

Permafrost degradation is a legal matter

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Abstract

New topical problems of permafrost degradation are identified in the context of a new sphere of legal regulation, primarily in the Arctic countries, with an emphasis on the legal problems of Russia. The object of research in the article consists of various legal consequences of the said phenomenon, manifested on very sensitive ecosystems, human, industrial, transport land spaces, that is, outside the maritime spaces. The study is based primarily on an integrated legal approach and appropriate legal instruments to address the emerging economic and legal consequences of the degradation of permafrost. This approach makes it possible to substantiate the recognition as an independent object of regulation of the phenomenon of permafrost and the need to develop its own legal conceptual framework. This approach is justified at both the national and international levels, as well as in the analysis of specialized and modified law institutions of the Arctic States. The article applies the advantage of the comparative legal method of studying the legislation of the Arctic states, as well as interdisciplinary and intersectoral methods of legal research. As a result, the need for a new independent scientific and applied integrated study of the legal problems of the degradation of permafrost can be considered. One of the conclusions of the work included the need to create international specialized legislation in the form of a model act. Research in the proposed format may determine the structure and content of future international legal regulation and the institutions that support it.

Keywords: Degradation of permafrost; Irresistible force; Land rights; Adaptation to negative climate change; Environmental regulation; Destruction of land; Paris Agreement; Model act.

Resumen. *La degradación del permafrost es un asunto legal*

Se identifican nuevos problemas actuales de la degradación del permafrost en el contexto de una nueva esfera de regulación legal, principalmente en los países árticos, con énfasis en los problemas legales de Rusia. El objeto de investigación del artículo consiste en diversas consecuencias jurídicas de dicho fenómeno, manifestadas en ecosistemas muy sensibles, espacios terrestres humanos, industriales, de transporte, es decir, fuera de los espacios marítimos. El estudio se basa principalmente en un enfoque legal integrado e instrumentos legales apropiados para abordar las consecuencias económicas y legales emergentes de la degradación del permafrost. Este enfoque permite fundamentar el reconocimiento como objeto independiente de regulación del fenómeno del permafrost y la necesidad de desarrollar su propio marco conceptual legal. Este enfoque se justifica tanto a nivel nacional como internacional, así como en el análisis de las instituciones jurídicas especializadas y modificadas de los Estados árticos. El artículo aplica la ventaja del método jurídico comparado para estudiar la legislación de los Estados árticos, así como los métodos interdisciplinarios e intersectoriales de investigación jurídica. Como resultado, se puede considerar la necesidad de un nuevo estudio independiente científico y aplicado integrado de los problemas legales de la degradación del permafrost. Una de las conclusiones del trabajo fue la necesidad de crear legislación internacional especializada en forma de ley modelo. La investigación en el formato propuesto puede determinar la estructura y el contenido de la futura regulación jurídica internacional y las instituciones que la respaldan.

Palabras clave: Degradación del permafrost; Fuerza irresistible; Derechos sobre la tierra; Adaptación al cambio climático negativo; Regulación ambiental; Destrucción de tierras; Acuerdo de París; Acto modelo.

Resum. *La degradació del permafrost és una qüestió legal*

S'identifiquen nous problemes d'actualitat de la degradació del permafrost en el context d'una nova esfera de regulació legal, principalment als països àrtics, amb èmfasi en els problemes legals de Rússia. L'objecte de recerca de l'article consisteix en diverses conseqüències jurídiques de l'esmentat fenomen, manifestades sobre ecosistemes molt sensibles, espais humans, industrials, terrestres de transport, és a dir, fora dels espais marítims. L'estudi es basa principalment en un enfocament jurídic integrat i instruments legals adequats per abordar les conseqüències econòmiques i

legals emergents de la degradació del permafrost. Aquest plantejament permet fonamentar el reconeixement com a objecte independent de regulació del fenomen del permafrost i la necessitat de desenvolupar un marc conceptual jurídic propi. Aquest enfocament es justifica tant a nivell nacional com internacional, així com en l'anàlisi de les institucions de dret especialitzades i modificades dels Estats àrtics. L'article aplica l'avantatge del mètode jurídic comparat per estudiar la legislació dels estats àrtics, així com els mètodes interdisciplinaris i intersectorials d'investigació jurídica. Com a resultat, es pot considerar la necessitat d'un nou estudi integrat científic i aplicat independent dels problemes legals de la degradació del permafrost. Una de les conclusions del treball va incloure la necessitat de crear una legislació internacional especialitzada en forma d'acte model. La investigació en el format proposat pot determinar l'estructura i el contingut de la futura regulació jurídica internacional i les institucions que la donen suport.

Paraules clau: Degradació del permafrost; Força irresistible; Drets de terra; Adaptació al canvi climàtic negatiu; Regulació ambiental; Destrucció de terres; Acord de París; Acte model.

Summary

1. The relevance of permafrost degradation and the legal focus of the review.
2. Effects of thawing of permafrost outside the sea and economic and legal measures.
3. Existing legal framework for the protection of permafrost and special legislation.
4. On conceptual apparatus and new object of legal regulation.
5. On forms of legal regulation.
6. On the problems of application and applicability of current law branches to new relations.
7. In concluding.
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1. THE RELEVANCE OF PERMAFROST DEGRADATION AND THE LEGAL FOCUS OF THE REVIEW

The legal definition of permafrost is not currently included in any of the jurisdictions of the Arctic countries. Our analysis of this aspect will be more detailed below. According a natural-scientific definition: a permafrost is soil, sand, sediment, or rock that remains at or below 0 °C (32 °F) for at least two years. While most is on land, there is also some subsea permafrost beneath offshore Arctic continental shelves. Permafrost ranges in thickness from less than 1 meter (3.3 feet) to greater than 1,500 meters (4,900 feet). Permafrost is not defined by soil moisture content, overlying snow cover, or location; it is defined solely by temperature. Any soil, sand, sediment, or rock remaining at or below 0 °C (32 °F) for two or more years is permafrost. However, some permafrost can contain over 30 percent ice in lenses and layers. The top part of the permafrost thaws and freezes on an annual basis. The maximum seasonal thaw depth in permafrost is called the active layer.¹

Permafrost, since the beginning of the last century, has attracted the attention of experts, primarily of natural-scientific profile. Today, in the context of large-scale development of the Arctic and due to the intense thawing of the permafrost, it has become a source of negative impacts on the environment, which has become the focus of attention of economists, politicians and legislators of all the Arctic countries: USA, Canada, Norway, Denmark, Iceland, Sweden, Russia, Finland.

More attention in our analysis is paid to the legislation of Russia, by virtue of its first place in the world for the spread of permafrost.² Also, under the conditions of

¹ The National Snow and Ice Data Center (USA) [https://nsidc.org/learn/parts-cryosphere/frozen-ground-permafrost/quick-facts-frozen-ground#:~:text=Permafrost%2C%20or%20permanently%20frozen%20ground,1%2C500%20meters%20\(4%2C900%20feet\)](https://nsidc.org/learn/parts-cryosphere/frozen-ground-permafrost/quick-facts-frozen-ground#:~:text=Permafrost%2C%20or%20permanently%20frozen%20ground,1%2C500%20meters%20(4%2C900%20feet))

² 65 percent of the territory of the country, on the territory of the subject of the Russian Federation in the Republic of Sakha (Yakutia) is the deepest "eternal" permafrost on the Earth, the Vilyu River area, it reaches 1370 meters.

permafrost, Russia has the largest number of settlements and objects of industrial, civil and other infrastructure in comparison with other Arctic countries. The first special laws on the protection of permafrost were adopted by two territorial subjects of Russia, their separate provisions will be presented later.³

According to model projections, the costs of this damage will be \$182 billion for all Arctic combined by mid-century, under a moderate climate change. Under a high-end scenario - the costs may rise to \$276 billion by mid-century. Russia is expected to have the highest burden of costs, ranging from \$115 to \$169 billion depending on the scenario. For Scandinavia and Iceland - \$36.4 billion (moderate scenario) to \$53.9 billion (high-end) North America is \$30.4 - \$53.1 billion.⁴

It is well known that the marine (oceanic) dimension of climate change impacts receives more attention than the land dimension. This is evidenced by: 1982 United Nations Convention on the Law of the Sea provides the basic international legal framework for all maritime activities, including in the Arctic; adopted recommendations of the Arctic Council. The Ilulissat Declaration, adopted in 2008 by the five coastal States of the Central Arctic Ocean —Canada, Denmark, Norway, Russia and the USA— reaffirmed that the law of the sea provides the framework for the management of activities in the Arctic Ocean. This ministerial declaration has played an important role in clarifying the international legal framework, including with regard to environmental protection and research. The Polar Code,⁵ in force for vessels operating in polar waters, is designed to improve the safety of vessel operations and limit their impact on humans and the environment in remote, vulnerable and potentially harsh polar waters (art. 1) as well as numerous other regional⁶ and national acts. These documents are aimed at developing clear priorities, including the perspective of regional maritime management, for the growth of shipping in the Arctic seas, addressing issues of maritime delimitation. Regulatory expansion due to the progressive decrease in area of perennial ice in the Arctic, and mainly along the Arctic coast of Russia. Demand is also driven by the need to improve maritime safety and reduce impacts on people and the environment in remote, vulnerable and harsh polar waters. Over the past few decades, and especially in recent years, there has been an increase in the number of national and international research networks established in recent years and to better understand the dynamics of pan-Arctic permafrost in coastal area.⁷

³ Special regional laws in Russia on the protection of permafrost are described in more detail: adopted in the Republic of Sakha (Yakutia) and in the Yamal-Nenets Autonomous Okrug.

<https://www.climatechangepost.com/norway/permafrost/>

⁴ <https://www.climatechangepost.com/norway/permafrost/>

⁵ The International Code for Ships Operating in Polar Waters (Polar Code) Resolution Mepc.264 (68) was adopted on 15 May 2015. <https://www.imo.org/en/OurWork/Safetycode/Pages/polar-asp.x>

⁶ Apostolos Tsiuvalas and Endealev Lihalem Enju. Legal implications of the 2022 Canada-Denmark-Greenland Agreement on Hans (Tartupaluk) for the Inuit of Greenland and Nunavut. 24.01.2023. <https://www.thearcticinstitute.org/legal-implications-2022-canada-markden-greenland-agrent-hans-island-tartuukpalinu-peoplesonnova/>

⁷ Arctic Report Card: Update for 2020. The sustained transformation to a warmer, less frozen and biologically changed Arctic remains clear.

At the same time, the rapidly changing cryosphere is affecting ecosystems throughout the Arctic, as well as terrestrial and coastal ecosystems, not just marine ecosystems. Changes in the type, length and seasonality of land-based snow cover, the rapid disappearance of Greenland's perennial ice sheet and glacier shield are called fundamental changes in all ecosystems that affect the carbon cycle and greenhouse gases. Unique ecosystems, such as those associated with millennial ice shelves, are threatened. Some are disappearing. Permafrost is found in many places around the world, but it is especially expressed on the 7,000-kilometer coastline of the East Siberian Arctic Shelf. For hundreds of thousands of years, soil layers 1 to 30 meters deep were permanently frozen below zero degrees Celsius. Accordingly, new directions for research to identify the most pronounced threats to the ecological and technical safety of ecosystems and infrastructure in the Arctic region are being identified.⁸

The impact of the melting of Arctic terrestrial ice on sea level rise worldwide.⁹ Over a 47-year period (1971-2017), the Arctic has been the world's largest source of sea-level rise, accounting for 48 % of the global contribution of continental ice in 2003-2010. and 30 per cent of total sea-level rise since 1992. Temperature effects dominate the mass balance of continental ice,¹⁰ causing also increased acidification (Di Qi et al., 2017). The IPCC Special Report states that "with regard to Arctic glaciers, various regional studies consistently indicate that in many places glaciers are now smaller than they have been for millennia". It is also stressed that further warming that will lead to more significant changes in the climate system, including the melting of glaciers, snow and permafrost, as well as sea-level rise.¹¹

Climate change in the Arctic has important implications for the human and terrestrial environment through permafrost melting, erosion, instability and ecosystem shifts. The United States Geological Survey (USGS) concluded that coastal erosion was increasing in the north. The slope of Alaska is likely the result of several changes in Arctic conditions, including a decrease in the length of sea ice, an increase in the temperature of the sea surface in summer, and a rise in sea level. The United States Geological Survey has found that coastal erosion occurs at an average rate of 1.4 meters per year, and although some areas are incremented, others are degraded at a rate of up to 20 meters per year. Coastal erosion threatens settlements, oil and gas infrastructure and wildlife. Adaptation measures to mitigate and manage adverse impacts can be costly and risky.

<https://arctic.noaa.gov/report-card/report-card-2020/coastal-permafrost-erosion/>

⁸ Coastal Protection on the West Coast of Jutland, Denmark

<https://documents1.worldbank.org/curated/en/63666152766>

⁹ United States Arctic Report 2021.

<https://arctic.noaa.gov/report-card/report-card-2021/#:~:text=The%20average%20air%20temperature%20above,%20%20long%20term%20average>

¹⁰ Changes in the Arctic: Background and Issues for Congress Updated March 19, 2024. P.17-19.

¹¹ IPCC Report on Impacts, Adaptation and Vulnerability: Key Takeaways.

The IPCC report states that “about 20 % of the permafrost of Arctic lands is vulnerable to abrupt permafrost melting and ground subsidence”, increasing the risks of sudden subsidence.¹² 30-50 % of the critical circumpolar infrastructure may be at high risk in 2050. Accordingly, infrastructure costs associated with the degradation of permafrost could rise to tens of billions of US dollars by the second half of the century. There may also be other costs associated with the relocation of infrastructure and villages, as well as the management of wildlife habitats and endangered and endangered species.¹³

2. EFFECTS OF THAWING OF PERMAFROST OUTSIDE THE SEA AND ECONOMIC AND LEGAL MEASURES

It is assumed that a). emerging relationships and their regulatory decisions are conventionally separated into public law and private law; b) legal regulation in both areas of the relationship faces the need to adapt broadly to new challenges.

The following negative manifestations involving the responsibility of public entities are actively manifested.

Ecosystems and individual species of flora and fauna are changing and degrading globally and locally, and sea levels are rising, as noted above. Following the thawing of the permafrost, the spatial base is degraded, significantly affecting the interests and livelihoods of the indigenous peoples of the North and their pastoral livelihoods. In the Arctic, communities have traditional land-use rights, and the thawing of permafrost today limits their ability to access and utilize resources fully. In order to respond to changing circumstances and to protect the rights of indigenous peoples, it will be necessary to adjust public legal obligations in a number of ways.

New challenges relate to the maintenance, survival, location, conservation or transfer of human settlements from all economic activities. Such facilities include vital facilities, including energy, subsoil use, transport infrastructure, pipelines, airports, sea and river ports, and so on. In changing and destroying the landscape and the spatial basis, it is obvious, there are legal consequences for all subjects of relations, both public and private. It affects the rights and interests of all entities, both public and private, that hold rights of use and ownership of any immovable property and natural resources. The latter should also include users of natural resources rights, including landowners, subsoil users and water users, whose interests are directly affected by threats, risks of damage and the destruction of the spatial basis. Accordingly, as the spatial framework melts, such rights are restricted or lost with loss or damage to the objects themselves.

Modifications are required in approaches to planning for land use and protection, spatial planning, evaluation of perspectives of permafrost degradation in

¹² IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC)

¹³ IPCC Special Report on the Ocean and Cryosphere in a Changing Climate SROCC SPM 2019.

settlement master plans, zoning of municipal territories, establishment of territorial zones and town planning regulations in the permafrost zone, approval of adequate construction technologies that meet the requirements and standards for conditions of degraded permafrost and a number of others.¹⁴

The requirements for ensuring environmental safety require a general change. Given the changing climate, environmental and technological prohibitions, requirements and limits of responsibility for ensuring the safety of infrastructure, such as roads, buildings and pipelines built on permafrost, are increasing. The task of revising and developing a new system of legal and technical requirements arises, as the risks of accidents increase disproportionately. Under conditions of increasing level of threats to environmental and technical accidents, the range of regulated relationships includes:

- the formation of a system for ensuring ecological safety in the sphere of life and production;
- implementing best practices for prevention and minimizing the negative effects of the degradation of permafrost; and
- developing a risk management system for safeguarding against environmental (climate) threats through specific restrictive, interdiction requirements and measures.

Emissions of methane, other greenhouse gases and pollutants previously trapped in the permafrost should be considered as a new environmental risk. The likelihood and extent of adverse impacts are still being assessed by experts. Nevertheless, in keeping with the legal principle of precaution, new precautionary and mitigating environmental measures and mandatory restrictions are now needed.

Normal routine operation will require the revision of existing and the development of adequate modern environmental and technological requirements. As far back as the 20th century experience of legislative regulation of the Arctic states in the use of the northern spaces has already fixed special requirements, for example, to methods and technologies of construction, to preserve permafrost and provide security for the population and livelihoods.

Today we need to develop specific subject matter of permafrost degradation regulation. For example, in Russia, the so-called second design principle has been institutionalized. However, if the frozen soils have temperatures above -1.5°C , a

¹⁴ Flooding, erosion, and melting permafrost in the Arctic threaten many villages. In the United States, numerous Alaska Native villages are under particular threat, although a complete assessment has not been finalized. However, 31 villages were identified that faced imminent threats. At least 12 of the 31 threatened villages have decided to relocate—in part or entirely—or to explore relocation options. Relocation has significant consequences for community relationships and poses special challenges for Native groups with close historical and cultural ties to the land.

<https://climate.law.columbia.edu/content/village-and-town-relocations>

<https://climate.law.columbia.edu/content/arctic-governance-resources>

different design principle should be applied, which assumes the embankment base to thaw to some estimated depth.¹⁵

On the importance of modern background monitoring system for legal and economic policy. Obtaining accurate data on permafrost distribution, and characteristics, and mapping permafrost is difficult due to the fact that permafrost is externally hidden and without field studies remotely determine, where it is, is not possible.¹⁶ Only the state system of background monitoring of permafrost and permafrost soils provides the data on which forecasts are possible.

In turn, it becomes possible to develop technical solutions for adaptation to negative climate change of almost all infrastructure; changing approaches to planning for the use and protection of land, for spatial planning, ensure the inclusion of settlements and urban districts in the master plans, as well as the zoning of municipal territories in the permafrost area; the admission of modern and adequate construction technologies, etc. Accordingly, legal policies on mitigation and adaptation are developed on the basis of background monitoring.

3. EXISTING LEGAL FRAMEWORK FOR THE PROTECTION OF PERMAFROST AND SPECIAL LEGISLATION

An overview of the legal regulation in the Arctic countries (Canada, Norway, Denmark (via Greenland), Sweden, Russia, Finland, Iceland and the USA (Alaska) showed the following. These countries have not yet adopted specific laws on the protection of permafrost or other regulations on land.¹⁷ Nevertheless, it may be argued that there is no legal vacuum, as separate and general aspects of the protection and management of permafrost are covered by:

- legislation on environmental protection, protection and use of individual natural objects and territories;
- general rules in the field of environmental and technological safety;

¹⁵ Traditionally, the way to preserve permafrost is cooling, using thermal packs or freezers. ... If the frozen ground undergoes heat transfer, it will thaw. For this reason, structures built in permafrost conditions can gradually sink; any heated areas will sink faster. Over the years, this can cause the structure to bend and even collapse. Construction on frozen ground is difficult. Huge layers of ice can form beneath the ground and eventually coalesce, causing the earth to move. For this reason, it is advisable to leave the foundation of the embankment frozen during the whole period of operation (the first principle of design). These provisions formed the basis of the current regulatory document governing the design and construction of roads in the permafrost zone. Building Regulations, registered by Rosstandart as SP 25.13330.2010. See: Influence of E.V. Kuznetsov, E.E. Kartasheva, T.V. Lagisov, Orenburg State University, Orenburg on the state of infrastructure facilities and structures. https://elibrary.ru/download/elibrary_37414781_13082711.pdf Date of circulation 12. 03. 2024.

¹⁶ The active layer (seasonal) in summer can thaw and microorganisms live in it represents a point of zero annual temperature fluctuations, on which the permafrost is stable and regardless of the season it remains frozen at a sufficient depth of up to a thousand meters or more, with the advance to the earth core as the ground temperature rises to 0 degrees, there is a bottom edge - the sole of the permafrost.

¹⁷ As of January 2022.

- as well as the requirements for architectural and urban planning activities.
- In general, the legal framework for preventing and mitigating the negative effects of the degradation of permafrost (outside the sea) within the boundaries of Arctic countries is still in its formative stage.

About the special regulations currently in force. Two regional laws on the conservation of permafrost in the constituent entities of the Russian Federation may be considered as an exception. Let's dwell on the description of special laws "On the Protection of Permafrost", adopted in Sakha (Yakutia) and Yamal-Nenets National District. Note that these Russian federal entities are almost entirely located in the permafrost zone. The Law of the Republic of Sakha (Yakutia) "On the Protection of Permafrost" is the first basic law on the protection of permafrost in the world, it has been in force since 2018.¹⁸ And also the latest law "On perennial (eternal) permafrost in the Yamal-Nenets Autonomous Okrug" came into force on January 1, 2024.¹⁹

Of interest are the emergence of regional laws as well as specific regulatory instruments. Despite the declarative nature of many of the provisions of these laws, the range of relations regulated by these laws is wide. It is an economic and other activity on the territory of the spread of permafrost, as well as ensuring the safety of these regions, including reducing the risks of accidents. However, in order to implement each of these laws, a significant set of normative and technical legal acts should be developed. Moreover, we note the rare case in which the diversity of special environmental-legal institutions of regional legislation exceeds that of federal ones. These laws include such institutions as:

- Specific new principles of public administration for the protection of permafrost. These include: prevention of irreversible effects of permafrost degradation as a result of enhanced geocryological processes; government regulation and monitoring of all factors related to the degradation of permafrost; openness, completeness and reliability of information on the permafrost and its changes, prediction of sensitivity and sustainability of permafrost landscapes; scientific validity, consistency and comprehensiveness of the approach to the protection of permafrost; the obligation to comply with the requirements of the legislation of the subject of the federation in the field of the protection of permafrost, as well as liability for violation of this legislation.²⁰
- Public administration in the field of the protection of permafrost is entrusted to the executive authorities in the field of environmental protection and urban planning.²¹ The following are the powers of specially authorized State bodies: adoption of the relevant normative legal acts; participation in the organization

¹⁸ Law "On the Protection of Permafrost in the Republic of Sakha (Yakutia)" from 22.05.2018 2006-3 1571-V. Adopted by the Resolution of the Riigikogu (Il Tumen) of the Republic of Sakha (Yakutia) from 22.05.2018 3 N 1572-V.

¹⁹ Law of the Yamal-Nenets Autonomous Okrug of December 22, 2023 G. N 105-CJSC.

²⁰ Article 4 of the Law of the Republic of Sakha (Yakutia)

²¹ Article 10 of the Law of the Republic of Sakha (Yakutia).

and conduct of State monitoring of permafrost; the implementation of measures to protect the population in emergency situations that threaten human life and health; limiting the number of capital construction projects as a result of State expertise in the event of a dangerous impact on the permafrost; establishing procedures for the implementation of permafrost supervision; creation and maintenance of a unified system of regional information fund on permafrost based on its monitoring and geocryological forecasting, and a number of others.

- Norming of permafrost and other environmental factors affecting permafrost to be performed in order to preserve a favorable environment and ensure environmental safety to prevent and (or) reducing its negative impact on the environment. The development of such norms includes: research to substantiate them, assessment and forecasting of environmental, social and economic impacts of permafrost regulations. For determination of criteria for safety and harmlessness of influence on perennial rocks is carried out technical and environmental standardization of the permafrost condition and determines the maximum permissible levels of factors affecting it.

Also, the state registration of factors affecting the permafrost has been introduced. There are special measures and requirements for economic activities, stages and branches of production, including mandatory measures for legal entities engaged in economic and other activities that have a negative impact on permafrost; the executive authorities may impose restrictions on activities which have a dangerous impact on the permafrost and may also stimulate activities which have no dangerous impact on permafrost and the environment.

The levels of impacts on the permafrost are recorded in the State accounting of facilities having a negative impact on the environment, in accordance with environmental legislation.

State permafrost supervision is carried out in accordance with a special law on urban planning policy in these regions.²²

Measures to protect the public from changes in the permafrost threatening the life and health of human beings are based on information on the unfavorable state of the permafrost, changing the level of permafrost when human life and health are threatened. Urgent measures are taken to protect the population in accordance with the legislation of the Russian Federation on the protection of the population and territories from emergencies of a natural and man-made nature. The rights of citizens, legal entities and public associations in the field of permafrost to information on the status of permafrost, the stability of perennial terrestrial rocks and geocryological forecasting are enshrined. Public participation is permitted in the discussion of proposed economic and other activities which may have dangerous and harmful effects on the permafrost, etc. There are State programs and measures to protect the

²² Law of the Republic of Sakha (Yakutia) of 29 December 2008, 644-3 N 181-IV "On Urban Policy in the Republic of Sakha (Yakutia)".

population in the event of changes in the permafrost, which threaten the life and health of the people. Spatial planning for permafrost protection is performed by local governments. Legal liability was also provided, including special grounds for compensation for breaches of the maximum permissible level of exposure to permafrost.

At present, the adoption of an appropriate federal law regulating relations in the sphere of permafrost is not envisaged in Russia. Although attempts have been made to develop federal drafts of such a law.

4. ON CONCEPTUAL APPARATUS AND NEW OBJECT OF LEGAL REGULATION

The exponential degradation of permafrost (also called perennial) can continue to be listed. Experts in paleogeology have historically accumulated serious results of consideration of the subject, which is very valuable for the formation of the future legal apparatus (Summerhayes, et al., 2020).

Today, in addition to the natural-scientific characteristics of the permafrost essence, there is a need to formalize this phenomenon from a legal point of view. The transition of quantitative changes into qualitative changes has taken place, the phenomenon of permafrost presupposes the existence of its legal definition for inclusion in legal circulation.

Let us note that the UN Framework Convention on Climate Protection, as well as the 2015 Paris Agreement, did not mention permafrost. In the modern legislation of the Arctic countries, in the acts of international law and authoritative expert documents on climate protection, there is a mention of “permafrost”. The content is based on the natural science description of the Intergovernmental Commission on Climate Change under the FCCC, which is not a legal one. Permafrost is defined as a special natural feature as a rock or soil with ice remaining frozen for two years or more. It is found mainly in the polar regions and high mountain areas, where temperatures remain below zero for much of the year. Permafrost is an important component of the cryosphere that plays a crucial role in ecosystem dynamics, carbon storage and landscape stability. Usually, the process of formation of permafrost occurs under the “active layer” of soil, which freezes and thaws every year.²³

By its physical characteristics permafrost must have certain features. If it is soil, its temperature must be below 0 degrees Celsius, with the obligatory presence of water in the solid state (ice) for more than two years. Such soil is called both permafrost and perennial or seasonal perennial rocks depending on its geophysical characteristics and the depth of its location below the surface.

²³ IPCC (Intergovernmental Panel on Climate Change). 2019. Summary for policy. In: IPCC special report on the ocean and cryosphere in a changing climate. Portner, H.-O., D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, M. Nicolai, A. Zhai, J. Petzold, B. Poloczanska, K. Edrman (Edyer).

If the recognition of permafrost as an autonomous subject of legal regulation is accepted, the need for an adequate conceptual framework becomes apparent. This apparatus is the starting point for the development of any branch of legislation. With the development and introduction of the concepts of “permafrost” and other related to this phenomenon of legal terms in the legal circulation, a unified legal system will be formed. As can be seen from the acts of national and international legislation, as well as from the position of the Intergovernmental Commission on Climate Change under the FCCC “permafrost” is still defined only as a natural phenomenon and only from the scientific side. That is, there is no established legal definition yet, nor is there a definition of degradation of permafrost. Accordingly, legal characteristics, which are important for the legal relationship, as well as the boundaries or limits of the scope of the definition, should also be included in these definitions.

At a minimum, the characteristics could include a national regime for the protection and use of permafrost areas where human settlements, infrastructure and sensitive ecosystems are located, which is considered a priority for regulation. At the same time, such a regime should be linked, to a large extent, to State and international measures to ensure environmental and technical security and to adapt to the negative climate changes that cause this degradation. Although individual legal institutions, as we have shown above, are already emerging, the phenomenon of degraded permafrost has not yet been recognized as a specific definition and subject of environmental law. It is necessary to prove this necessity, although this natural phenomenon is located on 25 per cent of the planet’s land area.

The legal definition of permafrost has not yet been unified as a legal term in all the Arctic States, and even in the strict sense of the word is virtually non-existent. The existing description of permafrost is based on the position of the IPCC. We have referred above to the IPCC definition of permafrost, with its natural science characteristics, which should help to streamline the conceptual framework and develop principles for legal regulation. The use of this word combination is quite common in the acts of technical legislation, but the truth, in the form of synonyms of the “permafrost”, “eternal (or perennial) permafrost”, “permafrost zone», “permafrost soil”. Historically, architectural legislation was the first to include special requirements for the design and construction of various types of production facilities, railways and residential utilities located in the permafrost zone.

The question that remains debated is, what natural-scientific term should be used as a basis as eternal permafrost or unspecified permafrost perennial? Thus, the new legal definitions introduced by the recent amendments of the Russian Federal Law on Environmental Protection in 2023,²⁴ permafrost as such was not included. However, such concepts as “soil”, “permafrost soil”, “degradation of permafrost soil”, “condition of permafrost (perennial) have been fixed by law as a set of characteristics of

²⁴ On amendments to the Federal Law "On Environmental Protection" and separate legislative acts of the Russian Federation", FZ 10.07.2023 297-FZ. Comes into force: 01.03.2024, 01.03.2025, 01.01.2026, adopted by the State Duma on 25 July 2023.

permafrost soils". In the current policy documents of the executive branch,²⁵ it was announced that a national system for monitoring long-term (perennial) permafrost was established, that is, as we can see, a different phrase was used. At the regional level, the later law of the Yamal-Nenets Autonomous Okrug of 2023 already uses the term "perennial permafrost", and the laws of the Sakha Republic (Yakutia), traditionally use the term "permafrost".²⁶

Comparing the various arguments, I stick to the phrase "permafrost". First, it was historically widespread, both in scientific use and in spoken use. Secondly, it appears to be lexically correct. Third, the natural-scientific term "permafrost" is recognized by famous scientists all over the world, as well as by most modern scientists who formulated the basic principles and provisions of this science.²⁷ Fourth, in international instruments, in scientific literature and in legislation, the well-established and unambiguously understood term, formed by one complex term in English "permafrost", that is, permafrost.

The term "degradation of the permafrost soil", I believe, may also reflect some legal characteristics, and not only duplicate the natural scientific definition covering physical, chemical and biological changes, which occur in the permafrost environment as a result of thawing and related processes.

This term was first enshrined in art. 1 of the Law on Environmental Protection in the Russian Federation and includes such legal criteria as follows. This: a). the periodic protrusion process; b). characterized by a gradual increase in its average annual temperature; c). which leads to the reduction of the layer of permafrost soil. This definition is similar to that of the earlier Law on the Protection of Permafrost in the Republic of Sakha (Yakutia). And according to a recent law in Yamal, the definition of the degradation of permafrost is the reduction of cold reserves in the thickness of perennial hard rock under the influence of both natural and man-made factors, leading to a reduction in the spread, increasing the temperature and decreasing the power of perennial molten rocks until their complete disappearance». As you can see, the earlier definition contains more additional criteria by including reference to natural and man-made degradation factors. The degradation also includes not only the reduction of the permafrost thickness, but also their total disappearance, reflecting the uniqueness of the specific nature of the subject matter.

²⁵ In particular, in the instructions of the President of the Republic of 1971 from October 16, 2021.

²⁶ See. Law of the Republic of Sakha (Yakutia) of 29 December 2008, 644-3 N 181-IV On Urban Policy in the Republic of Sakha (Yakutia) (as amended on 3 May 2023): para. 3) Limits of permitted construction, developed taking into account the standards for the protection of permafrost, approved by the legislation of the Republic of Sakha (Yakutia); para. 6. In order to comply with the technology of construction production in permafrost conditions should be, as a rule, allocate the project documentation for the construction of the zero cycle of the capital construction project for state or municipal needs in a separate (approved) part of the project documentation.

²⁷ A.V. Bushkov, Head. Department of Geocryology of the Geological Faculty of Moscow State University. M.V. Lomonosov. See. What permafrost law should be. <https://goarctic.ru/news/kakim-dolzhen-byt-zakon-o-vechnoy-merzlotte/>. To a specific field of science for its consolidation in the system of scientific specializations, education, vocational training and retraining of personnel. For reference: cipher and name of this scientific specialty in the WAC - 1.6.7. Engineering Geology, Frost and Primogenology.

Legally, the concepts of “permafrost”, “permafrost soil” and “degradation of permafrost” are extremely important for defining the category of “permafrost zone” associated with such definitions. As an analogue, elements of the regime of sanitary zones, zones of environmental emergency and environmental disaster can be used. The need to establish and maintain such a zone (with sub-zones) is determined on the basis of background monitoring of permafrost and forecasts of its condition.

The establishment of a special legal regulation of the permafrost zone will require the development of the following elements:

- The purposes of the establishment of such a zone (protection and adaptation), the principles of organization and criteria for the assignment of the territory (waters) to the “permafrost zone”, as well as its boundary.
- The content and limits of the legal regime, as well as its elements, as special environmental restrictions, prohibitions, as well as requirements for all actors, and above all natural resource users, to urban planning.
- Requirements and rules of environmental and technical safety.
- The competence of authorized state bodies.

The status of the “permafrost zone” itself forms the economic and legal basis for the organization of financial flows necessary for the accumulation of funds of states, international funds, other sources, as well as burden-sharing between the State and other actors to address socio-economic and environmental challenges.

In principle, permafrost zones would be primarily a tool for adaptation to adverse climate change. Adaptation, as we see, seems to be the most appropriate economic and legal solution to the problems that arise. The financing of activities in permafrost zones will directly correlate with the financial activities of the activities included in the National Plan for the Adaptation of each Arctic country to adverse climate impacts. Compensatory adaptation measures, in turn, can be complemented and linked with economic instruments, incentives and the involvement of such flexible mechanisms as public-private partnerships.

5. ON FORMS OF LEGAL REGULATION

The relevance of the issue of the degradation of permafrost in the context of climate change and environmental protection has forced all Arctic countries in recent years to intensify law-making, develop and implement special regulations. I am proceeding from the fact that, as a national, as well as international legislation in the field of permafrost conservation, there can be in mainly three forms.

The first is the extension of the general rules of environmental legislation to new relationships. In the Arctic countries are known for general environmental laws and regulations, high level of development, the principles and institutions of environmental law, environmental impact assessment such as background monitoring of protection

and management of permafrost, the rights to environmental information, state environmental control and other institutions, the general provisions of which extend to relations in area of degradation of permafrost. General rules are combined with systemic (or sporadic) greening of other non-environmental law.

The second form is the greening of other branches of legislation. It does so by incorporating point-by-point changes, as a package of amendments to different legislation or sporadically because of the multidimensional effects of the degradation of permafrost and the growth of new problems. Such a comprehensive legal regulation affects the branches of legislation: urban planning, civil, financial, insurance, maritime legislation, acts and norms of technical legislation, permeating stages and types of economic activities, as well as acts of international Arctic legislation, etc. This form of law-making, as the main green direction, is also evident in the development of permafrost legislation in all Arctic countries, as we noted above.

On an alternative form. In the future, a specific framework law on permafrost could be adopted at the national level and/or a model act at the international level. As noted above, to date, no Arctic countries have a special comprehensive act on permafrost to regulate relations in this area, nor do we yet know about the preparation of a special basic law until 2022. According to National Plans and the Arctic Council: Arctic activities are not governed by a single legal instrument or governing body. Rather, the Arctic is governed by a patchwork of domestic legislation, international regulations, and, most importantly, international cooperation among the Arctic States. Eight nations —Canada, Denmark (Greenland), Finland, Iceland, Norway, Russia, Sweden, and the United States— have territories in the Arctic, and the domestic laws of these nations govern actions taken within their territorial waters.²⁸

To sum up, the combined application of the two first forms of special legislation remain the defining trend. In particular, the general provisions of the environmental

²⁸ The following links provide information on national and international efforts to govern the Arctic and its resources in a time of change: United States. [United States Arctic Region Policy](#). National Security Presidential Directive and Homeland Security Presidential Directive. January 2009. U.S. federal agencies have also developed independent plans for Arctic involvement, such as the [U.S. Navy Arctic Roadmap](#). Canada. “[Statement on Canada’s Arctic Foreign Policy: Exercising Sovereignty and Promoting Canada’s Northern Strategy Abroad](#)”. “[Canada’s Northern Strategy: Our North, Our Heritage, Our Future](#).” Minister of Indian Affairs and Northern Development, 2009. Greenland (Denmark). [Kingdom of Denmark: Strategy for the Arctic 2011-2020](#). Finland. [Finland’s Strategy for the Arctic Region, July 2010](#). A scholarly assessment of the strategy is available [here](#), by Geopolitics in the High North. Iceland. [A Parliamentary Resolution on Iceland’s Arctic Policy](#). March 2011. Norway. [The Norwegian Government’s High North Strategy](#). Ministry of Foreign Affairs. 2006. [New Building Blocks in the North: The Next Step in the Government’s High North Strategy](#). Ministry of Foreign Affairs. 2009. Russia. [Strategia natsionalnoi bezopasnosti Rossiiskoi Federatsii do 2020 goda](#) (in Russian). An English analysis of the strategy is available [here](#), by Geopolitics in the High North. Sweden. [Sweden’s Strategy for the Arctic Region](#). Ministry for Foreign Affairs. 2011. Arctic Council Resources. Arctic governance is primarily executed through cooperative coalitions such as the Barents Euro-Arctic Council (BEAC) and the Arctic Council. The BEAC is a coalition for regional cooperation around the Barents Sea and includes Finland, Norway, Russia, and Sweden. The Arctic Council includes all eight Arctic States and is the main forum for Arctic cooperation <https://climate.law.columbia.edu/content/national-plans-and-Arctic-Council>

laws are combined with the introduction of point changes in acts of different industries, that is, the greening of other branches of law.

In the United States, for example, environmental legislation in general, as well as land, water, wildlife protection at the federal and state levels, extend to the protection of permafrost. The National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA) provide a comprehensive framework for environmental protection that indirectly contributes to the conservation of permafrost.²⁹

Canadian environmental legislation also covers the protection of permafrost, focusing particularly on Arctic regions. In particular, it is the Law “On Prevention of Pollution of Arctic Waters”.³⁰

Norway pays particular attention to the conservation of permafrost through its environmental laws and strict environmental policies. The Svalbard Environmental Protection Act and the Natural Diversity Act contain provisions aimed at protecting the permafrost ecosystems in the Spitsbergen archipelago.³¹

Denmark (Greenland), an autonomous territory within the Kingdom of Denmark, is developing its regulation to protect permafrost. Its Greenland Mineral Resources Act and Environmental Protection Act define the rules also applicable to land use and environmental protection in permafrost.³²

Iceland has environmental and land-use planning laws that indirectly contribute to the conservation of permafrost. The Environmental Impact Assessment Act and the Planning and Building Act play an important role in the regulation of development activities.³³

Sweden and Finland follow their legal approaches and requirements for permafrost conservation covering environmental protection, land-use planning and natural resource management.

As noted above, in the Russian Federation as a whole, there is also a similar development in permafrost regulation by greening legislation with point changes.

On international legal regulation of the protection of permafrost at the regional level. In addition to the legislative developments that have gained momentum with the adoption of the UNFCCC and the Paris Agreement of 2015, the Arctic region has a number of regional international agreements. They relate to the protection of the environment, which directly and indirectly contribute to the protection against

²⁹ Law on National Environmental Policy (NEPA) [link](<https://www.epa.gov/nepa>); Law on Endangered Species (ESA) [link](<https://www.fws.gov/s/lawsdigest/ct.html>).

³⁰ The Arctic Waters Pollution Prevention Act (AWPPA); Canadian Environmental Protection Act 1999 (S.C. 1999, pp. 33). a Also the Environmental Assessment Act» Canadian environmental assessment Act (S.C. 2012, C. 19, S. 52) <https://www.wipo.int/wipolex/ru/ru/text/271425>

³¹ Spitsbergen Environmental Protection Act [Link] (<https://www.regjeringen.no/en/dokumenter/svalbard-environmental-protectionact-/id419319/>); Natural Diversity Act [Reference]

³² Act on Greenland Mineral Resources [Link] (<https://www.lovgivning.gl/lov?rid=%7B11d30ea1-dc54-49f5-bf32-94d09cd86296%7D>).

³³ Law on Environmental Protection [Link] (<https://www.government.is/topics/planning-and-construction/environmental-impact-assessment-/> (<https://www.althingiis.lagas/nuna/1987125.html>)); Law on Planning and Construction

degradation of permafrost (but, as stressed earlier, mainly by limiting the sea areas, off land).

The agreements, declarations and recommendations of the Arctic Council deal primarily with permafrost in an ecosystem context within the framework of the concept of sustainable development and, consequently, with environmental legislation in the Arctic.³⁴ In general, the Arctic countries are trying to develop their legal policies in coordination and through the international structures of the Arctic Council, such as the Nordic Council of Ministers and others.

The “soft” law can be considered as a serious help in the legislation of the Arctic countries. This is the process of developing rules that are referred to as “soft law” and therefore do not fall under the definition of an international legal norm. However, without such rules, it would not have been possible to regulate international relations fully. In particular, these resolutions and recommendations of international organizations, as well as model laws. Let me say that the development by the Arctic countries of a draft model code on the degradation of permafrost could be an effective stimulus to the development of legislation, focus efforts on solving priority tasks, and become an example of effective regional cooperation in the Arctic. In the future, the coordinating role of the Model Code in the formation and consolidation of special principles, best practices in the field of environmental protection and management, adaptation and environmental safety may not be excluded. Historically, this path may well be comparable to the experience of developing the draft Polar Code, its adoption and operation.³⁵

6. ON THE PROBLEMS OF APPLICATION AND APPLICABILITY OF CURRENT LAW BRANCHES TO NEW RELATIONS

Adaptation to negative climate change is taking on more scope and challenges than could have been imagined. Not surprisingly that it is now necessary to adapt some legal principles and some provisions of the above-mentioned branches of law. In addition, there is at least a discussion of the applicability, in principle, of traditional approaches to legal regulation to the specific relationship of permafrost. Let us highlight some of the gaps that we believe raise questions and require special attention.

6.1. Problems of land law enforcement

This area also needs to be adapted and supplemented, based on new legal approaches. In large areas of northern latitude, permafrost is the spatial basis of the land located on

³⁴ Arctic Council agreements (<https://arctic-council.org/explore/work/cooperation/>)

³⁵ Polar Code (assessments and comments in foreign legal sources), compiled by Vylegzhanin A.N., Ivanov G.G., Dudykina I.P.
<https://typeset.io/pdf/poliarnyi-kodeks-otsenki-i-kommentarii-v-zarubezhnykh-wd1qhub8lu.pdf>

it, as well as located on plots of immovable, movable property and other objects, including transport and other infrastructure.

Let's try to put together the following legal puzzle regarding the situation of big scale degradation of permafrost. For example, there is an actual change and destruction of the very spatial basis of the land surface and everything on it. At the same time, geodetic parameters of the land plot can be kept. In its previous form, it is no longer possible to restore the damaged ecological condition of natural objects or land with its qualitative characteristics. That is, we get a completely special, but unfortunately, increasingly common case, destroying the presumption of the inviolability of the indestructible earth as the spatial basis.

At first glance, the need to formalize the fact seems obvious. The recognition of fact as legal, therefore, gives rise to certain legal consequences of these objective processes. First, the recognition of victims and protection of their interests are possible. In addition to safeguarding the significant public, socio-economic, environmental and private property, and other rights³⁶ of landowners. Second, it defines the status of real property as lost or as objects of past accumulated harm located in area of degraded permafrost. However, there is still no such ground for extinguishing land rights in the event of the destruction of land as a result of the degradation of permafrost.

I reviewed the relevant regulation in Russia, and I was not able to find a comparable norm in the legislation of other Arctic states. The task seems to be extremely complex, with no simple solution in principle.³⁷ It will be necessary to develop new theoretical approaches and make corresponding changes in special legislation (ecological, land, urban planning, continental shelf, budgetary).

According to Christian von Bar (2018), a professor at the Institute for European Legal Studies of the University of Osnabrück (Germany):

The concepts of land and private ownership of land are interrelated, each depending on the other. Land is the result of a doctrine based on legal imagination; in this sense it is an ideal (not a real) construct. It is common to use inaccurate characterization of a land parcel as a real estate to describe its suitability. This is not true: a claim is the object of a right in rem not because it is immobile, but because the right creates for it a regime of objectivity. Land is therefore a normative thing.

The value of this understanding of land is to understand what the legal order requires in terms of land and what is the area covered by the parcel.³⁸ If mechanically

³⁶ Rights holders may have non-property rights in different legal systems.

³⁷ New economic and legal approaches to such challenges are needed. I believe that, at a minimum, it is possible to start by recognizing the equality of property rights of victims, regardless of whether the land is located on permafrost or on other spatial grounds.)

³⁸ Christian von Bar. What do you need the concept of land (GRUNDSTÜCK) and what is it? On the difficulties of establishing the content of the concept of «Thing» in European property law» The article was first published in the journal: *Juridica International*. 2014. Vol. 22. P. 3-15

to equalize the concepts of real estate and land after a large part of lawyers, we will arrive at their equivalence. However, according to von Bar, every land parcel is a real estate, but not all real estate is a land parcel, while the common law enjoys only one concept - land. Thus, many lawyers classify objects according to a criterion that relates to property, at best to its secondary attributes; in other words, they deal with the secondary issue before the primary. The first question, which is one of the main: *what exactly is the subject of the exclusive right to own land?* Using the expression “immovable thing”, “land”, legislators do not indicate that it is the object of possession, opposed to third parties. Surprisingly, a common term for the European tradition that would solve this problem has not yet been proposed. ... The existence of a general concept of “real estate” (not generalization of the term “land plot”), which is currently used in most legal systems, it is connected with certain problems, The Committee notes that the State party has taken steps to ensure that the State party complies with its obligations under the Convention. Moreover, it is necessary to distinguish not just things movable and immovable as things registered and things unrecorded (as does the Netherlands HC in art. 3:10). It is also important that the proposed legal system allows the “legal” removal of an object (which in principle is capable of being an object of proprietary rights) from the surface of the ground. ... “Real estate” itself is not a thing, it becomes so only when on its basis there is a land plot...». ³⁹ That is, in other words, if the land is physically destroyed, it is then destroyed legally and real estate.

Further, we share the position of the distinguished professor that the formation of the land plot features of the relief of the earth’s surface, as a rule, do not influence.

The surface of the ground is absolutely irrelevant for the land, including the surface, to be the object of proprietary rights... It should be borne in mind that the nature of the surface of the sites is relevant here only to public law, not to private law. Only land covered by water requires more analysis. Here the character of the waters will matter —they are current or they are static; in these cases the land will fall under different regimes— public law or private law». ⁴⁰

But professor von Bar does not continue this logic of the problem: what is the impact of the dramatic change in the topography and landscape on the end of the existence of the land and on the object of the law? As it is evident, even an in-depth examination of the phenomenon of creation and recognition, transformation of the land plot of the object into a real estate object leaves the legal aspect of the loss of land.

The limits and content of the ownership right are directly related to the state of the property itself. Land and other real estate objects located on it form a single whole with the landscape on which they are located. The thawing of permafrost causes radical changes in the landscape ecosystem, potentially altering its qualitative and quantitative characteristics and, consequently, the functional boundaries of the land. Such a change entails total or partial ecological and economic unsuitability and even

³⁹ See. Christian von Bar. P.-22.

⁴⁰ See also Christian von Bar. P. 21.

loss of the facility itself. On the legal side, the modification or loss of functional characteristics of such an object entails a number of legal consequences, including unpredictable ones. Civil law science has not yet responded to this challenge, we will analyze this problem in more detail below. Legal issues arise regarding ownership of infrastructure built on public or private land, as well as liability for damage caused by the destruction of infrastructure caused by permafrost.

As a result, various conflicts and litigation between landowners over where the boundaries of their property rights lie, as well as disputes and torts in defense of the rights of infrastructure owners, are gaining ground. The courts have an additional burden of resolving new categories of land and other property disputes and torts. However, in such a case, on closer examination, a legal impediment to the qualification as a land offence, as well as for the application of the tort design, there will be the absence of the figure of the perpetrator of the harm and the offender. In the absence of such an element of an offence, the application of legal liability as a form of protection of the environmental and property rights of private and public rights holders and injured entities would not be possible.

Alternatively, within an adaptation system, compensation (such as compensation for nuclear damage) seems a more appropriate solution. At the initial stage, its main elements could be regulated in public law. The urgency of implementing appropriate compensatory mechanisms increases with the risk of damage to buildings and various infrastructure.

6.2. Problems of application of civil legislation, the problem of termination of ownership and legal consequences

In the civil law aspect, this problem is not reflected in the termination of the right of ownership to the deformed or deceased (ceased to exist) land as a real estate object. Neither reflected in legislation nor studied in the scientific literature. Also, in principle, there is no definition of the legal consequences for aggrieved rights holders in the event of the death of a real property object in the event of a significant change in the landscape but also, especially as a result of the degradation of permafrost. According to the generally accepted approach in civil law, ownership rights cease when property is lost or destroyed (for example, in the Civil Code of the Russian Federation it is Art. 235 and Art. 44 ZK of the Russian Federation). However, apart from this general rule, I have not found a special rule in the civil legislation of the Arctic countries on the consequences for the title of the property in the event of the disappearance of the land as a natural object. Similarly, there is no special rule in the legislation defining the grounds for state registration of termination of rights in immovable property and encumbrances of immovable property in connection with the loss or destruction of

land. There is only a general provision on the destruction of buildings⁴¹ as a basis for the termination of cadaster and, accordingly, the state registration of ownership.

At the same time, more research is needed: if the land has lost its useful properties, but has kept its geodetic coordinates, can such a real estate object be considered as dead? The answer to this question will determine whether the general rules on loss of property can be applied or whether new regulations (special rules) can be introduced on the same basis.

Termination of the right to property takes place only on the grounds provided by law, if the relevant ground as a legal fact is recognized as such by law. But is there a proper ground for terminating ownership of a plot of land that has been lost and lost as a result of an emergency situation involving the thawing of permafrost? Supposedly, right?.

The legislation on “emergency situations” in the Arctic countries covers only incidents caused by the thawing of the permafrost as a basis for applying appropriate state response measures. The legal consequences of an emergency incident on the status of ownership of real estate are regulated outside this legal institution, namely civil, land and other legislation. Such property relationships are not regulated in the context of disaster management. There is also no legal algorithm for action, either for victims or other actors or for public authorities, which is also problematic.

It is also problematic to attribute the climatic phenomenon of the degradation of permafrost to surprise factor. As predicted by background monitoring data, predicted and modelled by a regular manifestation, the intense melting of the permafrost is itself a climatic phenomenon, due to natural anthropogenic reasons. It would therefore be legally debatable to attribute this phenomenon to the sudden, unforeseen emergency. Accordingly, there is a need to develop alternative economic and legal approaches to address the above-mentioned problems, which have not yet been specifically regulated.

However, to attribute to the circumstances the irresistible force of degradation of permafrost is, I believe, technically acceptable, albeit with some caveats. Legal definition of “irresistible force” extremely broad, which makes it possible to abuse the notion of force majeure and subject it to virtually any impediment to the performance of an obligation or to the prevention of extra-contractual harm to an individual.⁴² Emergencies are most often recognized as insurmountable force and even automatically qualified as insurmountable force. But not every emergency can be considered an insurmountable force. It is necessary to have all signs of irresistible force: extreme and unpredictable under these conditions. Only an emergency, it provided that there is no aversion, is the most complete sign of irresistible force. The

⁴¹ For example, in Russia this is article 23 of the Federal Law “On State Registration of Real Estate” from 13.07.2015 N 218-F.

⁴² In accordance with Art. 202, 401 of the Civil Code of the Russian Federation (hereinafter referred to as the Civil Code of the Russian Federation) [2] irresistible force - an extraordinary and unforeseeable circumstance under these conditions, interrupting the course of the limitation period, as well as exempting entrepreneurs from liability, responsible for the breach of obligation regardless of fault.

most successful is the determination of irresistible force through emergencies of natural, anthropogenic and social nature, the consequences of which are exceptional in their power of manifestation and are not preventable under these conditions of activity of the debtor. Are the situations considered comparable to the case of the death or damage of a coastal land parcel as an object of property right, which is destroyed by water erosion, alteration of the river bed, earthquake, landslide, collapse into a karst void, etc.? Under civil law, the ground for the termination of ownership by force majeure is recognized in situations of destruction of such immovable property as land.⁴³

In such circumstances of force majeure (force majeure), the general rule is that floods, fires, earthquakes and other natural disasters, or any other circumstance that the affected party may not actually affect. We can easily agree with such legal characterization as attributing the destructive effects of the degradation of permafrost on a particular facility to force majeure.

In addition, however, there is the problem of quantifying the damage. The magnitude of the impact is so great that it implies comprehensive ad hoc mechanisms for calculating the socio-economic and environmental consequences of force majeure, other than those traditionally applied.

On the allocation of loss. I also see such a problem of a global nature, which have not yet been answered. First, how should the duty to compensate be apportioned, and which public or public legal entity should bear its burden? On the State as a whole, if so, in which bodies? Is participation by an international actor possible, including special funds? Insurance schemes are, in principle, limited, as explained below.

Secondly. Recall some specific characteristics of environmental harm such as: a). latent nature of the manifestation of negative effects, b). remoteness in time of occurrence of negative consequences, c). the complexity or impossibility of calculation of harm, and d). difficulty or impossibility of reparation in kind and others.

As noted above, the extra Arctic regions of the planet are sensitive to rising sea levels. Countries bordering the seas with coastal infrastructure are experiencing the effects of rising world water levels.⁴⁴ What are the economic and legal consequences of the loss of islands, coastal land and their infrastructure, a climate migration, even loss of island states due to flooding directly linked, inter alia, to the thawing of permafrost? Climate claims and litigation in similar cases are also increasing in number and variety.

Of course, there is a need to build on the analysis of best practices and an assessment of the effectiveness of approaches in such countries. The search should seek to identify all possible viable mechanisms. There was a need for a systematic analysis of the legal responsibilities and economic instruments that might be involved in the situation under consideration. However, going forward, administrative and

⁴³ A.I. Frolov Emergency and irresistible force: relationship of concept
<https://cyberleninka.ru/article/n/chrezvychaynaya-situatsiya-inepreodolimaya-sila-oshtneiponyatiy>

⁴⁴ Changes in the Arctic: Background and Issues for Congress Updated March 19, 2024

financial support measures for adaptation to the problems caused by the thawing of the permafrost seem to be the most relevant instruments in comparison with traditional ones.

In principle, the possibilities of property insurance, the use of the environmental tort design and other traditional legal means remain, although are very limited.

In regards to the applicability of insurance. Let us agree that insurance coverage of losses is problematic. This risk-sharing tool is becoming more expensive and difficult to obtain insurance for losses in regions affected by permafrost melting. In addition, it should be borne in mind that insurance itself imposes additional financial burdens on the insured person. The degradation of permafrost is seen as a major factor in reducing property values and has other economic consequences for rights holders, including landowners and local authorities.

Traditional property and civil liability insurance in its current configuration, taking into account the specific nature of the thawing risks of permafrost, may not be available in principle. Adequate insurance mechanisms for losses arising from the degradation of permafrost have not yet been developed. Even for large international insurance corporations, taking such risks would be uneconomical. Therefore, the role of insurance as an institution, including the potential of insurance funds, should not be overestimated. The scale of the economic impact of the degradation of permafrost should be taken into account, which is not comparable to traditional insurance cases.

It is important to note that the scope of insurance is clearly limited in law. Insurance is only aimed at *unintentional event risks* that meet the criteria of surprise and unpredictability. But to what extent do the circumstances of losses arising from the degradation of permafrost meet such criteria? The answer to the question is rather, negative. Today, forecasting is based on background monitoring and modelling data. Of course, the special circumstances that have been legally assessed must be taken into account in each case.

6.3. Problems of application of legislation on subsoil

Identification of permafrost as a geological *object is absent*. Data on the state of such an object are available as part of geological information. The activity, logically, requires funding, which in turn cannot be allocated.

On the other hand, soils and vegetation together as an ecosystem have a decisive influence on permafrost and active (seasonal thawing) layers.⁴⁵ Ecosystem baseline monitoring data, identifies the need for urgent action when various threats to and from both subsoil use and the environment are identified in relation to the degradation of permafrost.

Although mining or subsoil laws in Arctic countries may not explicitly regulate protection against the degradation of permafrost, environmental considerations are

⁴⁵ A.V. Brushkov. See *ibid*.

often included in regulatory frameworks, to minimize adverse impacts on permafrost ecosystems and related infrastructure. In addition, Governments may adopt additional guidelines and best practices for permafrost mining. Approaches vary from one Arctic country to another, but general environmental requirements for the protection of permafrost are included in mining legislation or subsoil laws. So reflected in the legislation: environmental impact assessment, the mechanism for obtaining permits for subsoil use, as well as special environmental requirements. Here are some examples:

Canada has extensive mining activities in its northern regions where permafrost predominates and regulates these activities through federal and provincial laws, such as the Canadian Environmental Impact Assessment Act and provincial mining laws. While these laws primarily focus on environmental impact assessment and permitting processes, they may include requirements related to the protection of permafrost, such as recommendations for land restoration and infrastructure design, permafrost-friendly.

Norway's mining activities are concentrated in its northern regions, where permafrost is present. The Minerals Act and related regulations are in force. While legislation may not specifically mention the protection of permafrost, environmental impact assessments and permit requirements are aimed at mitigating adverse environmental impacts, including on permafrost-sensitive areas.

USA (Alaska), as an Arctic state within the United States, carries out mining activities in regions affected by permafrost. Mining operations in Alaska are governed by federal and government regulations, including the Alaska Open Coal Mining Control and Recovery Act and the Alaska Mining Act. These laws focus on environmental protection and land reclamation requirements that can indirectly address the degradation of permafrost through measures to minimize soil disturbance and facilitate ecosystem restoration.

Russia carries out significant mining operations in its Arctic regions, where the degradation of permafrost poses challenges to infrastructure stability and environmental protection. Environmental impact assessment, State environmental expertise and environmental mitigation requirements are usually mandatory for mining projects, which may include environmental considerations in the context of the conservation and management of permafrost.

But at present, permafrost soils cannot be regulated by mining law because they are not mineral, underground water resources, an underground cavity or geological structure. In addition, permafrost does not fall under the definition of "subsoil" either,⁴⁶

⁴⁶ Based on the legal definition provided for in article. 1 The Federal Law "On Subsurface": there is a part of the Earth's crust located below the soil layer, and in its absence - below the surface of the Earth and the bottom of water bodies and watercourses, extending to depths available for geological study and development.

manifesting as permafrost rocks, or as a mixture of soils or as a subsurface (necessarily with ice remaining frozen for two or more years).⁴⁷

In principle, Russian mining legislation, including the Subsoil Law, does not mention the degradation of permafrost. This appears to be a gap, although there is a need to take this into account and appropriate specific regulation. It is especially necessary to fix imperatives in the form of mandatory requirements to the subsoil user, included in the license for the right to use the subsoil section in the conditions of permafrost and oriented to the best international practice, on the introduction of a system of measures for the management of environmental safety risks, etc.

A new and remarkable aspect is emerging. Resource extraction under the conditions of permafrost thawing may open previously inaccessible areas for resource extraction, such as mining and drilling. It is evident that in the interest of protecting permafrost from degradation, continuation of subsurface use in accordance with previous requirements will not be possible. And therefore such examples cannot be perceived positively. For example, the Department of the Interior's Bureau of Land Management does not agree that the proposed development is inconsistent with maintaining a livable planet (i.e., there is not a climate crisis). The planet was much warmer within the past 1,000 years, prior to the Little Ice Age, based on extensive archaeological evidence (such as farming in Greenland and vineyards in England). This warmth did not make the planet unlivable; rather, it was a time when societies prospered.⁴⁸

The existence of specific legal requirements on access to subsurface resources under permafrost conditions would allow the management of competing interests and the resolution of environmental and property disputes related to the exploitation of resources. It will also provide a solution to changing the boundaries of subsoil rights and land use rights, as well as the limits and distribution of legal liability for environmental risks, dispute resolution and rights protection mechanisms, as described above.

And in conclusion, there is another problem. The owner of a land plot in certain countries can be the owner of its subsoil. Changes in mining law in such countries will be required to take into account the specifics of a number of Arctic countries where such a legal framework is enshrined by law. If in the subsoil there are serious minerals, then the owners can oppose the termination of their ownership of the site in connection with its "death" due to the melting of the permafrost, as well as demand

⁴⁷ The subsurface is usually under an "active layer" of soil that freezes and thaws every year. In the opinion of geocryologists, these horizons, in turn, do not themselves belong to the sphere of subsoil use, the science of geology is not studied, therefore the inclusion of these objects in the formal definition of the subsoil would expand unreasonably subject to regulation by mountain law.

⁴⁸ On August 17, 2020, the Bureau of Land Management (BLM) issued the [Coastal Plain Oil and Gas Leasing Program Record of Decision](https://www.blm.gov/press-releases/2020/08/17/blm-issues-coastal-plain-oil-and-gas-leasing-program-record-of-decision), allowing oil and gas drilling in over 1.5 million acres in Alaska's Arctic National Wildlife Refuge. The action reverses decades-long protections for the largest national wildlife refuge in the country <https://climate.law.columbia.edu/content/blm-greenlights-drilling-arctic-national-wildlife-refuge>. But before <https://climate.law.columbia.edu/content/interior-department-arctic-drilling-study-concludes-there-not-climate-crisis>

compensation, since the main value of such a land plot is its underground resources, that is, subsoil.

In summary, I note that in the relationship under consideration, the main burden of damages and compensation is shifted from the private law level of regulation to the public law level. Adaptation mechanisms to adverse climate change, both national and international, are the first to be used. In addition, legal intervention by the State will be required to redefine land use boundaries, create compensatory instruments, sources and directions of financial flows and others. Moreover, the formation of new public-legal instruments should be guided by a specific purpose, based on the principles of early detection of degradation of permafrost, modelling, forecasting and prevention, and categorization of priorities and objects of adaptation projects.

6.4. Legislation on adaptation to adverse climate change is a relatively new area of environmental legislation governing relations in area of permafrost degradation

With the signing of the Paris Agreement in 2015, this legislation is being actively developed in accordance with the National Plans for Adaptation to negative climate change adopted in many countries. This process goes hand in hand and in hand with the regulation of CO₂ reduction. We emphasize that the dual nature of climate protection consists of both decarbonization and adaptation measures to negative climate change, including the degradation of permafrost. The Parties to the Paris Agreement have agreed on a format for establishing organizational, legal and financial adaptation measures at the level of the National Plan as a normative legal act adopted at the level of the Governments of the participating countries.

Key adaptation measures of the Arctic countries focus on adaptation of ecological systems to climate change, conservation of biodiversity, maintenance of ecosystem functions, increase of resistance to environmental stresses, Include measures for habitat restoration, conservation planning and permafrost monitoring programs. Settlements and civilian infrastructure in permafrost regions face the same problems of soil instability, damage to infrastructure and increased risk of natural disasters such as floods and landslides. Adaptation measures include improved building design, maintenance of infrastructure and land-use planning. Industrial infrastructure and mining in permafrost regions require specialized infrastructure and pose unique challenges due to climate change.

For example, in Russia, in addition to the federal level, adaptation legislation is being developed at both the sectoral and regional levels. In the context of the degradation of permafrost, there are plans to adapt to climate change in selected areas of environmental management and in selected ecologically significant areas, for example, the Environmental Adaptation Plan. The Climate Adaptation Plan of the Arctic Zone of the Russian Federation contains very disturbing findings on the impact of these

climatic factors on the Arctic region of the Russian Federation. Thus, at present about 40 per cent of buildings and engineering structures in the field of perennial cryolithicosone are deformed. Degradation of permafrost is estimated to account for 23 % of technical system failures and 29 % of hydrocarbon production losses. Among the main negative effects of climate change in the Arctic, the Plan includes the reduction of the bearing capacity of frozen bases and damage to infrastructure, the intensification of dangerous natural processes, Examples of the sectoral level of adaptation management also include relevant sectoral plans for adaptation to climate change in different sectors of the economy, where also noted, that the degradation of permafrost and the strengthening of geocryological processes will cause deformation of water networks, increase the risk of an increase in the number of accidents. Soil features do not allow the use of conventional technologies, road construction standards for other climates are completely unsuitable for permafrost. Permanent monitoring of the state of the road surface is required, as 69 % of regional transport is motor transport.

In general, adaptation to the effects of the degradation of permafrost is a major challenge to international cooperation to find new, effective and equitable solutions. International cooperation is crucial in addressing climate change in the Arctic regions. Agreements such as the Paris Agreement and the Arctic Council Declarations facilitate cooperation on climate change adaptation, environmental protection and sustainable development.

7. IN CONCLUDING

According to the study, there are different socio-economic and legal implications for highly sensitive ecosystems, human settlements, industry, and transport infrastructure in Arctic countries, which have permafrost covering their land. The work demonstrates that it is already in high demand:

- The establishing a new legal areas regulation and adapting existing legal institutions, particularly at the national level, are necessary.
- The acknowledging the degradation of permafrost as an independent legal entity and the need to establish a specific legal conceptual framework.
- A variety of specialized and modified legal institutions and economic and legal instruments are asserted to be effective in mitigating the consequences of permafrost degradation.

The thawing of permafrost in regions such as the Arctic is already having consequences for the whole of humanity and the biosphere that need to be addressed by both national and international legal means. The thawing of permafrost in regions such as the Arctic is already having consequences for the whole of humanity and the biosphere that need to be addressed by both national and international legal means. To account for this changing dynamic, it is necessary to update existing international

agreements and treaties, as well as adopt new special agreements. The need for a soft law recommendation on the problems of degradation of permafrost, such as a model act (code), is already evident. Such an act may be taken as a follow-up to the provisions of the UNFCCC Convention and other international agreements. Its provisions will have an impact on international law itself over time, including the incorporation of certain provisions and recommendations into relevant national legislation for sustainable development and environmental protection.

To address the legal gaps created by the degradation of permafrost and its related in-depth research, a multidisciplinary expert discussion is required, as well as a revisit and clarification of specific legal principles and institutions.

8. REFERENCES

- Bar, C. von (2018). Why do we need Grundstücke (land units), and what are they?. On the difficulties of divining a European concept of 'thing' in property law. *2018: Law and society – Contributions by the Honorary Doctors - Rätt och samhälle - Bidrag från hedersdoktorerna*. <https://doi.org/10.33063/dl.vi.482>
- Congressional Research Service (2024, March 19). *Changes in the Arctic: Background and Issues for Congress*. <https://sgp.fas.org/crs/misc/R41153.pdf>
- Di Qi, L.C., et al. (2017). Increase in acidifying water in the western Arctic Ocean. *Nature Climate Change*, 7: 195-199. <https://www.nature.com/articles/nclimate3228>
- IPCC. Special Report on the Ocean and Cryosphere in a Changing Climate. <https://www.ipcc.ch/srocc/>
- C. Summerhayes, J. Zalasiewicz, D. Vidas and M. Williams, 'Polar Regions in the Anthropocene', Chapter 2 in: K. Scott and D. VanderZwaag (eds), *Handbook On Polar Law 2020* (Edward Elgar, 39-pp).
- UN Climate Action. *IPCC Report on Impacts, Adaptation and Vulnerability: Key Takeaways*. <https://www.un.org/en/climatechange/ipcc-wgii-report>
- The International Code for Ships Operating in Polar Waters (Polar Code) Resolution Mepc.264 (68) was adopted on 15 May 2015. [https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.264\(68\).pdf](https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.264(68).pdf)

Thoman, R. L., J. Richter-Menge, and M. L. Druckenmiller (2020). *Arctic Report Card 2020*.

<https://www.nps.gov/articles/arcticreportcard2020.htm#:~:text=Read%20more-,Highlights,are%20ice%2Dfree%20in%20August>

Tsiouvalas, A. & Enyew, E.L. (2023, 4 January). *The Legal Implications of the 2022 Canada-Denmark/Greenland Agreement on Hans Island (Tartupaluk) for the Inuit Peoples of Greenland and Nunavut*. The Arctic Institute.

<https://www.thearcticinstitute.org/legal-implications-2022-canada-denmark-greenland-agreement-hans-island-tartupaluk-inuit-peoples-greenland-nunavut/>