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Proactive Environmental Planning for Emerging Shipping Routes in Arctic Waters

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Abstract

Projected reductions in the extent and thickness of the sea-ice cover in the Arctic Ocean could substantially benefit shipping, perhaps opening the Arctic Ocean as a major trade route. However, despite the economic benefits of such changes, the emergence of such a route through the Arctic Ocean presents a number of challenges to Arctic coastal States and policy makers in general. Of particular concern is the potential for significant environmental damage. Historically, strong objections have been raised over restrictions on navigation for environmental purposes, on the grounds that these run counter to the freedom of navigation enshrined in international law. Notwithstanding this, a broad range of measures exist for those coastal States wishing to address the threat from shipping.

An important element in the application of any protective measure is that it is targeted at the specific environmentally sensitive that it is designed to address. In the case of the Arctic it will be critical to determine those areas of vulnerability to shipping and to target specific measures for their protection. Such an approach will necessarily include a spatial analysis of both the environmentally vulnerable resources and the specific threat posed by shipping, as well as a complimentary analysis of the broad range of measures that are available to address such threats.

This paper examines the range of tools that are available to Arctic coastal States to regulate and mitigate the impacts of shipping in Arctic waters. After detailing the threats posed by shipping in the Arctic marine environment this paper examines (i) the application of marine spatial planning as a tool for prioritising the protection of vulnerable marine environments from the shipping and (ii) the range of proactive measures that could be employed in the Arctic to ensure that such damage does not arise.

Key words: Arctic, Shipping, International Maritime Organisation (IMO)

1 Background

Projected reductions in the extent and thickness of the sea-ice in the Arctic Ocean, as a result of climate change, could substantially benefit shipping (Watson and others 1997) perhaps opening the Arctic Ocean as a major trade route, thereby significantly shortening the shipping duration between Europe and Far East Asia (Wilson and others

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2004). However, while the economic benefits of such changes cannot be overlooked, the emergence of such routes in the Arctic Ocean presents a number of challenges to Arctic coastal States and policy makers in general. Of particular concern is the potential for significant environmental impacts resulting from shipping activities.

A broad range of measures exist for coastal States wishing to protect their marine resources from the impacts of shipping. However, an important element in the application of such measures is that they are targeted at the specific environmental sensitivity to be addressed. Recent state practice shows that, in many cases, this important link is not made.

2 Proactive Planning to Mitigate the Impacts of Shipping

In the case of the Arctic it will be critical to apply "risk based" and precautionary approaches to determine those areas of vulnerability to shipping and to proactively target specific measures for their protection. Such approaches will necessarily include a spatial analysis of both the environmentally vulnerable resources and the specific threat posed by shipping, as well as a complimentary analysis of the broad range of protective measures available.

In considering how such approaches may be applied to the Arctic, the concept of marine spatial planning (MSP) has considerable utility.

2.1 Marine Spatial Planning (MSP)

According to Gilliland and others (2004) the fundamentals of any spatial planning process are:

a. Spatial data representing the priority sites for protection such as habitats of conservation interest or biological components that act as indicators of human impacts;
b. Spatial data representing the extent, both temporal and spatial, and intensity of human activities (in this case shipping);
c. Clear analysis of how (a) is affected by (b), whether the analysis is based upon expert judgement, meta-analysis, or empirical models; and
d. Geographic Information Systems (GIS) technologies and procedures to:
   – store (a) and (b);
   – model how (b) affects (a) through information in (c); and
   – present the final outputs of the analysis.

An essential consideration in the application of MSP is the need to work across sectors and to provide a geographic context in which to make decisions about the use of resources, development, and the management of activities in the marine environment (Gubbay 2004). In the context of the Arctic, this approach could be applied to shipping activity as a single sector and at a broad spatial scale. Ideally, a spatial plan would be produced that was informed by assessment of potential impacts or vulnerability and which would then provide a context for further assessment. Thus, MSP

could improve our ability to make more informed decisions in relation to avoiding or managing the impacts of shipping in the Arctic.

2.2 Identification of Priority Sites for Protection

Several States, including New Zealand (Maritime Safety Administration of New Zealand (MSA NZ) 2001) and the United Kingdom (Safetec 1994), have applied semi-quantitative analytical models at a national level to identify Marine Environmental High Risk Areas (MEHRAs) that are vulnerable to the impacts of shipping. Similarly Australia has applied this approach to identify MEHRAs within the boundaries of the Great Barrier Reef Marine Park. Each of these approaches uses a risk-based approach to complete a comparative analysis of risk for areas within a defined spatial extent.

A considerable amount of work has already been undertaken to identify priority sites for protection from oil spills in the Arctic. In order to frame programs and strategies to address the threat of oil spills to sensitive habitats and species, the Emergency Prevention Preparedness and Response (EPPR) Working Group of the Arctic Council took a proactive approach to identify risks from oil-related activities to the Arctic. After identifying and mapping the specific circumpolar resources at risk, an analysis was completed to determine how selected biological resources overlapped with oil exploration or production areas, major oils storage depots, pipelines or shipping routes: As an outcome from this analysis, those areas within the Arctic area with the greatest risk for biological effects should an oil spill occur, due to spatial and temporal overlap of oil activities and species distributions, have been broadly identified (Emergency Prevention, Preparedness and Response working group of the Arctic Council (EPPR) 2002) as shown in Figure 1.

2.3 Assessing the Extent and Intensity of Shipping

The next stage in such an analysis is to determine those areas that are vulnerable to the threat of shipping. The vulnerability of coastal ecosystems to shipping depends on two critical factors:

1. the sensitivity of habitats and species to the impacts of shipping; and
2. the potential for exposure of those sensitive habitats and species to such impacts.

In considering the sensitivity of marine habitats and species to shipping it is necessary to understand the scope of threats posed by ships. Although the emphasis has historically been placed on the control and impacts of ship-sourced oil pollution, ships can constitute an environmental hazard to the marine environment in a number of ways:

2.3.1 Operational Discharges

The most common sources of ship-sourced pollution derive from the normal operation of a ship (Organisation for Economic Cooperation and Development (OECD) 2003). These so called 'operational discharges' include certain automatic releases as well as intentional discharges incidental to normal operations. Such discharges include

oil and other harmful substances, ballast water and associated invasive aquatic organisms, antifouling substances, garbage and sewage. The extent to which such sources of pollution represent an environmental threat will depend on the degree of compliance with the relevant international conventions. As such, non-compliance with established international standards represents a significant ongoing problem.

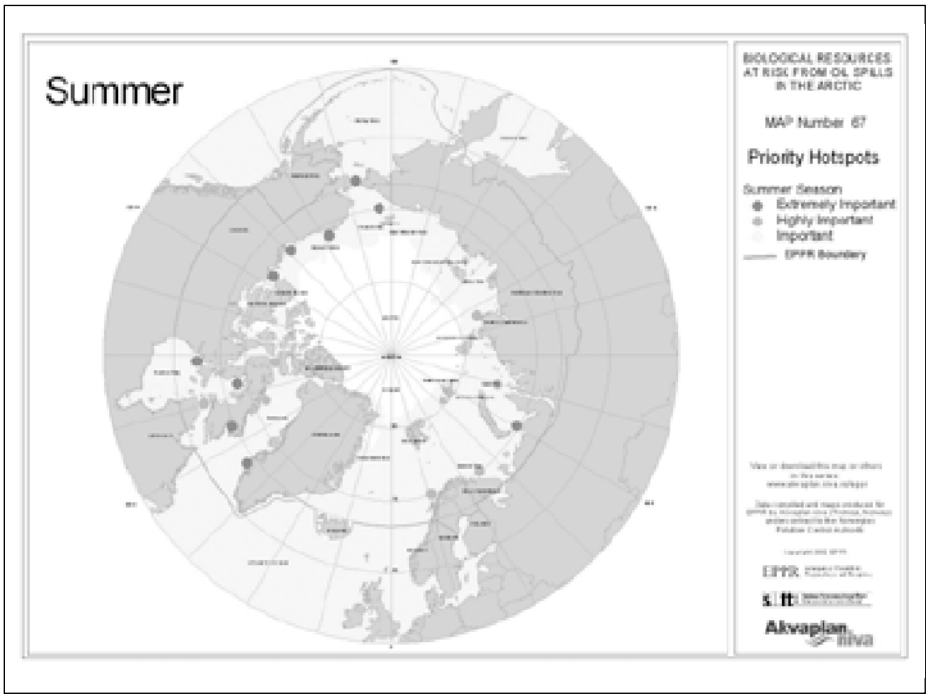

Figure 1. Biological resources at risk from oil spills in the Arctic during the summer season (EPPR 2002)

2.3.2 Accidental Discharges

Although operational discharges of oil represent by far the most significant input of oil from ships, public perception demands that accidental discharges of oil and other harmful substances receive the greatest scrutiny. Numerous high profile maritime casualties in recent years have demonstrated the potential significant impacts such incidents may have on both the environment and economy of coastal States (Roberts and others 2005).

2.3.3 Physical Harm

While less emphasis has generally been placed on the physical impacts of vessels these are becoming more apparent. Such impacts may include, engine and machinery noise; physical damage to organisms and habitats; and wake and wash effects.

2.4 Potential for Impacts

The potential for impacts to sensitive marine organisms is largely a function of the likelihood of a particular threat being present and its proximity to the habitat and

species. In some areas it is easy to predict the likely proximity of shipping to specific values based on actual ship position data (Roberts 2006). However, such data is unavailable for the Arctic since, at this stage, no transit routes exist for international traffic. However, a number of routes have been suggested and these provide an indication of where problems might arise as shown in Figure 2.

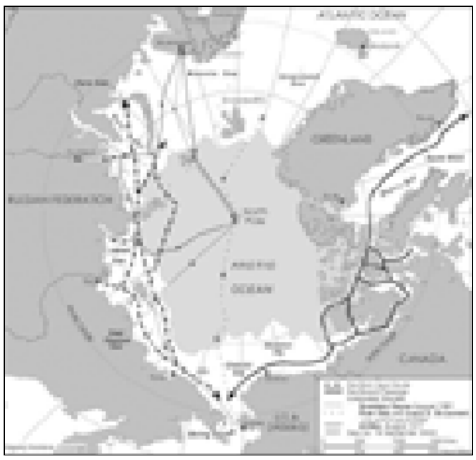

Figure 2. Arctic ocean marine routes (Brigham and Ellis 2004)

3 Selection of Protective Measures

The final stage in such a proactive planning exercise is the selection of management measures targeted at the specific environmental sensitivity that is to be addressed.

It is widely accepted that the International Maritime Organization (IMO) is the competent international organisation to regulate all aspects of shipping (Birnie 1997; Blanco-Bazan 2003). Specific competences are attributed to the IMO by a range of international instruments. As a result, IMO has, at its disposal, a broad range of measures that could be applied in Arctic waters to address the threats posed by shipping in the region. Notwithstanding this, Article 234 of the 1982 United Nations Convention on the Law of the Sea does also allow for coastal States to adopt and enforce "non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice covered areas" within the limits of EEZs.

However, while such measures may be adopted without IMO approval, it is widely acknowledged that approval by IMO of any measure to regulate international shipping is desirable, if not necessary. The establishment of routeing systems in particular is best conducted through the IMO (Plant 1995), since schemes not adopted by the IMO will not be published in the Ships' Routeing Manual (International Maritime Organization 2003), and consequently may not be known by vessels sailing the waters in which the scheme lies.

3.1 Particularly Sensitive Sea Area Concept

Of the measures available to regulate the environmental impacts of shipping, perhaps the one that has received the most attention in recent years is the PSSA concept.

A PSSA is defined as "an area that needs special protection through action by IMO because of its significance for recognised ecological, socio-economic or scientific reasons and because it may be vulnerable to damage by international shipping activities."

In general to be designated as a PSSA, three elements must be present:

1. The area must meet at least one of the three given criteria (ecological; social, cultural and economic; or scientific and educational);
2. It must be vulnerable to damage by international shipping activities; and
3. There must be measures that can be adopted by IMO to provide protection to the area from these specifically identified international shipping activities.

The designation of a PSSA has no legal significance because the concept is created by a non-binding IMO Assembly resolution and is not set forth in a convention. It is only through the application of associated protective measures (APMs), such as ships' routeing measures, that the legal basis for the regulation of shipping can be provided (Roberts 2006). The PSSA Guidelines identify several possible APMs including Special Areas, ships' routeing measures and vessel traffic services. While this is not an exhaustive list, these represent those measures that are currently available to the IMO through various instruments. However, identification of an area as a PSSA is not a precondition for the adoption of any of these measures, since each measure may be applied in its own right for the protection of a particular marine area, irrespective of whether designation of the area as a PSSA is being sought (Roberts 2006).

3.2 Special Discharge Restrictions

Under MARPOL 73/78, all sea areas are protected, to some degree, from the discharge of harmful substances. Most sea areas have a level of protection that is considered adequate. However, where additional protection is deemed necessary, MARPOL 73/78 provides for the designation of Special Areas and imposes correspondingly more stringent restrictions on the discharge of harmful substances. Special areas are provided for in three of the six MARPOL Annexes currently in force.[1] Therefore, Special Areas are afforded a higher level of protection than other marine areas. Thus, for example, according to MARPOL Annex I, the discharge of oil from oil tankers and from other ships of 400 gross tonnes and above is wholly prohibited in Special Areas.

3.3 Application of Ship's Routeing Measures

The International Convention for the Safety of Life at Sea, 1974 (SOLAS) recognises the IMO as the only body for establishing and adopting routeing measures at an

[1] Annexes I, II and V of MARPOL 73/78 provide for Special Areas to be designated in respect of the discharge of oil, noxious liquid substances and garbage, respectively.

international level. This competence is supplemented by the General Provisions on Ships Routeing (GPSR).

While vessel routeing measures have been used in the protection of the marine environment for many years (Peet 1994), the explicit application of such tools for this purpose has only been formally recognised by the IMO within the last decade (Roberts 2005). To date, the following measures have been approved as ships routeing measures under SOLAS: Area to be Avoided; Traffic Separation Scheme; Inshore Traffic Zone; Precautionary Area; Deep-water Route; and No Anchoring Areas.

3.4 Ships Reporting Systems

Ship reporting systems aim to give coastal States notice of the presence, in a designated zone of adjacent waters, of all or specified categories of vessels. A SRS may apply to transiting traffic as well as vessels entering a port. A typical system may require the reporting of the vessel name, radio call sign, position, course speed (and any additional information relevant to its purpose) to a coastal station when entering or departing the zone (Plant 1997).

The major contribution of such a measure in terms of protection of the environment is to serve as a mechanism for notifying coastal States of the presence of ships that may present a threat. In this way, coastal States may respond more effectively in the event that such a vessel becomes distressed. If a ship leaves its planned course or if circumstances point to a risk of collision or grounding, the coastal State can then give a timely warning or take other action deemed appropriate (Plant 1997).

4 Future Developments

Given the unique circumstances of shipping in Arctic waters, an interesting challenge may be to consider a range of additional new measures which recognise the unique and fragile nature of the Arctic environment. Such measures could conceivable include restrictions on certain types of cargo or vessel; construction, design, equipments and manning standards specific to Arctic waters; requirements for compulsory pilotage; and enhanced domestic response arrangements for dealing with oil spill, salvage and search and rescue scenarios.

However, in order to be effective, such measures would have to be broadly accepted and endorsed by the international community, and certainly would need acceptance from all Arctic coastal States. Recent state practice with the designation of measures to protect other sensitive marine areas from the impacts of shipping have illustrated that there are clearly limits as to how far the international community is currently prepared to go in adopting measures, for the purpose of environmental protection, where (i) there exists no generally accepted international rules and standards in international law for the adoption of such measures, and (ii) where such measures may violate the principle of freedom of navigation (Roberts 2006).

While no specific attempts have been made to adopt such measures for the Arctic, it can be anticipated that such proposals will not go unchallenged. Hence there is a need to undertake early and proactive work to identify appropriate measures and to seek international endorsement for their adoption.

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