Alaskan Arctic Natural Resource Governance & Spill Response

Rutgers University Arctic Studio

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Clients:
Alaska Center for Disease Control (CDC), National Institute for Occupational Safety & Health (NIOSH); Dr. George Conway
United Nations University, Traditional Knowledge Institute (UNUTKI), UNU-IAS Traditional Knowledge Initiative; Dr. Ameyali Ramos Castillo

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Introduction

This project is the result of a "studio" course at the E.J. Bloustein School of Planning and Public Policy, Rutgers University. The course is a practicum for Masters in City and Regional Planning (MCRP) students and involves a project for an external "client," to conduct research for the client within a semester.

The projects in this studio draw on research that I have been conducting, a socio-economic study of Alaskan arctic villages – particularly of the various organizations and institutions important in village development and sustainability. This is research supported by an International Polar Year grant from the National Science Foundation, Arctic Social Science Program/Office of Polar Programs.

The key event that is cutting across all dimensions of the Arctic, from oil exploration to population, is the new and consistent levels of summer sea ice retreat, having reached historic lows over the past five years[1]. That is, with greater and longer open water during the summer, everything from greater natural resource exploration (now oil, perhaps sea bed mining next) to changes in hunting (subsistence) to shipping and tourism. While my focus has been on the terrestrial aspects of sustainability – of the villages and communities – it is intimately tied changes in marine activity.

What we will present today are two related projects that were done as part of a graduate "studio" class by students in the planning program (MCRP) and working with Dr. George Conway and AK CDC/NIOSH and Dr. Ame Ramos Castillo, at a UN University group that works with indigenous groups on natural resources and governance.

Today we're going to focus on the specific issues of arctic spills and spill response. Without going into detail, we will note that oil exploration in the Arctic has potential of raising issues of Native Alaskan claims over marine use and resources, at least as they affect land use.

The entire studio class couldn't make it today – many have graduated and are now gainfully employed.
Matt Campo and Ronit Leib Anspach are here to present the findings of the class research.

Ronit Anspach.

As climate change contributes to longer periods of open water and offshore oil exploration increases, the Alaskan Arctic is expected to undergo significant

[1] A NASA study finds: "The last five years (2007 to 2011) have been the five lowest extents in the continuous satellite record, which extends back to 1979. While the record low year of 2007 was marked by a combination of weather conditions that favored ice loss (including clearer skies, favorable wind patterns, and warm temperatures), this year has shown more typical weather patterns but continued warmth over the Arctic. This supports the idea that the Arctic sea ice cover is continuing to thin. Models and remote sensing data also indicate this is the case. ... the ice cover this year is particularly thin and dispersed this year."
http://nsidc.org/arcticseaicenews/2011/09/arctic-sea-ice-at-minimum-extent/

environmental and socioeconomic changes in the near future. The Arctic Studio project, led by Professor Hal Salzman for a group of Master of City Planning graduate students, explores these changes and related natural resources management from the lens of native communities and response workers. Dr. George Conway of the Arctic Council, NIOSH, and EPPR, and Dr. Ame Ramos Castillo of the United Nations University Traditional Knowledge Institute are clients for this project.

Although much attention is given to potential oil spills in the Beaufort and Chukchi Seas, geospatial analysis of marine incidents illustrates that oil spills, and other natural resource disasters, can occur in broad geographic areas far beyond oil platforms. Further, historical patterns indicate that spills from vessels will occur with near certainty in the future as traffic levels increase. While these spills generally pose a low-to-moderate impact to marine and land environments individually, the cumulative effects remain uncertain. Moreover, both responders and surrounding communities are vulnerable where harsh weather conditions preclude or delay disaster response plans. Therefore, this study calls for increasing preparedness and ensuring safety for response workers as commercial marine traffic in the Arctic increases.

Likewise, indigenous communities have a stake in managing a broad range of both commodified and non-commodified natural resources. For instance, in so far as oil spills – and other natural resource disasters – affect the community, culture, and activities of indigenous groups (e.g., whale hunting for subsistence), organizations such as the Native Corporations in the North Slope rely on oil exploration for revenue. Yet, other Native Corporations, particularly in the coastal regions, do not see benefits from oil exploration. As a result, risks associated with oil exploration and increased marine traffic may generate new types of claims that reach beyond their historical focus on land-based rights. In other words, spills in Arctic waters may lead indigenous groups to assert new and expanded rights that will affect natural resource exploration and associated marine traffic. Moreover, the differences among Native Corporations with respect to dependence on oil revenues may complicate the claims made by the indigenous communities they represent. This project explores these tensions and calls for sustainable natural resource management practices that consider the socioeconomic and environmental future of the Alaskan Arctic.

[Slides 3 & 4]

Clients: UNU & AK CDC/NIOSH-- Dr. Conway

UNU is focused on helping indigenous groups develop governance structures to manage their natural and financial resources, and maintain their communities in ways that strengthen their culture and lifestyle and access to health, education, technology, and improve their overall welfare. The focus is on the governance structures, such as the Alaska Native Corporations and other entities that enable these communities to attain a standard of living that provides them parity with urban communities in terms of their level of health, education, welfare, and technology.

The Alaska CDC/NIOSH office and Dr. George Conway have project from the Arctic Council, Emergency Prevention and Preparedness and Response group to examine the oil spills that have occurred over the past two decades, with a focus on risks posed to responders. This project may provide additional material to supplement their manual, "*"Field Guide for Oil Spill Response in Arctic Waters"* that was published a number of years ago.

[slide 5]

To reiterate, the spill exposure areas are a much greater region and there is a higher probability of spills from vessel traffic rather than drilling (not that drilling doesn't also pose significant risk).

That is: our analysis suggests that more attention needs to be focused on the greater numbers and types of spills and broader geographic range than typically is the focus of the offshore drilling discussions.

In other words, our analysis emphasizes (1) the importance of high probability and generally low-to-moderate impact spills, that is vessel spills—that will occur with near certainty with given level of vessel traffic; (2) the unpredictability of spill response conditions and plans in the Arctic; (3) and thus the attention that needs to be paid to land staging areas and impact; (4) non-hazmat spills that pose risk to land as well as marine environments.

The combination of longer periods of open water and increased offshore oil exploration leading to offshore wells and platforms, and increased marine traffic (a) to service offshore drilling (platforms and on-land material and personnel), (b) increased shipping lane, (c) maritime safety & security, and military presence, (d) tourism and other vessel traffic.

Matt Campo.
[slide 6]
Working with Dr. Conway, we've been conducting analysis of spills that have occurred in the lower arctic and the implications for higher latitudes.

Spill incident analysis: An incident is anything that was deemed reportable to the USCG regardless of severity – These incidents include power failure, steering loss, groundings, and other reportable events. We used 10 years of data on vessel incidents, the USCG (Coast Guard) MISLE (Marine Information for Safety and Law Enforcement) database.

Before we get to the analysis, to illustrate one of the key findings – about the near certainty of a spill and risk from vessel traffic—we have the grounding and spill from the Monterrey – U.S. Army 311th Expeditionary Sustainment Command[2].

[slide 7]
Shortly after departing Kodiak on June 8, the Monterrey, a 174-foot landing craft, struck Discovery Rocks in Chiniak Bay, damaging the forward section of the vessel. As directed by the Coast Guard, the crew beached the vessel on Puffin Island to keep it

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[2] http://dec.alaska.gov/spar/perp/response/sum_fy12/120608201/120608201_index.htm

from sinking. Fuel escaped from the vessel's #3 and #4 starboard fuel tanks, which were ruptured by the initial collision. The Monterrey was carrying 42,000 gallons of fuel on board when they departed Kodiak. Temporary repairs will be made to the vessel to secure it for transit to a shipyard for permanent repairs at a later date. Beach and shoreline surveys for petroleum products will continue within Chiniak Bay until no remaining recoverable product is located.

How often does something like this occur?

[slide 8] Looking at just 10 years of data (2001 – 2011), we can see the high frequency of marine incidents – these are all reported incidents, not all spills. An incident reported to the USCG can range from a relatively minor event (e.g. engine trouble) to a grounding or collision causing the loss of a vessel. However, each incident can illustrate a potential spill risk. To put things in context, we are looking at incidents in well-traveled waters, with a relatively high capacity for response to different types of maritime events, including spill response.

If we now look at those incidents that resulted in a hazmat spill--
[slide 9]
We see many small spills, with a few significant events over the past 10 years. As compared to the previous figure, we can see that a small number of total incidents involve large spills, but given the large number of overall incidents, there are significant numbers of spills even if the incidence rate appears to be low. Concentrations are evident in Prince William Sound, Aleutian Chain and near Juneau.

[slide 10]
When disaggregating all events by vessel type, one can see that fishing vessels – the orange dots – and passenger vessels – the dark green dots - make up the vast majority of reported marine incidents (and the figure is dominated by those incidents).

[slide 11]
Removing fishing vessels and passenger vessels, we can see the distribution of incidents by other commercial vessels (e.g. bulk carriers, barges, tankers) which are likely to be those most prevalent in the high latitudes in the near future (depending on what happens with ocean changes and patterns of fish migration and feeding, new species may migrate to higher latitudes and bring fishing vessels with them…)

[slide 12]
There were 17 Spills => 1,000 gallons/3,800 liters only one (1) had injuries or fatalities associated with the event (Selendang Ayu) [the count is now 18 with the spill two weeks ago…]
Dot size is proportional to the size of the quantity discharged
Color of dot relates to vessel class, icons and corresponding colors in the key in the upper left-hand corner
Dot border indicates type of contaminant (1 chemical, 16 petroleum products)

This figure shows the range of spill size and thus spill impact. Note that there are several outliers, i.e., a few cases have potentially high environmental impact in terms of spill volume.

However, when we are consider responder risk, we want to look at the characteristics of the spill response (e.g. time, events, and other factors) that would affect the risk to responders, as well as affecting the actual spill volume (i.e., potential spill could be total volume of materials on the vessel; actual would be the amount that ultimately is discharged).

[slide 13]
As most everyone here knows from their own experience, especially in maritime environments and particularly in arctic environments, the best laid plans typically go awry. Therefore, it is important to understand the various trajectories in responses (e.g. equipment, responders, operations planning, etc.) and variances to their components. To do so, we reviewed the publicly available incident reports for large spills and spills that had injuries or fatalities (N=28 spill/fatality/injury incidents; N=17 of => 3,800 liters) to identify the range of factors that affected response and outcomes.

Given that delay and change in initial response plan is common, it becomes important to understand (a) the nature/causes of response changes/delays, (b) what occurs when there is a delay and/or change. The database had small number and a wide range of events/causes/changes, so we thought it more valuable to look at illustrative cases of different types of responses rather than statistical analysis of the cases. That is, any number of factors occurs in the lower latitudes of Alaska, and understanding these cases can provide insight into the types of response delay/change factors that will occur at higher latitudes. In some ways incidence is less important than understanding the range because low incidence/high impact incidents are as important to consider as high incidence events.

This figure identifies the response delay/change factors in four illustrative incidents. We will provide a brief overview of three of the cases and a more detailed discussion of the fourth case.

[slide 14]

F/V Icy Mist — Remote and Inaccessible spills

- Grounds on 2/25/09 due to rough weather in a sensitive environmental area near Unalaska
- Initial removal of petroleum products required responders to repel down a 1,000 foot cliff
- After removal of some materials, response was delayed due to weather and safety concerns from cold and rough seas
- Responders returned in June to find the hull breached and a loss of the engine and remaining cargo (fish)
  Delays were expected to continue for responders based on the need to clean debris from the shoreline, however further situation reports were not available

Sources: USCG MISLE, Alaska DEC Situation Reports

F/V Nordic Viking -- Poor weather conditions impact on response & spill risk

- Vessel grounded on July 21, 2007
- Weather delays prevented scheduled over flights during the initial response – responders continued to find pockets of oil 4 days later
- Weather continued to play a factor for tracking the spill throughout the response

Sources: USCG MISLE, Alaska DEC Situation Reports

Selendang Ayu -- Fine line between "incident" and disaster

- Initially had the potential to be the largest petroleum spill since Exxon Valdez
- 60 hour initial "crisis" response for search and rescue involving the use of several different types of equipment from public and private responders and a search and rescue plan under continuous change
- Plans in place for recovery of petroleum products, but several days of meetings and discussions on potential effects and recovery of soybean cargo
- Environmental response and recovery following took years and was continually monitored
- Cleanup delayed on occasion for responder risk and safety from hazardous weather conditions
- Several recovery and cleanup plan changes based on assessment of recovery feasibility and worker safety
- One of the "takeaways" from this incident is how fine the line is between a disaster of historical proportions and a relatively benign incident report to the Coast Guard. The Selendang Ayu began as a reported loss of steering, but continued to drift for hours before escalating the urgency of a need for assistance. Such an occurrence illustrates the concept that even relatively minor incidents can become serious quickly in the maritime environment, and especially in hazardous areas like the Bering Sea.

Sources: USCG MISLE, Alaska DEC Situation Reports

[slide 15 & 16 detail]

Monarch
Timeline represents a detailed discussion of the M/V Monarch response, indicating key events that caused changes or delays during the response.

-Weather
1. Foul weather and sea conditions cause both the incident and serious delays in response
2. Illustrative of potential for damage and delay caused by sea ice

-Responders
1. Even an experienced rescue diver almost suffered the bends at a relatively shallow depth, exposing the inherent danger in diving
2. Even in summer weather, divers need over 5 weeks to determine the scope of work for removing the oil from the ship

-Equipment
1. Response required the use of several different ships

2. Several delays and changes in the plan, even though the staging ground for the operations was quite close and resources were readily available
3. Fortunately the oil was contained with the hold of the ship after it sank, or the booming equipment would have had difficulties working through the sea ice
4. Mooring system failure causes nearly a week-long delay as an alternative vessel located

Sources: USCG MISLE, Alaska DEC Situation Reports

[Slide 17]
There are some key factors of events from the ones just reviewed, of incident-specific takeaways. Our analysis of these four incidents illustrate a range of spill response risk factors and, importantly, how response plans evolve over time in real situations and how the response risk changes as well as the ability to respond.

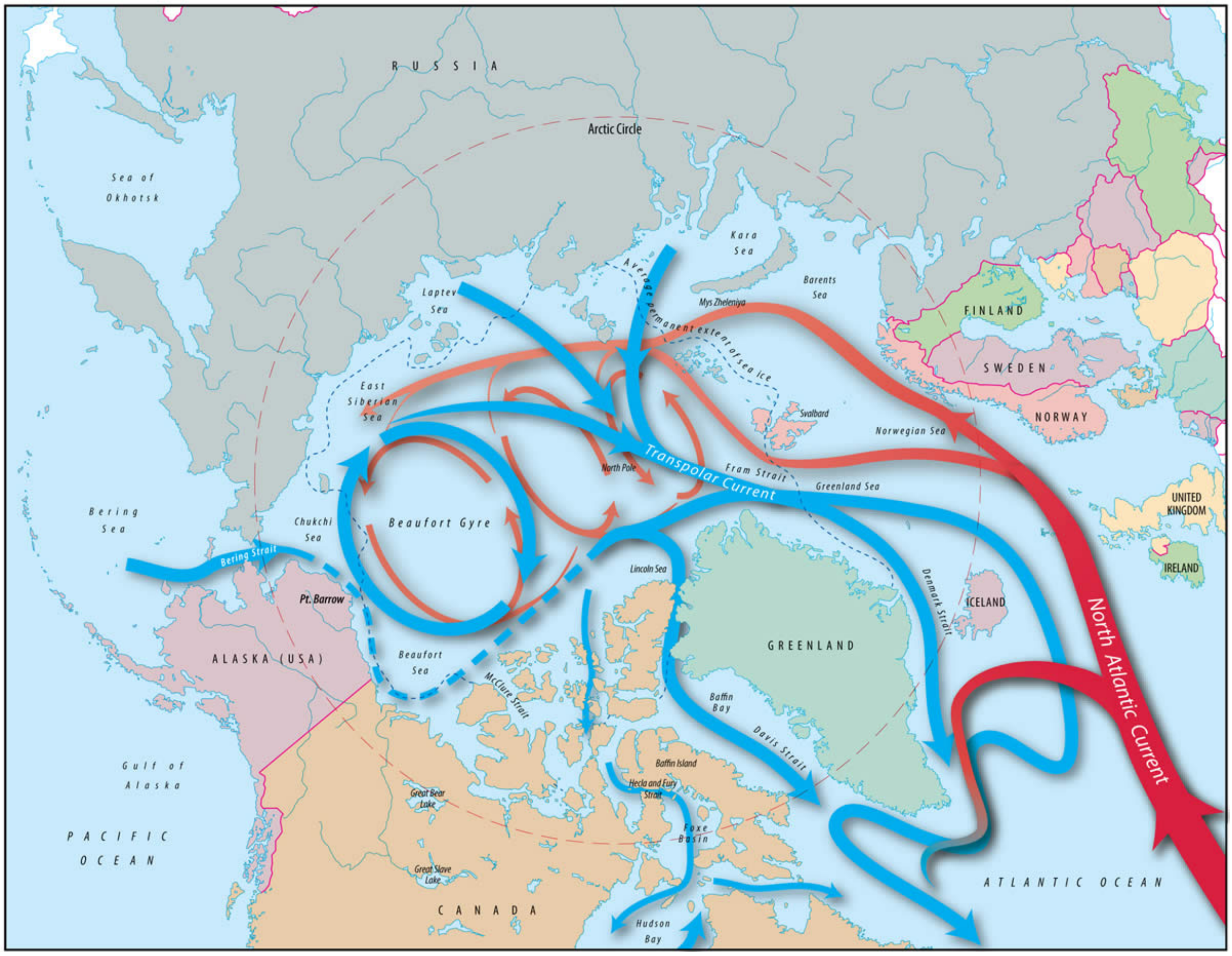
Point 1: Production and Transportation

Transportation is not limited to services for new oil platforms, but also the potential for new shipping lanes and Chinese and Russian vessels.

The other important consideration is the impact of cargo contents – how will communities and stakeholders create plans for bulk products such as soybeans or the contents of containers lost at sea that are increasingly washing up along the shores of Alaska. Such spills area of concern for two reasons: (1) contents that pose a wildlife and environmental risk because of their dispersion and harm to marine life and because they will wash up on shore; and (2) invasive species that may be introduced into the relatively pristine arctic waters.

In addition, these new shipping routes will be along generally inaccessible coastline, potentially limiting response capabilities for all types of spills and pollution. It is also important to note that these occurred in the low arctic latitudes and response in high latitudes will have much greater uncertainty, risk, and changing conditions.

Finally, the Beaufort Gyre and other currents can disperse spills through a wide region of the globe.



Courtesy of Jack Cook, WHOI ([Woods Hole Oceanographic Institute](http://www.whoi.edu))

http://www.windows2universe.org/earth/polar/arctic_currents.html

http://www.whoi.edu/oceanus/viewArticle.do?id=9208

[slides 17 – 19]
While these key takeaways are evident in the lower arctic regions, the high arctic adds additional complexity. Shell's plan for marine services to the rigs includes journeys from Dutch Harbor to the drill prospects, and additional services from land bases in Wainwright. These operational movements will compete with, and potential conflict with other commercial maritime traffic that could be transiting on liner routes. These conflicts are of particular concern in the Bearing Straight, where traffic has grown rapidly in recent years as a result of Russian and Chinese commercial interests.

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The findings from this preliminary analysis suggest that the spill response issues may be much broader and complex than those in lower latitudes and other geographic areas. The extreme cold and ice are the obvious challenges, but the other dimensions less often discussed are the near-certain hazards posed by the vessel traffic that will be servicing the offshore platforms, servicing and provisioning the terrestrial bases that will be supporting offshore platforms, that will be staging for spill and emergency response, and the indirect infrastructure and services that will develop to support the

terrestrial bases (e.g. restaurants, housing, services, platform staging areas, expanded spill and emergency response crews, Coast Guard, etc.) locate in Barrow and Wainwright. In addition, with greater periods of open or accessible seas, new shipping lanes may develop and tourist ships may continue to expand routes further into Arctic waters. There will inevitably be vessel incidents—as just occurred a few weeks ago—and hazmat and cargo spills will result. The large areas of inaccessible coast, of minimal terrestrial bases and equipment along the Arctic coast, as well as extreme conditions add multiple layers of complexity and risk. The implications for the communities as well as the larger coastal and marine environment will be key issues that need to be assessed.