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ARCTIC STATES' POLICY ON CLIMATE CHANGE ADAPTATION: EXAMPLES OF NATIONAL ADAPTATION PLANS**

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The article touches upon the issues of the implementation of international standards in national climate strategies on the example of the Arctic states. The analysis showed that each Arctic country has its own specifics in adaptation activities, and key guidelines in the field of public administration can be identified for each jurisdiction: from expanding scientific research in the field of adaptation, to special issues related to arctic ecosystems, urban infrastructure and communities. Experience of different states gives multiple ideas on tools which can be used by domestic legislator and law enforcers. Thus, the subject of the study is the arctic states' policies presented by national strategies, concepts and plans on climate change adaptation.

The purpose of the article is the analysis of the current national climate change adaptation strategies, concepts and plans implemented by state authorities on national and regional (local) levels.

The methodological basis. Particular attention was paid to the formal legal method, which was used by the authors of the study to analyze national legal "framework" on climate change adaptation, especially in rural areas, human security, nutrition and the protection of the most fragile elements of the social system.

The key results and conclusions. Each of the Arctic countries has its own specifics in the field of response to climate change, which is reflected in the adaptation activities and key guidelines of each state:

– Finland: activating civil society institutions to manage adaptation risks;
– Norway: humanitarian mission to developing countries in order to expand the "market" of potential customers for services in a variety of areas of adaptation;
– Sweden: expanding cooperation between the Government and municipalities on the technological safety of urban infrastructure to combat natural disasters;
– Denmark: expanding research into adaptation, safety issues associated with increased rainfall and flooding;
– Iceland: expanding scientific research to provide high-quality forecasts for the implementation of operational adaptation activities;
– USA: strengthening the coordination function of federal government bodies aimed at interaction with various stakeholders;
Canada: full implementation of the Paris Agreement on "net-zero emissions" by 2050.

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1. Introduction

Climate change is a global challenge for all countries in the world, as it affects not only ecosystems and the environment but also economic interests (the natural resource potential of the Arctic, significant for both Arctic and non-Arctic states [1]) and social processes (reindeer herding in Arctic and European countries [2] [3] [4], as well as technological means and processes ("techno-fix" adaptation, for example, in Svalbard) [5], the functioning of port facilities under rising sea levels [6], "Arctic business" [7] [1].

This article is dedicated to the experience of implementing international standards into national climate strategies, using Arctic states as an example. The Arctic focus is not accidental, as the Arctic is experiencing quite severe climate changes: from the disappearance of sea ice, increasing precipitation, and freshwater discharge to changes in underwater lighting and increased ocean acidification [8] [9]. At the same time, there is still a lack of a comprehensive organizational structure necessary for adapting to climate change, which summarizes international and national experience, knowledge of indigenous peoples, and institutional tools based on an "ecosystem approach" [10].

2. Research Results. Overview of National Adaptation Plans of Foreign Arctic Countries

2.1. National Adaptation Strategy of Finland

Finland has adopted both a National Strategy for Adaptation to Climate Change (2005)[1] and national and sectoral adaptation plans[2]. Currently, 12 main adaptation activities are being carried out in Finland to achieve the goals set by the Government and the main objective – the ability of Finnish society to manage climate change-related risks and adapt to them. These activities include:

1) conducting research on climate change resilience at the national level;

2) developing and implementing action plans for specific administrative structures considering the international consequences of climate change;

3) promoting regional and local adaptation research;

4) international cooperation in the field of adaptation;

5) integrating adaptation policy into EU policy and international regional cooperation projects;

6) improving assessment and management of climate risks;

7) developing tools applicable to managing financial risks caused by climate change;

8) enhancing research outcomes in the field of adaptation;

9) developing business opportunities related to adaptation;

10) developing regional adaptation tools;

11) improving communication in the field of adaptation;

12) developing educational policy and training programs on adaptation.

The 2022 adaptation plan is of particular interest: it is equipped with visual infographics and so-called "fact boxes", which contain the most important ideas in a concise form. For example, it describes the expected warming of the climate in the Arctic and explains why Saami

[1] Finland's National Strategy for Adaptation to Climate Change. The European Climate Adaptation Platform Climate-ADAPT. URL: http://urn.fi/URN:ISBN:952-453-231-X

[2] Finland's National Climate Change Adaptation Plan 2022. URL: https://climate-laws.org/document/national-climate-change-adaptation-plan-2022_a084

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reindeer herding is under threat. It is noted that Finland has adopted the “Regional Climate Strategy for Lapland until 2030” and the “Arctic Region Strategy" of 2013, which defines the directions for the development of education and international cooperation. According to the Adaptation Plan, “ecosystem services” are being developed in cities, which include air purification, water filtration and purification, “detoxification of urban pollutants”, “carbon dioxide fixation”, flood risk reduction measures, and other harm related to stormwater runoff and snowmelt.

Certainly, the municipal level of adaptation measures cannot be overlooked. Experts have analyzed climate risk management in Finnish municipalities, including assessing key sources of information and major obstacles to working with climate risks. The results show that municipalities generally implement climate risk management tools slowly, which is related to the lack of sufficient informational support and "inter-municipal bureaucracy" [11].

A vivid example confirming the lack of sufficient informational support and the necessary competencies of public authority representatives is the regions of Uusimaa and Pirkanmaa [12].

2.2. National Adaptation Plans in Norway

Currently, there is no national climate adaptation plan in Norway; however, an official government report on the climate change situation in Norway was adopted back in 2013[3]. The Norwegian Government adopted a report titled “Climate, Hunger, and Vulnerability. Climate Change Adaptation Strategy, Disaster Risk Reduction, and Assistance to the Hungry”[4]. This comprehensive document contains the following key ideas:

1) The Norwegian government defines adaptation to climate change as understanding the consequences of climate change and taking measures aimed at both preventing or reducing risks and utilizing opportunities arising from climate changes;

2) The UN document “2030 Agenda for Sustainable Development” is the main guideline for the state;

3) Norway recognizes the value of the Paris Agreement of 2015;

4) Norway is an active participant in the Sendai Framework for Disaster Risk Reduction 2015–2030;

5) Plans are in place to strengthen the practical application of the UN Convention on Biological Diversity of 1992;

6) One of the most important tools for financing the 2030 Agenda is the Addis Ababa Action Agenda;

7) The service “yr.no” offers quality weather forecasts for over 10 million locations worldwide;

8) The state is building a cooperation strategy with developing countries, including African countries;

9) The ocean is declared the most important tool for maintaining ecosystem balance;

10) Norway is one of the main partners of African countries in the energy sector;

11) The widespread use of predictive financing is being implemented;

12) Active participation in UN

[3] Climate change adaptation in Norway – Meld. St. 33 (2012–2013). Report to the Storting (white paper). Norwegian Government. URL: https://www.regjeringen.no/en/dokumenter/meld.-st.-33-20122013/id725930/

[4] Klima, sult og sårbarhet. Strategi for klimatilpasning, forebygging av klimarelaterte katastrofer og sultbekjempelse. Norwegian Government. URL: https://www.regjeringen.no/globalassets/departementene/ud/dokumenter/planer/strategi_klimatilpasning_ny.pdf

humanitarian projects to address the consequences of natural disasters, particularly in Myanmar, Bangladesh, and others, is planned;

13) In agriculture, there is a focus on the full-scale use of digital alert systems that accumulate data on weather, pests, fungi, and viruses that can damage agricultural crops.

Municipalities in Norway are largely autonomous and bear almost full responsibility for developing "climate policy" and planning in their territories. Thus, municipalities adapt national policy considering local physical-geographical, organizational, and financial features. However, these local interpretations are not always fully supported by national government entities. It can be concluded that Norway applies an "adaptive model" (also known as "adaptive co-management"), which is typical for countries of "Scandinavian socialism" [13].

The development of a fundamentally new climate adaptation program based on Norwegian experience, for example, reflected in the Norwegian Law "On Planning and Building", which includes a unified legal framework for all regions, standards, certification schemes, and design guidelines, is possible. It is evident that Norway can actively influence the international climate agenda through the creation of so-called "framework laws" [14].

2.3. Features of Sweden's Adaptation Strategy

In 2018, the Government of Sweden presented the National Climate Adaptation Strategy[5], which is implemented by specialized agencies (more than 32). The strategy is quite a comprehensive document, so it is advisable to note its main directions:

1) amending legislation, particularly the "Planning and Building Act", to enhance municipalities' readiness for climate change;

2) delegating tasks for assessing risks from floods, landslides, and soil erosion to the municipal level;

3) delegating local self-government the authority to issue permits for land improvement activities that may reduce soil permeability;

4) transferring responsibility for property preservation to property owners;

5) defining the main directions of government work, including responding to landslides and erosion; floods; high temperatures related to risks for the health and well-being of people and animals; water shortages for the population, agriculture, and industry; biological and ecological effects affecting sustainable development; impacts on food production and trade; increasing numbers of pests, diseases, and invasive non-native species affecting people, animals, and plants;

6) the state's obligations to fulfill all conditions of the Paris Agreement, the 2030 Agenda, and the UN Sustainable Development Goals;

7) assessing government performance based on the following criteria: principles of sustainable development, cooperation, scientific basis, precautionary principle, integration of adaptation measures, flexibility, working with uncertainty and risk factors, time perspective, and transparency;

8) recognizing the need for a comprehensive analysis of society's vulnerability to climate change;

9) establishing limits of responsibility for all authorized authorities in the field of adaptation;

10) recognizing the need for effective coordination of government authorities' activities in the field of adaptation;

11) defining a five-year period for

[5] Nationell strategi för klimatanpassning. URL: https://www.regeringen.se/rattsliga-dokument/proposition/2018/03/prop.-201718163

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national adaptation policy;

12) educational programs on climate change, continuous and integrated into all key areas of society's life and activities;

13) developing specific measures to be taken in response to the increasing risk of landslides, floods, and soil erosion;

14) identifying special risk zones concerning landslides, floods, and erosion;

15) distributing responsibilities for flooding agricultural land.

Priority in legal regulation is given to the local level of government, which is why significant research is being conducted to organize "synergistic" interaction among all management entities, including national agencies operating within the climate agenda, as well as developing "spatial planning" to mitigate negative socio-economic consequences [15].

Thus, one of the latest studies assessed the level of organization in 13 Swedish municipalities in terms of problem setting, administrative and political influence, as well as specific measures and solutions, including the role of training for state and municipal officials in this area. The analysis showed that only a few municipalities have formed organizational structures for climate change adaptation and received significant political support [16].

2.4. Denmark's Climate Adaptation Strategy

Denmark has adopted a Climate Adaptation Plan (2012)[6] and a Strategy (2018)[7]. The strategy emphasizes "autonomous adaptation", where public authorities, businesses, and citizens respond to the consequences of climate change on their own initiative within legally established deadlines. A vivid example is the activities of Danish farmers [17]. The strategy includes the following measures for climate change adaptation:

1) targeted informational support;

2) a research strategy that provides for the creation of a coordinating body to ensure the climate agenda;

3) the establishment of an organizational structure, including coordinating bodies for adaptation, which will ensure coordinated efforts of the public and public authorities.

The strategy highlights sectors of the economy and social sphere where adaptation issues are particularly significant. It is important to note that the strategy particularly emphasizes the "intersectoral" principle of adaptation, which will be supported by relevant ministries.

2.5. Iceland's Adaptation Plans

Iceland's climate strategy "A Look at the Climate Crisis"[8] emerged in Iceland quite recently, in 2021, and represents a very concise document that outlines the main climate threats to the country, the main values of the state, and key tasks that are detailed for each of the threats.

Key tasks of Iceland's strategy include:

1) research, monitoring, oversight, and assessment of climate threats to provide relevant knowledge to society and its application by all interested parties;

2) access to fundamental scientific research in social and natural aspects and

[6] How to manage cloudburst and rain water. Action plan for a climate-proof Denmark. Klimatipasning.dk. URL: https://en.klimatilpasning.dk/media/590075/action_plan.pdf

[7] Danish strategy for adaptation to a changing climate. Klimatipasning.dk. URL: https://en.klimatilpasning.dk/media/5322/klimatilpasningsstrategi_uk_web.pdf

[8] Í ljósi loftslagsvár – Stefna um aðlögun að loftslagsbreytingum. URL: https://www.stjornarradid.is/library/02-Rit--skyrslur-og-skrar/I_ljosi_loftslagsvar.pdf

necessary analysis of various impact factors of climate change, opportunities, and risks;

3) utilizing existing opportunities to strengthen and coordinate actions in the field of climate change;

4) a comprehensive review of adaptation measures within a periodically updated adaptation plan;

5) providing various rights in the framework of adaptation for all participants in public relations;

6) coordinating all state plans within the adaptation agenda;

7) including the social consequences of climate change, including demographic indicators, resettlement schemes, employment opportunities, and food production, in state priorities and goals;

8) sufficient funding for specific adaptation measures;

9) reflecting the importance of adaptation measures in the regulatory framework;

10) dissemination and access to necessary information about adaptation.

The state places significant importance on the local level of governance, as it provides better opportunities for mitigating projected changes and preparing or adapting to them [18]. In Iceland, experts propose a new model of change management based on assessing the resilience of the current state of land ("RBC model"), which allows for consideration of various factors affecting the resilience of ecosystems to anthropogenic impacts [19]. Another important issue is climate-smart forestry (CSF) [20].

2.6. National Climate Adaptation Plan in the USA

In the USA, the National Climate Adaptation Plan was adopted in 2021 by the Environmental Protection Agency (EPA). Previously, similar plans were adopted in 2012 and 2013[9]. At that time, the National Adaptation Strategy (2012)[10] was adopted, and in 2021, its "expanded version"[11]. More than half of the states have adopted their regional adaptation plans[12].

Priorities in climate adaptation include:

1) integrating adaptation measures into EPA programs, policies, legislative processes, and law enforcement activities;

2) consulting and collaborating with authorities at all levels, tribal nations, environmental and other public organizations, and businesses to strengthen the adaptation potential of the entire state;

3) measures to protect workers and facilities related to climate change;

4) measuring and assessing labor productivity;

5) scientific research in the field of climate change adaptation.

Researchers conclude that the topic of climate adaptation in the USA is quite politicized, including at the state level, and management decisions directly depend on the "political situation" [21]. Key difficulties associated with implementing adaptation measures at the state level include a lack of

[9] Climate Adaptation Plans. EPA – United States Environmental Protection Agency. URL: https://www.epa.gov/climate-adaptation/climate-adaptation-plans

[10] National Fish, Wildlife, and Plants Climate Adaptation Strategy. U.S. Climate Resilience Toolkit. URL: https://toolkit.climate.gov/sites/default/files/NFWPCAS-Final_0.pdf

[11] Advancing the National Fish, Wildlife, and Plants Climate Adaptation Strategy into a New Decade. U.S. Climate Resilience Toolkit. URL: https://www.fishwildlife.org/application/files/4216/1161/3356/Advancing_Strategy_Report_FINAL.pdf

[12] State Adaptation Progress Tracker. Georgetown Climate Center. URL: https://www.georgetownclimate.org/adaptation/plans.html

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necessary funding, political and institutional constraints, and difficulties in predicting climate changes [22].

2.7. Canada's Climate Adaptation Strategy

Unlike many other countries, Canada has adopted not only a long-term adaptation strategy[13] but also several plans related to climate change.

Canada has been actively working on developing relevant regulatory and management solutions since the early 2000s [23]. However, in the early 2010s, most activities lacked serious financial support at the federal level [24]. There is a noted insufficiency of "political potential" in the country for implementing adaptation measures [25]. One of the priority areas for adaptation measures is flood control [26].

In March 2022, the Government of Canada presented an Emission Reduction Plan for the period up to 2030[14], which serves as a roadmap for the Canadian economy to achieve a 40-45% reduction in emissions by 2030 compared to 2005 levels based on actions outlined in previous Canadian climate plans.

Earlier, in December 2020, the Government of Canada presented a document titled "A Healthy Environment and a Healthy Economy"[15] – an enhanced climate plan for Canada based on the "Pan-Canadian Framework on Clean Growth and Climate Change". Key directions of the strategy include:

1) disaster resilience;
2) health and well-being;
3) nature and biodiversity;
4) infrastructure;
5) economy and jobs.

The Government of Canada's Adaptation Action Plan outlines the role of the federal government in preparing Canadians for climate hazards and identifies specific investments, programs, and initiatives that make Canada more resilient to climate change[16].

Funding and implementation of three federal programs are anticipated:

1) Flood Hazard Identification and Mapping Program[17];

2) FireSmart Canada program, under which a "Center of Excellence for Innovation and Fire Resilience" will be established;

3) Climate-Resilient Coastal and Northern Communities Program to support systemic approaches to adaptation actions in coastal and northern regions based on the "Climate Change Adaptation Program".

3. Conclusion

Each Arctic country has its own specifics in responding to climate change, which is

[13] National Adaptation Strategy. Canada's climate plans and targets. Government of Canada. URL: https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/national-adaptation-strategy.html

[14] Canada's 2030 Emissions Reduction Plan. Canada's climate plans and targets. Government of Canada. URL: https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/emissions-reduction-2030.html

[15] A Healthy Environment and a Healthy Economy. Canada's climate plans and targets. Government of Canada. URL: https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/healthy-environment-healthy-economy.html

[16] Pan-Canadian Framework on Clean Growth and Climate Change. URL: https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html

[17] Flood Hazard Identification and Mapping Program. Climate change adaptation in Canada. Government of Canada. URL: https://www.nrcan.gc.ca/science-and-data/science-and-research/natural-hazards/flood-hazard-identification-and-mapping-program/24044

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reflected in adaptation measures and key benchmarks of each state.

– Finland: activating civil society institutions to manage adaptation risks;

– Norway: humanitarian mission to developing countries in order to expand the “market” of potential customers for services in a variety of areas of adaptation;

– Sweden: expanding cooperation between the Government and municipalities on the technological safety of urban infrastructure to combat natural disasters;

– Denmark: expanding research into adaptation, safety issues associated with increased rainfall and flooding;

– Iceland: expanding scientific research to provide high-quality forecasts for the implementation of operational adaptation activities;

– USA: strengthening the coordination function of federal government bodies aimed at interaction with various stakeholders;

– Canada: full implementation of the Paris Agreement on “net-zero emissions” by 2050.

The Russian Federation is the largest state located in the Arctic region. Russian legislation in the field of environmental use and protection in the Arctic can also be considered the most developed. At the same time, considering the actively developing national legislation in the field of climate, it becomes evident that Russia will soon need to present and implement national adaptation plans. Therefore, it is important to pay attention to adaptation strategies and national policies in this area specifically of Arctic states. A measured approach to foreign experience provides opportunities to create effective, harmonious policies that are comparable across different jurisdictions and countries with similar geographical and climatic conditions. For the sustainable development of our planet, it is necessary to activate political, strategic, and legislative activities in each state, taking into account the ongoing climate changes.

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