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The North in the World of Economy and Politics

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ENVIRONMENTAL IMPLICATIONS OF CLIMATE CHANGES IN THE ARCTIC REGION

Introduction

Climate changes have a significant impact on the Arctic and its environment. As Arctic waters become increasingly accessible offshore hydrocarbons exploitation, maritime shipping and tourism are all expected to increase over the coming years. Rapid progress of ice melting in the High North has given rise to the potential exploration and use of Arctic resources, which could destroy the unique environment. The region's situation is additionally complicated by the unclear international legal status of the sea bed and disputes regarding freedom of navigation characteristic for international waters of a high sea. Offshore oil and gas exploration, oil/gas drilling and storage vessels will threaten the Arctic ecosystem and multiply the risk of an oil spill in such an environmentally sensitive area.

Climate changes in the High North as a factor of geopolitical changes

The Arctic, a polar region around the North Pole, takes up approx. 6% of the Earth's surface. The rapid melting of Arctic ice, as a result of global warming, gave way of easier access to local minerals, particularly rich reserves of oil and natural gas. In the last 30 years Arctic sea ice extent has declined more than 11% per decade[2]. It led to the lowest summer-ice minimums and most open water ever recorded, allowing for increased commercial activity, and in turn, creating additional stress on this unique ecosystem[3].

The Arctic is warming twice faster than other regions of the Earth. The pace of contraction of sea ice and permafrost is actually surprising. Seasonal ice (which

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[2] See: J. Goodyear, Ch. Clusen, *Environmental Risks with Proposed Offshore Oil and Gas Development off Alaska's North Slope*, NRDC 2012; Changes in the Marine Environment, The Arctic, [online] http://arctic.ru/climate-change/marine-environment-changes (15.04.2015).

[3] J. Goodyear, Ch. Clusen, *Environmental Risks…,* p. 1.

melts and re-freezes every year) has become thinner overall. While in the 1980's it accounted for approx. 50% of the area of the Arctic, it is currently up to 70% (2010). Thicker ice comprises just 10% of ice cover, down from 30% to 40% in past years[4].

Climate changes and related sea warming are not only source of economic opportunities but also poses a major threats for fragile Arctic ecosystem. Fast ice melting changes the politics of the region, which strategic role in political and economical dimension is growing. Arctic contains a substantial portion of the world's oil and gas reserves. The region of High North could account for as much as 20% of the world's undiscovered but recoverable (using existing technology) oil and natural gas resources.

Already more than 400 oil and gas fields has been discovered and 61 of them are large ones – 43 are located in Russia, 11 in Canada, 6 in Alaska and 1 in Norway[5]. Russia is estimated to hold more than half of the total Arctic resources and 70% of the region's natural gas resources are attributed to the Russian exclusive economic zone (EEZ)[6]. For Russia opening of the Arctic presents an opportunity not only to capitalize on newly accessible resources and trade wealth, but also is a chance to use its pivotal position in the region to develop a greater influence among a number of EU and NATO states (due to territorial proximity and bilateral interactions)[7].

Exploitation of energy minerals

Production of oil and gas in the Arctic is relatively stable since the late 1980s. At the end of the first decade of the twenty-first century, about 10% of global oil production and 25% and gas production takes place in the Arctic and 97% of this oil and gas production comes from onshore fields in Russia and Alaska (smaller amounts are produced in Canada and Norway)[8]. Russian companies are pursuing projects in the Barents and Pechora Seas and as well in parts of the Cara Sea[9]. The vast majority (90%-95%) of offshore oil and gas takes place in already demarcated EEZs (located in areas of marine waters of USA, Canada, Greenland, Norway and Russia)[10].

Arctic region has a great potential for hydrocarbon extraction, but significant increases in production from these fields can be expected only well after 2030. Oil and gas extraction in the Arctic Ocean and transportation of the raw materials will continue to be very difficult even in littoral areas due to both economic and

[4] L. Perkins, *Winter Arctic Sea Ice Thickness Declining Rapi*dly, NASA March 5, 2009, [online] http://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=3589 (15.04.2015).
[5] *Arctic oil and gas*, EY Building a better working world, 2013, p. 2.
[6] *Ibidem*, p. 3; *The Arctic: thaw with conflict potential*, Center for Security Studies Analysis in Security Policy, CSS ETHZ, No. 118, July 2012, p. 1.
[7] Ch. Le Mière, J. Mazo, *Arctic opening: insecurity and opportunity*, IISS 2013, p. 123.
[8] *Ibidem*, p. 48.
[9] *Ibidem*, p. 51.
[10] *Ibidem,* p. 54.

technological obstacles[11]. Exploration is so difficult because of: 1). high implementation costs resulting from the isolation of the region from potential markets and 2). advanced technology necessary to conduct exploration works and mining, which in turn stems from the difficult climatic conditions. Main risks of resources exploitation in the Arctic region are[12]:

- harsh climate: extreme weather conditions, cold for much of the year, long periods of near-total darkness, the potential ice-pack damage to offshore facilities,
- limited existing infrastructure: lack of infrastructure and distance from markets and suppliers, new investments are very expensive and would require special equipment (such as special tankers and ice-breakers),
- gas-on-gas competition: the booming global gas supply from unconventional sources will slow down Arctic gas development,
- exceptionally long project timeline multiplies the economical risk,
- ecological aspects: risks of environmental damages, much more costly than standard projects (spill containment/recovery).

Despite of these barriers the huge potential for hydrocarbon discoveries in the warming Arctic focuses attention from governments and energy companies interested in exploration and exploitation of the region's natural resources, regardless of the large environmental risks such activity would carry.

International cooperation for region's environment protection

Before the end of the Cold War cooperation on environmental issues was perceived as "low politics". In January 1989, Finland invited the other Arctic states to a conference on protection of the Arctic environment. Consequently in September 1989, officials from the eight Arctic countries met in Rovaniemi to discuss cooperative measures to protect the flora and fauna. On 14 June 1991 during ministerial-level meeting in Rovaniemi, the *Arctic Environmental Protection Strategy* (AEPS) and the Declaration on the Protection of the Arctic Environment ("Rovaniemi Declaration") were formally adopted. The so-called Rovaniemi process led to the adoption of first documents and international cooperation between the Cold War parties in the Arctic[13]. The main objectives of declaration were[14]:

- to protect the Arctic ecosystem including humans,
- to preserve environment quality and natural resources,
- to acknowledge role of indigenous peoples, their traditional and cultural needs and practices related to the protection of the Arctic environment,
- to review regularly the state of the Arctic environment,

[11] *The Arctic: thaw with conflict…,* p. 2.
[12] *Arctic oil and gas…*, p. 5.
[13] T. Palosaari, *The Amazing Race: on resources, conflict, and cooperation in the Arctic*, Nordia Geographical Publications 40: 4, 2012, p. 15.
[14] *Arctic Environmental Protection Strategy*, June 14, 1991, p. 9.

– to reduce and eliminate pollution.

The AEPS was a multilateral, non-binding agreement among Arctic states (Canada, Denmark, Finland, Iceland, Norway, Sweden, Russia [USSR at that time], and the United States). The AEPS dealt with monitoring, assessment, protection, emergency preparedness/response, and conservation of the Arctic zone. The AEPS outlined the following objectives[15]:

– cooperation in scientific research to specify sources, pathways, effects of pollution, in particular: oil, acidification, persistent organic contaminants, noise and heavy metals as well as sharing of these data,
– assessment of potential environmental impacts of development activities,
– full implementation and consideration of further measures to control pollutants and reduce their adverse effects to the Arctic environment,

In 1993 during a follow-up meeting in Nuuk, Greenland, ministers endorsed expansion of the AEPS in order to deal with sustainable development (the Nuuk Declaration). The Ottawa Declaration of 1996 established the Arctic Council as a intergovernmental forum to provide means for promoting cooperation, coordination and interaction in issues of sustainable development and environmental protection of the region. The AEPS remained a main strategic document for the Council's working groups, including:

– Arctic Monitoring and Assessment Program (AMAP),
– Conservation of Arctic Flora and Fauna (CAFF),
– Protection of the Arctic Marine Environment (PAME),
– Emergency, Prevention, Preparedness and Response (EPPR),
– Sustainable Development and Utilization (SDU).

EAPS intended to protect Arctic from damage, but some critics of the strategy highlighted lack of financial commitment and lack of the legal authority of agreement.

Oil spill risks and its environmental consequences

The Arctic environment is a unique ecosystem and climate change has inevitably impact on the environment (flora and fauna). The potential exploitation and transit of petroleum could lead to irreversible ecological chain reactions. In regards to petroleum activities in the Arctic, the main environmental concern is a risk of large scale oil spill that may come from offshore drilling, tankers or oil transportation infrastructure. In case of a major oil spill in High North it is rather impossible to effectively contain or clean it up as petroleum companies doesn't poses adequate technology nor the expanded infrastructure to deal with it. Currently available technologies for recovery of oil from the surface perform poorly in high waves and rough weather conditions[16]. Consequently, climate change and drilling threatens

[15] *Ibidem,* p. 2.

[16] *Arctic Resource Development: Risks and Responsible Management*, The Geopolitics of Energy, Fridtjof Nansen Institute, ONS Summit 2012, p. 8.

riches animal and plant ecosystem that depends on sea ice and a complicated food chain.

The risk of major oil spills is the greatest threat posed by Arctic shipping. Several aspects of maritime transport in the region accentuate such worries[17]:

– harsh weather conditions,
– pervasive ice,
– limited hydrographical and bathymetrical charting,
– remoteness from emergency response centers.

Drilling and related industrial activity would create an unacceptable risk of irreparable damage to this formidable part of the planet and should be postponed until comprehensive research can be performed and a credible system and required infrastructure for responding to spills is put into place[18].

After the Exxon Valdez in Alaska disaster in 1989, large spill caused long-term damage to the environment (accident killed an estimated 100.000 to 250.000 seabirds, at least 2.800 sea otters, 300 harbor seals, 247 bald eagles, and 22 orcas, and destroyed billions of salmon and herring eggs)[19]. Soil contamination and ingested oil residues caused higher death rates of animals. Recent disaster, the Deepwater Horizon spill, was stopped after three months of leakage and only a small percentage (only 10% to 15%) of the crude released into open water was burned or recovered[20]. Additionally, chemicals used to aid burning (or dispersion) of oil slicks are very toxic (aromatic hydrocarbons) leading to further pollution of ocean and atmosphere.

Due to low temperatures and scarce sunlight over much of the year, the hazardous compounds released during an emergency operations may remain in Arctic ecosystems for long periods, aggravating the risks of bioaccumulation, and ocean currents may spread them over extensive areas. Sea birds, some marine mammals, and fish larvae are particularly vulnerable to large oil slicks[21]. It should be noted that in sea ice conditions oil spills would remain for many years as cold water breaks down oil much slower than warm water does.

Melting ice offer an opportunity to the emergence of new shipping lanes. New routes (The *Northern Sea Route* and the *Northwest Passage*) would shorten the distance from Europe to Asia by about one third, but the new routes are not only of interest from an economic viewpoint, but also have strong influence to environmental aspects[22]. In 2009, the Arctic Council issued the first major report focusing on several Arctic environmental concerns growing proportionately with increased shipping activity and listed risks of[23]:

– release of oil from ships through accidental or illegal discharge,

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[17] *Ibidem,* p. 8.
[18] See J. Goodyear, Ch. Clusen, *Environmental Risks..,* p. 1.
[19] *Ibidem*, p. 9.
[20] *Ibidem*, p. 4.
[21] *Arctic Resource Development..,* p. 8.
[22] *The Arctic: thaw with conflict..,* p. 2; T. Palosaari, *The Amazing Race..,* p. 17.
[23] *Arctic marine shipping assessment*, Report, Arctic Council, April 2009, p. 5, p. 153.

– introduction of invasive species through ballast water or on vessel hulls,
– disruption of migratory patterns of marine mammals,
– releases of hazardous contaminants to air or water,
– anthropogenic noise produced from marine shipping activity.
– emissions from ships during Arctic voyages of greenhouse gases (GHGs), Nitrogen Oxides (NOx), Sulfur Oxides (SOx) and Particulate Matters (PM).

Extreme temperatures may be hazardous for personnel as well as operations, since low temperatures influence the construction materials and may cause vital systems to freeze[24]. Climate change has dramatically weakened the foundation on which Arctic ecosystems function and threatens vulnerable wildlife. Arctic environment future depends on ensuring good practice and transparency of drilling companies. Gazprom and Rosneft and even Western companies cannot guarantee that all ecologic standards are maintained in their operations. Russian Arctic offshore oil platform Prirazlomnaya, the first offshore oil rig to began commercial drilling operations above the Arctic circle accompanied with strong objections from environmental NGO's (first shipment of oil were sent off on April 18 2014). Past experience and today's resounding (and scary) scientific consensus shows that an oil spill in the Arctic is inevitable if drilling progresses[25]. For the Arctic, international principle – the polluter pays – may not be sufficient barrier to refrain from drilling.

Polar Code: Arctic environmental prevention

Threats to the environment have to be resolved in a collective manner[26]. Several international agreements provide standards and guidelines on environment protection during ships operation but none of existing conventions does effectively protect environment in the Polar region taking into account the growing shipping and oil/gas drilling activity.

United Nations Convention on the Law of the Sea (UNCLOS) is a known as a basic legal framework governing the Arctic Ocean for environmental protection and as well territorial issues. Among others it regulates offshore petroleum activities on the continental shelves (art. 81). The coastal states are obliged to protect and preserve the marine environment and consider international standards established by *International Maritime Organization* (IMO). Another key documents are:

[24] *Summary Report and Recommendations on the Prevention of Marine Oil Pollution in the Arctic 2013*, Arctic Council Emergency Prevention Preparedness and Responses, p. 6.

[25] K. Mathiesen, *Drilling in the Arctic - what is the environmental impact*? The Guardian, [online] http://www.theguardian.com/environment/2013/oct/02/drilling-arctic-environmental-impact-greenpeace-piracy (15.04.2015).

[26] K. Åtland, *The Security Implications of Climate Change in the Arctic Ocean,* [in:] P.A. Berkman and A.N. Vylegzhanin (eds.). *Environmental Security in the Arctic Ocean*, NATO Science for Peace and Security Series C: Environmental Security, Springer Science +Business Media Dordrecht 2013, p. 206.

– *International Convention for the Prevention of Pollution from Ships* (MARPOL 73/78), applies to ships as well as floating and fixed platforms, and mandates minimization of discharges and pollution,
– *International Convention for the Safety of Life at Sea* adopted in 1974 (SOLAS in force since 1980), concerning safety of sea operations,
– *International Regulations for Preventing Collisions at Sea* (1972), against accidents at sea routes,
– *International Convention on Oil Pollution Preparedness, response and Co-operation* (OPRC) which obliges states to adopt plans for dealing with pollution (1990).

Above documents constitute a general framework, but are not tailored to the specific conditions of the demanding Arctic environment and do not address the risk of leakage during offshore drilling. Therefore, due to increased arctic shipping and potential threats related with it, the IMO on the 86th session of 2nd December 2009 IMO has adopted security instructions for ships operating in the Arctic ice-covered waters - a non – binding resolution *Guidelines for Ships Operating in Polar Waters*[27]. It defines standards for safety and pollution prevention, not included in the existing conventions SOLAS1 and MARPOL2. The fact that each of the coastal states is using its own legislation (among others jurisdiction of navigation rules and mining activities) adds even more complexity to Polar region legal conditions.

In parallel to the efforts of IMO, the Arctic Council proceeds with work directed to environmental protection. In May 28, 2008 during meeting in Ilulissat, approved Declaration concerning the protection of the marine environment, maritime safety, and division of emergency responsibilities if new shipping routes are opened.

The Arctic Council, through the research conducted by its Working Groups has contributed greatly to the understanding of environmental risk in the Arctic. Precautionary approaches are highly relevant in the Arctic, therefore, under the Arctic Council auspices two agreements on oil pollution prevention have been negotiated:
– 2011 – *Arctic Search and Rescue Agreement* - coordinates international search and rescue (SAR) coverage and response in the Arctic, and establishes the area of SAR responsibility of each state party,
– 2013 – *The Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic* - obligates for maintaining a minimum level of oil-spill response equipment, monitoring for potential spills, sharing information and assistance to other states when requested.

These agreements encourage cross- border communication on issue that are off share interest (maritime security, environmental protection) and therefore appear

[27] T. Palosaari, *The Amazing Race...,* p. 20.

uncontroversial[28].

The most important document that should significantly contribute to protection of Arctic environment is *Code of Safe Operation of Ships in Polar Water* (named *Polar Code*) adopted in October 2014 by IMO. The regulation is intended to cover the full range of design, construction, equipment, operational, training, search and rescue and environmental protection matters relevant to ships operating in the both Arctic and Antarctic waters. The *Polar Code* contains stringent rules on ship properties including required ice class and set uniform rules for all vessels in all of the polar countries[29]. *Polar Code* proposes following regulations[30]:

- prevention of pollution by oil: discharge into the sea of oil or oily mixtures from any ship is prohibited. Oil fuel tanks must be separated from outer shell,
- prevention of pollution by noxious liquid substances: discharge into the sea of noxious liquid substances is prohibited,
- prevention of pollution by sewage; discharge of sewage is prohibited (unless performed in line with MARPOL),
- prevention of pollution by garbage: discharge of garbage is restricted (unless performed in line with MARPOL).

IMO has already adopted related amendments to the SOLAS (November 2014) and plans to amend the MARPOL Convention in order to introduce environmental legislation of the *Polar Code* during the session in May 2015.

Ships trading in the polar regions already have to comply with all relevant international standards adopted by IMO, but the newly adopted SOLAS chapter XIV "*Safety measures for ships operating in polar waters*", adds additional requirements, by making the *Polar Code* mandatory (Preamble, Introduction and Part I-A [Safety measures])[31].

The expected date of entry into force of the SOLAS amendments is 1 January 2017, under the tacit acceptance procedure. It will apply to new ships constructed after that date. Ships constructed before 1 January 2017 will be required to meet the relevant requirements of the *Polar Code* by the first intermediate or renewal survey, whichever occurs first, after 1 January 2018[32].

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[28] Ch. Le Mière, J. Mazo, *Arctic opening: insecurity and opportunity*, IISS, 2013, p. 111. In 2013 the *Report and Recommendations on the Prevention of Oil Marine Pollution in the Arctic (RP3)* was also adopted. The report compiles relevant national and international laws and regulations, as well as industry standards, required management practices, and guidelines aimed at preventing accidental or episodic release of oil which could impact the marine environment.

[29] B. Koranyi, *Expanding Arctic ocean to get its own shipping rulet*, Reuters, 21.01.2014, [online] http://www.reuters.com/article/2014/01/21/us-arctic-shipping-idUSBREA0K0KI20140121 (22.04.2015).

[30] *Polar Code environmental provisions set for adoption at IMO's Marine Environment Protection Committee*, May 5, 2015, [online] http://www.imo.org/MediaCentre/ PressBriefings /Pages/17 - MEPC-68-preview.aspx#.VVCoefB5F5V (20.04.2015).

[31] *IMO adopts mandatory Code for Ships Operating in Polar Waters,* IMO, 21.11.2014, [online] http://www.imo.org/MediaCentre/PressBriefings/Pages/38-nmsc94polar.aspx#.VVPKXLntmE0 (22.04.2015).

[32] *Ibidem*.

Restrictive rules of *Polar Code* are undermined by Russia, which argues that the Code environmental requirements are almost impossible to meet. Specifically Russia it trying to obtain exemption for oily discharges for some of its ships on domestic routes in the Arctic, specifically ships operating in ice that would remain at sea for extended periods[33]. Russia is steeply ramping up the use of the Northern Sea Route (in 2012 and 2013 traffic exploded with 46 and 71 commercial ships arcing over Russia between the Atlantic and the Pacific Ocean)[34]. Russia considers that the *Polar Code* does not specify the number of icebreakers that can operate in the Arctic region and demands that territorial waters should be exempt from such limits as well as warships. Environmental restrictions are contrary to the strategy of the militarization of the Arctic by Russia.

Conclusions

Climate change and growing shipping activity and resource exploitation exposed Arctic region to a serious risk of an environmental disaster. Reduction of summer sea ice, longer open water seasons in the fall and the reduction of the year-round presence of multi-year ice, have far reaching implications for Arctic ecosystems. In case of oil spill emergency response capacity for saving lives and pollution mitigation is highly limited in specific climatic circumstances. The lack of infrastructure in all but a coupled with the vastness and harsh environment, makes carrying out a response significantly more difficult in the Arctic.

Arctic requires development of stable governance system similar to those one that exist in areas of Antarctica. The Arctic Council's ongoing work includes monitoring of pollutants and biodiversity, regional pollution mitigation, and planning for integrated ocean management, as well as many other initiatives focused on developing sustainable circumpolar communities. Environmental protection requires entry into force the mandatory *Polar Code* to ensure it comprehensively addresses safety and environmental issues, nevertheless oil spill is unavoidable in realistic view.

Due to the unsettled international legal status of the Arctic, maritime international conventions are main legal instruments for environment protection. Taking into account strong national sovereign and economic interest of A5 adoption of the single binding international treaty for the environmental protection of the Arctic region (as similar to the *Antarctic treaty* and its Protocol on *Environmental Protection of October* 4 1991 with article 7 "any activity – except research - aimed at exploitation of mineral resources is prohibited) will be difficult or impossible. In particular Russia due to its own commercial interests is resistant to the adoption of the *Polar Code* and leads relatively unilateral approach to Arctic exploration.

[33] J. Thomson, *IMO completes Polar Code environmental rules*, Barents Observer, 24.10.2014, [online] http://barentsobserver.com/en/business/2014/10/imo-completes-polar-code-environmental-rules-24-10 (22.04.2015).

[34] *Ibidem*.

In such circumstances, seems that the only way to implement the best practices and guidelines regulating individual activities (environment protection, energy and resources exploitation, fisheries, tourism) should be regulation in framework of sector binding conventions (similar to the *Polar Code*).

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Abstract

Climate changes have a significant impact on the Arctic and its environment. As Arctic waters become increasingly accessible offshore hydrocarbons exploitation, maritime

shipping and tourism are all expected to increase over the coming years. Rapid progress of ice melting in the High North has given rise to the potential exploration and use of Arctic resources, which could destroy the unique environment. The region's situation is additionally complicated by the unclear international legal status of the sea bed and disputes regarding freedom of navigation characteristic for international waters of a high sea. Offshore oil and gas exploration, oil/gas drilling and storage vessels will threaten the Arctic ecosystem and multiply the risk of an oil spill in such an environmentally sensitive area.

Wpływ zmian klimatycznych na środowisko Arktyki

Zmiany klimatyczne mają znaczący wpływ na region Arktyki i jego otoczenie. Dynamiczne kurczenie się stałej pokrywy lodowej, co ułatwia wydobycie węglowodorów spod dna Morza Arktycznego, a także spodziewany wzrost żeglugi morskiej i turystyki w ciągu najbliższych lat w regionie arktycznym, rodzi ryzyko degradacji unikalnego arktycznego środowiska naturalnego. Sytuacja jest dodatkowo skomplikowana brakiem uregulowania prawno-międzynarodowego statusu dna morskiego i spory dotyczące wolności żeglugi na wodach międzynarodowych. Przejście Północne może bowiem stać się alternatywnym morskim szlakiem handlowym o kluczowym znaczeniu geostrategicznym. Zmiany klimatu i potencjalna perspektywa nieodległej eksploatacji ropy naftowej i gazu ziemnego rodzą poważne konsekwencje dla niezwykle wrażliwego ze względu na bioróżnorodność morskiego ekosystemu Arktyki w obliczu zwiększonego ryzyka wycieku ropy.

Keywords: Environment, implications, climate changes, Arctic, region
Słowa kluczowe: środowisko, zmiany klimatu, Arktyka, region

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