

What happens when the ice is gone? An analysis of shipping and its effects in a potentially ice-free Arctic
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As the effects of global warming become more pronounced in the 21st century, changes in resource use and transportation become matters of concern. Specifically, the potential for global climate change to free the Arctic Ocean of much of its ice cover may lead to the establishment of commercial routes throughout the Arctic.

Though scientists are unsure of the extent to which global climate change or the Arctic Oscillation, a pattern of low and high pressure in the Arctic, are the causal factors in sea ice extent decline, there is consensus that the Arctic is quickly losing the extent and thickness of its sea ice. The National Snow and Ice Data Center recently reported that March 2006 had the lowest Arctic winter sea ice extent since satellite records began in 1979, decreasing from 5.72 million square miles in March 2005 to 5.6 million square miles in March 2006. In addition, sea ice is re-freezing later in the fall making the summer ice season in the Arctic longer by about 2 weeks, leading to an increase of six to nine percent in the shipping season.

The effects of such a change may be beneficial to the shipping industry due to reduced traffic time and costs. For instance, utilization of the Northwest Passage instead of the Panama Canal shaves 9,000 km off the trek and reduces overall shipping traffic and pollution. In addition, development of northern ports and increased access to unexploited oil and gas resources creates new jobs and enhances the economy. New ports such as Churchill on the Hudson Bay are predicted to generate 100 million dollars per year.

However, such changes may negatively impact the local environment, the marine mammals inhabiting the area, and the native peoples living there, as well as opening the area to drilling and mining. Increase local pollution and adverse impacts on the native communities in the area are only a few of the potential consequences of increased shipping. Also, legal questions abound over jurisdiction and security issues in much of the waters, with some straits being claimed both by Canada as internal waters and by the US as international passageways.

Currently an eight-nation Arctic Council is conducting a study of Arctic shipping to estimate the impacts on Arctic people and the environment. The study, "Arctic Marine Strategic Plan," is being led by Canada, Finland, and the US and an interim report will be completed this fall and presented at the Arctic Council meeting in Russia. The study will first estimate how much shipping is currently done in the Arctic using 2004 as a baseline and then determine the impacts on local peoples and the environment. After this analysis, the panel will establish two sets of predictions for years 2020 and 2050.

Though the future of Arctic shipping is hard to predict, the utilization of the Waterway Network Ship Traffic, Energy, and Environment Model (STEEM) will assist in finding the degree to which the Arctic would be used as an alternative route for shipping over existing lanes. This model, developed by Dr. Chengfeng Wang, with assistance from Dr. James Corbett, and Dr. Jeremy Firestone, is used to characterize ship traffic and assess environmental impacts of shipping. STEEM will be adapted so that new routes in the model can be selected using a network for GIS modeling. Then factors such as traffic volumes and economics will be used to establish a baseline context. This analysis will be a beneficial supplement to the Arctic Council's current study, through its consideration of the paths most shipping operators will most likely take on their treks through the Arctic.

Ultimately, the analysis will allow us to consider policy or economic interventions to mitigate some or all identified impacts. It can be a basis for Arctic governments to adjust their national laws and shipping regulations so as to ensure sustainable practices. This research and analysis will be significant to all nations and parties involved as the Arctic creeps ever closer to being free of solid ice cover.