Journal of Infrastructure, Policy and Development 2024, 8(7), 5303.
https://doi.org/10.24294/jipd.v8i7.5303

Article

Regional climate change adaptation plans in Russia: Legal political overview

Mikhail Kuprikov[1], Nikita Kuprikov[1,2], Konstantin Zaikov[3,*], Maksim Zadorin[4], Anna Tsvetkova[5]

[1] Department no. 904, Moscow Aviation Institute (National Research University), Moscow 125080, Russian Federation
[2] Scientific and Technological Complex "Mathematical Modeling and Intelligent Control Systems", Peter the Great Saint Petersburg Polytechnic University, Saint Petersburg 195251, Russian Federation
[3] Department of Regional Studies, International Relations and Political Science, Higher School of Social Sciences, Humanities and International Communication, Northern (Arctic) Federal University named after M.V. Lomonosov, Arkhangelsk 163000, Russian Federation
[4] Department of State and International Law, Northern (Arctic) Federal University named after M.V. Lomonosov, Arkhangelsk 163000, Russian Federation
[5] Department of Organization and Management, Empress Catherine II Saint Petersburg Mining University, Saint Petersburg 199106, Russian Federation
*** Corresponding author:** Konstantin Zaikov, k.zaikov@narfu.ru

CITATION

Kuprikov M, Kuprikov N, Zaikov K, et al. (2024). Regional climate change adaptation plans in Russia: Legal political overview. Journal of Infrastructure, Policy and Development. 8(7): 5303. https://doi.org/10.24294/jipd.v8i7.5303

ARTICLE INFO

Received: 18 March 2024
Accepted: 25 April 2024
Available online: 1 August 2024

Abstract: The article is devoted to the issues of political and legal regulation of climate adaptation in the regions of the Russian Federation. Against the background of the adopted federal national adaptation plan, regions are tasked with identifying key areas of activity taking into account natural-climatic, demographic, environmental and technological specifics. The authors focus on the similarities and differences of the presented adaptation plans, emphasizing that work to improve this system continues within the framework of Russia's international obligations. The Arctic regions deserve special attention, as they also differ from each other both in the selected climate adaptation activities (from ecology to energy saving) and in their number. This review provides a clear picture of how the federal ecological system can develop.

Keywords: climate change; adaptation, regional plans; arctic; environment

1. Introduction

At the end of 2023, about 39 regional plans for adaptation to climate change have been adopted in Russia (according to the Codex information and legal system (Regional adaptation plans)). Thus, this is 44% of all 89 regions of Russia (Metzel, 2022). The development of these plans is a part of the federal agenda within the framework of the Order of the Government of the Russian Federation of 25 December 2019 No. 3183-r "On Approval of the National Action Plan for the First Stage of Adaptation to Climate Change for the Period up to 2022 (Order of the Government No. 3183-r, 2019)." Currently, the second stage of the national action plan for adaptation to climate change for the period until 2025 (Order of the Government No. 559-r, 2023) has begun to operate; and regional authorities were recommended to send annual reports on the progress of implementation of adaptation measures to the Ministry of Economic Development of Russia by 15 April.

The topic of "climate adaptation" is widely covered from the perspective of scientists working in the natural sciences; various approaches are proposed in the field of protecting biodiversity in the face of climate change (Kirsanova et al., 2018), creating a food security system, developing an energy security system (Nevskaya et al., 2023; Ponomarenko et al., 2022; Resniova and Ponomarenko, 2021), improving

approaches to construction and dealing with emergency situations. Special attention is drawn to the scientific approach to the study of investments in sustainable development of consumer value chains based on harmonious growth on a global scale in the context of the triad: ecology-social equity-public administration (Zhang et al., 2023; Litvinenko et al., 2023; Lapinskas, 2023).

A large number of scientific publications on this topic makes it possible to form a holistic view of the problem of climate adaptation at the global, regional and national levels (Dmitrieva and Solovyova, 2023; Malyshkov et al., 2019; Radoushinsky et al., 2023).

Researchers have noted problems inherent in this process, which relate, for example, to the scope of powers and financing of municipal authorities as the main force and governing bodies in the field of climate adaptation (Fadeev and Fadeeva, 2022; Kirsanova and Lenkovets, 2022; Ray Biswas and Rahman, 2023). This problem is important because the political documents of the same Arctic countries and their associations ignore the positions and participation of local communities and their representatives in issues of climate adaptation (Rasmus et al., 2024). The volume of problems in the field of climate adaptation cannot be overestimated, because this also applies to the risks of fire hazard in forests in the Arctic due to changes in biophysical factors (Canosa et al., 2023), and the impact of climate change on the sustainability of winter transport routes, known as winter roads (Kirillina et al., 2023), and similarities and differences in the annual cycle of reindeer husbandry in Fennoscandia and Yamal (Laptander et al., 2023). There are also problems of changes in the genetic properties of soils, “soil respiration” as a response to planetary climate change (Mukhortova et al., 2021; Kalinina et al., 2024), and the urgent problem of permafrost thawing, its physical degradation as a threat to cultural patterns, symbolic representations, material practices and emotional and spiritual connections of local communities of Yakutia (Doloisio, 2020), and the effectiveness of the introduction of low-carbon technologies at enterprises in the context of the development of carbon regulation (Cherepovitsyn et al., 2023; Yury and Martirosyan, 2024), the specifics of the personnel training system for work in the Arctic (Cherepovitsyn and Tretyakov, 2023; Fadeev et al., 2021; Samylovskaya et al., 2020), and the specifics of climate change in specific Arctic regions, in particular in Canada (Pearce and Smit, 2013) and others. Without a doubt, the problem of climate impacts on “marine megafauna” (fish, jellyfish, cephalopods, seabirds and marine mammals) also requires special attention (Grémillet and Descamps, 2023; Golovina et al., 2023; Ilyushin and Asadulagi, 2023), as well as the importance of integrating wild harvesting into national climate strategies and national food systems around the world (Powell et al., 2023).

At the same time, there are quite a few articles of a legal nature; and therefore, the question of a more detailed study of this topic from the point of view of political, legal and management decisions arises. This article focuses on the Russian Federation.

2. Research methodology

The article uses general methods and principles of scientific knowledge

(primarily within the framework of environmental, political and legal science):

1) "System-structural method", which made it possible to analyze the general structure of modern Russian environmental policy related to the "ecosystem approach" reflected in current plans for adaptation to climate change at the federal and regional levels. The ecosystem approach within the UN is understood as "a strategy for the integrated management of land, water and living resources that ensures their conservation and sustainable use on an equitable basis" (Ecosystem Approach, 2023). Its application helps to ensure the conservation of biodiversity, its sustainable use and the fair and equitable sharing of benefits arising from the use of genetic resources. Moreover, the approach provides "a methodological framework for informing decisions in policy-making and planning processes, through which environmental convention actors can develop more specific approaches according to their specific circumstances". Climate adaptation is directly related to the protection of biodiversity and ecosystems from destructive anthropogenic impacts;
2) The "formal legal method", which made it possible to process and analyze the current norms of Russian law at the federal and regional levels;
3) "Method of statistical research", which made it possible to summarize and group materials related to climate adaptation;
4) "Methods of analysis and synthesis", which made it possible to form an analytical review of key regulatory and legal acts of the federal legislation of Russia, as well as "regional adaptation plans", highlighting key guidelines in the field of public administration on climate adaptation issues at the federal and regional levels.

The purpose of the study is to identify national strategic guidelines on climate adaptation issues at the regional level of Russia.

The object of the study is the forms and methods of influencing the socio-economic system of life of people in the regions of Russia, in order to form state approaches in the field of climate adaptation.

The subject of the study is the regulatory and legal acts of Russia at the federal level, as well as regional adaptation plans.

Thus, conclusions and generalizations within the study are made based on an analysis of regulatory and legal acts of Russia at the Federation level, as well as regional adaptation plans.

The principle of selecting sources for analysis was based on the hierarchy of sources of law in Russia, according to which the Constitution as the Basic Law is at the head of the entire regulatory system; generally recognized principles and norms of international law, as well as international treaties of Russia, which should not contradict the Constitution (Part 6, Art. 125); federal constitutional laws on special subjects of regulation specified in the Constitution; federal laws, by-laws (Government decrees and Presidential decrees), regional laws, acts of local government bodies. Such legal acts as "concepts" and "strategies", which often precede the adoption of federal or regional laws should be also noted. These "concepts" and "strategies" are adopted by secondary legislation, and often contain a specific action plan for the relevant bodies: ministries, agencies and services.

On this basis the selection of sources for analysis was made.

3. Russian Federal climate change legislation: From laws to GOSTs (Russian National Standards)

Regulations on climate adaptation are reflected in federal primary and secondary legislation. According to the analysis of regulatory documentation, the following priority sources have been identified:

(1) Federal Law of 10 January 2002 No. 7-FZ "On Environmental Protection" (Federal Law of 10 January 2002 No. 7-FZ), which defines the basis of state policy in the field of environmental protection, focusing on the balance of interests of subjects of socio-economic relations, the preservation of a favorable environment, in order to ensure compliance with Article 42 of the Constitution of the Russian Federation, as well as biodiversity and natural resources in order to meet the needs of current and future generations (however, the topic of climate adaptation is not directly indicated in the Law);

(2) Decree of the President of the Russian Federation dated 8 February 2021 No. 76 "On measures to implement state scientific and technical policy in the field of environmental development of the Russian Federation and climate change" (hereinafter referred to as Presidential Decree No. 76 "On Environmental Policy") (Decree of the President No. 76, 2021), which approves the Council for the implementation of the Federal scientific and technical program in the field of environmental development of the Russian Federation and climate change for 2021–2030. Its scope includes preparing proposals to the President and the Government for the eco-development of the country, coordinating the activities of government agencies and activities in the field of national projects "Ecology" and "Science", approving a comprehensive plan for scientific research, etc.;

(3) Resolution of the Government of the Russian Federation dated 24 March 2022 No. 455 "On approval of the Rules for verifying the results of climate projects" (hereinafter referred to as Government Decree No. 455 "On verification of climate projects") (Resolution of the Government No. 455, 2022), which determines the initiation of the release of "carbon units" into circulation in accordance with Article 10 of the Federal Law "On Limiting Greenhouse Gas Emissions", which defines the basis of economic activity, which is accompanied by greenhouse gas emissions and is carried out on the territory of Russia, its continental shelf, exclusive economic zone and the Russian sector of the Caspian Sea, and where the carbon unit is a specific indicator of the climate project (reduction and absorption greenhouse gases) in the form of a mass of greenhouse gases, which is equal to 1 ton of CO_2;

(4) Order of the Government of the Russian Federation dated 25 December 2019 No. 3183-r "On approval of the national action plan for the first stage of adaptation to climate change for the period up to 2022" (hereinafter – Government Order No. 3183-r "On the first stage of the national adaptation plan" (Order of the Government No. 3183-r, 2019) provided for 29 measures for regulatory and technical support of adaptation measures in the field of climate change: from the formation of a specialized working group under the Government to the preparation of regional adaptation plans;

(5) Order of the Ministry of Economic Development of Russia dated 13 May 2021 No. 267 "On approval of methodological recommendations and indicators on

adaptation to climate change" (hereinafter—Order of the Ministry of Economic Development No. 267 "On methodological recommendations for climate adaptation" (Order of the Ministry No. 267, 2021), which approved a unified approach to organizing and conducting climate risk assessment within the framework of 5 principles: staged and consistent process of assessing climate risks, a differentiated approach taking into account risks for the economy of a particular region, taking into account preventive and post-crisis adaptation, harmonization and integration of climate risk assessment at the territorial and sectoral levels, monitoring and forecasting;

(6) Resolution of the Government of the Russian Federation dated 8 February 2022 No. 133 "On approval of the Federal scientific and technical program in the field of environmental development of the Russian Federation and climate change for 2021–2030" (hereinafter referred to as Government Decree No. 133 "On the Federal Climate Program" (Resolution No. 133, 2022), where high-tech technological solutions, climate adaptation mechanisms, sustainable development with low greenhouse gas emissions have been identified as priorities;

(7) Order of the Government of the Russian Federation dated 11 March 2023 No. 559-r "On the national action plan for the second stage of adaptation to climate change for the period up to 2025" (hereinafter—Government Order No. 559-r "On the second stage of the national adaptation plan" (Order of the Government No. 559-r, 2023) provides for 17 adaptation measures: from improving insurance mechanisms in the context of adaptation to climate change to monitoring the condition and stability of soils within populated areas and production facilities in the Arctic zone of the Russian Federation;

(8) "GOST R ISO 14090-2019 Adaptation to climate change. Principles, Requirements, and Guidelines (12 September 2019)" (hereinafter—the State Standard for Climate Adaptation) (GOST R ISO 14090-2019), which is a federal standard that defines basic principles, requirements, and guidelines for climate adaptation that can be used to develop industry or corporate standards;

(9) "GOST R 54139-2010 Environmental management. Guidance on the application of organizational security controls and risk assessment. Climate Change (21 December 2010)" (hereinafter referred to as the State Standard for Environmental Management) (GOST R 54139-2010), which is a federal standard that establishes methods for assessing sensitivity and adaptation to climate change at the regional (international), national (state) and local (regional, municipal) levels, and can be used by government agencies and healthcare organizations and environmental activists.

The above sources contain an indication of the regional level of management in the field of environmental protection and climate adaptation.

Federal Law No. 7-FZ "On Environmental Protection" indicates environmental protection as a "subject of joint jurisdiction" of the Federation and its regions, that is, the equivalence of the powers of federal and regional bodies in the field of environmental policy. This is due to the need to ensure a balance of interests of the central government and the authorities of regions and communities, which defines the "principle of sustainable development", when business interests (in particular, resource extraction and infrastructure projects), and environmental standards

(international and national), and the interests of local population groups (including indigenous peoples) are provided equally.

The previously mentioned Presidential Decree No. 76 "On Environmental Policy" defines the tasks of regional government authorities in subsidizing a specialized program in the field of environmental regulation.

Government Order No. 3183-r "On the first stage of the national adaptation plan", firstly, recommends the highest executive bodies of state power of the constituent entities of the Federation to adopt regional adaptation plans, and secondly, determines the equal role of the regions and the Federation in the implementation of the national plan.

Order of the Ministry of Economic Development No. 267 "On methodological recommendations for climate adaptation" determines that the "subject of adaptation", in addition to the federal executive body, is the regional executive body or organization that takes measures to adapt to climate change in relation to impact objects under their jurisdiction (property). Among the "recommended sources of information for assessing climate risks" are the "safety passport of the territory of the region and (or) municipal entity", "climate safety passport of the region's territory", and "forestry plan of the region".

Regional government bodies act as co-executors within the framework of Government Decree No. 133 "On the Federal Climate Program".

Government Order No. 559-r "On the second stage of the national adaptation plan" recommends the highest regional executive bodies responsible for the implementation of the national plan activities to send reports to the Russian Ministry of Economic Development on the progress of implementation of climate change adaptation measures carried out in the regions of Russia, including activities of national and regional plans for adaptation to climate change, annually, until April 15. Also, the Ministry of Economic Development of Russia has been instructed, together with interested federal executive bodies, supreme executive bodies of the constituent entities of the Russian Federation and organizations, to submit a draft national action plan for the third stage of adaptation to climate change for the period until 2028 to the Government of the Russian Federation, by 30 December 2025.

In turn, state standards on climate adaptation and environmental management are applied throughout the Federation and its regions.

Thus, within the framework of the existing hierarchy of sources of law at the federal level, the constitutional principle related to the "subject of joint jurisdiction" of the Federation and the regions is confirmed in relation to issues related to "environmental protection and ensuring environmental safety" (clause "d", part 1, Art. 72 of the Constitution).

4. Federal national climate change adaption plans in Russia and in foreign arctic states

As mentioned above, in Russia, at the end of 2023, a national climate change adaptation plan was adopted for 2 periods: until 2022 and until 2025.

Analysis of foreign experience in adaptation strategies and plans allows identifying the most characteristic features and focus priorities for each of the Arctic

partner countries within the framework of the Arctic Council (Komendantova et al., 2023). The publication of data based on the analysis of the above documents indicates the following main ideas and directions of activity of foreign Arctic countries (Gladun and Zadorin, 2024) (**Table 1**).

Table 1. Climate change adaptation measures in foreign arctic countries.

No.	Country	Measures
1	Finland	• The role of local communities and indigenous peoples communities (Landauer and Komendantova, 2018); • Ecosystem services; • "Green areas"; • Flood control; • Migration control; • Information services center.
2	Norway	• Active implementation of international agreements; • Assistance to africa, humanitarian and energy projects; • Information services, monitoring.
3	Sweden	• Urban planning, soil fortification, land surveying; • Landslide, mudflows and erosion control; • Food security; • Public health.
4	Denmark	• Coastal reinforcement; • New construction technologies; • Control of humidity; • Insurance.
5	Iceland	• Flood fighting and firecontrol; • Damage and wear of infrastructure; • Monitoring and scientific research.
6	USA	• Inclusion of an adaptation agenda at all levels of government; • Food security; • Scientific research.
7	Canada	• Special consideration of the opinions of indigenous people, their autonomy in matters of adaptation; • Promotion of the environmental justice policy.

Source: compiled by the authors.

In the Russian plans "2022" and "2025" the Russian Government sees not only negative, but also positive consequences of climate change. In particular, the "Plan 2022" states that "the negative consequences of expected climate change for the Russian Federation include:

1) Increased risk to public health;
2) An increase in the frequency, intensity and duration of droughts in some regions, extreme precipitation, floods and soil waterlogging, which is dangerous for agriculture;
3) Increased fire danger in forest areas;
4) Permafrost degradation in the northern regions with damage to buildings and communications;
5) Disruption of ecological balance, including the displacement of some biological species by others;
6) Spread of infectious and parasitic diseases;
7) Increase in energy consumption for air conditioning in the warm season".

The positive consequences in the document include:

1) Reduction of energy consumption during the heating seasons;
2) Improving the ice situation and, accordingly, the conditions for transporting goods in the Arctic seas, facilitating access to the continental shelf of the Russian Federation in the Arctic Ocean;
3) Improving the structure and expanding the crop production area, as well as increasing the efficiency of livestock farming (subject to a number of additional conditions being met and certain measures being taken);
4) Increasing the productivity of boreal forests.

The main tasks in planning of climate adaptation measures include:

1) Implementation of decisions in the field of national security in general;
2) Implementation of optimal economic decisions in weather-dependent and climate-dependent economy sectors (Dmitrieva et al., 2023; Stroykov et al., 2021);
3) Support for climate programs in the field of investment activities and public-private partnerships;
4) Protection of Russian commodity producers from unfair actions of foreign partners to limit their competitiveness;
5) Fulfillment of obligations under the UN Framework Convention on Climate Change.

In turn, these tasks are based on the following principles:

1) Differentiated approach: climate, social, economic and technological specifics of economic sectors and specific regions;
2) Effectiveness of adaptation measures;
3) Different degrees of readiness of subjects for implementing adaptation policy;
4) Staged and consistent planning process;
5) Preventive (proactive) adaptation: construction of flood dams, forest shelter belts, expansion of crops of drought-resistant crops, etc.;
6) Post-crisis adaptation: evacuation of the population, liquidation of consequences, vaccination, temporary resettlement, etc.;
7) Adaptation to the direct (real and expected) and indirect consequences of climate change for the population, infrastructure and economy;
8) Harmonization and integration of adaptation plans;
9) Planning hierarchy: from the federal and regional levels;
10) Monitoring the effectiveness of adaptation measures and their adjustment;
11) Scientific and technological provision of climate forecasting and climate services.

The “2025 Plan” names the products of the Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet) and the Federal State Statistics Service (Rosstat) as the main source of information for assessing climate risks and economic vulnerability. It is also noted that within the framework of industry development trends, departmental climate risk management systems are being developed, the state information system “Automated Information Management System” of the Russian Unified Emergency Rescue Service (Terms, n.d.) and its segment “Atlas of Hazards and Risks” (n.d.) of the Ministry of the Russian Federation for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters (EMERCOM of Russia).

Russia's active participation in the Glasgow-Charm el-Cheikh work program since 2021 on global adaptation goals (Conference in Charm el-Cheikh, 2022), which is aimed at enhancing the actions of countries participating in the Paris Agreement, was also noted. Russia is a state party to the Paris Agreement (Decree of the Government No. 1228, 2019). The program set goals to harmonize global objective on adaptation (including the methodology and performance indicators for adaptation), facilitating the planning and implementation of adaptation actions at the national level (Lenkovets et al., 2017).

In Russia, when addressing issues of climate adaptation at the national level, the emphasis is on scientific substantiation of management decisions and support of economic activities (Matrokhina et al., 2023; Marinin et al., 2023; Romasheva et al., 2022), that is, science and agriculture are a priority. This, of course, does not negate the fact that depending on the region the situation may change (Kirsanova, 2020; Nechitailo and Marinina, 2022), because Russia is the world's largest Federation.

5. Regional climate change adaptation plans

Turning to the list of regional plans, it is important to determine the key areas of activity for each region, and, secondly, to point out that by the end of 2023 among the regions of the Arctic zone of Russia only the Yamalo-Nenets Autonomous Okrug, Arkhangelsk Region, the Komi Republic, Krasnoyarsk Krai, and the Republic of Sakha (Yakutia) had developed their regional climate plans (Kirsanova et al., 2024).

Generalization of data based on the analysis of regional plans indicates the following key ideas and areas of activity of the constituent entities of the Russian Federation by analogy with foreign Arctic countries (**Table 2**):

Table 2. Climate adaptation measures in the regions of Russia.

No.	Regions of Russia	Measures
1	Lipetsk Oblast (Order of the Lipetsk Region, 2022)	Total 52 measures, including: • transition to electric and gas engine fuel, incl. by developing vehicle charging infrastructure; • selection of plant varieties and hydrides for more efficient agriculture; • creation of seed funds; • system of environmental certification of areas, etc. Focus: agriculture and energy conservation.
2	Yamalo-Nenets Autonomous Okrug (Order of the Government of the Yamalo-Nenets Autonomous Okrug, 2022)	Total 50 measures, including: • regional monitoring network, emergency forecasting; • forecasting permafrost degradation; • preservation of the species composition of animals and plants; • storm drainage systems, improvement of fire prevention measures; • development of model forecasts for the most important areas of climate adaptation, etc. Focus: environmental safety in the Arctic.
3	Novosibirsk Oblast (Order of the Government of the Novosibirsk Region, 2023)	Total 31 measures, including: • modernization of heat and power complex facilities; • increasing the area of irrigated lands; • creation of seed funds; • agricultural insurance; • increasing the area of reforestation; • training of rescuers, etc. Focus: environmental safety in the Arctic.

Table 2. (*Continued*).

No.	Regions of Russia	Measures
4	Arkhangelsk Oblast (Order of the Government of the Arkhangelsk Region, 2022)	Total 21 measures, including: • improving the quality of seed and planting material; • agricultural insurance; • transition of boiler houses to alternative types of fuel; • reconstruction of the automated central lighting system; • elimination of unauthorized waste dumps; • introduction of energy-saving technologies; • flood control, etc. Focus: energy saving technologies.
5	The Republic of Dagestan (Order of the Government of the Republic of Dagestan, 2022)	Total 42 measures, including: • -flood prevention; • -landfill management and waste management; • -introduction of energy-saving technologies; • -forest and water protection, etc. Focus: ecosystem protection.
6	Nizhny Novgorod Oblast (Order of the Government of the Nizhny Novgorod Region, 2022)	Total 59 measures, including: • forest protection measures; • growing climate-adapted crops; • agricultural insurance; • development and maintenance of the road network; • relocation of citizens from unfit housing facilities; • measures to clean the ecosystem from pollution, etc. Focus: forestry and energy conservation.
7	Kursk Oblast (Order of the Kursk Region, 2022)	Total 85 measures, including: • introduction of renewable energy sources; • erosion of various types control; • forest protection and water protection measures; • monitoring activities; • preventive measures for civil defense and emergencies, etc. Focus: ecosystem protection and energy conservation.
8	Oryol Oblast (Order of the Government of the Oryol Region, 2022)	Total 19 measures, including: • emergency prevention; • agricultural activities; • agricultural insurance; • forest protection measures, etc. Focus: environmental safety.
9	Kaluga Oblast (Decree of the Government of the Kaluga Region, 2023)	Total 14 measures, including: • forest protection measures; • agricultural activities; • agricultural insurance; • development of the road network, etc. Focus: environmental safety.
10	Yaroslavl Oblast (Resolution of the Government of the Yaroslavl Region, 2023)	Total 34 measures, including: • flood prevention; • coastal reinforcement; • sediment and coastline control; • monitoring of fauna objects; • construction and major repairs of water and heat supply systems; • agricultural insurance; • fire and manmade accidents prevention, etc. Focus: environmental safety.
11	Samara Oblast (Order of the Government of the Samara Region, 2023)	Total 24 measures, including: • environmental monitoring; • seasonal flood prevention; • creation of a seed insurance fund; • monitoring of labor protection conditions; • introduction of healthy lifestyle principles, etc. Focus: environmental safety and human ecology.

Table 2. (*Continued*).

No.	Regions of Russia	Measures
12	Republic of Kalmykia (Order of the Government of the Republic of Kalmykia, 2022)	Total 72 measures, including: • introduction of renewable energy sources; • introduction of energy-saving technologies; • anti-erosion measures; • creation of a seed insurance fund; • development of eco-transport, etc. Focus: ecosystem protection and energy conservation.
13	Komi Republic (Order of the Government of the Komi Republic, 2023)	Total 19 measures, including: • increasing the effectiveness of fire safety measures; • regeneration of forests; • a registry of oil-contaminated soils; • monitoring of rare and endangered species of wild animals; • creation of new specially protected natural areas, etc. Focus: ecosystem protection.
14	Kirov Oblast (Order of the Government of the Kirov Region, 2022)	Total 29 measures, including: • modernization of the heat and power complex; • introduction of renewable energy sources; • introduction of energy-saving technologies; • creation of a seed insurance fund; • forest protection and fire-control; • sediment control, etc. Focus: ecosystem protection and energy conservation.
15	Rostov Oblast (Order of the Government of the Rostov Region, 2022)	Total 38 measures, including: • scientific research of the processes of wearing away of sea coasts of the Azov Sea; • increasing the effectiveness of fire safety measures; • preservation of rare species of animals and flora; • creation of a system of agroecological zoning; • support for the agricultural and fishery complex, etc. Focus: environmental safety and ecosystem protection.
16	Chuvash Republic (Order of the Cabinet of Ministers of the Chuvash Republic, 2022)	Total 48 measures, including: • forest protection and fire fighting; • flood control; • development of adaptive varieties in agriculture, taking into account climatic conditions; • introduction of renewable energy sources; • development of a network of fast charging stations for cars, etc. Focus: environmental safety and energy saving.
17	Chelyabinsk Oblast (Order of the Government of the Chelyabinsk Region, 2022)	Total 33 measures, including: • development of urban electric transport; • business grants for the conversion of the vehicle fleet to natural gas; • measures to reduce the carbon footprint; • forest fire protection; • restoration of agricultural soils, etc. Focus: environmental safety and human ecology.
18	Kostroma Oblast (Order of the Administration of the Kostroma Region, 2022)	Total 36 measures, including: • development of an emergency rescue service; • anti-infective measures and microbiological monitoring; • development of specially protected natural areas, etc. Focus: environmental safety and human ecology.
19	Republic of Khakassia (Resolution of the Presidium of the Government of the Republic of Khakassia, 2022)	Total 24 measures, including: • monitoring of forest fire hazard; • forest reproduction; • roadway replacement; • advanced technologies in road construction; • reconstruction of overhead power lines, etc. Focus: environmental safety.

Table 2. (*Continued*).

No.	Regions of Russia	Measures
20	Kemerovo Oblast (Order of the Government of the Kemerovo Region – Kuzbass, 2022)	Total 44 measures, including: • forest fire fighting; • development of electric transport and transport using environmentally friendly fuel; • optimization of traffic flows in order to reduce emissions; • development of adaptive varieties in agriculture, taking into account climatic conditions; • creation of a seed insurance fund; • emergency response, etc. Focus: environmental safety and human ecology.
21	Sevastopol (Federal City) (Order of the Government of Sevastopol, 2022)	Total eight measures, including: • complex landscaping; • preservation and restoration of water resources; • monitoring of dangerous exogenous geological processes in the coastal zone of the Black Sea; • coastal protection, etc. Focus: environmental safety.
22	Volgograd Oblast (Resolution of the Volgograd Region, 2022)	Total 32 measures, including: • pollution control of main waterways; • reducing the negative impact on atmospheric air; • development of an integrated waste management system; • liquidation of chemically hazardous facilities, etc. Focus: environmental safety.
23	Orenburg Oblast (Decree of the Government of the Orenburg Region, 2023)	Total 14 measures, including: • construction and reconstruction of automobile gas-filling compressor stations; • expansion of laboratory diagnostics of pathogens; • development of a system for preventing diseases of the circulatory system; • creation of field protection and anti-erosion forest plantations, etc. Focus: environmental safety and human ecology.
24	Chechen Republic (Order of the Government of the Chechen Republic, 2022)	Total 67 measures, including: • modernization of municipal infrastructure facilities; • use of renewable energy sources; • implementation of the energy saving and energy efficiency improvement program; • increasing the area of irrigated, field-protective and anti-erosion forest plantations; • sedimentary control, etc. Focus: environmental safety and human ecology.
25	Saratov Oblast (Decree of the Government of the Saratov Region, 2022)	Total 35 measures, including: • forest fire fighting; • increasing the efficiency of treatment plants; • use of science-based agriculture; • transfer of motor transport to gas motor fuel; • tax benefits for owners of electric cars; • development of biofuel production technologies; • increasing the area planted by crops of specific types, etc. Focus: environmental safety and energy saving.
26	Tomsk Oblast (Decree of the Government of the Tomsk Region, 2022)	Total 19 measures, including: • forest fires fighting; • protection of water resources; • ensuring the effective functioning of the emergency system, etc. Focus: environmental safety.
27	Republic of Buryatia (Order of the Government of the Republic of Buryatia, 2022)	Total 32 measures, including: • increasing the number of vehicles running on liquefied natural gas; • introduction of renewable energy sources; • development of a network of stations for electric cars charging; • conversion of boiler houses from coal to gas fuel; • growing perennial crops, etc. Focus: energy saving.

Table 2. (*Continued*).

No.	Regions of Russia	Measures
28	Jewish Autonomous Region (Order of the Government of the Jewish Autonomous Region, 2023)	Total 12 measures, including: • protection and reproduction of forests; • modernization of municipal infrastructure facilities; • construction and reconstruction of engineering protection structures; • the prevention of the development of cardiovascular diseases, etc. Focus: environmental safety and human ecology.
29	Kabardino-Balkarian Republic (Order of the Government of the Kabardino-Balkarian Republic, 2022)	Total 30 measures, including: • emergency prevention; • landslide, mudflows and avalanches control; • forest reproduction; • preservation and restoration of water resources; • waste management; • agricultural insurance, etc. Focus: environmental safety.
30	Sverdlovsk Oblast (Order of the Government of the Sverdlovsk Region, 2022)	Total 36 measures, including: • development of reclaimed lands; • creation of special varieties and hybrids of plants; • creation of seed funds; • agricultural pathogens control; • introduction of energy-saving technologies, etc. Focus: agricultural safety.
31	Republic of Crimea (Order of the Council of Ministers of the Republic of Crimea, 2022)	Total 23 measures, including: • development of irrigation systems; • agricultural insurance; • creation of fire barrier systems; • seismic monitoring; • development of electric transport, incl. charging infrastructure; • emergency response, etc. Focus: agricultural safety.
32	Republic of Karelia (Order of the Government of the Republic of Karelia, 2023)	Total 11 measures, including: • fire prevention measures; • forest reproduction; • ensuring the safety of hydraulic structures; • strengthening the infectious disease service of the epidemic control; • protection of farmland, etc. Focus: environmental safety.
33	Stavropol Territory (Order of the Government of the Stavropol Territory, 2022)	Total 20 measures, including: • emergency response; • forest fire fighting; • reclamation of land with solid household waste; • forest reproduction; • protection of farmland, etc. Focus: environmental safety.
34	Republic of Tatarstan (Order of the Cabinet of Ministers of the Republic of Tatarstan, 2023)	Total 28 measures, including: • increasing the area of field-protective and anti-erosion forest plantations; • increasing the area of irrigated lands; • increasing the use of hydrogen in the energy sector; • increasing the use of alternative fuels, incl. gas engine, etc. Focus: agricultural safety and energy conservation.
35	Krasnoyarsk Krai (Order of the Government of the Krasnoyarsk Krai, 2023)	Total 28 measures, including: • emergency response; • monitoring the condition of water resources; • development of an aviation forest protection system; • introduction of renewable energy sources, etc. Focus: environmental safety.

Table 2. (*Continued*).

No.	Regions of Russia	Measures
36	Krasnodar Krai (Order of the Governor of the Krasnodar Krai, 2023)	Total 13 measures, including: • development of a system of engineering protection structures for economic facilities; • protection of water resources; • pathogens control in agriculture; • forest fires fighting, etc. Focus: environmental safety.
37	Ivanovo Oblast (Order of the Government of the Ivanovo Region, 2022)	Total 25 measures, including: • protection of water resources; • hunting, catching and shooting wild animals; • development of a network of protected natural areas; • forest protection; • development of processing and disposal of textile products according to a waste-free, ecological closed cycle system; • emergency response, etc. Focus: environmental safety.
38	Moscow Oblast (Order of the Moscow Region Government, 2022)	Total six measures, including: • fire fighting; • forest conservation, etc. Focus: environmental safety.
39	Republic of Sakha (Yakutia) (Order of the Government of the Republic of Sakha (Yakutia), 2022)	Total 63 measures, including: • modernization of the heat and power complex; • introduction of renewable energy sources; • introduction of new irrigation regimes for agricultural crops; • development of a network of specially protected natural areas, etc. Focus: environmental safety and energy saving.

Source: compiled by the authors.

The ranking of adaptation measures for each regional plan is directly related to the assessment of the state of the environment by scientific organizations and institutions that provided information to regional governments. As an example, we can cite a group of scientific organizations and reports that are mentioned in the regional adaptation plan of the Lipetsk Oblast (region of Central Russia):

- Data from the Federal State Budgetary Institution "Yu.A. Israel Institute of Global Climate and Ecology";
- Report "State and environmental protection of the Lipetsk Oblast" (from 2011 to 2020);
- Global'noe izmenenie klimata i Tsentral'nyy federal'nyy okrug. Na puti k adaptatsii [Global climate change and the Central Federal District. On the way to adaptation]. Climate Center of Roshydromet. St. Petersburg, High technology, 2021;
- Materials of the Federal State Budgetary Institution "Voeikov Main Geophysical Observatory";
- Interactive map of manifestations of dangerous exogenous geological processes on the territory of the Russian Federation: http://geomonitoring.ru:13159;
- Territorial planning scheme of the Lipetsk Oblast, stage IV. "Territorial development plan for the Lipetsk Oblast. Project proposals". Moscow, Giprogor, 2006. Amendments, 2014. JSC "Lipetskgrazhdanproekt";
- Pavlova V. N., Varcheva S. E. Assessment of climate risks of crop losses in regional farming systems;

- Nedikova E. V., Maslennikova S. V., Bakulina P. V. Analysis of erosion processes on the territory of the Lipetsk Oblast.

As for the regional plans of the Arctic regions, for example, the Republic of Sakha (Yakutia), then there is no mention of scientific institutes, but there are links to data from federal agencies (for example, the Federal Air Transport Agency), as well as to the Department of Forecasting and Development of the Real Sector of Economy of the Ministry of Economy of the Republic of Sakha (Yakutia).

Each region is free to attract any accredited scientific organization, order scientific research, and also use open information regarding the current state of the environment.

6. Conclusion

Thus, the analysis of the Russian legal system on climate adaptation leads to the following conclusions:

1) The legislative system at the federal level is sufficiently developed and is based on the principle of strategic planning, which is clearly observed in both national and regional adaptation plans.
2) A brief analysis of existing regional adaptation plans showed that the key focus of management decisions is environmental and food security, as well as energy saving.
3) Despite the common approaches in different regions, one can see a large number of differences even in the number of measures; by the end of 2023 the undisputed leader is the Kursk region (85 measures), and in the Arctic is the Republic of Sakha (Yakutia) (63 measures).

Author contributions: Conceptualization, KZ and MZ; methodology, MZ, AT and KZ; software, NK; validation, NK, AT and MK; formal analysis, MZ; investigation, MZ; resources, MK; data curation, AT; writing—original draft preparation, MZ and AT; writing—review and editing, KZ and AT; visualization, MZ; supervision, KZ; project administration, KZ; funding acquisition, KZ. All authors have read and agreed to the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

References

Atlas of Hazards and Risks. (n.d.). Russian Emergency Situations Ministry. Available online: https://atlas.mchs.gov.ru/?startDate=2023-12-19&endDate=2023-12-19&_u=27556 (accessed on 1 February 2024).

Canosa, I. V., Biesbroek, R., Ford, J., et al. (2023). Wildfire adaptation in the Russian Arctic: A systematic policy review. Climate Risk Management, 39, 100481. https://doi.org/10.1016/j.crm.2023.100481

Cherepovitsyn, A. E., & Tretyakov, N. A. (2023). Development of new system for assessing the applicability of digital projects in the oil and gas sector. Journal of Mining Institute, 262, 628–642.

Cherepovitsyn, A., Stroykov, G., & Nevolin, A. (2023). Efficiency of Low-Carbon Technologies Implementation at Non-Ferrous Metallurgy Enterprises under the Conditions of Carbon-Regulation Development in Russia. Sustainability, 15(24), 16640. https://doi.org/10.3390/su152416640

Conference in Charm el-Cheikh: what you need to know to “not get lost” at the UN climate meeting (Russian). (2022). Available online: https://news.un.org/ru/story/2022/10/1434097 (accessed on 1 February 2024).

Decree of the Government of the Kaluga Region of No. 276 “On approval of the regional plan for adaptation to climate change” (Russian). (2023). Available online: https://docs.cntd.ru/document/406633115 (accessed on 1 February 2024).

Decree of the Government of the Orenburg Region of No. 151-pp “On approval of the regional plan for adaptation to climate change in the Orenburg region” (Russian). (2023). Available online: https://docs.cntd.ru/document/406512769 (accessed on 1 February 2024).

Decree of the Government of the Russian Federation of No. 1228 “On the adoption of the Paris Agreement” (Russian). (2019). Available online: https://docs.cntd.ru/document/561281256 (accessed on 1 February 2024).

Decree of the Government of the Saratov Region of No. 1365-P “On approval of the regional plan for adaptation to climate change in the Saratov region” (Russian). (2022). Available online: https://docs.cntd.ru/document/406843870 (accessed on 1 February 2024).

Decree of the Government of the Tomsk Region of No. 415 “On approval of the regional plan for adaptation to climate change for the period 2022-2024” (Russian). (2022). Available online: https://docs.cntd.ru/document/467978130 (accessed on 1 February 2024).

Decree of the President of the Russian Federation dated No. 76 “On measures to implement state scientific and technical policy in the field of environmental development of the Russian Federation and climate change” (Russian). (2021). Available online: https://docs.cntd.ru/document/573545874 (accessed on 1 February 2024).

Dmitrieva, D., & Solovyova, V. (2023). Russian Arctic Mineral Resources Sustainable Development in the Context of Energy Transition, ESG Agenda and Geopolitical Tensions. Energies, 16(13), 5145. https://doi.org/10.3390/en16135145

Dmitrieva, D., Chanysheva, A., & Solovyova, V. (2023). A Conceptual Model for the Sustainable Development of the Arctic’s Mineral Resources Considering Current Global Trends: Future Scenarios, Key Actors, and Recommendations. Resources, 12(6), 63. https://doi.org/10.3390/resources12060063

Doloisio, N., & Vanderlinden, J. P. (2020). The perception of permafrost thaw in the Sakha Republic (Russia): Narratives, culture and risk in the face of climate change. Polar Science, 26, 100589. https://doi.org/10.1016/j.polar.2020.100589

Ecosystem Approach. (2023). Convention on Biological Diversity. Available online: https://www.cbd.int/ecosystem (accessed on 1 January 2024).

Fadeev, A. M., Lipina, S. A., & Zaikov, K. S. (2021). Innovative approaches to environmental management in the development of hydrocarbons in the Arctic shelf. The Polar Journal, 11(1), 208–229. https://doi.org/10.1080/2154896x.2021.1889836

Federal Law of 10 January 2002 No. 7-FZ “On environmental protection” (Russian). (2002). Available online: https://docs.cntd.ru/document/901808297 (accessed on 1 February 2024).

Gladun, E. F., & Zadorin, M. Y. (2024). State policy of foreign Arctic countries in the field of adaptation to climate change: the example of national adaptation plans. Pravoprimenenie.

Golovina, E., Khloponina, V., Tsiglianu, P., et al. (2023). Organizational, Economic and Regulatory Aspects of Groundwater Resources Extraction by Individuals (Case of the Russian Federation). Resources, 12(8), 89. https://doi.org/10.3390/resources12080089

GOST R 54139-2010 Environmental management. Guidance on the application of organizational security controls and risk assessment. Climate Change (Russian). (2010). Available online: https://docs.cntd.ru/document/1200086160 (accessed on 1 February 2024).

GOST R ISO 14090-2019 Adaptation to climate change. Principles, requirements and guidelines (Russian). (2019). Available online: https://docs.cntd.ru/document/1200167738 (accessed on 1 February 2024).

Grémillet, D., & Descamps, S. (2023). Ecological impacts of climate change on Arctic marine megafauna. Trends in Ecology & Evolution, 38(8), 773–783. https://doi.org/10.1016/j.tree.2023.04.002

Ilyushin, Y. V., & Asadulagi, M. A. M. (2023). Development of a Distributed Control System for the Hydrodynamic Processes of Aquifers, Taking into Account Stochastic Disturbing Factors. Water, 15(4), 770. https://doi.org/10.3390/w15040770

Kalinina, O., Metkin, D., & Bichevaya, O. (2024). The Application of Green Seismic Survey Technology in Forested Areas and Its Ecological and Economic Effectiveness: Methodology and Practice of Application. Sustainability, 16(4), 1476. https://doi.org/10.3390/su16041476

Kirillina, K., Tananaev, N., Savvinova, A., et al. (2023). Climate change impacts the state of winter roads connecting indigenous communities: Case study of Sakha (Yakutia) Republic. Climate Services, 30, 100356. https://doi.org/10.1016/j.cliser.2023.100356

Kirsanova, N. (2020). Assessment Of Socio-Economic Development Level of Single-Industry Cities in Arctic Zone of Russian Federation. In: Proceedings of the 20th International Multidisciplinary Scientific Geo Conference Proceedings SGEM 2020, Ecology, Economics, Education and Legislation. https://doi.org/10.5593/sgem2020/5.2/s21.009

Kirsanova, N. Y., & Lenkovets, O. M. (2022). Assessment of accountability in state regulation of Arctic zone of the Russian Federation in current institutional environment. Sever i rynok: formirovanie ekonomicheskogo poryadka [The North and the Market: Forming the Economic Order], 1, 47–57. https://doi.org/10.37614/2220-802x.1.2022.75.004

Kirsanova, N. Y., Lenkovets, O. M., & Nikulina, A. Y. (2018). Renewable energy sources (RES) as a factor determining the social and economic development of the Arctic zone of the Russian Federation. In: Proceedings of the SGEM International Scientific GeoConference, 2018, Conference Proceedings; 2–8 July; Albena. 679–686. https://doi.org/10.5593/sgem2018/5.3

Kirsanova, N., Nevskaya, M., & Raikhlin, S. (2024). Sustainable Development of Mining Regions in the Arctic Zone of the Russian Federation. Sustainability, 16(5), 2060. https://doi.org/10.3390/su16052060

Kirsanova, O. (2011). Implementation Of the Paris Climate Agreement in Construction and Maintenance of Buildings. In: Proceedings of the SGEM2017 17th International Multidisciplinary Scientific GeoConference. https://doi.org/10.5593/sgem2017/53/s21.058

Komendantova, N., Landauer, M., Rovenskaya, E., et al. (2021). Towards a more sustainable Arctic. Northern Dimension Institute (NDI), Finland.

Landauer, M., & Komendantova, N. (2018). Participatory environmental governance of infrastructure projects affecting reindeer husbandry in the Arctic. Journal of Environmental Management, 223, 385–395. https://doi.org/10.1016/j.jenvman.2018.06.049

Lapinskas, A. (2023). Influence of mining rent on the efficiency of using natural potential: the paradox of plenty and its Russian specifics. Journal of Mining Institute, 259, 79–94. https://doi.org/10.31897/pmi.2023.13

Laptander, R., Horstkotte, T., Habeck, J. O., et al. (2024). Critical seasonal conditions in the reindeer-herding year: A synopsis of factors and events in Fennoscandia and northwestern Russia. Polar Science, 39, 101016. https://doi.org/10.1016/j.polar.2023.101016

Likhacheva, A. (2022). Arctic Fever. Springer Nature Singapore. https://doi.org/10.1007/978-981-16-9616-9

Litvinenko, V., Petrov, E., Vasilevskaya, D., et al. (2022). Assessment of the role of the state in the management of mineral resources. Journal of Mining Institute. https://doi.org/10.31897/pmi.2022.100

Malyshkov, G. B., Nikolaichuk, L. A., & Sinkov, L. S. (2019). Legislative regulation of waste management system development in Russian federation. International Journal of Engineering Research and Technology, 5(12), 631–635.

Marinin, M. A., Marinina, O. A., & Rakhmanov, R. A. (2023). Methodological approach to assessing influence of blasted rock fragmentation on mining costs. Gornyi Zhurnal, 9, 28–34. https://doi.org/10.17580/gzh.2023.09.04

Matrokhina, K., Trofimets, V., Mazakov, E., et al. (2023). Development of methodology for scenario analysis of investment projects of enterprises of the mineral resource complex. Journal of Mining Institute, 259, 112–124. https://doi.org/10.31897/pmi.2023.3

Metzel, M. (2022). There are 89 subjects in Russia. Putin signed the law on the admission of new regions. TASS, 5 October 2022 (Russian). Available online: https://tass.ru/politika/15957961 (accessed on 02 November 2023).

Mukhortova, L., Schepaschenko, D., Moltchanova, E., et al. (2021). Respiration of Russian soils: Climatic drivers and response to climate change. Science of The Total Environment, 785, 147314. https://doi.org/10.1016/j.scitotenv.2021.147314

Nechitailo, A. R., & Marinina, O. A. (2022). Analysis of technological directions of electrification of hydrocarbon production facilities in poorly developed territories (Russian). Север и Рынок: Формирование Экономического Порядка, 25(2/2022), 45–57. https://doi.org/10.37614/2220-802x.2.2022.76.004

Nevskaya, M. A., Raikhlin, S. M., Vinogradova, V. V., et al. (2023). A Study of Factors Affecting National Energy Efficiency. Energies, 16(13), 5170. https://doi.org/10.3390/en16135170

Order of the Administration of the Kostroma Region dated 6 June 2022 No. 107 “On approval of the regional plan for adaptation to climate change in the Kostroma region” (Russian). (2022). Available online: https://docs.cntd.ru/document/406086314 (accessed on 1 February 2024).

Order of the Cabinet of Ministers of the Chuvash Republic dated 1 September 2022 No. 859 “On approval of the regional plan for adaptation to climate change in the Chuvash Republic” (Russian). (2022). Available online: https://docs.cntd.ru/document/406210071 (accessed on 1 February 2024).

Order of the Cabinet of Ministers of the Republic of Tatarstan dated 16 May 2023 No. 1073-" On approval of the Adaptation Plan to climate change on the territory of the Republic of Tatarstan" (Russian). (2023). Available online: https://docs.cntd.ru/document/406658854 (accessed on 1 February 2024).

Order of the Council of Ministers of the Republic of Crimea dated 6 May 2022 No. 571-" On approval of the Climate Change Adaptation Plan of the Republic of Crimea" (Russian). (2022). Available online: https://docs.cntd.ru/document/406051082 (accessed on 1 February 2024).

Order of the Government of Sevastopol dated 2 December 2022 No. 192-RP "On approval of the Regional Adaptation Plan to climate change in the territory of the city of Sevastopol" (Russian). (2022). Available online: https://docs.cntd.ru/document/406495420 (accessed on 1 February 2024).

Order of the Government of the Arkhangelsk Region of 3 November 2022 No. 742-rp "On approval of the regional plan for adaptation to climate change" (Russian). (2022). Available online: https://docs.cntd.ru/document/406531108 (accessed on 1 February 2024).

Order of the Government of the Chechen Republic of 22 December 2022 No. 458 "On approval of the regional plan for adaptation to climate change on the territory of the Chechen Republic" (Russian). (2022). Available online: https://docs.cntd.ru/document/406449633 (accessed on 1 February 2024).

Order of the Government of the Chelyabinsk Region dated 16 December 2022 No. 1327-rp "On the regional plan for adaptation to climate change in the Chelyabinsk region" (Russian). (2022). Available online: https://docs.cntd.ru/document/406408736 (accessed on 1 February 2024).

Order of the Government of the Ivanovo Region dated 5 August 2022 No. 92-rp "On approval of the action plan for adaptation to climate change in the Ivanovo region" (Russian). (2022). Available online: https://docs.cntd.ru/document/406186032 (accessed on 1 February 2024).

Order of the Government of the Jewish Autonomous Region of 30 June 2023 No. 279-rp "On approval of the regional plan for adaptation to climate change in the Jewish Autonomous Region for the period until 2030" (Russian). (2023). Available online: https://docs.cntd.ru/document/406713866 (accessed on 1 February 2024).

Order of the Government of the Kabardino-Balkarian Republic of 24 June 2022 No. 292-rp "On approval of the regional plan for adaptation to climate change in the Kabardino-Balkarian Republic" (Russian). (2022). Available online: https://docs.cntd.ru/document/406110188 (accessed on 1 February 2024).

Order of the Government of the Kemerovo Region—Kuzbass dated 13 May 2022 No. 234 "On approval of the regional plan for adaptation to climate change in the Kemerovo region—Kuzbass" (Russian). (2022). Available online: https://docs.cntd.ru/document/406048802 (accessed on 1 February 2024).

Order of the Government of the Kirov Region dated 30 December 2022 No. 350 "On approval of the regional plan for adaptation to climate change in the Kirov region" (Russian). (2022). Available online: https://docs.cntd.ru/document/406467805 (accessed on 1 February 2024).

Order of the Government of the Komi Republic of 14 March 2023 No. 119 "On approval of the regional plan for adaptation of the Komi Republic to climate change" (Russian). (2023). Available online: https://docs.cntd.ru/document/406556282 (accessed on 1 February 2024).

Order of the Government of the Krasnoyarsk Krai of 10 August 2023 No. 565 "On approval of the adaptation plan to climate change in the Krasnoyarsk Krai" (Russian). (2023). Available online: https://docs.cntd.ru/document/406768446 (accessed on 1 February 2024).

Order of the Government of the Nizhny Novgorod Region dated 4 July 2022 No. 715-r "On approval of the regional plan for adaptation to climate change" (Russian). (2022). Available online: https://docs.cntd.ru/document/571717253 (accessed on 1 February 2024).

Order of the Government of the Novosibirsk Region of 14 March 2023 No. 170-rp "On approval of the regional plan for adaptation to climate change" (Russian). (2023). Available online: https://docs.cntd.ru/document/465756289 (accessed on 1 February 2024).

Order of the Government of the Oryol Region of 29 December 2022 No. 1056 "On approval of the Regional Adaptation Plan to Climate Change" (Russian). (2022). Available online: https://docs.cntd.ru/document/406470065 (accessed on 1 February 2024).

Order of the Government of the Republic of Buryatia dated 26 August 2022 No. 680 “On approval of the regional plan for adaptation to climate change in the Republic of Buryatia for the period until 2030” (Russian). (2022). Available online: https://docs.cntd.ru/document/406217506 (accessed on 1 February 2024).

Order of the Government of the Republic of Dagestan dated October 11, 2022 No. 459 “On approval of the regional plan for adaptation to climate change” (Russian). (2022). Available online: https://docs.cntd.ru/document/406276844 (accessed on 1 February 2024).

Order of the Government of the Republic of Kalmykia dated 28 April 2022 No. 179 “On approval of the regional Climate Change Adaptation Plan of the Republic of Kalmykia” (Russian). (2022). Available online: https://docs.cntd.ru/document/406042975 (accessed on 1 February 2024).

Order of the Government of the Republic of Karelia dated 24 March 2023 No. 254r-P “On approval of the Climate Change Adaptation Plan in the Republic of Karelia” (Russian). (2023). Available online: https://docs.cntd.ru/document/465432859 (accessed on 1 February 2024).

Order of the Government of the Republic of Sakha (Yakutia) dated 1 July 2022 No. 567 “On the regional plan for adaptation to climate change in the Republic of Sakha (Yakutia) for the period until 2025 and for the long term until 2050” (Russian). (2022). Available online: https://docs.cntd.ru/document/406133873 (accessed on 1 February 2024).

Order of the Government of the Rostov Region dated 11 May 2022 No. 285 “On approval of the regional plan for adaptation to climate change in the Rostov region” (Russian). (2022). Available online: https://docs.cntd.ru/document/406048485 (accessed on 1 February 2024).

Order of the Government of the Russian Federation dated 11 March 2023 No. 559-r “On the national action plan for the second stage of adaptation to climate change for the period up to 2025” (Russian). (2023). Available online: https://docs.cntd.ru/document/1300943426 (accessed on 1 February 2024).

Order of the Government of the Russian Federation dated 25 December 2019 No. 3183-r “On approval of the national action plan for the first stage of adaptation to climate change for the period up to 2022” (Russian). (2019). Available online: https://docs.cntd.ru/document/564102934 (accessed on 1 February 2024).

Order of the Government of the Samara Region of 24 January 2023 No. 22-r “On approval of the regional plan for adaptation to climate change in the Samara region” (Russian). (2023). Available online: https://docs.cntd.ru/document/406531488 (accessed on 1 February 2024).

Order of the Government of the Stavropol Territory of 30 December 2022 No. 995-rp “On approval of the Climate Change Adaptation Plan in the Stavropol Territory” (Russian). (2022). Available online: https://docs.cntd.ru/document/406424458 (accessed on 1 February 2024).

Order of the Government of the Sverdlovsk Region dated 27 July 2022 No. 355-RP “On approval of the Climate Change Adaptation Plan for the Sverdlovsk Region” (Russian). (2022). Available online: https://docs.cntd.ru/document/406180191 (accessed on 1 February 2024).

Order of the Government of the Yamalo-Nenets Autonomous Okrug dated 19 December 2022 No. 1281-RP “On the regional plan for adaptation to climate change” (Russian). (2022). Available online: https://docs.cntd.ru/document/406396822 (accessed on 1 February 2024).

Order of the Governor of the Krasnodar Krai dated 9 February 2023 No. 22 “On approval of the Adaptation Plan to climate change in the Krasnodar Krai” (Russian). (2023). Available online: https://docs.cntd.ru/document/406507968 (accessed on 1 February 2024).

Order of the Kursk Region Administration dated 7 February 2022 No. 59 “On approval of the regional plan for adaptation to climate change” (Russian). (2022). Available online: https://docs.cntd.ru/document/578130903 (accessed on 1 February 2024).

Order of the Lipetsk Region Administration dated 5 May 2022 No. 243 “On approval of the regional adaptation plan to climate change” (Russian). (2022). Available online: https://docs.cntd.ru/document/406041995 (accessed on 1 February 2024).

Order of the Ministry of Economic Development of Russia dated 13 May 2021 No. 267 “On approval of methodological recommendations and indicators on adaptation to climate change” (Russian). (2021). Available online: https://docs.cntd.ru/document/603604566 (accessed on 1 February 2024).

Order of the Moscow Region Government of 21 November 2022 No. 1140-RP “On approval of the Climate Change Adaptation Plan for the Moscow Region” (Russian). (2022). Available online: https://docs.cntd.ru/document/352395458 (accessed on 1 February 2024).

Pearce, T., & Smit, B. (2013). Vulnerability and Adaptation to Climate Change in the Canadian Arctic. Climate Vulnerability, 293–303. https://doi.org/10.1016/b978-0-12-384703-4.00439-1

Ponomarenko, T., Reshneva, E., & Mosquera Urbano, A. P. (2022). Assessment of Energy Sustainability Issues in the Andean Community: Additional Indicators and Their Interpretation. Energies, 15(3), 1077. https://doi.org/10.3390/en15031077

Powell, B., Bhatt, I. D., Mucioki, M., et al. (2023). The need to include wild foods in climate change adaptation strategies. Current Opinion in Environmental Sustainability, 63, 101302. https://doi.org/10.1016/j.cosust.2023.101302

Radoushinsky, D., Gogolinskiy, K., Dellal, Y., et al. (2023). Actual Quality Changes in Natural Resource and Gas Grid Use in Prospective Hydrogen Technology Roll-Out in the World and Russia. Sustainability, 15(20), 15059. https://doi.org/10.3390/su152015059

Rasmus, S., Yletyinen, J., Sarkki, S., et al. (2024). Policy documents considering biodiversity, land use, and climate in the European Arctic reveal visible, hidden, and imagined nexus approaches. One Earth, 7(2), 265–279. https://doi.org/10.1016/j.oneear.2023.12.010

Ray Biswas, R., & Rahman, A. (2023). Adaptation to climate change: A study on regional climate change adaptation policy and practice framework. Journal of Environmental Management, 336, 117666. https://doi.org/10.1016/j.jenvman.2023.117666

Regional adaptation plans to climate change, electronic fund of legal and regulatory and technical documents (Russian). (n.d.). Available online: https://docs.cntd.ru/search?q=%D0%BE%20%D1%80%D0%B5%D0%B3%D0%B8%D0%BE%D0%BD%D0%B0%D0%BB%D1%8C%D0%BD%D0%BE%D0%BC%20%D0%BF%D0%BB%D0%B0%D0%BD%D0%B5%20%D0%B0%D0%B4%D0%B0%D0%BF%D1%82%D0%B0%D1%86%D0%B8%D0%B8&tab=4 (accessed on 1 February 2024).

Resniova, E., & Ponomarenko, T. (2021). Sustainable Development of the Energy Sector in a Country Deficient in Mineral Resources: The Case of the Republic of Moldova. Sustainability, 13(6), 3261. https://doi.org/10.3390/su13063261

Resolution of the Government of the Russian Federation of 24 March 2022 No. 455 “On approval of the Rules for verifying the results of climate projects” (Russian). (2022). Available online: https://docs.cntd.ru/document/350066706 (accessed on 1 February 2024).

Resolution of the Government of the Russian Federation of 8 February 2022 No. 133 “On approval of the Federal scientific and technical program in the field of environmental development of the Russian Federation and climate change for 2021-2030” (Russian). (2022). Available online: https://docs.cntd.ru/document/728142472 (accessed on 1 February 2024).

Resolution of the Government of the Yaroslavl Region of 23 May 2023 No. 489-p “On approval of the regional plan for adaptation to climate change in the Yaroslavl region” (Russian). (2023). Available online: https://docs.cntd.ru/document/406668348 (accessed on 1 February 2024).

Resolution of the Presidium of the Government of the Republic of Khakassia dated 1 December 2022 No. 209-p “On approval of the regional plan for adaptation to climate change in the Republic of Khakassia” (Russian). (2022). Available online: https://docs.cntd.ru/document/406389857 (accessed on 1 February 2024).

Resolution of the Volgograd Region Administration dated 27 April 2022 No. 248-p “On approval of the regional plan for adaptation to climate change in the Volgograd region” (Russian). (2022). Available online: https://docs.cntd.ru/document/406030383 (accessed on 1 February 2024).

Romasheva, N. V., Babenko, M. A., & Nikolaichuk, L.A. (2022). Sustainable development of the Russian Arctic region: environmental problems and ways to solve them. MIAB. Mining Inf. Anal. Bull, 10(2), 78–87. doi: 10.25018/0236_1493_2022_102_0_78

Samylovskaya, E., Kudryavtseva, R. E., Medvedev, D., et al. (2020). Transformation of the Personnel Training System for Oil and Gas Projects in the Russian Arctic. Resources, 9(11), 137. https://doi.org/10.3390/resources9110137

Stroykov, G., Vasilev, Y. N., & Zhukov, O. V. (2021). Basic Principles (Indicators) for Assessing the Technical and Economic Potential of Developing Arctic Offshore Oil and Gas Fields. Journal of Marine Science and Engineering, 9(12), 1400. https://doi.org/10.3390/jmse9121400

Terms. (n.d.). Russian Emergency Situations Ministry. Available online: https://mchs.gov.ru/ministerstvo/o-ministerstve/terminy-mchs-rossii/term/1066 (accessed on 1 February 2024).

Yury, I., & Martirosyan, A. (2024). The development of the soderberg electrolyzer electromagnetic field’s state monitoring system. Scientific Reports, 14(1). https://doi.org/10.1038/s41598-024-52002-w

Zhang, B., Ma, J., Khan, M. A., et al. (2023). The Effect of Economic Policy Uncertainty on Foreign Direct Investment in the Era of Global Value Chain: Evidence from the Asian Countries. Sustainability, 15(7), 6131. https://doi.org/10.3390/su15076131