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"The Challenges and Opportunities in the High North - *with Global Warming*"

Based on Valsson's new book
"How the World will Change – with Global Warming"
(The book can be read and bought on www.howtheworldwillchange.com)

Abstract

The impacts of global warming will be very different from one part of the globe to another. Generally speaking, those regions that are already very hot and dry, will be worse off, whereas areas that are now cold will be better off, if they have got enough water. These areas are mostly in the High North: in Northern Scandinavia; Iceland; Greenland; Northern Canada; Siberia and Alaska.

The warmer and longer summers and shorter and milder winters, have already made habitation, transportation, agriculture, fishing, etc. much easier in these regions. With continued warming the High North may eventually have a climate similar to that of Northern Europe today.

Of course, there are also changes in other aspects of climate that will cause problems in the High North, as in other regions of the globe. These include, for example, changes in weather patterns, wind intensity and precipitation that, at least for some time, will be hitting regions with little warning.

These changes have already led to many adaptation tasks. As these irregularities may continue into the future this calls for a new "design philosophy". This philosophy entails that technologies, construction and plans are designed to meet more unexpected and challenging climate conditions than before.

The three key words in this new design philosophy are: simple, robust and resilient.

Of most consequence for regional development in the High North is the retreating of the Arctic sea ice. This has already made shipping in the Arctic Ocean easier and, eventually, year long shipping lanes will be open between the North Atlantic and the North Pacific Oceans. These routes are shorter than today's routes through the Suez and Panama Canals and do not have their size and capacity constraints. Reduced ice in the Arctic Ocean also means easier access to resources like oil and gas, and fishing will increase greatly. Recently the nations bordering the Arctic have started to realize better the immense resource potentials and the increased geopolitical importance of the Arctic, so "the race is on".

The two big players are Canada and Russia, but the USA (Alaska), Denmark (Greenland), Norway, Sweden, Finland and Iceland are smaller players. In the history of land reclamation in the world, the large, powerful nations always have an advantage. They can for instance threaten, influence, patrol, do research and establish presence. The five small Scandinavian countries (total population only 25 million) need to create a task force within the Nordic Council of Ministers to create policy on how they can unite their strengths in the various battles for rights in the Arctic that are now taking place.

Introduction

In December 2006 the author of this paper, published the book *How the World will Change – with Global Warming*. The book starts by giving a general overview of what is believed to cause global warming and also what attempts are being made to try to reduce it.

Many reports have been published on the consequences of global warming. One of the best was commissioned by the *Arctic Council*. This is the *Arctic Climate Impact Assessment* report (ACIA 2005). This report, like most such reports, puts emphasis on the changes in climate and the impact of these changes on living nature. Much less attention is given to what the consequences will be in terms of human habitation and human infrastructures.

The ACIA report describes how the High North and the Arctic will warm much more than the rest of the world; probably by 4-7°C in this century. The reason for this is that, as snow and ice retreat, the land and the oceans start to absorb much more heat than earlier.

The book *How the World will Change – with Global Warming* presents a planner's vision of what the changes in climate and nature will lead to as concerns human settlements. It presents both impacts on the local/regional scales, where several adaptation measures can be instrumented, but also global changes where relocation and migration are recommendable strategies.

This paper builds on material from the book and starts by giving an overall global picture. Then it drafts a picture of what the Arctic will look like in the latter half of this century and finally outlines what will be the impacts of these changes on the Nordic countries. Here the focus is on opportunities created by these changes. It does not overlook the various challenges, however, not least in terms of planning and environmental protection.

The Global Overall Picture

Today the governing structure of the world is that of a ribbon around the globe. Through technological advances and global warming, the edge of this habitable ribbon is spreading rapidly north into the Arctic. As most of the Polar ice has disappeared in the summer, around 2040 and earlier if the most resent trends continue, the Arctic Ocean will provide excellent access to the huge resources of the Arctic rim, with ships sailing, via ice-free rivers, into the vast spaces of Siberia, Northern Canada and Alaska.

If the warming continues into the 22nd century, many of the central areas of the globe will become uninhabitable. This would mean that the world structure of the future would primarily be that of the semi-globe of the northern hemisphere with the Arctic – that today is the periphery – at the centre. Prophetically this world structure, that will unite the world over the Arctic, was chosen to become the logo of the United Nations sixty years ago.

Today, economic activity is mostly limited to the developed ribbon around the world that we know from the flat world map. On such a map the High North is an outer fringe that stretches along the map's upper edge. This map gives a very distorted picture of the spatial realities of the globe; it belies the fact that all northern areas come together in the Arctic and that the main land mass areas of the globe circle around it.

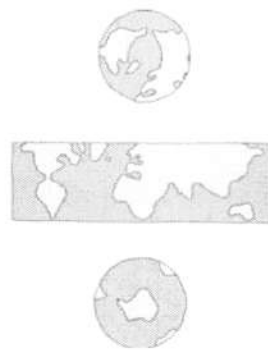

Figure 1. Today's ribbon map of the world only shows the middle of the globe. It does not show the polar areas, presented here as two separate circular pictures.

The next picture shows the High North areas of the globe – here not seen directly from the top but rather more from the European side. In this way the Arctic and most of the land mass of Earth can be shown in one, only slightly distorted, global picture.

Figure 2. Arctic and sub-Arctic areas, grey on the map, are today difficult for habitation. Global warming and reduction of the sea ice will make them more approachable and important for future development on Earth.

As, in about 50 years, the Arctic has been activated by global warming, the subsequent interconnection of the areas and oceans of the Northern Hemisphere will start to take off. This, together with a gradual spreading of people and bio and climate zones northward, will mean the start of an epoch in which the shift from the spatial system of the ribbon to the spatial system of the semi-globe will take place.

This shift is very dramatic because the Arctic, that today is the area furthest away in the system of the ribbon, will become the very centre in the semi-global system of the Northern Hemisphere in the future or - by putting this more generally: This will lead to a new world structure, with the Arctic in the middle.

The following two figures show the described spatial systems of the ribbon and the semi-sphere, graphically.

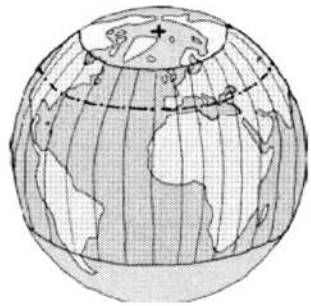

Figure 3. Today's worldview is that of the ribbon, but the influence of the spatial characteristics of the sphere are becoming ever stronger.

Figure 4. The transfer from the ribbon world to an overall global world will not be completed because the semi-global world - shown above - will take over.

The Arctic

The Arctic is not accounted for in today's ribbon view of the world. The main reason is that it has been covered by snow and ice. After the political thawing of the Cold War and in response to the thawing of Arctic pack ice already begun because of global warming, the eight Arctic countries – the USA, Russia, Canada and the five Scandinavian countries – started formally co-operating about potential changes, founding the *Arctic Council* in 1996.

In the last few years it is becoming ever more apparent that a fast melting of the polar ice is taking place. This melting will, ever more, open the Arctic Ocean floor and the Arctic rim to exploitation of the immense resources located there.

It is not only global warming and the enormous natural resources, however, that will make the Arctic regions very important in the world of the future. It is also its central location in the land mass of Earth and the short, direct sea routes to the

main population centres of the globe in the North Atlantic and North Pacific spaces.

The Arctic has not been enjoying the benefit of the short distances because of the sea ice that has been covering most of the Arctic Ocean. The Arctic sea ice is now retreating fast and by 2040 there will be easy access to the resources of the Arctic, and even today to some areas. Also the sea routes between the North Atlantic and North Pacific spaces will be navigable the whole year with specially built ships.

Large transhipment harbours will be needed at both ends of the Arctic shipping lanes, both at the Bering Strait and at the gates into the Atlantic between Greenland, Iceland, Norway and the UK.

The following picture shows the main Arctic sea routes of the future – and the location of two possible transshipment harbours (the circles).

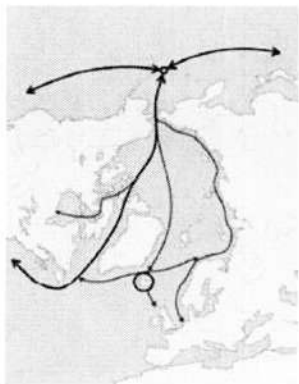

Figure 4. Once most of the sea ice has disappeared, also in the winter, in the late 21st century, world shipping will become a catalyst for still stronger development in the High North.

Importance of Traffic

Where traffic goes areas thrive, but in areas of little transportation not much happens. The main reason why Greenland, Iceland and Northern Scandinavia did not thrive in older times was not so much the cold but rather their location on the edge of the navigable area of the world. This changed dramatically with the advent of steam ships, and the High North became a part of the habitable world.

As the Polar ice is now retreating rapidly and better ships and remote sensing are being developed, transportation, and thus the habitable edge of the world, is moving ever further into the Arctic.

The final stage of this development will be as the whole Arctic Ocean will be navigable, and as all-year sea route connection between the Atlantic and Pacific Oceans has become a reality. This will mean great activity in the Arctic sea routes, and very vigorous economic activity in many areas of the Arctic, because "where traffic goes areas thrive".

The way the Arctic sea ice retreats directs the way in which the sea routes develop. Because of the Gulf Current the Barents Sea by Northern Norway and Northwest Siberia is first becoming ice free, and the snow cover there on land is thus also retreating fast. This will be of benefit, for instance, for land and railway transportation in these areas.

The retreat of the ice is leading to new plans for a railway transportation corridor from China, where Narvik was chosen to become its Atlantic port (see the picture).

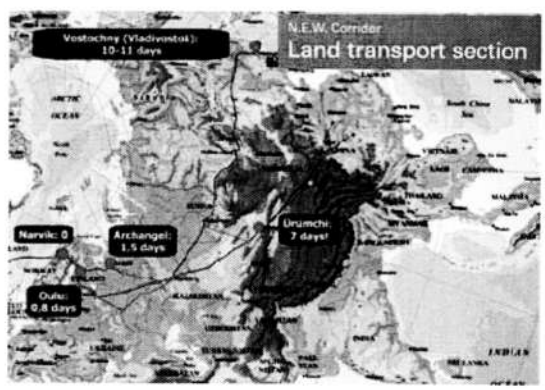

Figure 5. A new and improved Siberian railway project to connect the South-east Asian and North Atlantic markets, is now underway. Narvik is its Atlantic port.

The ever larger container ships are leading to the growing importance of transhippment harbours. These harbours need not be hubs of land transportation because it is mostly feeder ships that distribute the containers to other harbours. Large, safe harbours with enough

inexpensive, flat land are needed – which might be a problem in Narvik.

Reydarfjördur is the best possibility for a transshipment harbour in Iceland. As long as the Arctic ice closes the Arctic sea, exept the route close to Siberia and Northern Norway, a harbour in Reydarfjördur is out of the way to Europe – but Reydarfjördur is already directly enroute to northern North America.

Once the ships start to go over the North Pole Reydarfjördur is the perfect location, because then it is located at a spot where the routes between Europe, America and the Pacific will come together.

Today a large transhipment harbour is being planned in the old military harbour at Scapa Flow in the Orkneys. This harbour is planned to serve transportation between Europe and America but it also could serve as a hub for transportation to and from the Arctic later.

All of these harbours – Narvik, Reydarfjördur and Scapa Flow, together with Murmansk on the Kola Peninsula – could become important transhipment harbours for Arctic shipping, and would accordingly enhance regional development in their areas.

Areas of Resource Development

The three main types of resource development in the High North are *oil and gas, agriculture* and *fishing.*

First fishing and agriculture: In general it can be said that with increased warming of the North, productivity of all its life systems will increase. A crucial fact is that more precipitation will occur in the Arctic as it gets warmer, contrary to what will happen in many southern areas. With warming, vegetation in the North will actually become more "southern". Therefore the area will yield more and more valuable agricultural products in the future.

The increased warmth of the Arctic Ocean and increased amount of nutrients that will be discharged by the increasingly ice-free Arctic rivers, will mean that the Arctic Ocean will take a big leap in marine productivity.

Today some of the fishing grounds are closed by the Arctic sea ice, but as the warming continues the sea ice will continue to retreat.

The fact that large areas of the Arctic Ocean are shallow means, in addition to the retreating sea ice, that more sunlight can reach the bottom and make it a fertile ground for fish and other marine organisms. As fishing preferably needs to be a year round activity to reach maximum profitability, this highest productivity will not be gained until the sea ice has disappeared in the wintertime as well.

Maps that show the best future agricultural and fishing areas in the High North are not available. Such maps are needed so that planners can estimate where the main centres of these activities will be in the future. As concerns fishing it is clear that islands have an advantage as it comes to centres for fishing because from there the radius of reach covers such a wide ocean area. As fishing stocks will be spreading north, Jan Mayen and Svalbard will become important fishing islands.

Let us now look at a map where the most important oil/gas resources are located.

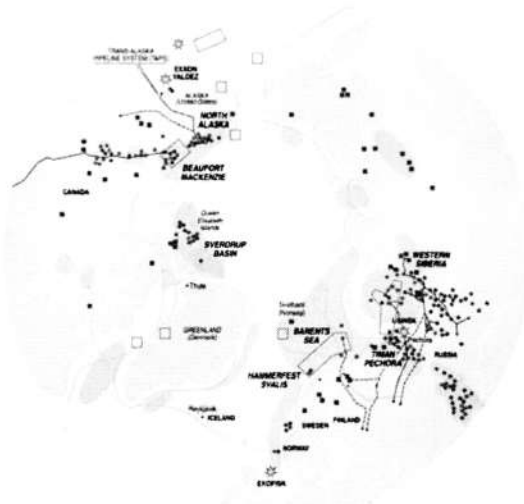

Figure 6. Lilac areas are prospective areas for oil and gas. Today's oil spots are green and gas red. As of now, most such activity takes place in Northwestern Siberia, in the Barents Sea, in the Mackenzie Vally in Canada, and in the Alaskan North Slope.

In the near future most new oil/gas activity in Scandinavia will happen in Northern Norway, in the Hammerfest-Svalis area and in Svalbard. Oil finds have also been confirmed at Jan Mayen, the Faroe Islands and on the west coast of Greenland.

It is not likely that many people would like to move their residence to these dark areas until the climate has become considerably warmer. The workers would therefore mostly live elsewhere, and go north for intensive work stints, as on oil platforms today. The economic and regional importance of these activities will, in spite of this, be great.

Disputes in the Arctic

There are four main fields of unresolved disputes in the Arctic: a) Sovereign rights pertaining to the regulation of fisheries, b) Decisions as to the northernmost extensions of the continental shelves in the Arctic, i.e. outside the 200 mile Exclusive Economic Zones.
c) Delimitation lines between coastal states, d) Rights and regulations concerning international shipping.

Nations and politicians are finally realizing, and accepting, that the globe is getting warmer. What arouses their interest is that the enormous areas and resources of the High North are opening up because of the retreat of the Polar ice. Rights to fishing and regulations in international shipping are also bones of contention.

Of late the world news has been filled with reports of actions where nations are trying to demonstrate the seriousness of their claims.

In July '06 Canada's PM Stephen Harper announced that Canada was ordering up to eight military icebreaker patrol ships and planning to build a naval base at a cost of 3.5 billion pounds sterling. Harper clearly stated Canada's position: "Canada has a choice when it comes to defending our sovereignty over the Arctic. We either use it or lose it. And make no mistake, this government intends to use it."

Also in July the Russians announced that their Arctic research expedition had proven that the Lomonosov Ridge continues from the Siberian continental shelf all the way to the North Pole. In accordance with international law they subsequently claimed an area outside their 200 mile EEZ, all the way to the North Pole (see the map).

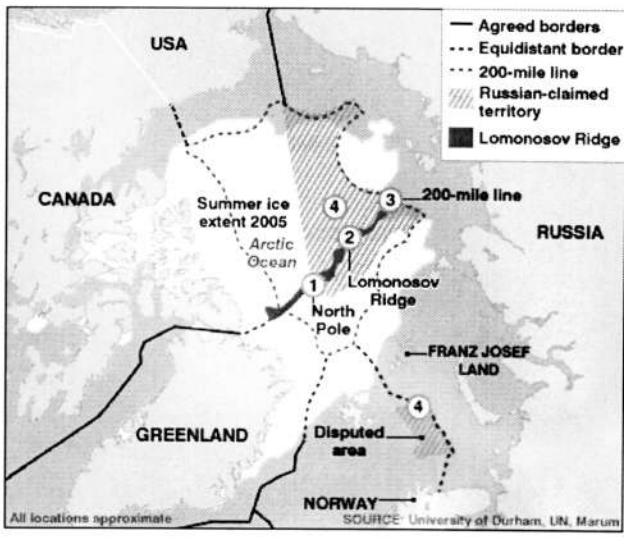

Figure 7. Russian claims in the Arctic. Brown shows the Lomonosov Ridge (nos. 1.2.3) and grey hatched deap sea-bed claims outside their EEZ, and also a disputed area in the Barents Sea, at the uncertain delimitation line with Norway (both no. 4).

The deap sea-bed claims of Russia outside its EEZ (no. 4 on the map) covers an area of 1.2 million km^2 (which is about 12 times the size of Iceland). In early August the Russians announced that they had used two submarines to place the Russian flag on the ocean floor at a depth of 4 km, directly on the North Pole, to confirm their claim.

The Danes, on behalf of Greenland, this summer also sent a research team into the Arctic aboard the Swedish icebreaker Odin. The main mission was to collect data showing that a ridge also extends to the North Pole from Greenland.

These are only examples of actions and research programmes that are underway on behalf of the eight Arctic nations in supporting their rights and claims in the Arctic.

In the history of land and ocean reclamation in the world, the large, powerful nations always have an advantage. They can, for instance, threaten, influence, patrol, carry out research and establish a presence.

The five small Scandinavian countries (total population only 25 million) need therefore to join together and to form a *task force* within the *Nordic Council of Ministers* to create policy on how they can unite their strengths in the various battles for rights in the Arctic that are now taking place. In order to strengthen their unity the *Nordic Countries* need to resolve as soon as possible all unfinished disputes among themselves concerning the Arctic.

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