

Arctic Futures: Future changes in activity structures of the globe

Gunnar Sander, April 2012

1. Project/publication	Valsson, T. and G.F. Ulfarsson 2011: <i>Future changes in activity structures of the globe under a receding Arctic ice scenario</i> . Futures 43 (2011) 450-459.
2. Initiator	Research work by the authors.
3. Objectives	Create a framework for mapping changes in future global activity structures in the view of future environmental change expected to occur if global warming continues unabated in the 21 st century. This is done by a schematic assessment in a GIS-system of how the world may change structurally in this century.
4. Geographical delimitation	The mapping applied is laid out to give a worldwide overview, with a special focus on the Arctic. The factors selected are chosen since they are assumed to be significantly altered by an extensive warming of the Arctic.
5. Time horizon	2100
6. Thematic focus	Future global activity and human habitability. The authors also refer to environmental impacts that may follow from the developments of economic activity, without elaborating more on it.
7. Images of the future	Future scenarios for how the world potentially will develop are showed in a series of maps produced by overlay analysis (see method description). The conclusion is that the High North in some respects is going to gain economically from global warming, whereas the central and southern areas of the globe will be negatively affected. However, these areas will also be subject to great ecological threats due to added activity and the exploitation of their natural resources, most notably oil spills.
8. Key driving forces	A basic assumption is that global warming will continue throughout the century. It is however unclear which assumptions are used; an article concluding with a global average temperature increase by 5-6° C if attempts to curb CO ₂ emissions are not successful, is only referred to.
9. Uncertainties / wildcards	The weights that are applied when performing overlays of the maps are subjective measures of the authors' opinion (as an "educated guess"). The numerical weights are presented for each analysis. The authors argue that weights can be changed according to context and influence, but that the "correct" weights are not important since the purpose is to add value to the debate of future impacts by spatially mapping out future scenarios.
10. Accomplishment and collaboration	Work done by the two authors.
11. Method	<p>The analysis is based on developing and interpreting maps that show how the changing climate will have an impact upon some basic habitability or activity factors. This is done in the following steps:</p> <ol style="list-style-type: none"> 1. Selection of four basic environmental features connected to global activity and habitability factors. These are: <ul style="list-style-type: none"> * Improved or worsened temperature change and water availability, * Gain or relative loss by Arctic shipping, * Gain or relative loss by Arctic oil and gas * Gain or lose by a Polar Centre that changes the global activities from a "ribbon that surrounds the globe" by equator to an area with the North

	<p>Pole as a spatial point centre.</p> <ol style="list-style-type: none"> 2. The selected features are interpreted on eight maps showing how negative or positive these factors are for global activity and habitability in different regions. The evaluation is made visual with two to four evaluation categories ranging from small to great impact. Numerical values are assigned to each category by subjectively weights. The maps are drawn in a GIS system. 3. Accumulated effects are illustrated by making a variety of overlay combination maps which show the net effects of what areas will be most influenced by the global changes, positively or negatively. <p>The maps produced in step 3 that are shown in the article are:</p> <ul style="list-style-type: none"> • Best Arctic oil + best shipping areas. This is mostly the coastal areas. • Best Arctic areas as an overlay of all the positive effects from all the factors mentioned in 1) above. Again, it is the coastal areas that will improve economically. • Today's areas losing relatively from Arctic shipping and a new Polar Centre. These areas are located furthest from the Arctic. The Panama and Suez Canal areas are mentioned especially as relative losers, even though absolute volumes of shipped goods may increase. • Today's areas losing relatively most from changes in all the four negative features of change. When adding climatic factors and Arctic oil to the previous analysis, negative impacts in the Southern Hemisphere, the USA and Central Asia are aggravated, mostly due to lack of water. <p>A brief discussion on whether international processes are in place to wisely guide new developments in the Arctic finalises the article before conclusions are drawn.</p>
<p>12. Sources of information</p>	<p>Main sources of information are the IPCC 2007 assessment report and the 2004 Arctic Climate Impact Assessment.</p> <p>In making the thematic map for gain by Arctic oil, maps from US Geological Survey of Arctic oil reserves from 2008 were applied.</p>
<p>13. Strengths</p>	<p>A brief overview of how climate change may affect the North versus other regions.</p>
<p>14. Weaknesses</p>	<p>The analytical definitions of concepts used and evaluations are unclear and simplistic. For example, the idea that higher temperatures and more water available is positive economically, is an oversimplification. Examples of the opposite are negative effects of melting permafrost for activities on land (petroleum, mining, transport etc), possibly also negative effects on (some) marine ecosystems and hence fisheries. "Polar Centre" seems to indicate a major shift not only in economic activity, but also in location of settlements to an area "with the North Pole as a spatial point centre". Power relations (the north as a semi-colonial periphery ruled from the outside versus an economic and political centre) and the likelihood of major population changes northwards are two objections.</p> <p>It is unclear how the initial maps are made. The one with the clearest reference is the mapping of Arctic oil from USGS. Here is a misinterpretation that resources indicated in their statistical geological analysis do exist and will be developed. Thus uncertainty in the resource appraisal and the potential for developing them (costs and prices, political factors etc), are neglected.</p> <p>The strength in a geographic approach with mapping is to give more nuanced information on spatial developments. This is not achieved in the current analysis due to the analytical weaknesses, the over simplified overlay analysis and the</p>

	<p>rough resolution of maps. Instead, the authors end up with an almost qualitative statement about how the North will gain economically from climate change and Arctic developments, whereas other regions will lose. Several reports have drawn similar conclusions without using mapping, and the mapping adds very little to it.</p> <p>The discussion of management in the Arctic is very superficial. It presents some facts about the working groups of the Arctic Council, without any reference to the efficacy of this body and its relation to international agreements. The section seems to conclude that the Arctic coastal states are best fitted to govern their adjacent seas and are in a good position to do so since they all have Environmental Impact Assessment processes.</p>
15. Attention and significance	No particular information.
16. Relevance for the Fram Centre	No particular.