.76 m.
5. Any discharge into the sea of noxious liquid substances or mixtures having such substances should not be allowed.
6. Discharges of sewage into the sea are not allowed with rare exceptions.
7. Some rules for the discharge of garbage into polar waters were established [19, pp. 38–41].

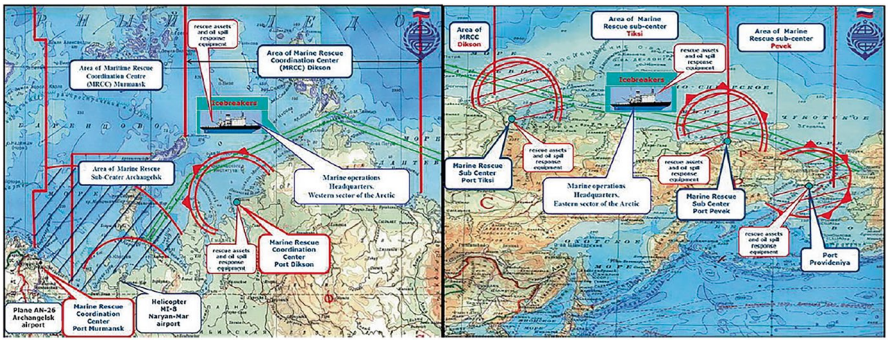
The PC also stipulated that after 1 January 2017, shipbuilders must build new vessels that should be compatible with new safety and environmental standards. According to the Code, the existing ships should be refitted by 1 January 2018 or, in some cases, by the end of 2020 to meet its requirements.

Moscow demonstrated that it can be a responsible player within the PC regime. First of all, the Code's requirements were integrated into the Russian national legislation. For example, the most important maritime regulations were changed in line with this document: Commercial Shipping Code, Rules of Navigation via the NSR, Law on Sea Ports, Rules for the Classification and Construction of Sea-Going Ships, Technical Regulations on Maritime Transportation Safety, Rules for the Technical Supervision of Ships in Service, etc.

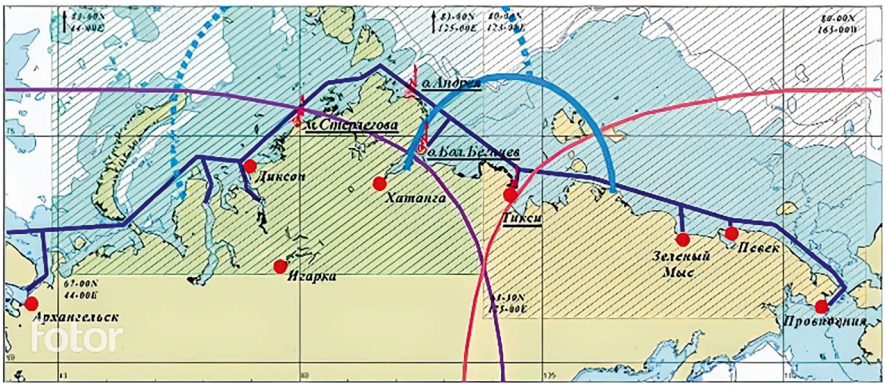
Second, all Russian commercial ships built after 1 January 2017 correspond to the PC safety and environmental requirements. Third, by 2020, all Russian ships built before 2017 were refitted in accordance with the Code's standards. Fourth, Moscow suggested a number of training courses on navigation in icy waters for crews from non-Arctic countries in order to decrease the possibility of incidents in the NSR water area.

Moscow aims to complete the program on the construction of ten federal SAR centers in the AZRF to ensure Arctic shipping safety. Seven of these centers are already finalized while three others will be operational very soon [20]. Along with national SAR centers, two maritime SAR coordination centers (Dikson and Murmansk), four regional SAR and fire stations, three maritime SAR stations (Arkhangelsk, Tiksi, and Pevek), and four storage units for equipment for oil spill response (Dikson, Tiksi, Pevek, and Providence) were created [21, p. 29] (see Map 3).

There were plans to create an international consortium for further NSR development and its transformation to an international maritime transport corridor. Sovkomflot (cargo and tanker ships), Rosatomflot (nuclear icebreakers), Rosmorport (diesel icebreakers, port and navigation infrastructure), and some international shipping companies (most of all Chinese ones) were primary candidates for such a consortium [22, p. 9]. However, as mentioned above, the Kremlin preferred Rosatom as a chief manager of the NSR.



Map 3 The AZRF SAR centers with their zones of responsibility. (Source: http://www.arctic-lio.com/nsr_searchandrescue)



Map 4 The SafetyNET and Navtex stations and their coverage zones in the AZRF. (Source: http://www.hydrostate.ru/tsibm.html)

Russia aims to develop SafetyNET and Navtex systems in the AZRF to increase the safety of the maritime traffic in the region. For example, in addition to the existing Navtex stations in Murmansk, Arkhangelsk, and Tiksi, a new one should be built on the Andrew Island (see Map 4).

It is safe to assume that a proper technical equipping of ice-class ships could be helpful for both safe navigating in icy waters and PC implementation. For instance, Norilsk Nickel company equipped its ice-strengthened ships with Jeppesen's dKart Ice Navigator that allows them to navigate without an icebreaking escort. The combination of high-resolution radars with the Electronic Chart Display and Information System can also provide crews with new ice detection options and ensure safer navigation in polar waters [23].

Ionospheric interference is a serious concern for many Arctic seafarers because electromagnetic fields affect radio signals on specific frequencies, positioning systems, and communications in general. According to the International Association of

Lighthouse Authorities and IMO, a more resilient positioning system is required by Arctic e-navigation. Currently, the AZRF is fully covered by the long-range radio navigation system "Seagull" that is seen as a reliable backup to GPS/GLONASS and an integral part of the IMO's global radio navigation system [23].

Moscow plans to create several satellite groups that will be specially designed to cover the entire Arctic region and improve communications and navigation systems in the NSR waters. To monitor the Arctic hydrometeorological situation, Russia plans to launch six Arctic-M satellites into a highly elliptical orbit by 2031 [18, pp. 24–25]. The first satellite was launched in February 2021. The second satellite will be launched in 2024–2025. To provide the AZRF population and the NSR water area with high-quality broadband Internet and mobile communications, Moscow plans to create an Express-RV satellite group of four satellites, launching them into a highly elliptical orbit. In addition to this, Russia is creating a special grouping of two Condor-FKA satellites for remote sensing of the NSR water area (by 2024).

Some experts propose specific US–Russian bilateral measures for PC implementation:

- Joint efforts to improve hydrographic information and update nautical charts in the Bering and Chukchi seas
- Start US–Russia navigation safety information exchange on a regular basis
- Increase joint US–Russia emergency response capabilities, for example, by deploying rescue tugs and icebreakers near the high-risk areas
- Conduct SAR and oil spill response exercises on a regular basis to maintain the effectiveness of the 2011 and 2013 agreements on these issues
- Introduce stricter communication and reporting requirements to properly monitor Arctic shipping, reduce risk, and enforce ship compliance with the PC guidelines for safe shipping [24]

In view of increased traffic in the Bering Strait and Bering Sea, the US and Russian authorities initiated a joint proposal to create a two-way routes system in this water area to reduce emissions and increase maritime safety there. It should be noted that this region is not formally an integral part of the NSR legal regime but at the same time, belongs to the water area covered by the PC. Particularly, six two-way routes and six precautionary areas were jointly proposed to the IMO.

These routes running along the coasts of Alaska and the Chukchi Peninsula are helpful for ships to avoid the numerous islands, reefs, and shoals near the Bering Strait. They could also reduce the risk of shipwrecks and environmental disasters. These routes are of voluntary rather than mandatory character; they do not limit neither commercial fishing nor subsistence activities of local (indigenous) communities [25]. However, after the start of the Ukrainian military conflict in 2022, the discussion of these plans was postponed.

It should be noted that the Russian expert debate on the PC aims not only to discuss the Code's implementation but also to further improve it. Particularly, the following suggestions are made:

First and foremost, an improved PC variant should substantially reduce shipping emissions, such as carbon dioxide, nitrogen, sulphur oxides, particulate matter, and

black carbon [21, 26]. These emissions heavily affect Arctic air quality, human health and eventually, the global climate. If the Arctic shipping traffic increases, the lack of a regional environmental regime can increase negative impact on local communities, flora, and fauna, and again, accelerate global climate change [27].

In contrast with Antarctica and the Baltic Sea, the current PC version does not prohibit the use of heavy fuel oil (HFO) in the Arctic region, although its detrimental effect on the local environment and population is obvious. Many Russian experts favor the use of lighter and cleaner fuels, such as, for example, LNG and distillates, to reduce shipping emissions in the Arctic seas [21, 26]. The IMO's recent initiative to introduce a partial HFO ban in the Arctic in the mid-2020s and a full ban by the end of the decade received a rather positive reaction from the Russian expert community [28]. Obviously, an introduction of an HFO ban could be one more serious step toward the BE principles in the NSR development.

Second, the Russian expert community favors banning ballast and greywater discharge in the polar waters. They believe that the NSR masters together with private companies should build in the Arctic ports special facilities to receive, store, and reprocess ballast and greywater [26, p. 29].

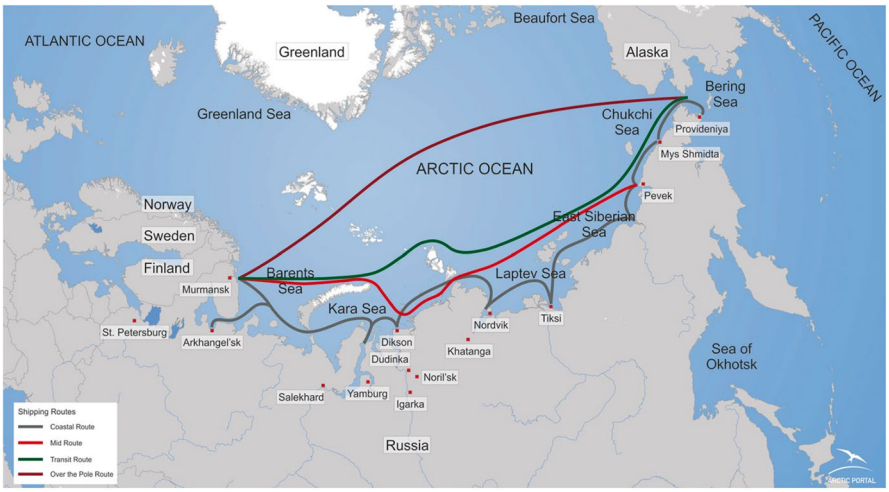
Third, the PC does not fully prevent disturbances of wildlife. The Code requires that vessels should avoid large marine mammals such as whales, walruses, narwhals, or polar bears, but it says nothing about seabird colonies. There is also criticism related to the lack of measures in the PC to prevent the migration of invasive species to the Arctic Ocean and reduce underwater noise [21, 26].

To sum up, Russia's effective Polar Code implementation and modernization of the NSR safety, pollution control, and communications infrastructures have significantly contributed to Moscow's transition to the BE principles in the AZRF, although in this case, Russia's main objectives were NSR internationalization and making it all-year-round seaway rather than building BE in the region.

4 Modernization of Port Infrastructure

There are more than 20 large, medium, and small ports along the NSR. Of these, the most important ports are Amderma, Anadyr, Baydaratskaya Bay, Dixon, Dudinka, Green Cape, Igarka, Cape Kamenny, Cape Schmidt, Novaya Zemlya, Pevek, Providence, Sabetta, Tiksi, Kharasaway, Khatanga, and Egvekinot (see Map 5). Some of them are situated on the Arctic Ocean's coast, and some are at the mouths of Siberian rivers or near them and the AZRF industrial centers. Most of these ports were built in Soviet times. Ports such as Sabetta and the "Arctic Gate" have been built over the past decade. New ports are being built—terminal "Utrennee," "Bay North," coal terminal "Chaika," etc.

The outdated AZRF port infrastructure is a serious barrier to the NSR's integration into the world's maritime transport system [30, 31]. Obviously, the old Arctic ports need reconstruction to create a world-class transport corridor in the High North. The most recent NSR development plan (2022) suggests that 14 ports will be



Map 5 The AZRF ports. (Source: Ref. [29])

either modernized or built anew. The cost of this program is about 237 billion rubles [18, pp. 9–17]. Unfortunately, the modernization plans for these ports aim more at increasing their efficiency (in particular, increasing their cargo turnover and receiving vessels of larger tonnage) than at complying with high international environmental standards. The only environmental problem that was mentioned in the 2022 NSR development strategy was pollution of atmospheric air and water areas during the transshipment of dusty bulk cargo in the NSR ports. However, some specific plans for the NSR ports' modernization have BE-related priorities.

Modernization of the NSR port infrastructure in line with the BE principles could include the following priorities:

First is to make safer and environmentally cleaner the NSR ports and terminals dealing with dangerous and hazardous cargo such as crude oil, fuel, chemicals, coal, fertilizers, explosives, etc. The new ports have already been built in line with stricter safety and environmental standards, but old ports, such as Amderma, Anadyr, Dixon, Dudinka, Igarka, Pevek, Providence, Tiksi, Khatanga, and Egvekinot, badly need modernization. This is especially important for terminals that reload coal to ships traveling via the NSR.

Second, according to the BE concept, "smart ports" should be supported by the environment-friendly coastal transport infrastructure. Currently, only four NSR ports are linked to Russia's national transportation system via railways, and 40% of Arctic ports are experiencing problems with the reception of large tonnage vessels [32, p. 55]. Many AZRF ports are hardly accessible from the land because of their remote location—there are no railways or highways connecting them with the Russian urban and industrial centers located in "mainland" Russia. To solve this problem, Moscow plans to build several railways that should connect major Arctic ports with the industrial centers of Ural and West and East Siberia. Among them are

the railways Belcomur [Arkhangelsk-Syktyvkar-Solikamsk (Perm)] that should connect the White Sea ports with Ural industrial centers, the Northern Latitudinal Railway in the Yamal-Nenets Autonomous District (Obskaya-Salekhard-Nadym-Novy Urengoy–Korotchaevo), Lavna-Vykhodnoe in the Murmansk Region, and Siberian Meridian (connecting the AZRF ports with Asian harbors via Siberia) [18, pp. 13–15].

Third, BE principles can be introduced to the port logistic system, including emission reduction schemes. The port logistics sector has a significant impact on global greenhouse gas emissions. In addition to greenhouse gases, the mobility and logistics sector also produces other emissions that are important parameters for making transportation more eco-friendly. These include noise, air pollutants, and particulate emissions. Emissions can be reduced by several methods, including reducing transport volumes, optimizing routes, increasing port transport efficiency, shifting transport to ecologically friendly modes of transport, or introducing more energy-efficient vehicles.

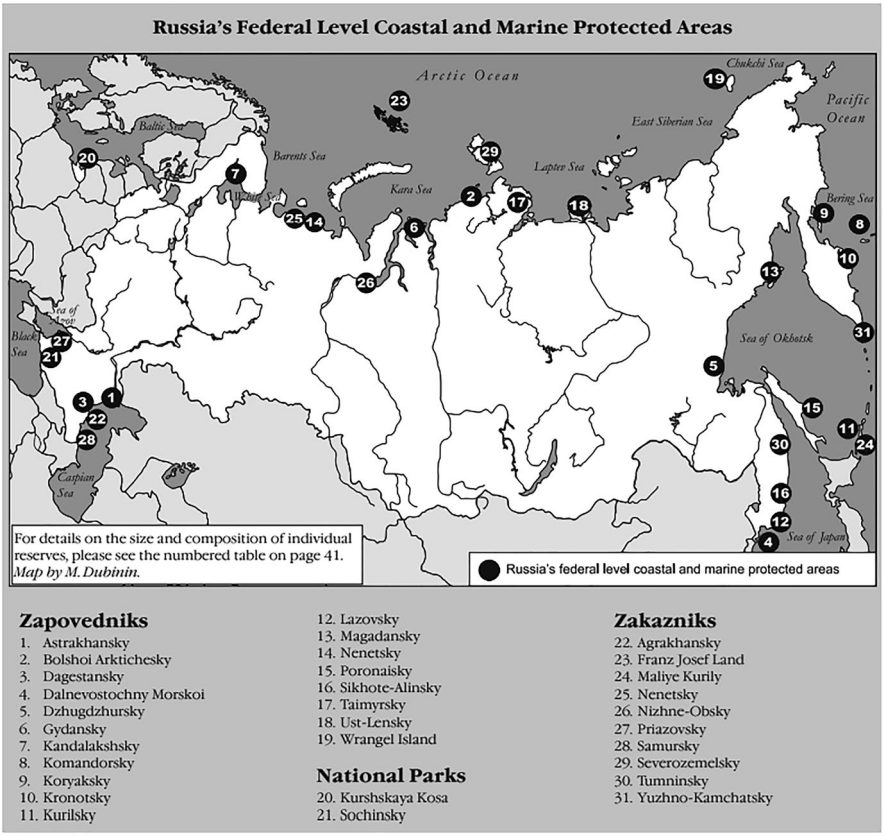
For example, the Hamburg Container Terminal Altenwerder (HCTA) model can be applicable to the modernization of Russian Arctic ports. HCTA uses 90 so-called automated guided vehicles (AGV) to move containers between the quayside and the yard. Until recently, AGVs were diesel-hydraulically and diesel-electrically driven. Since 2017, they have started to use lithium-ion batteries. This technology has substantially reduced CO_2 emissions, particulate matter, soot, nitrogen emissions, and noise. These vehicles are refueled during off-peak hours to withdraw excess electric energy from the power grid. They can also feed energy back into the power grid as so-called primary control power. This is done to regulate load peaks in the power grid and make the network frequency stable. To implement this project, the number of charging stations was increased on the HCTA. A special control software to determine the number of AGVs required for container handling and optimizing the charging strategies on the terminal was developed [33, p. 91].

In sum, these measures can stimulate the further improvement of the NSR port infrastructure as well as bring it closer to the BE standards.

5 Marine Protected Areas

MPAs are also an important element of BE because they help to reduce Arctic emissions from vessels, including the so-called "particularly sensitive sea areas" [27]. According to the MPA supporters, these areas could reduce shipping emissions by limiting vessel operations within the MPAs and specifying speed limits and/or fuel requirements for ships [26, p. 29].

There are seven *zapovedniks*, or strictly protected nature reserves, with MPAs in the AZRF: Kandalakshsky, Nenetsky, Bolshoi Arkticheskiy (Greater Arctic), Taimyrsky, Wrangel Island, Koryaksky, and Komandorsky natural reserves. The Franz Josef Land, Nenetsky, Nizhne-Obsky, and Severozemelsky *zakazniks* or special purpose reserves, also protect Arctic marine waters. There are also offshore



Map 6 Russia's federal-level coastal and marine protected areas. (Source: Ref. [34, p. 5])

buffer zones in the Nenetsky, Gydansky, Ust-Lensky, Wrangel Island, and Komandorsky *zapovedniks*. Some limited MPAs exist in the Russian Arctic and Beringia national parks [34, 35] (see Map 6).

It is unclear whether Moscow would agree to further expand MPAs in the NSR water area, especially in view of the growing traffic in the region. However, the Russian authorities do not deny a dialogue with the environmentalists and the need for further research in this field [36–38].

6 Conclusions

Currently, Russia has no clear and coherent NSR development strategy based on the BE principles, which undoubtedly hinders the transition of this sea route and the entire AZRF to the path of sustainable development and reduction of environmental

risks. At the moment, Moscow is mainly concerned with two problems: (1) how to increase the NSR's capacity and effectiveness and (2) how to ensure the further internationalization of the NSR with the aim to make it an important international transport corridor. Therefore, the measures currently being taken by Russia to modernize its commercial fleet and the NSR port infrastructure are mainly technocratic in nature, aimed at increasing the NSR's economic efficiency and not at the environmental aspects of its functioning.

At the same time, a number of Russian legislative acts, conceptual documents, and the NSR development plans contain elements of a BE strategy. This applies to measures to reduce shipping pollution and the risks of marine casualties and oil spills as well as to modernize the AZRF ports and establish MPAs to reduce the anthropogenic load on the local environment and communities. Russia still has to do a lot of "homework" to bring the NSR and the entire AZRF to the BE principles if it wants to keep up with global trends and ensure the AZRF's sustainable development. However, generally speaking, there is a rather positive dynamic in Russian strategic thinking and planning: the BE concept is gradually taking root in this domain, including further NSR development. If the BE principles are implemented in the NSR-related activities, this will become an important driver of sustainable development of the entire Russian Arctic.

Acknowledgments This chapter was written in the frame of the research project no. 102229431 "The Northern Sea Route's development as an integral part of the 'blue economy' of the Arctic Zone of the Russian Federation," funded by the St. Petersburg State University.

Author Contributions Conceptualization, N.B. and A.Se.; resources, A.Sb. and M.L.; data curation, N.B., A.Sb. and M.L.; writing—original draft preparation, A.Sb. and A.Se.; writing—review and editing, N.B. and M.L.; supervision, A.Se.

References

1. Sergunin, A., Gjørv, G.H.: The politics of Russian Arctic shipping: evolving security and geopolitical factors. Polar J. **10**(2), 251–272 (2020). https://doi.org/10.1080/2154896X.2020.1799613
2. Erokhin, V., Tianming, G., Konyshev, V., Sergunin, A.: The Northern Sea Route development: the Russian perspective. In: Ilin, I., Devezas, T., Jahn, C. (eds.) Arctic Maritime Logistics. The Potentials and Challenges of the Northern Sea Route, pp. 283–303. Springer, Cham (2022). https://doi.org/10.1007/978-3-030-92291-7_15
3. European Commission: The 2018 Annual Economic Report on EU Blue Economy. European Union, Brussels (2018) Available online: https://data.europa.eu/doi/10.2771/305342. Accessed 1 June 2023
4. Goldin, V.I.: The Northern Sea Route: on the latest history of the issue. GoArctic (August 15, 2018). Available online: https://goarctic.ru/work/severnyy-morskoy-put/. Accessed 15 July 2020 (in Russian)
5. The Government of the Russian Federation: The transport strategy of the Russian Federation (June 29, 2008). Available online: http://edu.tltsu.ru/sites/sites_content/site1977/html/media27851/2030_29_06_2008.pdf. Accessed 30 July 2021 (in Russian)

6. Zhernov, V.: The Northern Sea Route was given "green light" at the Arctic Forum. RIA Novosti. (September 23, 2011). Available online: https://ria.ru/20110923/442599326.html. Accessed 15 July 2021 (in Russian)
7. The Government of the Russian Federation: News (2012). Available online: http://premier.gov.ru/events/news/17172. Accessed 15 February 2016 (in Russian)
8. Putin, V.: The Federal Law of July 28, 2012, N 132-FZ "On amendments to certain legislative acts of the Russian Federation concerning state regulation of merchant shipping through the water area of the Northern Sea Route." Available at: http://asmp.morflot.ru/en/zakon_o_smp/. Accessed 15 July 2021
9. Ministry of Transport of the Russian Federation: Rules of navigation on the water area of the Northern Sea Route (January 17, 2013). Available online: https://safety4sea.com/rules-of-navigation-in-the-northern-sea-route/. Accessed 31 May 2023
10. Rosatom: The Northern Sea Route: the 2020 results (2021). Available online: https://arctic.gov.ru/wp-content/uploads/2021/02/2020.pdf. Accessed 15 July 2021 (in Russian)
11. Sea News: Cargo shipment in the Northern Sea Route in 2022 amounted to 34 million tons. Sea News (January 16, 2023). Available online: https://seanews.ru/2023/01/16/ru-perevozki-po-sevmorputi-v-2022-godu-sostavili-34-mln-tonn/. Accessed 30 May 2023 (in Russian)
12. Bondar, M.: Infographics "ViZ": dynamics of cargo traffic *via* the Northern Sea Route over 10 years (July 30, 2020). Available online: https://www.vetandlife.ru/vizh/rynki/infografika-vizh-dinamika-perevozki-gruz/. Accessed on 1 June 2023 (in Russian)
13. Putin, V.: The Federal Law of the Russian Federation no. 525 FZ, 27 December 2018. On making changes in specific legislative acts of the Russian Federation. Available at: https://docs.cntd.ru/document/552045960. Accessed 30 May 2023 (in Russian)
14. Medvedev, D.: The plan of development of the Northern Sea Route's infrastructure up to 2035. Decree no. 3120-r (December 21, 2019). Available online: http://static.government.ru/media/files/itR86nOgy9xFEvUVAgmZ3XoeruY8Bf9u.pdf. Accessed 30 June 2020 (in Russian)
15. Golubkova, E., Stolyarov, G.: Rosatom: Northern Sea Route to cost 735 bln roubles. MarineLink (June 24, 2019). Available online: https://www.marinelink.com/news/rosatom-northern-sea-route-cost-bln-467639. Accessed 30 June 2020
16. The Government of the Russian Federation: Rules of navigation on the water area of the Northern Sea Route. Decree no. 1487 (September 18, 2020). Available online: www.nsra.ru/files/fileslist/137-en5894-2020-11-19_rules.pdf. Accessed 30 May 2023
17. Putin, V.: The Russian Federation President's Decree No. 645, 26 October 2020 'On the strategy for the development of the Arctic Zone of the Russian Federation and ensuring national security up to 2035'. Available at: http://static.kremlin.ru/media/events/files/ru/J8FhckYOPAQQfxN6Xlt6ti6XzpTVAvQy.pdf. Accessed 30 May 2023 (in Russian)
18. Mishustin, M.: Decree of the Government of the Russian Federation no. 2115-r, 1 August 2022 'The plan of development of the Northern Sea Route for the period up to 2035. Available online: https://www.garant.ru/products/ipo/prime/doc/405010751/?ysclid=ligh2bm6p7340055657. Accessed 30 May 2023 (in Russian)
19. International Maritime Organization: The International code for ships operating in polar waters (Polar Code) (2014–15). Available online: https://www.liscr.com/sites/default/files/liscr_imo_resolutions/Res%20MEPC.264%2868%29%20-%20%28POLAR%20CODE%29%20International%20Code%20for%20Ships%20Operating%20in%20Polar%20Waters.pdf. Accessed 30 May 2023
20. Murmansk Directorate of the Ministry for Emergency Situations: The Arctic—a priority for safety policies (July 15, 2021). Available online: https://51.mchs.gov.ru/deyatelnost/stranicy-s-glavnoy/press-sluzhba/novosti/4513171. Accessed 30 May 2023 (in Russian)
21. Vasilyev, V., Semyonov, V., Tsoy, L.: IMO International Polar Code: Some Aspects of the Code's Implementation in the Russian Federation. Central Marine Research & Design Institute, St. Petersburg (2015) Available online: http://www.cniimf.ru/news/22062015/polyarnyi-kodeks-cniimf.pdf. Accessed 30 May 2023 (in Russian)

22. Semenikhin, Y.N., Novosel'tsev, E.M.: Peculiarities of transport development in the Arctic Zone. In: Nauchno-Tekhnicheskie Problemy Osvoeniya Arktiki. Nauka, Moscow (2015) Available online: http://www.dniimf.ru/rus/files/transport_development_in_the_ArcticArea.pdf. Accessed 3 July 2017 (in Russian)
23. Oechslin, P.: Russia's role in Arctic operations. (July 18, 2014). Available online: http://www.e-navigation.com/p/russia-s-role-in-arctic-operations. Accessed 15 July 2021
24. Rufe, R., Huntington, H.: Arctic shipping: a route to Russian-American cooperation (November 20, 2014). Available online: http://russiancouncil.ru/en/inner/?id_4¼4806#topcontent. Accessed 3 July 2017
25. Ham, W.: US, Russia propose Bering Strait shipping routes. MarineLink (January 26, 2018). Available online: https://www.marinelink.com/news/shipping-propose-russia433323. Accessed 31 March 2021
26. Fomin, S.Y.: Recommendations on improving the international legislation on reducing shipping hazards for the Arctic ecosystems: the case of the Bering Strait (March 20, 2015). Available online: http://www.wwf.ru/data/seas/shipping/predl-po-soversh-mejd-zakonodatelstva.pdf. Accessed 20 February 2021 (in Russian)
27. Azzara, A.J., Wang, H., Rutherford, D.: A 10-year projection of maritime activity in the U.S. Arctic region. A Report to the President. U.S. Committee on the Marine Transportation System, Integrated Action Team on the Arctic; The International Council on Clean Transportation, Washington, DC (2015) Available online: https://rosap.ntl.bts.gov/view/dot/60539. Accessed 1 June 2023
28. Agarkova Belov, E.: Russia should get behind Arctic ban on dirty fuel. The Moscow Times (November 16, 2020). Available online: https://www.themoscowtimes.com/2020/11/16/russia-should-get-behind-arctic-ban-on-dirty-fuel-a72054. Accessed 1 June 2023
29. The Northeast Passage: Arctic Portal.org. (February 8, 2011). Available online: https://arctic-portal.org/ap-library/news/344-northeast-passage. Accessed 30 May 2023 (in Russian)
30. Erokhin, V.: Northern Sea Route as an infrastructure framework of the Russia-China Arctic blue economic corridor. Mark. Logis. **1**, 12–29 (2018) (in Russian)
31. Gao Tianming: Russian-Chinese collaboration to establish the Arctic blue economic corridor: challenges and prospects. Obshestvo: Politika, Ekonomika, Pravo. **3**, 51–55 (2018). https://doi.org/10.24158/pep.2018.3.10. (in Russian)
32. Stepanov, N.: Modernization of the Northern Sea Route's port infrastructure. Federalism. **25**(3), 52–65 (2020). https://doi.org/10.21686/2073-1051-2020-3-52-65. (in Russian)
33. Jahn, C., Nellen, N.: Smart port concept: strategic development, best practices, perspectives of development. In: Ilin, I., Devezas, T., Jahn, C. (eds.) Arctic Maritime Logistics. The Potentials and Challenges of the Northern Sea Route, pp. 81–93. Springer, Cham (2022)
34. Spiridonov, V., Mokievsky, V.: Tides of change: tracing the development of marine protected areas in Russia. Russ. Conserv. News. **36**, 4–7 (2004) Available online: https://www.wild-russia.org/pubs/pdfs/36.pdf. Accessed 30 May 2023
35. Arctic-Fund: Natural protected areas (2023). Available online: https://arctic.narfu.ru/infologia-arktiki/zashchita-okruzhayushchej-sredy-arktiki/okhranyaemye-prirodnye-territorii#:~:text=Охраняемые%20морские%20акватории%20имеются%20в,2%25%20от%20площади%20континентального%20шельфа. Accessed 1 June 2023 (in Russian)
36. Editors: Expanding Russia's system of marine protected areas. Russ. Conserv. News. **36**, 35–37 (2004) Available online: http://wild-russia.org/pubs/pdfs/36.pdf. Accessed 1 June 2023
37. Fert-Malka, M.: Pragmatic environmentalism in the Russian Arctic (May 17, 2017). Available online: https://jsis.washington.edu/aic/2017/05/17/pragmatic-environmentalism-in-the-russian-arctic/. Accessed 1 June 2023
38. Zagorski, A., Todorov, A.: Integrated Marine Management in the Arctic. Russian International Affairs Council, Moscow (2018)