

Edited by Adam Stępień, Timo Koivurova, Paula Kankaanpää

# THE CHANGING ARCTIC AND THE EUROPEAN UNION

BRILL | NIJHOFF

# The Changing Arctic and the European Union

*A Book Based on the Report "Strategic Assessment of Development of the Arctic: Assessment Conducted for the European Union"*

*Edited by*

Adam Stepień  
Timo Koivurova  
Paula Kankaanpää



BRILL  
NIJHOFF

LEIDEN | BOSTON

Cover illustration: A New and Accurate Map of the North Pole: E. Bowen, A Complete Atlas, or Distinct View of the Known World. London 1752. Collection of the Arctic Centre, University of Lapland, Finland.

This publication has been typeset in the multilingual “Brill” typeface. With over 5,100 characters covering Latin, IPA, Greek, and Cyrillic, this typeface is especially suitable for use in the humanities. For more information, please see [www.brill.com/brill-typeface](http://www.brill.com/brill-typeface).

ISSN 0924-4549

ISBN 978-90-04-30317-1 (paperback)

ISBN 978-90-04-30318-8 (e-book)

Copyright 2016 by Koninklijke Brill NV, Leiden, The Netherlands.

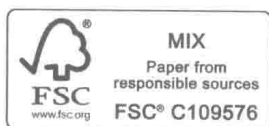
Koninklijke Brill NV incorporates the imprints Brill, Brill Hes & De Graaf, Brill Nijhoff, Brill Rodopi and Hotei Publishing.

All rights reserved. No part of this publication may be reproduced, translated, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission from the publisher.

Authorization to photocopy items for internal or personal use is granted by Koninklijke Brill NV provided that the appropriate fees are paid directly to The Copyright Clearance Center, 222 Rosewood Drive, Suite 910, Danvers, MA 01923, USA.

Fees are subject to change.

This book is printed on acid-free paper.



Printed by Printforce, the Netherlands

# The Changing Arctic and the European Union

# Nijhoff Law Specials

VOLUME 89

The titles published in this series are listed at *[brill.com/nlsp](http://brill.com/nlsp)*

# Editorial

The book is based on the reports prepared within the project “Strategic Environmental Impact Assessment of Development of the Arctic”, a Preparatory Action funded by the European Commission, DG Environment (Service contract 191 105/2012/637465/SER/El):

- Stępień, Adam, Timo Koivurova and Paula Kankaanpää (Eds.) (2014). Strategic Assessment of Development of the Arctic: Assessment Conducted for the European Union, Preparatory Action, Strategic Environmental Impact Assessment of development of the Arctic. Arctic Centre, University of Lapland.
- Dahlbäck, Björn, Lize-Marié van der Watt, Kamil Jagodziński and Paula Kankaanpää (2014). European Arctic Initiatives Compendium. Preparatory Action, Strategic Environmental Impact Assessment of development of the Arctic. Arctic Centre, University of Lapland.
- Tedsen, Elizabeth, Arne Riedel, Katherine Weingartner, Roberto Azzolini, Frederic Guillon, Simona Longo, Corrado Leone, Outi Paadar, Anastasia Leonenko (2014). Gap Analysis Report. Preparatory Action, Strategic Environmental Impact Assessment of development of the Arctic. Arctic Centre, University of Lapland.
- Kankaanpää, Paula and Smieszek, Malgorzata (Eds.) (2014). Assessments in Policy-Making: Case Studies from the Arctic Council. Preparatory Action, Strategic Environmental Impact Assessment of development of the Arctic. Arctic Centre, University of Lapland.

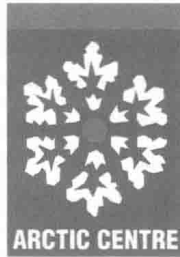
The reports are copyrighted by the European Union.

The contents of the book as well as that of the reports on which it is based do not reflect the official opinion of the European Union. Responsibility for the information and views expressed therein lies entirely with the authors.

The network implementing the project: Arctic Centre, University of Lapland, Finland; Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Germany; Arctic Centre, University of Groningen, the Netherlands; Arctic Portal, Iceland; Committee on Polar Research, Polish Academy of Sciences; Ecologic Institute, Berlin – Washington, DC; Ecorys, the Netherlands; European Polar Board and European Science Foundation; Finnish Meteorological Institute; Fram Centre, Norway; GRID-Arendal, Norway; International Polar Foundation;

National Research Council of Italy; Pierre and Marie Curie University, France; Sámi Education Institute, Finland; Scott Polar Research Institute, University of Cambridge, United Kingdom; Swedish Polar Research Secretariat; Tromsø Centre for Remote Sensing, UiT The Arctic University of Norway; University of the Arctic Thematic Networks: Thule Institute of the University of Oulu, Finland.

All project partners participated in the production of original reports, but the opinions and statements in this book are those of the authors.



## Strategic Environmental Impact Assessment of development of the Arctic

Language editors: Zoë Chandler (Inkling Oy), Debra Justus, Maija Myllylä (Waria)

## Preface

This book constitutes an updated and expanded version of the report *Strategic Assessment of Development of the Arctic: An assessment conducted for the European Union* (SADA). The SADA is the final report of an assessment conducted within the “Strategic Environmental Impact Assessment of Development of the Arctic” project,<sup>1</sup> financed by the European Commission Directorate-General for the Environment, and carried out by a network of 19 leading Arctic universities, research and communication centres with extensive activities in and knowledge of the Arctic. The project was led by the Arctic Centre of the University of Lapland and tested the initiative of establishing the EU Arctic Information Centre.<sup>2</sup> The whole project network participated in the assessment process, drafting of the reports, and thus, contributed to the production of this book; however, the text should not be understood as a common statement endorsed by all institutions within the network. The responsibility for the publication and its content lies solely with the book authors and the opinions expressed therein do not reflect the official position of the European Commission nor that of other EU institutions.

The primary objective of the “Strategic Environmental Impact Assessment” project was to increase the awareness about the Arctic and its changing political, economic and environmental landscape, as well as to comprehend the influence of EU policies on the future of the Arctic region by participating in dialogues and information exchange between the EU and civil society. This was implemented by using assessment as a tool to put together information for the needs of decision-makers and for the benefit of a wider public. As a result, this work is a content-rich snapshot of the development of the Arctic, and at the same time an example how assessment methodologies can be used to better understand the changes occurring in the region.

The assessment process started in April 2013 with the design of methodology and selection of themes to be examined. Project partner experts produced thematic factsheets. These served as background papers for the consultation process that included thematic workshops and an online questionnaire. Stakeholders had a chance to comment on the draft report and their feedback has been implemented in the final stage of the assessment. The content of this publication is therefore a synthesis of stakeholder input and expert analysis.

---

1 See project website at [www.arcticinfo.eu](http://www.arcticinfo.eu).

2 See the website of the Arctic Centre at <http://www.arcticcentre.org/EN/ABOUT-US/EU-Arctic-Information-Centre>. Accessed 20 February 2015.



The proposed ideas for the enhancement of EU Arctic policy have been developed on the basis of stakeholder input, although they should not be seen as a direct outcome of stakeholder consultations. The original report was finalised in May 2014.

For this publication, the updated text of the SADA report has been expanded by chapters summarizing findings of three other reports that constituted the project results: *European Arctic Initiatives Compendium*, *Gap Analysis Report* and *Assessments in Policy-making: Case Studies from the Arctic Council*.<sup>3</sup> The process leading to production of these reports was conducted between April 2013 and June 2015. These contributions complement the discussion in the thematic chapters and are a rich source of information for all interested in the European contribution to Arctic affairs and the role of assessments as tools in policy-making.

The book could be of use particularly to those less familiar with Arctic affairs and willing to broaden their understanding of the changes in the region or the role the European Union plays in shaping these developments. The consecutive chapters deliver a balanced and up-to-date overview of a broad spectrum of Arctic issues. Therefore, the publication may prove useful also for students or journalists.

The authors and the whole project network would like to express their utmost gratitude primarily to all those who participated in stakeholder workshops and in the online questionnaire. Their participation and contribution at various stages of the process was an indispensable element of the assessment. The authors are also grateful for the contribution provided by numerous researchers and experts, who are acknowledged in the respective chapters. We also express our gratitude to Filip Holiencin for his help with compiling the index. Last but certainly not least, gratitude is offered to the European Commission and particularly the staff of the DG Environment for their continued support to the work of the project team.

*Adam Stępień, Timo Koivurova and Paula Kankaanpää*

---

3 All original reports can be found at the project website [www.arcticinfo.eu](http://www.arcticinfo.eu).

# List of Figures, Tables, Pictures and Textboxes

## Figures

- 0.1 European Arctic as defined in the Strategic Assessment of Development of the Arctic study 7
- 0.2 Strategic Assessment of Development of the Arctic process 9
- 2.1 Climate change in the Arctic: drivers and impacts 58
- 2.2 Arctic sea ice extent, 2007–2015 61
- 2.3 Arctic sea ice extent, September 2012, and median September sea ice extent, 1981–2010 62
- 2.4 Greenland: cumulative ice mass loss and sea level equivalent (SLE) 63
- 2.5 Earth climate system and main forcing mechanisms on our atmosphere 63
- 2.6 EU-27 greenhouse gas emissions by sector, 1990–2012 72
- 3.1 Arctic maritime transport routes 83
- 3.2 Total annual cargo volumes on the Northern Sea Route. Data include intra, destination and transit traffic 84
- 3.3 Cruise tourism in some Arctic areas by number of passengers 86
- 3.4 Trends and shaping factors for Arctic shipping 87
- 3.5 Average monthly Arctic sea-ice extent in September and March 1979–2014 88
- 3.6 Modelled routes physically accessible for ships sailing in September between the Bering Strait and St. Croix in Canada or Rotterdam in the Netherlands 89
- 3.7 Distance savings for voyages along the Northeast Passage compared with the Suez Canal 95
- 3.8 Shipping emissions and climate change 98
- 3.9 Maritime zones 101
- 4.1 Arctic characterisation: High, Low and Sub Arctic and ocean currents 117
- 4.2 Variability of Northeast Atlantic cod recruitment (three-year-old cod), 1946–2010 118
- 4.3 Large Marine Ecosystems – catch abundance 119
- 4.4 North East Atlantic Fisheries Commission Convention (dark blue) and Regulatory Area (orange, international waters beyond EEZs) 124
- 5.1 Main oil and gas areas, mining sites and sea-ice extent in the Arctic 138
- 5.2 Potential Arctic oil and gas resources 141
- 6.1 Arctic mining activities: drivers and impacts 164
- 6.2 Mining activities in Northern Fennoscandia and Greenland 166
- 6.3 Mineral licences in Greenland, 2000–2013 169
- 7.1 Main land-use activities causing pressures in Northern Fennoscandia (southern boundary – Barents region) 190

- 8.1 Overview of the main sociocultural drivers and trends and their implications in the European Arctic 214
- 8.2 Arctic indigenous and non-indigenous population 215
- 8.3 Public and private employment in the European Arctic, 2010 222
- 8.4 EU Northern Periphery and Arctic Programme 2014–2020 area 229

## Tables

- 3.1 Number of Arctic transit voyages by freight carriers, 2009–2014 85
- 4.1 Fisheries management systems in the Arctic 121
- 5.1 Selected international instruments relevant to Arctic offshore oil and gas activities 151
- 5.2 Arctic oil and gas development: Significance for the EU 155
- 7.1 The land-use pressures, drivers and impacts in the European Arctic 202
- 9.1 List of European Union countries' Arctic policy documents and statements 258
- 9.2 Arctic human needs and mega-trends 286

## Pictures

- 2.1 Ice road and skiing trails on Kemijoki river in Rovaniemi, Finland 67
- 3.1 Icing of vessels due to sea spray and humidity in the air is a serious challenge 90
- 3.2 Sovcomflot (SCF) LNG tanker operating in the Sea of Okhotsk 92
- 3.3 *Vladimir Tikhonov* 94
- 3.4 Maksim Gorkij passengers waiting for the rescue on an ice floe 114
- 4.1 Pelagic trawlers in Iceland 127
- 5.1 LNG plant in Melkøya island in Hammerfest, Norway 149
- 6.1 Testing prior to the possible reopening of the Hannukainen mine, Finland 167
- 6.2 Abandoned mine in Pyramiden, Svalbard 171
- 6.3 Kiruna town centre with the LKAB iron ore mine in the background, Sweden 175
- 7.1 Arctic landscape – “empty” at first sight, but full of human activities 188
- 7.2 Hannukainen old mine site near-by Ylläs ski resort 192
- 7.3 Traditional Sámi reindeer herder summer camp, Skuolla, Sweden 196
- 7.4 Local people and Sámi demonstrating against the planned mining exploration activities at Gállok in summer 2013 197
- 8.1 Inuit hunters with snowmobiles 220

- 8.2 Sámi Parliament in Norway in session, Karasjok 226
- 8.3 Tromsø, Norway, one of the main urban centres in the European Arctic 242

### Textboxes

- 2.1 Why does the arctic warm faster than lower latitudes? – arctic feedbacks 60
- 2.2 Governments agree on a target of 2 degrees celsius and 450 ppm CO<sub>2</sub> 68
- 3.1 What stakeholders say about Arctic shipping? 107
- 4.1 UN Fish Stocks Agreement 122
- 4.2 Conflicts (fisheries) 123
- 4.3 Gap at the top 125
- 5.1 Economic and social benefits: Snøhvit case 149
- 5.2 Health, safety and environmental protection industry standards 152
- 6.1 Importance of minerals production in Fennoscandia and the Russian North for the EU 176
- 7.1 Can mining co-exist with tourism? – case of Hannukainen 191
- 7.2 Sámi perspective on mining – Case of Gállok 197
- 8.1 Remote and peripheral – northern sparsely populated areas 225

# List of Acronyms

AAC	Arctic Athabaskan Council
AACA	Adaptation Actions for a Changing Arctic
ABA	Arctic Biodiversity Assessment
AC	Arctic Council
ACCESS	Arctic Climate Change, Economy and Society (project)
ACIA	Arctic Climate Impact Assessment
AEC	Arctic Economic Council
AECO	Arctic Expedition Cruise Operators
AEPS	Arctic Environmental Protection Strategy
AHDR	Arctic Human Development Report
AIS	Automatic Identification System
AISG	Arctic Inter-Service Group
AMAP	Arctic Monitoring and Assessment Programme (AC working group)
ANISTIAMO	Addressing New Challenges in Satellite Based Maritime Surveillance and Arctic Monitoring
AoA	Assessment of Assessments
ARC	Arctic Research Centre
ARCTIS	Arctic Resources and Transportation Information System (Norway)
Arcum	Arctic Research Centre (Umeå University)
ARICE	Arctic Research Icebreaker Consortium for Europe
ARR	Arctic Resilience Report
ATQ	Autonomous Tariff Quota
AWI	Alfred Wegener Institute: Helmholtz Centre for Polar and Marine Research (Germany)
BAS	British Antarctic Survey
bcm	Billion Cubic Metres
BEAC	Barents Euro-Arctic Council
boe	Barrels of Oil Equivalent
BPAN	Barents Protected Areas Network
CAFF	Conservation of Arctic Flora and Fauna (AC working group)
CAP	Common Agricultural Policy (EU)
CBD	Convention on Biological Diversity
CBM	Community-based monitoring
CBSS	Council of the Baltic Sea States
CFP	Common Fisheries Policy (EU)
CHNL	Centre for High North Logistics (Norway)
COP	Conference of the Parties

CSR	Corporate Social Responsibility
DG	Directorate-General (European Commission or European Parliament)
DNV	Det Norske Veritas
DPSIR	Driving force–Pressures–State–Impact–Response framework
EBRD	European Bank for Reconstruction and Development
EC	European Community
ECA	Emissions Control Area (MARPOL)
ECDS	Environment Climate Data Sweden
ECRA	European Climate Research Alliance
EEA	European Economic Area
EEAgency	European Environment Agency
EEAA	European Economic Area Agreement
EEAS	European External Action Service
EEC	European Economic Community
EEZ	Exclusive Economic Zones
EFTA	European Free Trade Association
EGNOS	European Geostationary Navigation Overlay Service
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIP	European Innovation Partnership
EISCAT	European Incoherent Scatter Scientific Association
EMAS	Eco-management and Audit Scheme (EU)
EMSA	European Maritime Safety Agency
ENP	European Neighbourhood Policy
ENPI	European Neighbourhood and Partnership Instrument
EO	Earth Observation
EP	European Parliament
EPPR	Emergency Prevention, Preparedness and Response (AC working group)
ERDF	European Regional Development Fund
ERIC	European Research Infrastructure Consortium
ESA	European Space Agency
ETC	European Territorial Co-operation
ETS	Emissions Trading System (EU)
EU	European Union
EUAIC	EU Arctic Information Centre (initiative)
FAO	UN Food and Agriculture Organization
FMP	Fishery Management Plan
FOI	Swedish Defence Research Agency
FPIC	Free, Prior and Informed Consent

GAR	Gap Analysis Report
GDP	Gross Domestic Product
GEA	Global Environmental Assessments
GEOSS	Group on Earth Observation System of Systems
GHG	Greenhouse-gas
GLONASS	Global Navigation Satellite System (Russia)
GMES	Global Monitoring for Environment and Security
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSA	European GNSS Supervisory Authority
HRIA	Human Rights Impact Assessment
IA	Impact Assessment
IACHR	Inter-American Commission on Human Rights
IASC	International Arctic Science Committee
IASOA	International Arctic Systems for Observing the Atmosphere
IASSA	International Arctic Social Science Association
ICC	Inuit Circumpolar Council
ICES	International Council for the Exploration of the Sea
ICOS	Integrated Carbon Observing System
ICT	Information and Communication Technology
IEA	International Energy Agency
IFI	International Financial Institution
IGO	Inter-governmental Organization
ILO	International Labour Organization
ILO169	1989 ILO Convention no 169 concerning Indigenous and Tribal Peoples in Independent Countries
IMO	International Maritime Organization
IMP	Integrated Maritime Policy (EU)
INSPIRE	Infrastructure for Spatial Information in Europe Directive
INTERREG	Interregional Co-operation Programmes
IOC	International Oil Companies
IPCC	Intergovernmental Panel on Climate Change
IPEV	Polar Institute Paul Emile Victor (France)
IPF	International Polar Foundation
IRF	Institute of Space Physics (Sweden)
IUU	Illegal, Unreported and Unregulated Fisheries/Fishing
IWC	International Whaling Commission
IWGIA	International Work Group for Indigenous Affairs
JRC	Joint Research Centre of the European Commission
KISS	Kangerlussuaq International Science Support

KTH	Royal Institute of Technology (Sweden)
LKAB	Luossavaara-Kiirunavaara AB
LME	Large Marine Ecosystems
LNG	Liquefied Natural Gas
LOS	Law of the Sea
MaReMa	Centre of Marine Resource Management
MARPOL	Convention on the Prevention of Pollution from Ships
MoU/MOU	Memorandum of Understanding
NAMMCO	North Atlantic Marine Mammal Commission
NCM	Nordic Council of Ministers
ND	Northern Dimension
NDBC	Northern Dimension Business Council
NDEP	Northern Dimension Partnership on Environment
NDI	Northern Dimension Institute
NDPC	Northern Dimension Partnership on Culture
NDPHS	Northern Dimension Partnership on Public Health and Social Well-being
NDPTL	Northern Dimension Partnership on Transport and Logistics
NEAFC	North East Atlantic Fisheries Commission
NEFCO	Nordic Environment Finance Corporation
NEP	Northeast Passage
NERC	Natural Environmental Research Council (UK)
NGLS	Natural Gas Liquids
NGO	Non-governmental Organization
NOAA	National Oceanic and Atmospheric Administration (US)
NOCS	National Oil Companies
NOCS	National Oceanography Centre Southampton (UK)
NOFIMA	The Norwegian Institute of Food, Fisheries and Aquaculture Research
NordMin	Nordic Network on Mining Expertise
Nordregio	Nordic Centre for Spatial Development
NPA	Northern Periphery and Arctic Programme 2014–2020
NPFMC	North Pacific Fishery Management Council
NPP	Northern Periphery Programme 2007–2013
NSIDC	National Snow and Ice Data Centre
NSPA	Northern Sparsely Populated Areas
NSR	Northern Sea Route
NWP	Northwest Passage
OGS	National Institute of Oceanography and Experimental Geophysics (Italy)
OSL	Otto Schmidt Laboratory for Polar and Marine Research (Germany)



OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PAME	Protection of Arctic Marine Environment (AC working group)
PAN	Protected Area Network
PCB	polychlorinated biphenyl
PCW	Polar Communication and Weather (Canada)
POMOR	Master Program for Polar and Marine Research (Germany)
POPS	Persistent Organic Pollutants
PSSA	Particularly Sensitive Sea Area
PV	Polar View (ESA)
REDD+	Efforts to reduce emissions from deforestation and forest degradation, and foster conservation, sustainable management of forests, and enhancement of forest carbon stocks
REE	Rare Earth Elements
REFIT	Regulatory Fitness and Performance Programme
RFMO	Regional Fisheries Management Organisation
ROSCOSMOS	Russian Federal Space Agency
SADA	Strategic Assessment of Development of the Arctic
SAON	Sustaining Arctic Observing Networks
SAR	Search and Rescue
SDWG	Sustainable Development Working Group (AC)
SEA	Strategic Environmental Assessment
SEIS	Shared Environmental Information System
SIA	Sustainability Impact Assessment
SIOS	Svalbard Integrated Observation System
SLCF	Short-Lived Climate Forcers
SLE	Sea level equivalent
SMHI	Swedish Meteorological and Hydrological Institute
SOLAS	Convention on the Safety of Life at Sea
STUK	Radiation and Nuclear Safety Authority (Finland)
SWD	Staff Working Document (European Commission)
SWIPA	Sea, Water, Ice and Permafrost in the Arctic
SYKE	Finnish Environment Institute
TAC	Total allowable catch
TEKES	Finnish Funding Agency for Innovation
TEN-T	Trans-European Transport Network
TEU	Treaty on the European Union
TFEU	Treaty on the Functioning of the European Union
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea