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Handbook of Research on International Collaboration, Economic Development, and Sustainability in the Arctic

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Alexander Zakharchenko, Tomsk Polytechnic University, Russia

The chapter discusses the key lines of international collaboration in the fields of exploration and development of the Arctic, from the first autonomous expeditions of the late 19th century to the powerful long-standing joint research conducted by thousands of scholars from all over the world. The chapter outlines the key trends of international cooperation within the framework of the exploration of the Arctic, as well as forecasts its development in the future. It is expected that the long-standing comprehensive studies of the Arctic will be continued due to the specific importance of this region for the future of the mankind. Robotic marine expeditions will start a new era in the exploration of the Arctic Ocean. Taking into account the complexity and high costs of polar studies and the growing interest of many countries to the High North, the international collaboration in the Arctic is expected to grow.

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Vasilii Erokhin, Harbin Engineering University, China

The Arctic possesses about one-quarter of the world's untapped energy resources and abundant deposits of minerals. The region has always been in the focus of geopolitical interests of the USA, Russia, countries of Northern Europe, and Canada. However, with an opening of the previously ice-jammed waterways, new potential sites with vast resources have been identified and explored. Diversified transportation

routes are of paramount importance to the economic and energy security of energy importing countries, particularly non-Arctic ones. As the Arctic becomes a focus of interest of many regional and non-regional actors, it is crucial to identify the dangers such a boom may bring. This chapter reviews the history of the Arctic policies of major actors in the region, overviews the contemporary approaches to the development of the Arctic, and discusses how varying interests and policies can be translated into the effective international regulations for the benefit of the entire Arctic region, its people, environment, and sustainable development.

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Bistra Vassileva, University of Economics – Varna, Bulgaria

The Arctic gains an increasing geopolitical importance in the globalized world. The region provides a lot of opportunities especially due to the global warming and intensive development of digital technology but at the same time, it poses extreme challenges. The chapter starts with a literature review on interactions, relationships, networks and their implications on trans-Arctic collaborations. The first section begins by exploring how each Arctic state deals with the opportunities and challenges of the region. The second section describes the evolution of trans-Arctic relations. In the third section, market connections between the Arctic states, the importance of establishing a predictable regulatory framework, knowledge and data exchange, broadband penetration, and use of traditional indigenous knowledge to stimulate sustainable long-term trans-Arctic interactions are analyzed. The chapter ends with conclusions and recommendations aimed at the future development of trans-Arctic interactions with a focus on global intervention policies and strategies in the region.

Chapter 4

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Alexander Sergunin, Saint Petersburg State University, Russia & Nizhny Novgorod State University, Russia

This chapter examines an emerging regional security system in the Arctic. There was a significant shift in the Arctic powers' threat perceptions and security policies in the High North. In contrast with the Cold War era when the Arctic was a zone for the global confrontation between the USSR and the U.S./NATO, now this region is seen by international players as a platform for international cooperation. The Arctic countries now believe that there are no serious hard security threats to them and that the soft security agenda is much more important. The military power now has new functions, such as ascertaining coastal states' sovereignty over their exclusive economic zones and continental shelves in the region; protecting the Arctic countries' economic interests in the North, and performing some symbolic functions. The Arctic states believe that the regional cooperative agenda could include climate change mitigation, environmental protection, maritime safety, Arctic research, indigenous peoples, cross- and trans-border cooperative projects, culture, etc.

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Sukalpa Chakrabarti, Symbiosis International University (Deemed), India

The geopolitical importance of the Arctic is intensifying with the economic and strategic opportunities being unraveled in the wake of the impact of climate change. The chapter analyses the actors and the

factors affecting the current security relations in the region and recommends the creation of a regional security architecture (RSA) to deal with the emerging conflict potential of the Arctic. Through the establishment of an effective RSA for the Arctic, the prime objective of building a security environment that protects the region and promotes sustainable economic growth will be achieved. The chapter has been conceptualized under the broad theme of security studies while drawing specifically from the constructivist-structuralist framework of the regional security complex theory (RSCT).

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Arctic Europe Between National Interests and Arctic Governance 117

Igor Kochev, Tomsk State University, Russia

Wim Heijman, Wageningen University and Research, The Netherlands

From an economic point of view, melting ice is making the Arctic ocean increasingly important for a number of countries – Arctic states as well as non-Arctic states. Also, the EU has clear interests in the area. This chapter provides a brief description of those interests and its implications on the EU's relationship with the Arctic partners. This note takes seven aspects of the EU-relations with the Arctic states into consideration (i.e., the institutional framework, the EU Arctic interests and policies, shipping, fishing, marine mammals, offshore oil and gas operations, and the EU's Arctic partners).

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Going North: China's Role in the Arctic Blue Economic Corridor 133

Gao Tianming, Harbin Engineering University, China

When China announced its Belt and Road Initiative (BRI), most of the attention focused on the joint building of transportation infrastructure across the Eurasian landmass and the Indian Ocean. However, with the release of the Arctic Policy in 2018, China incorporated the Arctic shipping lanes into the BRI transport network. Development of shipping in polar waters requires collaboration with Arctic countries. This chapter discusses the challenges China faces in exploring new maritime ways in the Arctic and collaborating with Russia in the development of the Arctic Blue Economic Corridor. The investment projects in the Arctic are considered in the format of eight development zones located in the polar regions along Russian part of the Northern Sea Route. The author concludes that Arctic shipping lanes have a great potential to be efficiently incorporated into the BRI transport network. However, there are many specific technological and economic challenges to be considered and met before polar transport routes may become any viable alternatives to southern maritime routes used by China.

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Collaboration Between Russia and the Countries of Northeast Asia in the Arctic 162

Alexander Voronenko, Khabarovsk State University of Economics and Law, Russia

Mikhail Tomilov, Khabarovsk State University of Economics and Law, Russia

Sergei Greizik, Khabarovsk State University of Economics and Law, Russia

In the 21st century, the Arctic region has become an object of high attention and extensive studies from the side of the international community. The countries of Northeast Asia, particularly China, Japan, and the Republic of Korea, demonstrate their interest in the Arctic issue. Among the opportunities to get

involved in the development of the Arctic is the collaboration with Russia. The countries have common interests in the region and complementary opportunities. Moreover, Russia and the countries of Northeast Asia do not have critical disagreements between themselves. The authors argue that the collaboration between Russia and the countries of Northeast Asia can potentially establish a new economic paradigm in the High North. One of the key elements of such collaboration is the Russian region of the Far East, a territory that Russia attempts to develop and integrate into the economy of Northeast Asia. Among other issues, this chapter discusses the capacity of the Far East as a gate through which the countries of Northeast Asia may approach the Arctic.

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Mikhail Khudzhatov, Peoples' Friendship University of Russia, Russia

The Arctic is characterized by a significant potential in terms of mineral resources, raw materials, hydrocarbons, and energy. In the North, mining and extractive industries are booming, but the expansion of exploration in the severe climate conditions requires the use of advanced technologies, many of which have not been developed and adopted in Russia. For this reason, there is a need to promote investment activity in the Arctic. This chapter discusses the most effective customs instruments for the attraction of foreign investments, identifies critical problems in the sphere of development of investment collaboration between Russia and non-Arctic countries of Asia (China, Japan, and the Republic of Korea), and offers practical solutions in the field of investment collaboration in the High North.

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Russia-China Collaboration in the Arctic: Opportunities and Challenges 207

Nikolay Kotlyarov, Financial University Under the Government of the Russian Federation, Russia

In recent years, the international expert community has demonstrated a growing interest in China's Arctic policy. To a great extent, such an interest has been triggered by recent gaining an observer status in the Arctic Council by China, as well as by China's efforts to actively participate in elaborating the rules of global governance. China has a range of interests in the Arctic, including climate change problems, opportunities for energy diversification, and development of the Northern Sea Route. Among Russian experts, the discussion on the desirability of cooperation with China has lately shifted towards the acknowledging the need to strengthen Russia-China strategic partnership in the Arctic, particularly in the context of worsening relations between Russia and Western countries. The chapter addresses recent trends in Russia's and China's attitudes to bilateral cooperation in the Arctic and analyzes experts' approaches to the settlement of disputes, including such issues as the legal regime of the Arctic and the development of navigation along the Northern Sea Route.

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Minerals and Fisheries in the Arctic: A Geo-Economic Comparison of India and China 220

Ishita Ghoshal, Fergusson College (Autonomous), India

Ishita Ghosh, Symbiosis International University (Deemed), India

Sukalpa Chakrabarti, Symbiosis International University (Deemed), India

The chapter focuses on the revealed comparative advantage (RCA) that India and China may have (or not) with the Arctic region vis-à-vis certain marine and mineral resources. The outcomes will indicate where and how India and China could look to maximize trading potential, other than natural gases. The

study applies a multi-country and multi-commodity Ricardian trade model and utilizes the Balassa Index to examine the revealed comparative advantage of select fish and minerals available at the Arctic. The study finds that there is considerable comparative advantage that the Arctic enjoys in terms of export of salmon/trout/cod and palladium vis-à-vis India and China. India and China both have a lot to gain by positively contributing towards intensification of partnerships among the governments for sustainable management of the resources. The focus should be on effective cooperation among the states in addressing illegal, unreported, and unregulated (IUU) fishing and to promote human development by supporting and safeguarding the small-scale actors in both mining and fishing sectors.

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Innovation-Driven Growth of Tourist Destinations in the Russian Arctic: Challenges to Sustainable Development..... 245

Anna Ivolga, Stavropol State Agrarian University, Russia

Alexander Trukhachev, Ministry of Tourism and Recreation of Stavropol Region, Russia

Yulia Elfimova, Stavropol State Agrarian University, Russia

The attractiveness of the Arctic as a tourist destination has been growing. The growth is determined by a number of competitive advantages of the region in the eyes of foreign tourists. Along with higher income to those countries involved, mass tourism brings serious challenges in remote Arctic areas: increasing pollution through tourist traffic, risk of environmental damage because of accidents with cruise ships. One of the possible solutions to the coexistence between the exploration of Arctic tourist destinations and sustainable development is an innovation-driven growth. In the sensitive Arctic areas, traditional approaches to the development of tourism business are not applicable. Innovation approach represents a new concept of how tourism can at the same time bring economic benefits to remote and peripheral Arctic areas and ensure sustainable development of a fragile environment. The goal of this chapter is to define the categories of innovations applicable in Arctic tourism, including process, marketing, institutional, management, product, and service innovations.

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Images of Norway as a Tourist Destination From Russian Travel Bloggers' Perspective 270

Ekaterina Klimova, UiT – The Arctic University of Norway, Norway

Young-Sook Lee, UiT – The Arctic University of Norway, Norway

Tourism is increasingly becoming an important sector to be considered when it comes to discussing the sustainable development of the Arctic. This chapter presents a research into the image of Norway—one of the Arctic nations—as a tourist destination. The image is traced through a qualitative study of Russian travel blog sites. Results from the study widen the understanding of Russian tourists' interests in Norway. The findings also highlight the process of image formation of Norway as an Arctic destination by the Russian travel bloggers.

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Northern Sea Route: International Law Perspectives 292

Jędrzej Górski, City University of Hong Kong, Hong Kong

The Northern Sea Route (NSR) passes through international waters and therefore is subjected to international regimes which encroach upon the regulatory sovereignty of states having stakes in the

Arctic. These commitments cover freedom and safety of navigation, delimitation of exclusive economic zones, and obligations related to sustainability such as marine pollution, or conservation of fisheries. Russia's historical claims to sovereignty over the navigation along the NSR have been substantiated after the adoption of the UNCLOS which allowed states to take regulatory actions against marine pollution in ice-covered areas. Such special rights come in tandem with the provision of public goods such as piloting, icebreaking, and rescue services by Russian authorities and state-owned enterprises. The issue of the right to natural resources along the NSR will not be completely settled until a conclusive decision on Russian claims to extended continental shelf filed under the UNCLOS. Sustainability issues are least controversial and subject to unhindered intergovernmental cooperation.

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Conventional and Deep-Water Shipping Passages Along the Northern Sea Route 314

Andrey Afonin, Admiral Makarov State University of Maritime and Inland Shipping, Russia

*Evgeniy Olkhovik, Admiral Makarov State University of Maritime and Inland Shipping,
Russia*

*Alexander Tezikov, Admiral Makarov State University of Maritime and Inland Shipping,
Russia*

The chapter presents a description of conventional and deep-water shipping routes within the water areas of the Northern Sea Route (NSR). There are provided the evaluation of the hydrographical survey of the Arctic Ocean seabed with respect to navigational safety along with the summary of the principal factors affecting the efficiency and safety of shipping in the polar water. The chapter discusses the current situation and major development tendencies of the NSR, in particular the forecasted growth of navigation intensity, increase of the shares of high ice-strengthened heavy-tonnage vessels and hazardous cargoes in transportation, and spread of the year-round navigation zone to the East. Some of the research findings obtained during the previous decade at the Arctic Faculty of Admiral Makarov State University of Maritime and Inland Shipping are provided. The assessment of the effects of shallows and ice on the working capacity of the NSR for deep-draft vessels is provided.

Chapter 16

Seaport Facilities in Maritime Transport Infrastructure in the Arctic 338

*Evgeniy Olkhovik, Admiral Makarov State University of Maritime and Inland Shipping,
Russia*

Pavel Garibin, Admiral Makarov State University of Maritime and Inland Shipping, Russia
Vladimir Tsuprik, Far Eastern Federal University, Russia

Harbor facilities are important elements of international transport infrastructure. Maintenance of the existing mooring facilities along with the construction of new ports and harborage areas have revealed a number of challenges at all stages of the life cycle. In the Arctic, adverse climate conditions impose specific constraints on the processes of study, engineering, construction, and exploitation of seaport facilities. In this chapter, the authors provide the examples of design solutions as well as specific features of construction and maintenance of seaport facilities in various conditions, suggest technical and hardware solutions for monitoring and safeguard of cargo harbor facilities in the Arctic, measures to reconstruction, repair, utilization, conservation, and elaboration of computational information models. The chapter considers major objectives of environmental safety control during the performance of cargo handling operations, oil spills prevention and response, training and education of hydraulic engineers to perform activities in the Arctic.

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- Regional Aspects of the Arctic Ice Silk Road: Case of Heilongjiang Province, China..... 370
Zhang Xiuhua, Harbin Engineering University, China

A recently released white paper on the Arctic policy emphasized the principal lines of China's activities in the Arctic, particularly development of resources, fishing and tourism, Arctic shipping routes, infrastructure, navigation security, scientific research, and environmental protection. Such priorities are in the best interest of China's strategy of the unified regional development and new architectonics of the extensive exploration of the potential of China's Northern provinces. Being the northernmost region of the country, Heilongjiang province has an opportunity to become China's outpost for the implementation of the national Arctic policy. This chapter assesses the challenges and perspectives of turning Heilongjiang province into a transport and logistics hub between Northeast Asia, Europe, and North America by China's participation in the development of the Arctic Blue Economic Corridor. The author elaborates an idea of the establishment of the Arctic Research and Industrial Cluster based on the scientific, technological, and industrial facilities of Heilongjiang province.

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Liudmila Lapochkina, Northern (Arctic) Federal University, Russia
Elena Vetrova, Saint Petersburg State University of Economics, Russia

Circumpolar territories and the regions related to the Arctic are those rich with natural resources. They have a high potential for the development of mining and extractive industries. The abundance with resources makes the North increasingly attractive for investments. However, circumpolar territories are characterized by peculiar socio-economic, natural, and climatic conditions which taken together frequently pose a negative impact on people and hinder the exploration opportunities of the Arctic resources. In global, regional, and sub-regional levels, the development of the Arctic is heavily regulated by multilateral international treaties. However, the issues of monitoring and assessment of the sustainable development of the Arctic remain open, which stems from the absence of agreed criteria and indicators for assessing sustainability in the context of national, regional, and scientific approaches. It necessitates the development of a specific methodological approach to the establishment of a system to monitor and assess the sustainable development of the Arctic.

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- Temperature in the Arctic and the Antarctic: The Differently Directed Trends 416
Valentin Sapunov, Saint Petersburg State Agrarian University, Russia

This chapter aims at the consideration of world temperature dynamics and its prediction in the polar regions of the planet. The global warming started in the 17th century and has been progressing since then. The decline in average global temperature began in 1997. There exist various factors which affect the process, the abiotic ones being among the major in controlling the climate. The climate is also dependent on the interaction between abiotic, biotic, and social spheres. This system seems rather stable and not very much dependent on human activity. The effects of contemporary cooling are not expected to be significant for the mankind but are definitely important for the polar regions. In the Arctic, the temperature

is increasing. The one in the Antarctic declines. The average global temperature thus becomes variable. Modern science is able to predict climate change, but extensive studies free of political and economic pressure have to be conducted.

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Olga Pasko, Tomsk Polytechnic University, Russia

Natalia Stauraskaya, Omsk State Technical University, Russia

Anna Safronova, Tomsk Polytechnic University, Russia

The chapter is about contemporary ecological problems of the Arctic with regard to the relevant regulations, as well as their practical implementation. The chapter outlines the range of problems related to the coordination of international cooperation and concerted actions of stakeholder states for sustainable development in the region. The goals of international treaties on environmental protection have been classified. There is a review of key tendencies of legal regulation improvement for safeguarding Arctic ecosystems and the designation of protected areas. The natural resources and theoretical issues of their use have been thoroughly described and illustrated with examples obtained internationally. There are conclusions on the state of the art in the field of international rules and regulations for the sustainable development of the Arctic, in particular by sound environmental management, improvement of infrastructure and industrial facilities, preservation of the authentic culture of the northern indigenous communities, and improvement of the quality of their life.

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Yuri Yegorov, University of Vienna, Austria

Arctic region is an important resource for hydrocarbons (oil and gas). Their exploitation is not immediate but will develop fast as soon as oil prices approach \$100 per barrel again. In the Arctic, fish stock is an important renewable resource. Contrary to hydrocarbons, it is already overexploited. Future simultaneous exploitation of both resources poses several problems, including externalities and common pool. The academic community still has some time for theoretical investigation of those future problems and working out the corresponding policy measures that are consistent with sustainable development of the region. The Barents Sea is especially important because it has a common pool both in hydrocarbons and fish.

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Stanislav Lipski, State University of Land Use Planning, Russia

Olga Storozhenko, Bauman Moscow State Technical University, Russia

The Arctic zone of Russia includes nine regions (five of them partially). In total, it covers an inland area of 4.9 million square kilometers and 0.2 million square kilometers of islands. Traditionally, land management has been well developed in Russia as a part of public policy with its established goals, including carrying out different land reforms. However, during previous years, the level of land management in the country as a whole and in the Arctic zone, in particular, has decreased significantly due to a number of economic, organizational, and legal factors. Various federal and regional legislative acts regulate a range of issues related to the activities of indigenous peoples and land management. However, a character of

such regulation is neither consistent nor sufficient. Notwithstanding the fact that all territories of Russian Arctic inhabited by indigenous people are recognized as the specially protected natural areas, those territories are still engaged in business activities.

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<i>Alexander Sergunin, Saint Petersburg State University, Russia & Nizhny Novgorod State University, Russia</i>	

The main research objective of this chapter is to examine sustainable development strategies (SDSs) of urban centers of the Arctic Zone of Russia (AZRF). There are three specific purposes for this analysis: first, to evaluate the scope and focus of such strategies; second, to find out whether these strategies are efficient or not and whether they improve the situation in the particular city or not; third, to understand whether these policies are of short-term/single-issue character or they represent forward-looking/comprehensive strategies. The Arctic municipalities view building SDSs as an important policy priority for themselves. They have tried to create proper legal and institutional settings for the development and implementation of such strategies. They have made great strides in implementing some sustainability-related projects over the last 10 to 15 years. There was a clear shift from survival/reactive to capacity-building/proactive SDSs. Despite some residual problems and shortcomings, AZRF cities' SDSs evolve in a rather dynamic and positive way.

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<i>Semyon Kuznetsov, Saint Petersburg State Agrarian University, Russia</i>	

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Section 5 Food and Nutrition Security

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National security is always directed at ensuring the country's sovereignty, protection of national interests, as well as the provision of sustainable economic development. Food security is a specific dimension of national security. The development of the circumpolar territories in the northern areas of the Asian part of Russia shifts the emphasis of food supply and gives new impetus to the development of agricultural production. In this chapter, the authors argue that the self-sufficiency of northern territories in the Asian part of Russia may be achieved by 2030 by means of development of vegetable production.

Chapter 26

Omega-3 Fatty Acids as an Essential Nutritional Element in the High North 547

Liudmila Nadtochii, ITMO University, Russia

Daria Kuznetcova, ITMO University, Russia

Artem Lepeshkin, ITMO University, Russia

Mariya Ostrovskaya, Admiral Makarov State University of Maritime and Inland Shipping, Russia

Anna Veber, Omsk State Agrarian University, Russia

This chapter considers specific nutritional factors of indigenous peoples in Russia's Arctic zone. The authors have identified the prerequisites for the optimization of the diets of indigenous peoples in the light of existing environmental and medical-biological problems. A low level of self-sufficiency of local population with basic food products (meat, dairy, and egg products) was identified. The chapter provides a detailed analysis of the chemical composition of chia seeds as a promising ingredient of the northern diet, in particular the biological value of a product based on protein, lipid, carbohydrate, mineral, and vitamin components. The authors proposed considering chia seeds as a part of the composition of various food products for functional purposes. Potentially, the inclusion of scientifically based food recipes in the diets let providing the indigenous people with balanced food products.

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Special Legume-Based Food as a Solution to Food and Nutrition Insecurity Problem in the Arctic..... 570

Anna Veber, Omsk State Agrarian University, Russia

Svetlana Leonova, Bashkir State Agrarian University, Russia

Nina Kazydub, Omsk State Agrarian University, Russia

Inna Simakova, Saratov State Agrarian University, Russia

Liudmila Nadtochii, ITMO University, Russia

Amid the progressing growth in the world's population, changing climate conditions, and increasing demand, food production transforms to ensure food security for the mankind. On the national level, the concept of food security is defined as an economic and agro-industrial capacity of a country, which allows the people consuming environmentally friendly and healthy food products on a continuing basis, at reasonable prices, and above the scientifically based nutrition threshold. In circumpolar territories, the people are especially vulnerable to food and nutrition insecurity due to a number of reasons, including severe climate, underdevelopment of local agricultural production, heavy reliance on imported food, higher nutrition requirements, among others. This chapter discusses the potential of legume-based food products to contribute to the improvement of food and nutrition security in northern communities.

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Mykhailo Guz, National University of Life and Environmental Sciences of Ukraine, Ukraine

Organic agriculture is a promising form of management in which the preservation of the natural foundations of life and natural processes is the determining factor in ensuring food security and sustainable development. Until recently, organic farming has been considered as something related to the traditional

regions of agricultural production. However, raising food security issues make people look for new opportunities even in the severe conditions of the polar regions. In the High North, food security issues are complemented by specific challenges: climate, fragile environment, remoteness, and way of life of indigenous people. In the chapter, the author discusses the potential of organic farming as a solution to the food insecurity problem in the northern areas. The approaches to organic production management and establishment and running of an organic farm are studied. The author concludes that a green turn to more organic farming is a promising step towards food security and sustainable development of rural areas in the Arctic.

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Foreword

In the Arctic, varying and often differently directed interests of major actors challenge the achievement of sustainable development goals. Arctic-global interactions should address the geopolitical issues, international governance of major problems and challenges related to the Arctic, global environmental governance, international challenges to shipping in polar waters, and determinants of Arctic oil and gas development. However, although many scholars have acknowledged that the development of the Arctic is inextricably linked with climate, environmental and socio-economic processes, there are few studies which have actually succeeded to cover the full range of economic, investment, transport, social, and environmental dimensions.

This book focuses on a very timely and important topic: convergence between economic development and sustainability in the Arctic. The authors argue that the rapid growth in exploration and utilization of natural and environmental resources in the High North and transport connectivity between continents through the Arctic Ocean are the major challenges to sustainable development of circumpolar territories. As the authors point out, economic development of the Arctic can be beneficial, but not without costs. What immediately comes to mind is climate change in the region, biodiversity, sustainable fisheries management, and sustainability of social and environmental systems. New approaches to national policies and international agenda, as well as new management solutions, are needed for ensuring sustainability, strengthening resilience, for adaptation, and for transformational changes in the Arctic.

The publication edited by Dr. Erokhin and his colleagues contains the chapters that discuss different spheres of international collaboration in the Arctic, including interaction between Arctic countries and involvement of non-Arctic actors to the Arctic governance, regional security issues, national interests and policies of individual states and alliances in the North, exploration of mineral and biological resources, investment collaboration, transport connectivity, tourism, food and nutrition security of indigenous communities, and many more. The authors are from all over the world (Austria, Bulgaria, China, India, Netherlands, Norway, Russia, and Ukraine). Their studies span over a variety of countries, alliances, and intergovernmental organizations, including the Arctic Council, the Nordic Council of Ministers, the EU, and collaboration with China, countries of Northeast Asia, and other stakeholders in the Arctic. The authors of the chapters emphasize on the critical challenge of convergence between the economic benefits of exploring the Arctic and the urgent need for environmental protection of a fragile Arctic environment, improving living standards of people living in circumpolar territories, and securing traditional way of life and cultural heritage of indigenous communities.

I highly recommend this book to those interested in the recent developments in the High North. The editors should be complimented in drawing together the large number of contributors who made this book possible. The variety of talent, expertise, and experience, along the wide scope of topics, make this book a unique collection of information and analysis, and a valuable resource for anyone studying international collaboration on economic development, transport connectivity, and sustainability-related issues in the Arctic.

Ilan Alon

University of Agder, Norway

Foreword

The international collaboration, economic development, and sustainability in the Arctic has considerable potential for future progress. This extremely well-crafted and thoroughly researched volume edited by Dr. Erokhin, Dr. Gao, and Dr. Zhang is a must read. It complements the existing volumes on the Arctic-related topics by establishing a complex picture of sustainable economic, social, and environmental future of the region, rather than focusing on pure institutional politics, governance, or security. Most of the existing publications have included contemporary issues of international cooperation on the sustainable development of the Arctic in the formats of the Arctic and Nordic councils or intergovernmental collaboration between the eight Arctic countries. However, it is crucial to consider the roles of cross-continental interactions, particularly, with increasing involvement of non-Arctic actors.

The publication edited by Dr. Erokhin, Dr. Gao, and Dr. Zhang provides a complex and broad analysis of major challenges to sustainable development of the Arctic. In this respect, the authors address the specific implementations of China's Belt and Road Initiative, China-Nordic and EU-Arctic diplomatic models for achieving sustainable development, as well as the collaborations in the Nordic-Korea and Nordic-Japan formats and various diplomatic and economic formats with the countries of Northeast Asia and Russia. This book is also different from existing titles because of its substantial review of the history of the Arctic policies of various countries, overview of the contemporary approaches of Arctic and non-Arctic actors to the development of the region, and rich discussion on how varying approaches to the Arctic policies can be translated into the effective international regulations for the benefit of the entire Arctic region, its people, and the environment.

Written by an international interdisciplinary team of experts representing over 30 universities and research institutions from all over the world, the publication offers a wealth of information and critical analysis, including a comprehensive compilation on Arctic sustainability research, identifies key knowledge gaps, provides salient recommendations for prioritizing future research, and involves strong practical component which makes the book appropriate for government officials, policymakers, and businesses worldwide. The book is structured into 28 chapters that address international collaboration in the Arctic, economic development of the region and exploration of mineral and biological resources, cross-continental transport connectivity, sustainability-related issues, and food and nutrition insecurity concerns. It focuses on the effects of economic and investment collaboration between Arctic and non-Arctic countries for sustainable development of ecosystems, biodiversity, food security, and indigenous rural communities in the circumpolar territories of Northern Europe, Russia, and North America.

This volume is a must for academics and practitioners in the field because it rightly develops the theme of international collaboration in the Arctic with a critical focus on the importance of balancing economic development *vis-à-vis* sustainability. The book also probes into many of the choices that link national, regional and global policies of economic development and transport connectivity extensively with the ensurance of sustainable development of fragile Arctic ecosystems and preservation of traditional way of life and culture of indigenous communities. I congratulate the contributors for this outstanding work which will sit at the vanguard of excellence for the next generation of Arctic studies.

Julian Chaisse

Chinese University of Hong Kong, Hong Kong & Asian Academy of International Law (AAIL), China

Preface

Global interest in the exploration of the Arctic has been growing rapidly. The Arctic is an unexplored stockpot of natural resources and a promising transport corridor. The Arctic macro-region possesses about one-quarter of the world's untapped energy resources, holds abundant deposits of nickel, copper, coal, gold, uranium, tungsten, and diamonds, and produces about one-tenth of the world's oil and a quarter of its natural gas. With an opening of the previously ice-jammed waterways, new potential sites with vast resources have been identified and explored. The melting of ice in the Arctic opened up the opportunities for transporting through the Northern Sea passage, which provides easier access for shipping. Presently, the opportunities for accessing huge fish reserves, shortening shipping routes, and exploring energy resources have made the Arctic the most favored destination. The Northern Sea Route's (NSR) accessibility and the possibility of shortening the distance and time for transportation have greatly stimulated the aspirations of Arctic and even many non-Arctic countries to get an access to the NSR.

As the Arctic becomes the global resource base and a trade corridor between the continents, it is crucial to identify the dangers that such a boom of extractive industries and transport routes may bring. The region is now changing at an unprecedented pace, in ways that fundamentally affect ecosystems, people, biodiversity, and sustainability. Such changes are driven primarily by external factors: climate and environmental change, rapid social and economic developments, and industrialization. Factors such as resource demand and transportation needs are making the greatest impact on the Arctic. Arctic ecosystems face multiple challenges in terms of their sustainable development. Increasingly frequently, business interests (extraction of mineral resources, cargo shipping, extensive fishing, tourism, etc.) interfere with the sustainable development goals. The major challenge is how to converge the economic benefits of exploring the Arctic with the urgent need for environmental protection of a fragile Arctic environment. Arctic social and environmental systems are deeply intertwined with both the environmental systems and economic development of other regions of the world, so rapid changes in this sensitive region are likely to be felt elsewhere. That is why international cooperation for sustainable development is put at the top of the agenda of the comprehensive Arctic strategy. The region encompasses one of the last and most extensive, continuous wilderness areas on the Earth, and it is home to hundreds of endemic species of plants and animals. Arctic biodiversity is of global concern, with both the Arctic and the broader international community having a mutual interest in cooperation to ensure its conservation and sustainable use.

The multifaceted study of the urgent need for the balanced development of the Arctic is crucially needed. It requires comprehensive coverage of many areas and investigation of all influencing factors as well as translating these into international regulations for the benefit of the entire Arctic region, its people, and the environment. This publication addresses the major challenges to international cooperation for the development of the Arctic in view of the rapid growth in exploration and utilization of natural and

environmental resources and transport connectivity between Europe, Asia, and North America. Major policy and management options that may be needed for ensuring sustainable development, strengthening resilience, for adaptation, and for transformational changes in the Arctic are discussed. The book covers the contemporary issues of international cooperation on the sustainable development of the Arctic in the formats of the Arctic Council, Nordic Council, and various trans-Arctic interactions between Nordic and Arctic countries (Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, the USA) and non-Arctic actors (China, India, Japan, the Republic of Korea, and the EU member states). Specific implementations of China's Belt and Road Initiative, China-Nordic and other cross-regional diplomatic models and formats of economic collaboration are concerned. The publication also addresses the perspectives and major challenges of the investment collaboration and development and commercial use of trade routes in the Arctic. The effects of climate change in the region are discussed in view of the biodiversity, sustainable fisheries management, and food and nutrition security. The book also discusses the current situation of the Arctic tourism and analyses the feasibility, challenges, and corresponding suggested measures of the Arctic tourism cooperation between Arctic and non-Arctic countries.

The book is structured in five sections and 28 chapters, which address various formats of international collaboration in the Arctic; challenges and opportunities of economic development and exploration of the region; utilization of maritime transport routes in the Arctic Ocean; sustainability-related issues of climate change, environmental management, and regional development; and food and nutrition insecurity concerns in the High North. The book has been contributed by the respected experts representing eight countries of Europe and Asia and 30 research institutions, universities, and organizations.

SECTION 1: INTERNATIONAL COLLABORATION

The publication opens with an overview of international collaboration in the Arctic. Its peculiarities and challenges for the Arctic connectivity have been attracting the attention of many scholars worldwide. However, despite the overall agreement between the major actors in the Arctic on the prevalence of the international rule of law and crucial relevance of the sustainable development goals, different countries have different visions of both their roles in the region and the particular lines of Arctic policies. In Chapter 1, Olga Pasko, Alexander Gryaznov, Alexander Zakharchenko (all from Tomsk Polytechnic University, Russia), and Natalia Staurskaya from Omsk State Technical University (Russia) address the key lines of international collaboration in the fields of exploration and development of the Arctic, from the first autonomous expeditions of the late XIX century to the powerful long-standing joint research conducted by thousands of scholars from all over the world. They conclude that due to the complexity and high costs of polar studies, international collaboration in the Arctic is expected to grow.

In Chapter 2, Vasilii Erokhin overviews the contemporary approaches to the development of the Arctic and discusses how varying interests and policies can be translated into the effective international regulations for the benefit of the entire Arctic region, its people, environment, and sustainable development. He acknowledges that the Arctic has always been in the focus of geopolitical interests of the Arctic and Nordic countries. However, being associated with Harbin Engineering University (China) and looking at the Arctic from a perspective of Asian non-Arctic actors, Dr. Erokhin argues that with an opening of the previously ice-jammed waterways and exploration of new sites of hydrocarbons and mineral resources, development of the Arctic gains importance to the economic and energy security of Asian states.

Dr. Vassileva from University of Economics – Varna (Bulgaria) deepens the analysis of existing trans-Arctic interactions and cross-country collaborations in the region by exploring how each Arctic state deals with the opportunities and challenges of the region. She describes the evolution of trans-Arctic relations and analyses market connections between the Arctic states in terms of the establishment of regulatory framework, knowledge and data exchange, broadband penetration, and utilization of traditional indigenous knowledge in the promotion of sustainable long-term trans-Arctic interactions.

In the Arctic, any issue of international collaboration agenda is eventually affected by security concerns. Chapter 4 written by Alexander Sergunin from Saint Petersburg State University and Nizhny Novgorod State University (Russia), a world-famous expert on international relations in the Arctic, examines an emerging regional security system in the High North. Prof. Sergunin states that the Arctic countries believe that there are no serious hard security threats to them and that the soft security agenda is much more important. The military power now has new functions, such as ascertaining coastal states' sovereignty over their exclusive economic zones and continental shelves in the region; protecting the Arctic countries' economic interests in the North, and performing some symbolic functions. According to Prof. Sergunin, the cooperative agenda should include climate change mitigation, environmental protection, maritime safety, Arctic research, indigenous peoples, cross- and trans-border cooperative projects, and culture. This point of view is shared by Sukalpa Chakrabarti from Symbiosis International Deemed University (India). In Chapter 5, she addresses the geopolitical importance of the Arctic, economic and strategic opportunities of exploration of the region, and the impact of climate change and recommended the creation of a Regional Security Architecture to deal with the emerging conflict potential of the Arctic.

Section 1 is concluded by an overview of specific interests of some of the EU member states in the Arctic prepared by Igor Kochev from Tomsk State University (Russia) and Wim Heijman from Wageningen University and Research (The Netherlands). They take into consideration seven aspects of the EU-relations with the Arctic Region, i.e. the institutional framework, the EU Arctic interests, shipping, fishing, marine mammals, offshore oil and gas operations, and EU's Arctic partners.

SECTION 2: ECONOMIC DEVELOPMENT

Section 2 focuses on the economic aspects of development and exploration of the Arctic, particularly with involvement of non-Arctic actors. In Chapter 7, Gao Tianming from Harbin Engineering University (China) discusses the prospects of the recent China's initiative on the establishment and development of the Arctic Blue Economic Corridor (ABEC), an extension of the Belt and Road Initiative (BRI) network to the High North. China's involvement in the development of the ABEC means that the country is open to working with both Arctic and non-Arctic countries to build the ABEC through developing the Arctic shipping routes. Within the ABEC initiative, China expects its involvement in the infrastructure construction for the ABEC routes in the Nordic countries and Russia and conduction of commercial trial voyages in the polar waters to pave the way for Chinese commercial, exploration, transport, and logistics operations. China also attaches great importance to navigation security along the prospect routes of the ABEC, particularly, in the seas of the Arctic Ocean controlled by Russia. As economic activity in the Arctic region grows, there is a potential for 5+1 dialogue on promoting collaboration between China and Nordic states in the areas of polar transportation, logistics, investments, as well as the development

of infrastructure along the Arctic sea routes and connectivity in the region. Specifically, Dr. Gao considers the potential investment projects in the Arctic in the format of eight development zones located in the polar regions along Russian part of the NSR. He concludes that Arctic shipping lanes have a great potential to be efficiently incorporated into the BRI transport network, but acknowledges the existence of many technological and economic drawbacks which have to be settled before polar transport routes may become an alternative to southern maritime routes used by China and other Asian nations.

Alexander Voronenko, Mikhail Tomilov, and Sergei Greizik, all from Khabarovsk State University of Economics and Law (Russia), extrapolate the northern connectivity paradigm to the entire region of Northeast Asia. They state that China, Japan, the Republic of Korea, and Russia have common interests in the Arctic and do not have critical disagreements between themselves. One of the key elements of the cross-country collaboration is the Russian region of the Far East, a territory which Russia attempts to develop and integrate into the economy of Northeast Asia. Among other issues, in Chapter 8, the authors discuss a capacity of the Far East to become a gate through which the countries of Northeast Asia may approach the Arctic.

Specific aspects of investment collaboration between Asian states and Russia in the Arctic are discussed in Chapter 9. Mikail Khudzhatov from Peoples' Friendship University of Russia explores the most effective customs instruments for the attraction of foreign investments, identifies critical problems in the sphere of development of investment collaboration between Russia and non-Arctic countries of Asia, and offers practical solutions in the field of investment collaboration in the High North. In Chapter 10, the theme of investment and economic collaboration in the Arctic is deepened on the example of Russia-China relations. Prof. Kotlyarov from Financial University under the Government of the Russian Federation addresses recent trends in Russia's and China's attitudes to bilateral cooperation in the Arctic and analyzes experts' approaches to the settlement of disputes, including such issues as the legal regime of the Arctic and the development of navigation along the NSR.

Among the Asian states, not only the countries of Northeast Asia have been becoming increasingly interested in the participation in the Arctic-related issues. India-based experts Ishita Ghoshal (Fergusson College) and Ishita Ghosh and Sukalpa Chakrabarti (both from Symbiosis International Deemed University) focus on the revealed comparative advantage that India may have with the Arctic region vis-à-vis certain marine and mineral resources. Their study demonstrates where and how India could look to maximize trading potential, other than natural gas and hydrocarbons, and finds that there is considerable comparative advantage that the Arctic enjoys in terms of export of fish (salmon, trout, and cod) and minerals (palladium). Drs. Ghoshal and Ghosh and Prof. Chakrabarti conclude that India has a lot to gain by positively contributing towards intensification of partnerships with China and Arctic countries for sustainable management of the resources.

Section 2 is concluded by two chapters both discussing the prospects of turning the Arctic into an attractive tourist destination. In Chapter 12, Anna Ivolga and Yulia Elfimova (both from Stavropol State Agrarian University, Russia) and Alexander Trukhachev (Ministry of Tourism and Recreation of Stavropol Region, Russia) acknowledge the growth in the attractiveness of the Arctic as a tourist destination. However, they justly note that mass tourism brings serious challenges in remote Arctic areas, i.e. increasing pollution through tourist traffic and risk of environmental damage because of the accidents with cruise ships. One of the possible solutions to the coexistence between the exploration of Arctic tourist destinations and sustainable development is an innovation-driven growth. Innovation approach represents a new concept of how tourism can at the same time bring economic benefits to remote and peripheral Arctic areas and ensure sustainable development of a fragile environment.

Ekaterina Klimova and Young-Sook Lee, both representing UiT – The Arctic University of Norway, agree that tourism is increasingly becoming an important sector to be considered when it comes to discussing the sustainable development of the Arctic. In Chapter 13, they present a research into the image of Norway – one of the Arctic nations – as a tourist destination. The image is traced through a qualitative study of Russian travel blog sites. Results from the study widen the understanding of Russian tourists' interests in Norway. The findings also highlight the process of image formation of Norway as an Arctic destination by the Russian travel bloggers.

SECTION 3: CONNECTIVITY

Climate change and ice melting open up new opportunities for navigation in the Arctic Ocean through the three major passages which have been existed so far, i.e. Northwest Passage, Transpolar Passage, and the NSR. Many countries, including non-Arctic ones, have outlined their interest in improving sea transit conditions and surveying for new resources in the Arctic. The contributions aggregated in Section 3 discuss concrete steps within the increasing international efforts on the development of transport passages in the Arctic Ocean and improvement of connectivity between Northern Europe, North America, and Asia. In Chapter 14, Jędrzej Górski from City University of Hong Kong (Hong Kong SAR, China) reviews the international regimes which encroach upon the regulatory sovereignty of states having stakes in the Arctic. These commitments cover freedom and safety of navigation, delimitation of exclusive economic zones, and obligations related to sustainability such as marine pollution, or conservation of fisheries. According to Dr. Gorski, Russia's historical claims to sovereignty over the navigation along the NSR have been substantiated after the adoption of the UNCLOS which allowed states to take regulatory actions against marine pollution in ice-covered areas. Such special rights come in tandem with the provisions of public goods such as piloting, icebreaking and rescue services by Russian authorities and state-owned enterprises. The issue of the right to natural resources along the NSR will not be completely settled until a conclusive decision on Russian claims to extended continental shelf filed under the UNCLOS.

Particular shipping routes within the water areas of the NSR are investigated by Andrey Afonin, Evgeniy Olkhovik, and Alexander Tezikov, all from Admiral Makarov State University of Maritime and Inland Shipping, the largest maritime university and Russia's only center of personnel education and training for maritime shipping industry in the Arctic. In Chapter 15, they provide the evaluation of the hydrographical survey of the Arctic Ocean seabed with respect to navigational safety along with the summary of the principal factors affecting the efficiency and safety of shipping in the polar water. Drs. Afonin and Olkhovik and Prof. Tezikov discuss the current situation and major development tendencies of the NSR, in particular, the forecasted growth of navigation intensity, increase of the shares of high ice-strengthened heavy-tonnage vessels and hazardous cargoes in transportation and spread of the year-round navigation zone to the East. In the Arctic, adverse climate conditions impose specific constraints on the processes of study, engineering, construction, and exploitation of seaport facilities. In Chapter 16, Dr. Olkhovik with participation of Pavel Garibin from Admiral Makarov State University of Maritime and Inland Shipping (Russia) and Vladimir Tsuprik, Far Eastern Federal University (Russia) provide the examples of design solutions as well as specific features of construction and maintenance of seaport facilities in various conditions, suggest technical and hardware solutions for monitoring and safeguard of cargo harbor facilities in the Arctic, measures to reconstruction, repair, utilization, conservation, and

elaboration of computational information models. The authors consider major objectives of environmental safety control during the performance of cargo handling operations, oil spills prevention and response, training and education of hydraulic engineers to perform activities in the Arctic.

Section 3 is concluded by a study of specific regional aspects of Arctic-Asia connectivity made by Zhang Xiuhua (Harbin Engineering University, China) on the example of Heilongjiang Province. Recently released White Paper on the Arctic Policy emphasized the principal lines of China's activities in the Arctic, particularly, development of resources, fishing and tourism, Arctic shipping routes, infrastructure, navigation security, scientific research, and environmental protection. Such priorities are in the best interest of China's strategy of the unified regional development and new architectonics of the extensive exploration of the potential of China's Northern provinces. Being the northernmost region of the country, Heilongjiang province has an opportunity to become China's outpost for the implementation of the national Arctic policy. In Chapter 17, Dr. Zhang assesses the challenges and perspectives of turning Heilongjiang province into a transport and logistics hub between Northeast Asia, Europe, and North America by China's participation in the development of the ABEC.

SECTION 4: SUSTAINABILITY

The abundance with resources makes the Arctic increasingly attractive for exploration. However, circum-polar territories are characterized by peculiar socio-economic, natural, and climatic conditions which taken together frequently pose a negative impact on people and hinder the exploration opportunities of the resources. In global, regional, and subregional levels, the development of the Arctic is heavily regulated by multilateral international treaties. However, as Liudmila Lapochkina from Northern (Arctic) Federal University (Russia) and Elena Vetrova from Saint Petersburg State University of Economics (Russia) state in Chapter 18, the issues of monitoring and assessment of the sustainable development of the Arctic remain open. It stems from the absence of agreed criteria and indicators for assessing sustainability in the context of national, regional, and scientific approaches. It necessitates the development of a specific methodological approach to the establishment of a system to monitor and assess the sustainable development of the Arctic.

In the recent decades, one of the most critical issues of sustainable development appears to be the progressing climate change. The global warming started in the XVII century and has been progressing since then. In Chapter 19, Valentin Sapunov from Saint Petersburg State Agrarian University (Russia) demonstrates that the climate is dependent on the interaction between abiotic, biotic, and social factors. The effects of contemporary climate change are not expected to be significant for the humankind but are definitely important for the polar regions. In the Arctic, the temperature is increasing, the one in the Antarctic declines. The average global temperature becomes variable and thus threatens sustainability.

Potential responses to those threats include the coordination of international cooperation and concerted actions of stakeholder states for sustainable development in the region. In Chapter 20, Olga Pasko and Anna Safronova (both from Tomsk Polytechnic University, Russia) and Natalia Staurskaya from Omsk State Technical University (Russia) classify the goals of international treaties on environmental protection and provide a review of key tendencies of legal regulation improvement for safeguarding Arctic

ecosystems and the designation of protected areas. They conclude that international regulations in the sphere of sustainable development of the Arctic should incorporate the sound environmental management, improvement of infrastructure and industrial facilities, preservation of the authentic culture of the northern indigenous communities, and improvement of the quality of their life.

The Arctic is an important source of not only hydrocarbons but also fish stock and other marine resources. Yuri Yegorov from University of Vienna (Austria) argues that, contrary to hydrocarbons, fish stock in the seas of the Arctic Ocean and Northern Atlantic has already been overexploited. Future simultaneous exploitation of both resources poses several problems, including externalities and common pool. The academic community still has some time for theoretical investigation of those future problems and working out the corresponding policy measures that are consistent with sustainable development of the region. The Barents Sea is especially important because it has common pool both in hydrocarbons and fish.

Another important dimensions of sustainably are territorial development and preservation of indigenous peoples. Notwithstanding the fact that many of the circumpolar territories inhabited by indigenous people are recognized as the specially protected natural areas, those territories are still engaged in business activities. In Chapter 22, Stanislav Lipski from State University of Land Use Planning (Russia) and Olga Storozhenko from Bauman Moscow State Technical University (Russia) claim that in the Russia's Arctic zone, the regulation of the issues related to the activities of indigenous peoples and land management is not sufficient. Traditionally, land management has been well developed as a part of public policy with its established goals, including carrying out different land reforms. However, during previous years, the level of land management in the Arctic zone, in particular, has decreased significantly due to a number of economic, organizational, and legal factors.

Alexander Sergunin from Saint Petersburg State University and Nizhny Novgorod State University (Russia) examines sustainable development strategies (SDSs) of urban centers of the Arctic Zone of Russia. In Chapter 23, he evaluates the scope and focus of such strategies, finds out whether these strategies are efficient or not and whether they improve the situation in the particular city or not, and understands whether these policies are of short-term/single-issue character or they represent forward-looking/comprehensive strategies. Prof. Sergunin concludes that the Arctic municipalities view building SDSs as an important policy priority for themselves. They have tried to create proper legal and institutional settings for the development and implementation of such strategies. They have made great strides in implementing some sustainability-related projects over the last 10 to 15 years. Prof. Sergunin actually reports a clear shift from survival/reactive to capacity-building/proactive SDSs in the Arctic.

Section 4 is concluded by a study of forensic support in remote areas of the Arctic. In the case of Russian Arctic, Semyon Kuznetsov from Saint Petersburg State Agrarian University (Russia) covers the relevant aspects of education and training of medical specialist to work in the northern territories remote from the administrative centers. In Chapter 24, he reveals the problem of insufficient basic training in forensic medicine for the specialists living and working in geographically isolated areas of the Arctic zone of Russia. Dr. Kuznetsov outlines the contradictions between the provisions on forensic medical training, declared educational standards, and requirements of the criminal procedures set by the Russian legislation and attempts to elaborate possible ways of solution of the specified problems.

SECTION 5: FOOD AND NUTRITION SECURITY

In the harsh environment of the Arctic, hunting and fishing have always been an important part of human existence. However, in the recent decades, intensive exploration of natural resources of the Arctic and development of other kinds of economic activities have resulted in a substantial increase of Arctic population. Along with food availability issues, the inclusion of Nordic territories to the global production chains has brought along increased anthropogenic stressors on the ecosystems, environmental pollution, and safety and quality of food. The principal challenges to food security across the Arctic are high cost often coupled with economic vulnerability and decreasing consumption of traditional foods. Food security challenges are exacerbated by healthy nutrition, contaminants, and climate change.

Specific issues of food and nutrition security in the High North are discussed across the chapters in Section 5. In Chapter 25, Sergey Ryumkin from Novosibirsk State Agrarian University (Russia) and Inga Malykhina from Irkutsk State Agrarian University (Russia) argue that the development of the circumpolar territories in the northern areas of the Asian part of Russia shifts the emphasis of food supply and gives new impetus to the development of agricultural production. Liudmila Nadtochii, Daria Kusnetcova, Artem Lepeshkin (all from ITMO University, Russia), Mariya Ostrovskaya from Admiral Makarov State University of Maritime and Inland Shipping (Russia) and Anna Veber from Omsk State Agrarian University (Russia) consider specific nutritional factors of indigenous peoples in Russia's Arctic zone. In Chapter 26, they outline the prerequisites for the optimization of the diets of indigenous peoples in the light of existing environmental and medical-biological problems and provides a detailed analysis of the chemical composition of chia seeds as a promising ingredient of the northern diet. Another product which may potentially contribute to the improvement of food and nutrition security in the High North is legume-based food. In Chapter 27, Anna Veber and Nina Kazydub (both from Omsk State Agrarian University, Russia), Svetlana Leonova from Bashkir State Agrarian University (Russia), Inna Simakova from Saratov State Agrarian University (Russia), and Liudmila Nadtochii from ITMO University (Russia) analyze the potential of special legume-based food to be included in the northern diets.

Section 5 is finalized with an exploration of the opportunities of agricultural production in the High North. Until recently, farming has been considered as something related to the traditional regions of agricultural production. However, raising food security issues make people look for new opportunities even in the severe conditions of the polar regions. In Chapter 28, Mykhailo Guz from National University of Life and Environmental Sciences of Ukraine studies the approaches to organic production management and establishment and running of an organic farm in the High North. He concludes that a green turn to more organic farming is a promising step towards food security and sustainable development of rural areas in the Arctic.

This book attempts to develop a long-term outlook of the challenges the northern regions of the planet face in terms of sustainable development. The publication includes the studies which have been carried out in the cases of both Arctic and non-Arctic countries. Its outcomes may be shared with a wide international network of stakeholders, including research institutions, universities, and individual researchers. The book is appropriate for government officials, policymakers, and businesses of most of the countries which link their strategic interests with the Arctic. Adaptation of research outcomes and solutions to the situation in particular countries and various collaboration formats (Arctic Council,

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Nordic Council, collaboration with Russia, China-Nordic diplomatic model, Belt and Road Initiative, etc.) allows increasing the visibility of the publication and elaborating new practices and solutions in the sphere of achieving sustainability amid the grows of economic exploration of abundant mineral, transport, environmental, and biological resources of the Arctic.

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