

Climate of Opinion

The Stockholm Network's Energy and Environment Update
Issue 12 – The Arctic: March 2009

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Commentary

The Arctic: conflict or cooperation? – Gulya Isyanova¹

When most of us think of the world, we visualise the standard map, with the Arctic as a small white area tucked up at the top. In many respects, this is how people generally conceptualise the region. However, a bird's eye view of the Arctic shows it for what it actually is – a substantial centre-point between the enormous land masses of the Americas, Europe and Eurasia. This bird's eye perspective is indicative of our changing perceptions of the Arctic and of the region's growing role in a variety of global issues.

Glass half empty

Our relationship with the Arctic has developed in a complex manner. In the collective imagination, it has been transformed from a wild place which our ancestors viewed as needing to be conquered, to an environment that we increasingly need to protect. For many, the polar bear epitomises this transformation. Once feared and hunted, it has now become an emblem for the fragility of the region.

The Arctic is at the forefront of the climate change debate – both in terms of the impact that climate change is wreaking upon the region and in terms of the role that the Arctic plays in driving climate change. Rising average global temperatures are causing Arctic sea ice to melt and retreat. Not only does this mean the shrinking of the natural environment of many local species and peoples, but also the worsening of climate change itself. As the surface area of the Arctic decreases, so it reflects less and less ultraviolet light back into space. Instead, this energy remains in the atmosphere or is absorbed by the sea, thereby adding to global warming.

A thawing Arctic spells bad news for climate change mitigation. Moreover, as a thawing Arctic will result in rising sea levels, it also spells bad news for adaptation, particularly for low-lying countries and coastal regions.

However, from a more practical and immediate perspective, it would seem that the bad news does come with a silver lining – a thawing Arctic presents us with many economic opportunities as well.

Glass half full

With the Arctic sea ice melting, hitherto inaccessible oil and gas reserves – some estimate as much as a quarter of all global reserves – could soon become exploitable. Although we are still a long way away from pumping Arctic crude into our cars – exploration, investment into production, refining and transportation infrastructure will take decades – countries with a territorial stake in the region are growing more and more attached to the region. Only last summer Russia sent an expedition to plant its flag on the Arctic seabed. Countries are also increasingly trying to establish their territorial claims via the United Nations Convention on the Law of the Sea. Will the Arctic become the new frontier of intense national competition? It does seem likely – and there is a precedent.

Throughout the 20th century, the Arctic region was a key strategic point. During the Second World War, Germany built secret weather stations in a bid to calculate optimal timing of key battles – as a result, for example, during the Battle of the Bulge, the Allied planes were hindered by snow and fog. And during the Cold War, when the United States and the Soviet Union aimed intercontinental ballistic missiles over the Arctic, the region became a geopolitical centre of confrontation.

An ice-free Arctic in the future will also mean an increase in shipping routes, such as the infamous Northwest Passage. Only this past year, Russia has started to build up a fleet of new nuclear-powered icebreakers, and the US, Canadian and Finnish governments have planned to do the same.

Whether it is oil and gas exploration, military exercises or busy shipping lanes, the Arctic is set to become a hotbed of activity in the next few decades.

The issue

In this issue, **Rachel Chu** (Stockholm Network) details the impact that climate change is having on the Arctic, while **Matt Stone** (University of Oxford) looks at the region's potential energy resources. **Dr Katarzyna Bozena Zysk** (Norwegian Institute for Defence Studies) considers what implications the thawing Arctic

has for international relations in the region and Russian security, and **Richard Campanaro** (London School of Economics) analyses what it will mean for international trade and the global economy.

¹ Gulya Isyanova is a former Researcher at the Stockholm Network.

The Melting Cog – Rachel Chu¹

Anthropogenic climate change is now a well-established scientific and political reality, but what does this reality mean for the Arctic? Science tells us that the Earth at higher latitudes, the Arctic in particular, is a fundamental cog in the machinery of the climate system. As such, the Arctic primarily acts to balance other parts of the system, trapping atmospheric water vapour as sea ice which in turn reflects solar energy back into space, and keeping stores of carbon locked in permafrost regions. However, increasing levels of atmospheric CO₂ seem to have altered the cog, causing it instead to intensify shifts in the global climate, at an ever faster pace. These changes in the Arctic now seem on course to change the entire climate system.

Key climate mechanisms involving the Arctic

When it is in an approximately stable state, as it has been since the last Ice Age, we can understand the Earth's climate system as a balancing of the Earth's energy 'budget' across the globe, both in the ocean and the atmosphere. Depending on the brightness or 'albedo' of the Earth's surface, with ice-covered surfaces having greater albedo and forest land having less, more or less solar energy reaching the surface is reflected back into the atmosphere. The Arctic plays a major role in keeping the Earth's energy budget in equilibrium, primarily through three processes.

First, polar ice and snow at high latitudes mean that albedo is higher than at lower latitudes, acting to reflect the Sun's energy back into space. Second, sea ice in the Arctic helps to maintain

ocean circulation, which then balances north-south differentials in ocean temperature. The formation of ice draws fresh water from the ocean, and so higher salinity, along with colder ocean temperatures, makes Arctic oceans denser than mid-latitude oceans, which have lower salinity and are warmer. This creates a pressure gradient between higher and lower latitudes, with deep northern waters flowing southwards and warm surface waters in the south flowing northwards. Global ocean circulation thus depends on the presence of Arctic sea ice to help maintain a balance of ocean temperatures across the earth.

Third, frozen Arctic ground, known as permafrost, stores millions of years' worth of carbon discharged by decomposing organic material. It keeps a flood of carbon from being released into the atmosphere. If permafrost melts, this stored carbon can be rapidly mobilised into the atmosphere through oxidation to CO₂, and via the action of microbes in the soil as methane (CH₄). In doing so, permafrost helps maintain manageable levels of atmospheric CO₂, which is important in controlling the amount of solar heat that reaches the Earth. Hence, permafrost is another crucial way in which the Arctic helps regulate the Earth's energy balance.

Shaking up the system

However, scientists are detecting changes in the Arctic that indicate the delicate energy balance of this system is shifting. According to the Intergovernmental Panel on Climate Change's (IPCC) 2007 report, "Climate Change 2007", this change is almost certainly man-made, probably in great deal due to industrial emission of CO₂.

Though CO₂ is naturally present in the atmosphere, because it tends to absorb solar heat and trap it within the atmosphere, excess CO₂ in the air is causing the Earth to heat beyond normal levels.

In particular, warming is expected to alter – and in some cases, is already altering – the key features of the Arctic's role in the Earth's climate system. First, rising temperatures are causing ice and snow to melt, to the extent that the IPCC predicts a mainly ice-free Arctic Ocean in summer by 2100. In part due to the subsequent reduction in albedo, scientists also project that annual mean warming in the Arctic for the 21st century will be double the global mean warming. Therefore, by reducing the amount of Arctic surfaces capable of reflecting solar energy, warming in the Arctic is expected to accelerate, and disrupt global temperature equilibriums accordingly. Also as a result of melting ice, scientists expect sea levels to rise between 0.8 and 2.0 metres by 2100.

Second, scientists expect this melting of Arctic ice to lead to changes in ocean circulation. IPCC models project a decrease in the major circulation pattern in the Atlantic of up to 50% or more by the end of the 21st century. This will impact the global balance of ocean temperatures, as discussed above. Furthermore, the stratification of oceans (i.e. decreased mixing of surface and deep waters) would impede normal cycling of oceanic CO₂ from surface to deeper waters for storage, thereby lowering the potential for oceanic uptake of atmospheric CO₂ – both natural and man-made. Instead, additional CO₂ will tend to remain in the atmosphere, causing further warming.

Third, rising temperatures will also induce substantial thawing of Arctic permafrost, such that the IPCC projects a decrease in permafrost areas of 20-25% by the mid 21st century. Permafrost regions will be likely to become a major new source of atmospheric CO₂. Moreover, lakes formed by the thawing of ice-rich permafrost threaten to become a source of methane (CH₄) release, which can elicit more than twenty times the warming of CO₂. The likely jump in atmospheric levels of CO₂ and CH₄ are expected to intensify the warming taking place.

Apart from the effect these changes will have on global climate, we can expect localised changes in the Arctic. Alterations to the temperature and seasonal balance of Arctic waters, as well as the northward movement of sub-arctic species, will likely put pressure on Arctic species, especially aquatic life. Such changes in Arctic biodiversity will alter local food chains with attendant impacts on the lives of indigenous inhabitants. Also, melting surfaces will require adaptation of infrastructure and transportation systems (e.g. those relying on ice or frozen ground). However, climate change may also open up opportunities, including greater access to resources, new transportation routes, and hydropower and even agricultural possibilities.

Engineering a fix

With growing awareness of both the local and global consequences of climate change, representatives of countries worldwide are attempting to coordinate a response that would minimise its overall extent. Despite widespread political rifts, the UN climate change conference in Poznań, Poland in December 2008 achieved some progress. Leaders of a range of developing economies such as Brazil, Mexico and South Africa – some of the highest emitters in that group – committed to lowering their greenhouse gas emissions. Still, those hoping for a new deal to follow the 1997 Kyoto Protocol will have to wait for next year's conference in Copenhagen.

However, even if some progress was made in Poznań, some have pointed to an important caveat: the Poznań negotiations were based on the conclusions of the IPCC's latest report which drew data from up to 2005. Scientists following the progress in the Arctic, however, report that climate change has already accelerated beyond previous expectations. In particular, 2007 was a year of record warmth, with surface temperature in Arctic seas jumping 5°C. Furthermore, the minimum extent of sea ice in 2007 and 2008 has been the smallest on record. These findings are prompting scientists to revise their projections – some say we will have ice-free summers in the Arctic Ocean as early as 2040. This degree of change may require even greater measures than

those being considered under current intergovernmental negotiations.

The new Obama administration is probably best placed to lead a more meaningful international response to accelerating climate change. First, President Obama can establish American leadership in global climate change and energy policy, particularly a leadership accepted by the rest of the world. The State Department's appointment of Todd Stern as Climate Change Envoy should help in this respect. Second, Obama faces a tricky diplomatic challenge – not least because of his executive inexperience – of bridging two camps in the climate change debate. In one camp are many developed countries, mainly EU member states, who are willing to commit to emissions targets which bind both developed and developing countries, despite lack of full global commitment. In the other camp are those who will not participate without sufficient international agreement to limit emissions. These include developing countries, like China and India, who push for application of the UN's 'common but differentiated responsibility' clause. These also include the US Senate, who in the 1997 Byrd-Hagel Resolution unanimously refused to sign up to any protocol that does not contain binding commitments from developing countries, which are not present in the Kyoto Protocol. As a fresh face in the debate, President Obama can

endeavour to forge a bridge between all of these parties. Third, in executing policies on alternative technology, to which he has already committed, President Obama can ensure that they are implemented through market mechanisms, rather than through bureaucratic channels. Accordingly, the US government should focus expenditure on investment in areas like venture capital and basic research. Otherwise, it risks tying itself to projects that offer diminished return – which is widely recognised to be the case with Germany's subsidies to photovoltaic technology.

The melting cog

The evidence of climate change on the Arctic seems to indicate that we may be reaching a stage at which feedback mechanisms dominate and climate change accelerates faster and faster each year. Some say we have already reached it. No matter which scenario we are in at the moment, science demonstrates that the Arctic 'cog' is indeed changing and threatens to spiral out of control in a way that will alter the global climate system. It remains to be seen whether effective international collaboration can now materialise.

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Clashing styles in the Arctic: International law or *fait accompli*? – Matt Stone¹

When Russia invaded Georgia in August 2008, the European Union (EU) reacted by papering over its differences with Moscow and changing the topic. Because Brussels could not credibly challenge Moscow with hard power, it sought to constrain Russian action through a flurry of diplomatic demarches and multilateral agreements. Leading neoconservative scholar Robert Kagan has called this contrast of styles Europe's post-modernism and Russia's modernism. Similarly, the international legal scholar Christopher Borgen has identified a "normative friction" that occurs where the European conception of public order rubs against the Russian one.

It is this interplay of contrasting styles – European, and broadly Western, adherence to international legal norms, and Russian partiality to *realpolitik* – that will determine the final status of the Arctic. In the gradually expanding competitive space north of the Arctic Circle, Western fidelity to international law will face a strong challenge from Russia's attempts at establishing a *fait accompli*.

In the absence of large-scale commercial exploration, only educated guesses have been ventured about the region's hydrocarbons potential. In 2008, the U.S. Geological Survey estimated that, given the current state of technology, there are 90 billion barrels of recoverable oil, 44 billion barrels of recoverable natural gas liquids and 1,670 trillion cubic feet of

recoverable natural gas in the area north of the Arctic Circle. None of those resources have been tapped due to the harsh climate, lacking technology, and polar ice. However, with the accelerating pace of polar ice shrinkage due to anthropogenic climate change and rapidly advancing deep-water drilling technology, commercial exploration and exploitation could become technologically and economically viable within the next decade or two.

The opening of an Arctic energy frontier is complicated by the lack of a final legal resolution of the region's status. Some bilateral territorial disputes remain outstanding, including those between Canada and the United States, and Norway and Russia. Additionally, many of the eight Arctic littoral states have made some claim to a continental shelf that extends beyond the 200-nautical-mile exclusive economic zone prescribed in the U.N. Convention on the Law of the Sea (UNCLOS). The most prominent of these is the dispute over the Lomonosov Ridge that Russia, Canada, and Denmark (by way of Greenland) might legitimately make some claim on. To complicate matters further, the U.S. has never acceded to UNCLOS, which adjudicates continental shelf disputes through the Commission on the Limits of the Continental Shelf (CLCF).

American reticence on UNCLOS might change over the next year. The Bush administration made public its support for UNCLOS in May 2007. In a presidential directive issued on 9 January 2009, the White House indicated its willingness to "consider, as appropriate, new international arrangements or enhancements to existing arrangements" as "human activity in the region [the Arctic] increases." The directive went further by declaring:

"The Senate should act favorably on U.S. accession to the U.N. Convention on the Law of the Sea promptly, to protect and advance U.S. interests, including with respect to the Arctic. ... [Joining] will secure U.S. sovereign rights over extensive marine areas, including the valuable natural resources they contain. ... And it will give the United States a seat at the table when the rights that are vital to our interests are debated and interpreted."

Given President Barack Obama's stated support for U.S. accession to UNCLOS and the Democrats near-filibuster-proof majority in the Senate, it now seems clear that Washington will make a legitimate push toward accession, barring an eleventh-hour filibuster by a Republican senator. American accession to the treaty would serve as a strong signal to Europe and Russia that Arctic disputes should be resolved in multilateral fora and not through strength of arms.

This contrasts sharply with the rhetoric of military confrontation emanating from Moscow. In its draft "strategy of national security of the Russian Federation until the year 2020," the government declares that "the struggle for the hydrocarbon resources can be developed to the [extent of] military confrontation ..., which can result [in the] violation of balance on Russia's borders." The document specifically indicates the Arctic as an arena for geopolitical competition.

True to form, in August 2007, a Russian expedition planted a Russian flag on the seabed at the North Pole. The stated purpose of the expedition was to collect mineral samples to further Russia's case in the CLCF that the Lomonosov Ridge is an extension of its continental shelf, yet the brazen media stunt convinced many observers that Moscow would eventually issue the international community a *fait accompli* about its political and economic rights in the Arctic. As John Pike, director of GlobalSecurity.org, pointed out to CNN, "The Russians have got a half-dozen icebreakers. Americans have a pair of icebreakers, but they are old and worn out." The facts on the "ground" in the Arctic do not favour a multilateral resolution to these disputes, especially if the final decisions do not come down on the side of a government in Moscow that believes control of hydrocarbon resources is its ultimate source of strength in international affairs.

Actual exploitation of Arctic hydrocarbons will not occur for many years yet: polar ice must shrink more than it has, deep-water technologies need more time to develop, and the price of oil must return to its triple-digit heights. Despite these impediments, disputes over the legal status of the region may not ultimately hinder unilateral

development of specific areas, including the Lomonosov Ridge region. Whereas the West has settled on a broad acceptance of international legal norms to govern a virgin energy frontier, Russia is likely to seek a *fait accompli* that will entrust a large percentage of the Arctic's bounty to the Kremlin. This competition will only go to the West if it is willing to back international law

with a combination of hard and soft power. Otherwise, the Arctic may go the way of Georgia – strategically important, tactically forgotten.

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Geopolitics In the Arctic: The Russian security perspective – Dr Katarzyna Zysk¹

The Arctic – a new strategic playground

The Arctic is increasingly attracting international attention. A range of factors have focused the world's eyes on what was hitherto a backwater in international politics and relations. Among the most important are: climate change; the prospects for easier access to Arctic energy and other natural resources; a possible opening up of new commercially attractive and significantly shorter maritime transport routes between Asia and Europe; and the fact that vast parts of this promising region remain *terra nullius* – a land belonging to no one. The thawing Arctic ice has brought to the surface long-standing border disputes and other unresolved legal issues in the region. These include the delimitation of exclusive economic zones, the definition of the limits of continental shelves, and disagreements on the application of legal principles governing marine passages. Indeed, there is a growing awareness in capitals around the world that security challenges emerging in the Arctic have the potential to more broadly affect international affairs.

Actors with a stake in this region, especially the five polar states, have asserted their interests and expressed readiness to take measures to protect them. Canada's stance (as summarised by Prime Minister Stephen Harper in a famous 2007 catchphrase, 'Use it or lose it') has been among the most resolutely articulated national ambitions. Equally, in January 2009, in one of its final actions the Bush administration issued a directive on Arctic policy. The European Union has also turned its attention northwards, as has the European Security and Defence Assembly

(Western European Union). Furthermore, the security implications of the changing conditions in the Arctic have raised the interest from NATO.

Russia has been among the most determined Arctic players. A strong focus on the region has increasingly been a part of Russian domestic and foreign policy discourse, particularly since Putin's second presidential term. The assertive Russian rhetoric about protecting national interests in the Arctic has been followed up by a range of steps aimed at strengthening Russia's position in the region. In September 2008 a new Arctic strategy described the region as Russia's main base for natural resources in the 21st century. High-ranking Russian politicians have stated publicly that the previously inconsistent Russian northern policy was now a thing of the past.

Russian authorities stress the decisive role the Arctic will play in the country's further social and economic development and competitiveness. According to President Dmitri Medvedev, the Arctic provides 20% of Russian GDP and 22% of Russian exports. The interest in the oil reserves in the region has been fuelled by the Russian economy's heavy reliance on energy extraction, of which the Arctic's share is expected to grow rather than diminish. Indeed, according to Russian sources, up to 90% of hydrocarbon reserves found on the entire Russian continental shelf are in the Arctic. As a result, defining the limits of the country's continental shelf has become a top priority.

There is little doubt that Russian policy remains of crucial importance to all actors involved in the Arctic. A better understanding of the Russian view of the strategic situation is a prerequisite for developing an adequate response to the challenges in the region. It is also a necessary condition for development of an efficient dialogue

and cooperation with Russia as a crucial regional actor.

Russia operates with different approaches to a range of problems in the Arctic. One of them is confrontational and phobic, based on an assumption that the interests of Russia and the West are diverging, and that the United States is particularly interested in 'keeping Russia down'. The Western presence, especially the military presence in the High North, has therefore been observed with mistrust and as a reflection of anti-Russian strategic agendas. This approach is fairly consistent with the general thrust of Russian security policy in recent years.

The other approach is based on a commitment to the rules of international law. Despite its newfound assertiveness, in terms of official policy Russia has been following a rather pragmatic line where the High North is concerned. Indeed, it has acted in compliance with international law in pursuing its territorial claims. This policy line was recently reaffirmed in the Ilulissat Declaration signed in May 2008 by Russia and the four other Arctic Ocean states. The importance of international law has been repeatedly stressed by Russia's leadership and reflected explicitly in core foreign policy documents.

This article focuses on the first of these approaches; an approach that has come to dominate the Russian attitude to 'hard security' issues in the region. Tentative conclusions about policy implications can only be drawn when the elements presented here are analysed within a broader setting of Russian High North discourse and policies. In other words, the harsh Russian rhetoric quoted in this article does not necessarily have to lead to equally alarmist conclusions. For Russia's partners, though, the challenge may be to choose which language they should listen to.

The Russian security and defence perspective

An Arctic policy document endorsed by the Russian government in 2001 stated that all types of activities in the region are directly linked to Russia's security and defence interests. Such elements of Russian security thinking can be

traced back to the Soviet period and assessments of the military strategic importance of the north-western region. Above all, the region's value is related to the sea-based nuclear forces of the Northern Fleet, operating from its bases on the Kola Peninsula. Broadly speaking, the perceived weaknesses of Russia's conventional forces have led to the strengthening of the role of the nuclear deterrent in its military strategy. The maintenance and upgrading of this nuclear capability has therefore been given the highest priority in the modernisation efforts of the Russian defence.

Old patterns in Russian approaches to security in the High North are visible in the way other actors in the region are viewed through lenses of a classical *Realpolitik*. The view of the US and NATO as a threat to Russia's security is still widely held in large parts of the Russian political, military and academic elites. Russian analysts and decision-makers frequently see a broad anti-Russian agenda among America and its allies, aimed at undermining Russia's positions in the region and bolstering America's and NATO's standing. Consequently, the Alliance's infrastructure and military exercises in the immediate proximity of the Russian borders have been observed with some suspicion. The international attention devoted to the region has strengthened the conviction that other actors may attempt ousting Russia. In September 2008 the Secretary of the Russian Security Council and former chief of the FSB, Nikolai Patrushev, warned that "If we do not take action now, we will lose precious time, and later in the future it will be simply too late – they will drive us away from here".

Similar reasoning has been evident in Russian responses to Norwegian management of the Svalbard archipelago, and to legal measures aimed at protecting the islands' environment. There is a widespread conviction that this policy aims to drive Russia away from the archipelago. This has been a source of concern, as a weakening of the Russian presence at Svalbard is believed to lead to a deterioration in Russia's Arctic position.

A potential for conflict in the Arctic?

As most other actors in the Arctic, Russia views a large-scale military confrontation in the region

as unlikely. However, a possibility that international competition could result in small-scale confrontations over contested claims – based primarily on access to and control of energy – has not been excluded. According to the Russian daily *Kommersant*, such a scenario was recently spelled out in the draft of the new national security strategy. The strategy document lists the Barents Sea and other parts of the Arctic as regions with particularly strong potential for confrontation.

Although the likelihood of an armed conflict seems to be remote, Russian military activities in the region have been on the rise. Russian authorities strongly emphasise the importance of a continued and reliable military presence as an essential tool in securing national interest and strengthening the country's influence in the Arctic. With this aim in mind, the Russian Ministry of Defence (MoD) in July 2008 let it be known that the Navy would strengthen its active presence in the Arctic waters, including in the Svalbard zone. High-level representatives of the Russian MoD have emphasised that the military should be ready to conduct exercises in the Arctic to uphold the country's jurisdictional rights. These same sources claim that modifications in the combat plans of formations and units of the Leningrad, Siberian and Far Eastern military districts were being made with a view to possible future military action in the High North.

But despite the harsh Russian rhetoric, it seems unlikely that Russia would push for a confrontation in the region. One of the region's biggest assets as a promising new site for energy exploration and maritime transport route is its stability. As the report to the WEU Assembly on High North policies stated in November 2008, given the importance of the Arctic to Russia it is likely that the country's leadership will avoid actions that might undermine the region's long-term stability and security.

Conclusions

Russia has vital military and economic interests in the Arctic. The recent focus on the region has fuelled Russian insecurities and may spur a future increase in Russian military activity in and around

the region. Such a Russian approach to the High North – in effect, viewing relations in the region as a zero-sum game – could have devastating consequences, including a negative impact on bilateral and multilateral cooperation.

As stressed above, although this hard-line Russian attitude is the most visible, it is only part of a more complex picture. The problem is, however, that this harsh rhetoric tends to dominate the debate and attract the attention of the outside world, which is then forced to articulate a response. Over time the risk is that the Russians' tough power language will undermine the positive results of the more rational Russian and thus have a counter-productive effect on developments in the region.

Russian security and defence policy in the High North and in the Arctic shows that regional relations with Russia are inevitably connected to Russia's relationship with the United States and NATO. Indeed, regional cooperation on security and defence will, to a large degree, be an outcome of developments within that general framework. Thus, further cooperation with Russia in the Arctic will depend not least on how the Obama administration will approach a range of international issues that have long soured US-Russian bilateral relations and Russia's relations with the West.

The financial slump and the dramatic fall in energy prices have highlighted the fragile foundation of Russia's ambitious economic and military projects. It is not inconceivable that the Russian government will choose to respond to the mounting difficulties by sharpening its anti-Western rhetoric, hoping to turn away ordinary Russians' attention away from pressing domestic problems. But equally the global economic downturn has limited Russia's room for manoeuvre, and signals sent by Russia's political leadership at the beginning of 2009 point in a more positive direction. Under a best case scenario, this newfound sense of urgency may create a 'window of opportunity' for diplomatic progress in US-Russian relations including challenges emerging in the Arctic.

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Climate Change and Arctic Economies – Richard Campanaro¹

The Arctic is a land of immense diversity. Populated by only four million people, it is on the front line of anthropogenic climate change. Over the past fifty years, it has witnessed some of the largest temperature rises on the planet, as much as 3 to 4°C in Alaska and Canada's Yukon and Northwest territories. The resulting environmental changes, from melting sea ice and permafrost to increasingly variable precipitation and wind patterns, are having serious effects on economies around the region. In this ongoing process there are no clear economic 'winners'. The long shadow of economic uncertainty casts its pall over the whole range of northern non-state economic actors, including indigenous communities, the fossil fuel industry, and international shippers.

Though separated by vast distances and differences, indigenous peoples are connected by their shared environmental adaptations. Their economic institutions reflect both their similarities and differences. Hunting, herding, fishing, and gathering form the backbone of their societies. Agriculture, the central institution in many southern economic systems, is almost totally absent, limited by long winters, short summers and low soil productivity. By transforming these ecosystems, climate change promises to forever alter the way indigenous peoples make their living.

Increasingly, communities around the Arctic are finding that traditional knowledge is at odds with their shifting environment. Progressively later freeze-ups on the coasts of eastern Siberia, Alaska and the Canadian Arctic have limited hunters' ability to travel safely across sea ice, the primary winter transportation corridor for the region's coastal populations. Among other impacts, this constrains their access to the marine mammals that constitute an important segment of local diets. Later winters have also forced the Saami of Scandinavia and the Kola peninsula to find new routes for their reindeer

herds, changing migration patterns and undoing millennia of evolved social behaviour. Traditional economic activities are being made more dangerous by unfamiliar weather patterns, which have led to more violent storm systems across the region and an increasing number of deaths. By raising the costs of hunting and herding, these unpredictable climatic swings are forcing many indigenous peoples to rely increasingly on supplementary income provided by wage labour and government subsidies.

The changing population and distribution of prey species is also having dramatic effects. The gradual thinning and retreat of arctic sea ice is directly affecting the region's seven primary marine mammals, including beluga and bowhead whales, the narwhal, ringed and bearded seals, the walrus, and the polar bear. These animals rely on sea ice for a variety of needs. The possible disappearance of summer sea ice over the next fifty to one hundred years would be disastrous for animals and indigenous peoples alike.

On September 16 2007, sea ice covered 4.13 million km² of the Arctic Ocean, an area slightly smaller than that covered by the European Union and a 39% decrease from the twenty-year average measured between 1979 and 2000. Four days earlier, global oil prices had hit an all-time high of \$80 per barrel. In a deeply ironic juxtaposition, circumpolar climate change therefore became equated with untapped fossil fuels, the very substances whose exploitation was primarily responsible for triggering climate change to begin with. With an estimated 90 to 200 billion barrels of oil and a third of the world's undiscovered natural gas, the fossil fuel potential of the Arctic is undeniable. Nevertheless, the likelihood of its immediate exploitation remains doubtful. Public commentators, casting their eyes on Russia's west Siberian and Barents Sea fields, assume that success in one sector of the Arctic foreshadows similar success elsewhere. However, western Siberia and the Barents Sea are special cases in the polar world. Both are mild, warmed by the northern arm of the Gulf Stream that keeps sections of the Norwegian and Barents Sea relatively ice-free. Compared to conditions farther east, these corporate and state ventures face relatively few environmental

constraints. Operators in other maritime and terrestrial areas of the Arctic face more uncertain environmental futures.

Offshore drillers are the most likely to benefit from the long-term ecological effects of climate change. By opening more sea-lanes to maritime traffic for longer seasons, warming trends may reduce the currently high costs of exploration, construction, maintenance, and transportation. Nevertheless, uncertainty remains. Increasingly common storm systems and severe coastal erosion may undo some of the cost savings that might accrue to businesses from a warmer sea.

The future of terrestrial oil and gas exploration is more unclear. These businesses are literally rooted in arctic permafrost. Their infrastructures are built on frozen ground. Over the past thirty years, a 2°C warming trend in the permafrost has led to a halving of the number of days during which the Alaskan Department of Natural Resources permits heavy vehicles on the tundra. This equates to a 50% shorter season during which heavy exploration and drilling equipment can be used. The effects of permafrost melting are particularly marked along the coast of the Arctic Ocean, where it has contributed to severe erosion around the ports, with the threat of even higher communication and transportation costs. The costs associated with this warming trend will be very high. Old buildings and port facilities will have to be retrofitted to cope with changing conditions. Thus, while a warmer Arctic may reduce some environmental constraints, its knock-on effects for infrastructure and travel will make the coming decades an increasingly challenging time for its terrestrial oil and gas industries.

Though the summer sea ice in 2008 did not reach the minimum extent seen a year earlier, the season was marked by two important events. It saw the first recorded instance in which both the Asiatic and American transpolar sea-lanes, the Northern Sea Route (NSR) and Northwest Passage (NWP) respectively, were simultaneously ice-free. It also saw the lowest-ever recorded overall volume of arctic sea ice, with thin first-year floes making up 73% of the March ice pack. These events foreshadowed the beginning of a new era of activity for transpolar shipping, which

could cut as much as 40% off shipping distances between East Asia and either Europe or the east coast of North America via Suez and Panama.

States and companies will need to overcome several obstacles in order to realise this potential boon. First, governments will need to provide adequate support to ships passing through their waters. This will require considerable spending on port, search and rescue, and pollution control facilities, as well as the construction of icebreakers capable of operation in the increasingly variable ice conditions. To date, neither Canada nor Russia, the states most immediately concerned with the NSR and NWP, have made the necessary commitments. Port and support infrastructure on the NSR has become increasingly dilapidated since its heyday in the late 1980s, when the Soviet Union poured resources into its maintenance. The Canadian Arctic lacks all but the most rudimentary facilities. Icebreaker capacity is in even worse shape, having decreased in both countries since 1990. Russia has made a move to ameliorate its capacity shortfalls, commissioning its first polar class vessel since the fall of the Soviet Union. A recent order by the Canadian government for six ice-capable coastal patrol ships will provide some support, though they will need to leave the Arctic before the winter freeze-up and will be based in southern ports rather than constituting a truly arctic force.

Companies will also need to make considerable investments in order to take advantage of transpolar routes. In order to operate safely in arctic waters, vessels need to be reinforced to withstand contact with first-year ice. Such vessels, which cost significantly more than normal container ships, will only be able to take advantage of transpolar routes for a few months every year. Current estimates from the Arctic Monitoring and Assessment Programme (AMAP) of the Arctic Council foresee the NSR's summer shipping season extending from the current 30 days to an estimated 90 to 100 days by 2080. Companies will also need to hire or train ice-ready crews with the special skills necessary in arctic waters, whose wages will increase alongside demand for their services. Finally, given the inherent risks of arctic travel, companies will face significantly higher insurance premiums.

A few general conclusions are immediately apparent. First, indigenous economies are under threat from unpredictable weather patterns, polar melting, and changing animal populations. Sustainable indigenous economies will only emerge once the economic benefits accruing to companies and states from industry and resource exploitation in the Arctic are shared with the populations that first spearheaded humans' occupation of the polar landscape. Second, climate change will adversely affect the costs of doing business on the Arctic mainland, where expanding active layers of permafrost will undermine infrastructure and shorten winter

transport seasons. Finally, the retreat of sea ice, while opening up new sources of fossil fuels and previously ice-bound maritime trade routes, will not translate into immediate economic benefits for businesses or communities. Both companies and governments will need to make significant infrastructure investments before realizing their potential economic windfalls. Only then might the Arctic economy live up to some of the expectations that have been heaped upon it.

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Microclimates – Top stories in energy and environment

Nuclear reactors

The Swedish government has decided to abandon a 30-year-old ban on nuclear power in hopes of lowering reliance on fossil fuels and meeting target cuts for carbon emissions. The decision, which still needs approval by the national parliament, is expected to become a main topic in the next elections with the opposition parties firmly against the move. However, even if passed, the plan is not expected to receive any state funding. If the plan is approved in parliament, Sweden will join a growing list of countries, including Britain, France, Poland and Finland, who are rethinking nuclear power and planning for new reactors in the near future.

<http://tinyurl.com/d7vjex>

Plans for an energy island announced

Plans to build a hydroelectric plant on a man-made island off the coast of the Netherlands have been announced. The Dutch government has indicated an interest in being an investor. The hydroelectric plant will act as a back up to wind energy by ensuring that electricity is still generated when the wind drops; it will also provide extra peak-time capacity. The project,

which could be operational by 2020, will generate enough electricity to supply two million homes.

<http://tinyurl.com/5qbgcd>

Ambitious EU renewables law deal secured

EU governments and the European Parliament have agreed to a far-reaching new directive to boost EU renewable energy use to 20% by 2020. According to the new legislation each EU country will be required to significantly increase the contribution of renewable energies to its energy mix, leading to an overall EU share of 20% by 2020.

Producers of renewable electricity are set to receive preferential access to EU grids, which contains further provisions to cut the red tape blocking renewable energy uptake in many EU countries. Member states will also be permitted to link their national support schemes with those of other EU states, and will be allowed under certain conditions to import 'physical' renewable energy from third-country sources. 'Virtual' imports – based on renewable energy investments in third countries, however, cannot be counted towards national targets. Finally, Member States will be able to sell or trade excess renewables credits to another Member State.

<http://tinyurl.com/4w2gpg>

Delegates leave Poznań with mixed feelings

The UN climate summit that took place in Poznań, Poland, in early December ended with little tangible progress taking place. The single major accomplishment of the conference was to finalise discussions on the management of the Adaptation Fund – a project which aims to finance projects that reduce greenhouse gas emissions in developing countries – allowing countries to begin receiving funds. It is generally recognised, however, that the available funds are far lower than will be required. Still, (as the Stockholm Network highlighted in the *Carbon Scenarios* project from last year) such action could amount to an important step towards mitigating the worst effects of climate change.

While some Western countries feel that the Poznań discussions made the piece-meal progress necessary for a post-Kyoto deal in Copenhagen in December this year, developing nations as well as environmental groups are doubtful that enough concrete progress will be made in time for a new, meaningful agreement later this year.

<http://tinyurl.com/57gbgo>

Carbon mouseprint

A Harvard physicist has released a study asserting that one Google search produces about 7g of CO₂, which is allegedly the equivalent to boiling the water for half-a-cup of tea. This is because Google utilises several data banks simultaneously to conduct its search function. This, together with operating the servers and home computers of end-users, constitutes the calculation of 7g CO₂ per search.

Google, however, refutes the study, saying that because a typical search returns results so quickly, the energy it expends is equivalent to 0.2g of CO₂. Google also points to its efforts to cut energy consumption by computers in half by 2010, which it says will reduce global CO₂ emissions by 54 million tonnes per year.

<http://tinyurl.com/9thk9k>

Gas squabbles

Russia and Ukraine were embroiled in a three-week standoff in January, which led to supply cuts to millions of businesses and residents in almost 20 countries within Europe. EU countries import a quarter of their gas from Russia and 80% of it comes through Ukraine.

The row was reportedly due to a dispute over unpaid debts and new prices. Russia and Ukraine have since signed a new gas deal, which they say should resolve payment discrepancies. Many experts say this incident underlines the need for Europe to diversify its energy suppliers, such as through the Nabucco pipeline or alternative energy development.

<http://tinyurl.com/cav4vk>

'Clean' heat

A study recently published by France's Atomic Energy Commission, indicates that rising temperatures across Europe stem from fewer foggy or hazy days between 1970 and 2000. The study attributes this decrease of particles in the air to improved government regulations and the closure of Communist-run coal factories in Eastern Europe.

However, the study shows that the decline in foggy or hazy days has slowed since 2000, and predicts that further improvements in air quality and visibility may be limited in the future, leading to less rapid increases in temperatures.

<http://tinyurl.com/ajxwb4>

Pipe dreams

Meeting in Budapest in January, consortium countries of the Nabucco pipeline - which would channel Caspian and, conceivably, Middle Eastern gas to Europe via Turkey - were unable to settle the financing and logistics of the project. Both Hungarian Prime Minister Ferenc Gyurcsany and Czech Prime Minister Mirek Topolánek, whose country currently holds the EU presidency, are asking the EU to help finance the pipeline. However, European Energy Commissioner Andris Piebalgs has said that EU grants will not be

available for now. The European Investment Bank and European Bank for Reconstruction and Development, though, have indicated that loans may be a possibility.

The consortium countries were also unable to work out the key issue holding up a transit agreement - Turkey's demand to receive up to 16% of the gas that would pass through its country. Azerbaijan, likely Nabucco's principal supplier, opposes Turkey's position. The European Commission has said it will attempt to resolve the transit issue through bilateral talks between the EU and Turkey.

<http://tinyurl.com/ak4kj3>

Hillary Clinton appoints Climate Envoy

The US State Department has appointed Todd Stern, a former energy advisor in the Clinton administration, to be its special envoy to the UN and other climate change talks. Secretary of State Hillary Clinton has said his task will be to work towards a US and global commitment to emissions targets as well as the development of clean energy policy. She hopes Stern's appointment will demonstrate to the rest of the world fresh American leadership on global climate policy. Stern has accompanied Clinton on her first state trip to Asia, in an effort to broker a special climate change partnership with China.

<http://tinyurl.com/deducq>

Where's the air care?

Twelve EU Member States are in threat of prosecution by the European Commission for failing to meet EU standards on air quality. The Commission has warned the countries that EU standards on levels of a particulate matter, PM10, set in 2005 have not been met and serious action, such as financial penalties, may be taken. Britain, one of the twelve countries in violation of the air quality directive, plans to request an extension to reach these standards and if granted, will have until 2011 to satisfy the criteria.

<http://tinyurl.com/cdjs7t>