

# Tromsø Center: Direction in a Complex Arctic System

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## List of Acronyms

<b>BEAR</b>	Barents Euro-Arctic Region
<b>IPIP</b>	Indigenous Peoples' Integrated Policy Center
<b>MSC</b>	Marine Stewardship Council
<b>PCBs</b>	Polychlorinated biphenyls
<b>RNME</b>	Royal Norwegian Ministry of the Environment
<b>UN</b>	The United Nations



## Foreword

This report is produced by students in the Master of International Public Affairs (MIPA) program in the Robert M. La Follette School of Public Affairs at the University of Wisconsin–Madison for the Nelson Institute for Environmental Studies at the University of Wisconsin–Madison and the Working Group for Tromsø Center, Troms County, Norway. The opinions and judgments presented in the report do not represent the views, official or unofficial, of the La Follette School or of the clients for which the report was prepared.

The authors of this report are enrolled in the Public Affairs Workshop, International Issues, the capstone course in their graduate program. The workshop provides MIPA students the opportunity to improve their analytical skills by applying them to an issue with a substantial international component and to contribute useful knowledge and recommendations to their client.

I am grateful to Wilbur R. Voigt whose generous gift to the La Follette School supports the workshop projects. With his donation, we are able to finance the production of the final reports, plus other expenses associated with the projects.

The La Follette School offers a two-year graduate program leading to a Master of Public Affairs or a Master of International Public Affairs degree. In both programs, students develop analytic tools with which to assess policy responses to issues, evaluate implications of policies for efficiency and equity, and interpret and present data relevant to policy considerations.

The workshop provides practical experience applying the tools of analysis acquired over three semesters of prior coursework to actual problems clients face in the public, non-governmental, and private sectors. Students work in teams to produce carefully crafted policy reports that meet high professional standards. The reports are research-based, analytical, evaluative, and (where relevant) prescriptive responses to real-world clients. This culminating experience is the ideal equivalent of the thesis for the La Follette School degrees in public affairs. While acquiring a set of analytical skills is important, it is no substitute for learning by doing.

Melanie Frances Manion  
Professor of Public Affairs and Political Science  
May 11, 2007

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## Executive Summary

A network of problems threatens the Barents Euro-Arctic Region's (BEAR) ecosystem. Climate change allows for increased petroleum extraction and the possibility of new shipping routes, potentially threatening biodiversity and indigenous peoples if not managed properly. The University of Wisconsin–Madison's Nelson Institute for Environmental Studies is a leading partner in the initiative to develop a center in Tromsø, Norway, that would focus on sustainable development in the BEAR. This report presents five proposals that can serve as a resource to the Nelson Institute during the process of determining the center's institutional focus.

Using a systems approach, we identify five “pressure points” that the new Tromsø Center could address. These pressure points—environmental concerns, indigenous peoples, fisheries, petroleum industries, and shipping—represent critical areas where efficacious management could provide maximum impact.

We present five proposals for the Tromsø Center to consider. The first, the Policy Clearinghouse, would foster integrative policies through multidisciplinary dialogues among stakeholders in one facility. The Indigenous Peoples Integrated Policy Center would capitalize on Norway's experience with sustainable development and coordination with the Sami to create a center that balances global indigenous peoples' concerns and extractive industries. Ecolabeling for BEAR Fisheries would generate income and legitimate the Marine Stewardship Council's certification program by increasing Norway's share of eco-conscious markets. The Center for Integrated Maritime Transport and Technology would use technology to target acute oil spills, provide system mapping, and research shipping activities. International Ecotourism Partnerships would produce revenue and raise environmental awareness while coordinating tourism between Russia and Norway.

The Tromsø Center could choose from three implementation options. The first considers these proposals as mutually exclusive alternatives. This option maximizes impact and returns to the Tromsø Center, but it limits the breadth of integrated policy. The second option organizes proposals in combinations, maximizing synergy but raising questions about implementation. The final option approximates the Policy Clearinghouse and uses the other proposals as individualized, and perhaps short-term, projects. This option is flexible and integrative.

Based on extensive research, we establish four goals that we believe represent Norway and the Nelson Institute's priorities: sustainability, political feasibility, administrative feasibility, and justifiability. To help policymakers evaluate each proposal's progress toward each goal, we define specific criteria: environmental, economic, and social sustainability; national and international feasibility; speed and ease of implementation; and redundancy and maximum impact. We weigh each proposal against the criteria and rank it high, medium, or low. Given that all proposals measure well against our criteria—with variance according to the specific proposals and possible combinations—we are confident that each option would use resources effectively.



## Introduction and Problem Definition

A global cycle of environmental degradation and climate change is rapidly altering the arctic environment, presenting Norway with opportunities and challenges in the Barents Euro-Arctic Region (BEAR). Norway's management of the BEAR, which contains a complicated mix of fragile marine life and valuable natural resources, is gaining in importance as environmental changes and economic interests reshape the Arctic. As Norway responds to these changes, it can advance its position as an international leader in sustainable development. The region's environmental complexity means that action on one issue affects the entire system, creating an imperative for Norway to approach BEAR policy from a systemic perspective: formulating decisions requires a thoughtful understanding of economic opportunities, environmental challenges, and social equity.

The University of Wisconsin–Madison's Nelson Institute for Environmental Studies has identified Tromsø, Norway, as a convergence point for BEAR commercial developments, environmental problems, and social concerns. The Nelson Institute is working with partners in Troms County, Norway, to establish a think tank in Tromsø. While the Tromsø Center would concentrate on the broad goal of sustainable development, its specific focus has yet to be defined. The process of selecting an institutional structure requires in-depth analysis of potential outcomes connected to any proposed approach.

This report proposes and analyzes five institutional structures for the Tromsø Center to assist the Nelson Institute and its Norwegian partners as they determine the specific direction of this center. Each proposal is structured to maximize the center's potential impact, considering existing opportunities for collaboration, extensive local expertise, and interests of BEAR stakeholders.<sup>1</sup> In addition to these considerations, our proposals reflect input taken from discussions with Knut Volleback, Norwegian ambassador to the United States; Tom Loftus, former U.S. ambassador to the Kingdom of Norway; and Dr. Frances Westley, former director of the Nelson Institute.

We begin by identifying specific “pressure points” that represent areas where Norway has the most leverage to achieve sustainable development through the Tromsø Center, thereby strengthening its position as an international leader while guaranteeing local and national benefits. These “pressure points” include: environmental concerns, indigenous peoples, fisheries, oil and gas extraction, and maritime transport. After a discussion of these points, we present our five proposals and their potential performance against our goals and criteria for the Tromsø Center. Finally, we present alternative approaches for the implementation of these proposals. Background on our identified “pressure points” is in the following section.

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<sup>1</sup> Our analysis balances environmental protection with social and economic sustainability, taking into account Norway's endorsement of the precautionary principle. See Appendix A for more about sustainable development and the precautionary principle.

## Pressure Points

This section describes specific issues that are critical to the management of the BEAR. These “pressure points” highlight the most salient issues in the BEAR among a variety of stakeholders and potential areas of focus for the Tromsø Center.

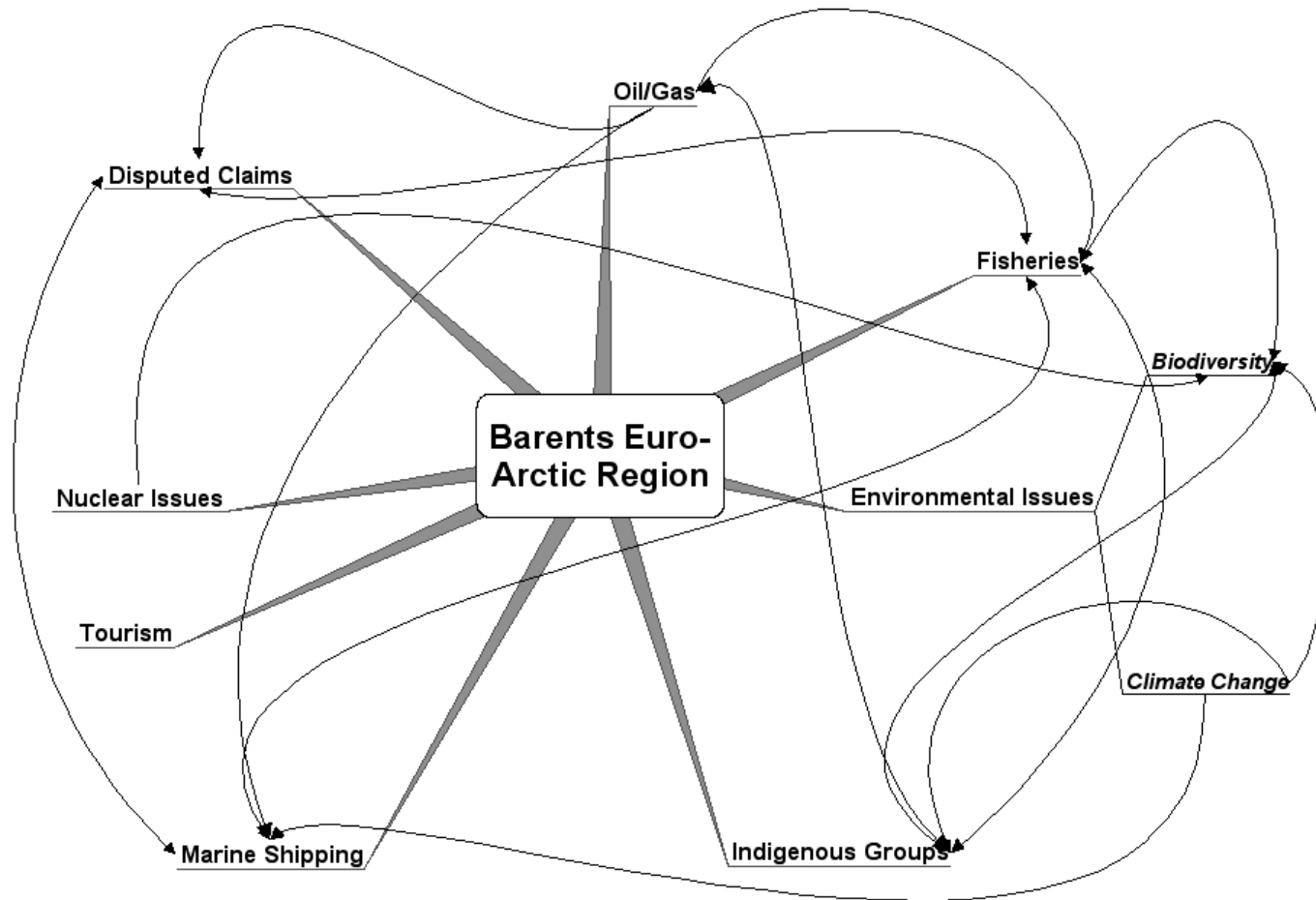
Based on existing synergies, the Tromsø Center can have the greatest impact on outcomes in the region by addressing five “pressure points.” These five areas are indigenous peoples, environmental concerns, fisheries, the petroleum industry, and maritime shipping. The linkages among these areas amplify the impacts of any policy, whether through the negative effects of unsustainable development or the benefits of positive interventions. As we show, the city of Tromsø’s proximity to the region, opportunities for collaboration, and extensive local expertise give the center a comparative advantage to address issues related to each pressure point. Figure 1 places the Troms County and the Barents Sea in geographical context. Figure 2 shows the relationships among the pressure points.

**Figure 1:  
Geographical Map of Barents Euro-Arctic Region**



Source: Facts about the Barents Euro-Arctic Region

Figure 2: Barents Euro-Arctic Region Systems Map



## Environmental Issues

The BEAR is a complex yet environmentally sustainable ecosystem. However, human activities, such as anthropogenic pollution, natural resource extraction, bioprospecting expeditions, introduction of invasive species, and climate change are severe threats to arctic biodiversity.

Bioprospecting is the search for biological resources to discover products for commercial use (drugs, crops, industrial products). Marbank, Mabcent, Marbio, and Mareano are Norwegian bioprospecting initiatives that seek to discover medicinal cures from the bioactive compounds of arctic benthos. Bioactive compounds such as antimicrobial peptides are unique to the benthos found in the Barents Sea region. Bioprospecting disturbs this highly sensitive environment through its extractive process. In addition, Greenpeace International (2005) highlights that “there is no legal management regime to regulate [bioprospecting] activities on the high seas.” Although the UN Convention on the Law of the Sea helps define states’ rights within the larger framework of the Convention on Biological Diversity, legal ambiguities remain.

Global nuclear fallout from the 1960s and 1970s, discharges from nuclear fuel reprocessing plants Sellafield in the United Kingdom and La Hague in France, and the Chernobyl accident in the former Soviet Union have introduced disruptive radionuclides into the BEAR. Of the radionuclides that exist, plutonium-239 and strontium-90 pose the gravest threats to marine life (Fisher, et al., 1999). The biggest threat of nuclear contamination comes from Russia’s Kola Peninsula, where the city of Murmansk stores more radioactive waste than anywhere else in the world. Compounding the problem is that fact that Russia has no long-term strategy for the storage of radioactive waste. Solid and liquid radioactive waste exceeds depository capacity, exposing the process of radioactive decay to the environment. Numerous international organizations, however, such as the Barents Euro-Arctic Council, the Barents Regional Council, the Arctic Council, the Northern Forum, and the Nordic Council, are working to ameliorate the problem. Russia also receives aid from Norway, Canada, and Germany to assist in its storage of radioactive waste.

Persistent organic pollutants (POPs) accumulate in the fatty tissues of marine life and humans, causing cancer and irreversible deformities. Most POPs—organochlorines—come from pesticides, industrial chemicals, or byproducts such as DDT. POPs are transferred by global air currents and settle in the Arctic’s cold climate. Climate change is exacerbating the release of another toxin, polychlorinated biphenyls (PCBs). Melting sea ice releases PCBs into the Arctic Ocean and contaminates the food chain. Recent studies indicate that high levels of PCBs in fish affect not only marine life but also humans.

Through the emission of greenhouse gases, climate change is this century's largest man-made threat to the arctic socio-environmental community. While in much of the world the implications of climate change are hazy, in the Arctic the shift is alarmingly noticeable, with a rate of warming nearly double that experienced by non-polar regions (Hassol, 2004). The speed of change is especially relevant because it decreases the opportunities for arctic species to adapt. While changes will occur on both land and sea, the effect on the Arctic Ocean will likely have the greatest impact on Norway and the planet. These changes are divided into two categories: those to sea ice cover and changes to ocean currents and circulation.

One of the most widely discussed impacts of global warming is the melting of the world's ice. There are two principal types of arctic ice: ice sheets such as in Greenland and the sea ice covering much of the Arctic Ocean. The melting of both would have important consequences for the region and planet. Melting ice sheets are linked to rising sea levels that could threaten coastal regions and lead to ecological destruction and the displacement of millions of people. Furthermore, sea ice mitigates climate change, reflecting a great deal of solar radiation back into space; less ice cover will lead to even warmer polar waters and more melting. Commercial fish species are especially sensitive to temperature changes and a warming may cause them to migrate. One notable threat is that cod, common in the Barents Sea, could move eastward toward cooler Russian waters (Schjolden, 2004). At the same time, reduced ice cover would open up vast stretches of the Arctic Ocean to oil and gas exploration, providing potentially huge gains for Norway's economy.

Coupled with decreased salinity from both types of melted ice, warmer water would not only stress the arctic marine ecosystem, but it might also affect the flow of the world's ocean currents. The Arctic Ocean is a hub of a global system of currents, as warm water travels up the coast of Norway and cold water travels southward east of Greenland. A disruption of this flow might have a profound effect on regional and world weather patterns (Richter-Menge et al., 2006).

## Indigenous Groups

As a major constituency within Norway and a central group in international indigenous affairs, the Sami may figure largely in any potential center. Their relatively high concentration and political importance in the Tromsø region and the University of Tromsø's position as leader in Sami studies reinforces the likelihood of collaboration between them and the Tromsø Center. Evaluating the interplay of the relations among the Sami, Norwegian society, the Norwegian government, and local bodies will help highlight potential foci for a Tromsø Center.

Relations with the Sami have become increasingly important in Norwegian politics, especially as they reflect Norway's preference to stand at the forefront of progressive

policy, which, recent experience suggests, affects policy on dams, fisheries, and governance (Eide, 2001; Minde, 2003, chap. 5; Semb, 2001). Related to this are issues of felt responsibility with respect to the country's history of "Norwegianization" in the 20th century. These factors heavily influence Norwegian policy and public sentiment. Recent constitutional amendments require the government to promote Sami well-being (Brenna, 1997; Eide, 2001; Semb, 2001). In this sense, consideration of the Sami's symbolic leverage on Norwegian self-perception is important in addition to recognition of them as strong independent actors in their own right (Minde, 2003, chap. 5).

The Sami are international figures in indigenous affairs. In the 1960s and 1970s, they were key actors in the first round of negotiations and renegotiations of International Labour Organization (ILO) Convention 107 and ILO Convention 169. Beyond these two globally significant pieces of legislation on indigenous affairs, the Sami play important roles with other key international institutions such as the World Council of Indigenous Peoples and the Arctic Peoples Conference (Minde, 2001). Besides their current affiliation with the Arctic Council, the Sami maintain connections with other major indigenous-related organizations, including the UN Permanent Forum on Indigenous Issues and the UN Earth Summit (Jull, 2003, chap. 2).

The Sami are principle regional actors. The Norwegian government is evaluating different rights regimes for the Sami that would provide full autonomy for supra-majority Sami areas or 50 percent representation in local governments of Sami-majority areas (Eide, 2001). This autonomy would include extensive authority over natural resources as well as "normal" government authority. The Sami's importance and influence is reflected in the status of the University of Tromsø as a major center for Sami studies, offering Sami-based coursework as well as a range of studies in Sami history and anthropology.<sup>2</sup>

As an indigenous group living in one of the world's most sensitive climate change regions, the Sami face potentially drastic changes in their environment through fisheries-related changes and threats to biodiversity. Beyond global environmental change, the Sami face local environmental challenges, such as the controversy over the Alta Dam (Minde, 2001; Riseth, 2003, chap. 12). The Sami have responded to these challenges in part by positioning themselves ideologically and symbolically as one of the world's "keynote" indigenous groups, a part for which they possess the ideological capacity and potential to play well, as they have the resources to make their story heard (capacity) and the unique qualities of a "raw" first-peoples (potential).

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<sup>2</sup> See Appendix B for a description of other university programs with which the Tromsø Center could collaborate.

The Sami have faced conflict with Norwegian fisheries policy. The 1990 policy included quota restrictions that placed the Sami at a distinct disadvantage with respect to ethnically Norwegian fishing firms due to cyclical fishing patterns and under-capitalization (Eythorsson, 2003, chap. 8; Nilsen, 2003, chap. 9).

## Fisheries

The BEAR is home to some of the world's largest and most important fisheries and one of the few remaining clean and healthy marine environments. These fisheries are central to the arctic ecosystem, local and national economies, and the social sustainability of coastal peoples. Economically speaking, fish and fish products make up 14 percent of Norway's non-petroleum exports, making it the world's third largest seafood exporter (Horn Forlag, n.d.). The industry has historical significance as well and is closely linked with national identity, giving fishery representatives political traction on many issues. Fishing also supports the livelihoods of coastal Sami who possess special fishing rights under national law.

Oil and gas extraction, global climate change, pollution, and over-fishing threaten the region's tremendous fishery resources. Most Barents Sea fisheries have collapsed or are overexploited. Because fisheries migrate and are not confined to the boundaries of a particular coastal state, they represent a common pool resource. Enforcing regulations is extremely costly, making it difficult to limit access to fisheries. This, combined with potential scarcity rents (benefits well in excess of the costs associated with fish capture), leads to overfishing.

Consequently, firms overinvest in equipment to gain advantage in harvesting non-excludable resources and thereby capture scarcity rents, leading to fleet capacity that exceeds resource availability. In areas where national exploitation rights are contested, the incentive to overexploit is even greater. The risks of overfishing are compounded by natural fluctuations in fish stocks that impede prediction of a sustainable level of exploitation. Finally, regulations enacted to safeguard fisheries sometimes exacerbate the problem by creating perverse incentives.

The Barents Sea cod fishery is the world's largest and one of two remaining cod fisheries that can support large-scale commercial fishing (Esmark and Jensen, 2004). However, its sustainability is uncertain. Exploitation of cod and haddock exceeds safe biological limits, with some catch quotas topping limits by 25 percent (Matishov, et al., 2004), threatening the region's two largest commercial fisheries (Esmark and Jensen, 2004). The International Council for the Exploration of the Seas has recommended halting Norwegian coastal cod fishing.

In addition to unsustainable quotas, illegal, unreported, and unregulated fishing is a problem. Catch enforcement is low, however; only 0.5 percent of 400,000 annual landings are controlled on the Norwegian mainland. To capture scarcity rents, fishers overinvest in technology, increasing the incentive to engage in illegal, unreported, and unregulated fishing. Although Norway acknowledges the need to decrease fishing capacity, trawler fleet capacity increased by 70 percent since 1990 (Esmark and Jensen, 2004), making it twice that of the resource supply. The International Council for the Exploration of the Seas estimates that illegal, unreported, and unregulated fishing catches are close to one-fourth of Barents Sea fisheries total allowable catch (World Wildlife Fund, 2005). Large-scale fish discarding, a component of illegal, unreported, and unregulated fishing, is also high. As fishers are not permitted to exceed catch quotas and as there are price differentials for larger fish, fishers often discard all but the largest fish. Globally, discards account for one-third of total allowable catch (Esmark and Jensen, 2004) and pose a difficult challenge because they are nearly impossible to prevent.

Another threat to Barents Sea fisheries is potential oil spills from new petroleum discoveries. Unlike fisheries themselves, eggs and larvae are highly vulnerable. Spills close to spawning grounds could kill as much as 20 percent to 30 percent of a year group of cod (Nagoda, Skrede, and Esmark, 2005). Changing sea temperatures pose another concern for Norway as they could cause fish to migrate north, giving Russia a larger share of the total allowable catch.

Norway addresses these challenges at the national and international levels. Nationally, most political parties support designating important fishery areas as petrol-free zones (Nagoda, Skrede, and Esmark, 2005). Internationally, Norway is party to the UN Convention on the Law of the Seas, the UN Straddling Fish Stocks agreement, and the Barents Sea Loophole agreement,<sup>3</sup> which support sustainable fisheries. Norway also works with Russia to improve fisheries sustainability through the Joint Commission on Fisheries, which regulates fisheries, sets annual quotas, and develops methods to protect young fish.

However, fisheries management at the international level is problematic. While Norway and Russia share approximately equal total allowable catch of cod, 14 percent

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<sup>3</sup> “The Grey Zone” and “Barents Sea Loophole” are examples of areas where marine jurisdiction is unclear. Until the Grey Zone Agreement set up parallel jurisdiction in the area, Russia and Norway each behaved as if it had sole jurisdiction in the region. Each country enacted separate regulations and enforcement on all vessels, thereby undermining the effectiveness of fisheries management. In the case of the “Loophole,” Iceland began heavily fishing Loophole cod in the 1990s. Although neither Russia nor Norway had clear rights to these waters, they argued that their historical fishing in the region entitled them to fish the waters and precluded Iceland from doing so. Although the Loophole Agreement of 1999 largely settled this dispute, the maritime boundary between Russia and Norway remains unsettled and poses constraints for fisheries management and petroleum development (Stokke, 2003).

of the total allowable catch is allotted to 13 other countries, creating collective action challenges (World Wildlife Fund, 2005). Russia, Norway, and Iceland dispute certain areas, including the “Loophole,” making it difficult to determine rights to fisheries and more likely that fishers will not abide by regulations.

## Oil and Gas Extraction

Petroleum extraction in the BEAR is a multibillion-dollar annual industry. While the Barents region does hold valuable oil reserves, natural gas is the major resource of current and future interest. International demand for natural gas has grown rapidly in recent decades, leading to higher natural gas prices. While exploration in the Arctic has been considered too costly and dangerous, the current increase in natural gas prices makes gas exploration in the BEAR viable.

Oil is crucial to Norway’s economy. In the late 1960s, Norway began extracting petroleum in the BEAR, making it a major engine of the country’s economy. Petroleum represents one-third of Norwegian government revenue; 25 percent of Norwegian gross domestic product’s long-term stimulation resulted from petroleum’s economic influence. Experts regard Norway’s current oil fund, valued at an approximate \$300 billion (Organisation for Economic Cooperation and Development, chap. 1, 2007b), to be “a world-class model for managing of oil revenues” (Solholm, 2006). Norway utilizes this fund as a macroeconomic stabilizer, releasing approximately 4 percent of its capital value into the yearly government budget (Organisation for Economic Cooperation and Development, chap. 2, 2007a).

While petroleum revenues have helped expand the Norwegian economy, Norway remains environmentally responsible in its approach to resource extraction. No major environmental problems have occurred, and there is even a pattern of decline in minor accidents and spills (Royal Norwegian Ministry of the Environment [RNME], 2005). Through responsible handling of its natural resource wealth and environment, Norway is a model for resource management in the BEAR.

Norway still faces obstacles for sustainable growth. The value of massive potential petroleum reserves in the Svalbard Box, an area of roughly 173,000 square kilometers in the heart of the BEAR, aggravates a longstanding border disagreement between Norway and Russia. Some estimates indicate there may be as many as 12 billion barrels of oil in this disputed area (Talley, 2005). Norway bases its claim to this territory on scientific research of the continental shelves and the ocean floor, but these remain uncertain. Svalbard, currently treated as a pseudo-international territory, lies within Norwegian sovereign territory but has disputed usufruct rights, and its continental shelves make establishment of specific borders difficult (Pedersen, 2006). Scientific research regarding the continental shelves and the potential riches below them can more accurately inform governments as to the value of this disputed region.

## Maritime Transport

The extraordinary retreat of arctic sea ice due to climate change is opening up new shipping routes that may increase maritime activity in the BEAR. Receding ice may increase opportunities for mineral extraction, further expanding maritime shipping of petroleum products. Comprehensive and unified efforts among stakeholders will be needed to reduce the environmental impacts of maritime transport in the BEAR.

The greatest threat posed by increased maritime traffic in the region is an acute oil spill. This is exacerbated by an increase in the expected volume of petroleum transport in the BEAR from 12 million tons in 2004 to 36 million tons by 2015 (RNME, 2007), and by the increased risk involved with shipping activities in the Arctic due to ice, darkness, and fog. The same extreme conditions complicate rescue and cleanup efforts.

International law largely governs maritime transport. Norway operates through international organizations, principally the International Maritime Organization, to safeguard its coastal waters. Harmonization of rules on ship construction and crew training needs to be addressed as the shipping industry expands in the BEAR. Furthermore, the UN Convention on the Law of the Sea—specifically Article 76—determines which waters are internal or external to a nation (UN Convention on the Law of the Sea, n.d.). If waters are designated internal (sovereign), a nation can impose its own national shipping laws instead of working through the international community. Norway hopes to expand its claim on internal waters, enabling it to promote a higher level of safety and regulation in maritime transport.

Maritime transport is an important industry for many coastal communities in northern Norway. Therefore, the expected increase in maritime activity should lead to continued economic growth in the BEAR. Norway is also a large producer of tankers and carriers. Norwegian shipbuilding industries should see a sustained increase in economic activity. Finally, oil and gas exports account for one-third of all Norwegian exports (Central Intelligence Agency, 2007); as oil and gas production increases in the BEAR, shipping activity should increase.

Norway and Russia have a bilateral agreement for cooperation on preparedness against oil pollution (Norwegian Maritime Directorate, 2004). As Russia continues to expand its role in the shipping of petroleum, efforts aimed at compliance, cooperation, and enforcement remain vital. A key component of successful maritime transport in the BEAR will be the integration of Russian petroleum interests with Norway's goals of sustainable development.

## Linkages

Significant linkages exist among these pressure points. Climate change will undoubtedly affect other activities and stakeholders in the region. For example, changing sea temperatures will affect fisheries distribution and will likely have profound economic and social consequences. Reduced ice cover may produce profitable new shipping routes and opportunities for resource extraction. However, the heightened risk of acute oil spills and increased shipping activity threatens fishery sustainability. Changes in shipping routes may increase maritime pollution through more illegal bilge discharge. In addition, new shipping routes may affect social conditions in the primary shipping ports and cause fishing and transport vessels to compete for use of waters. All of these challenges in turn affect the political feasibility of new developments in the petroleum and shipping industries.

In consideration of Norway's strict oil governance regime, quotidian threats to the Sami from the shipping or petroleum industries are most likely low. Like fisheries, the most serious threat from these sectors would be an acute crisis such as a platform accident or tanker spill (RNME, 2007). Nevertheless, coastal Sami communities depend upon fishing for their livelihood, and they are important political actors in fishery debates. Although less likely to be affected by the maritime aspects of increased shipping and exploration, inland Sami are important political actors in the region whose concerns will also affect any project's viability.

Finally, increased oil production and higher emissions from barges and vessels will exacerbate the rapid rate of climate change found in the Arctic today. In turn, this process of climate change will accelerate the challenges described above, perpetuating a vicious cycle of environmental degradation. As a result, the following proposals seek to identify actions that can exploit new development opportunities while mitigating environmental harm, ultimately undermining the negative cycle introduced by climate change.

## Goals and Criteria

We develop four goals to evaluate each of our proposed alternatives for the Tromsø Center's institutional direction: any proposed institutional alternative must be sustainable, politically feasible, administratively feasible, and justifiable. Each goal contains specific criteria that represent areas of concrete progress measurement.

The first goal that we employ is *sustainability*—namely, environmental, economic, and social sustainability. Considering the deleterious effects of climate change and industry already seen in the BEAR and the Nelson Institute's interests in the project, addressing environmental sustainability is a major criterion. Economic sustainability is another important criterion to ensure a safe and equitable coexistence of various commercial activities in the BEAR. Finally, we consider social sustainability, which evaluates each alternative's capacity to help social groups maintain their way of life amidst the effects of climate change and the burgeoning BEAR economy.

Second, we evaluate the extent to which an alternative is *politically feasible*. Our recommendation should be viewed as a non-partisan, practical approach that supplements the Ministry of Environment's Report No. 8 to the Storting, which outlines Norway's 2005-06 integrated management plan for the Barents Sea and the sea areas off the Lofoten Islands. We also evaluate our selected alternatives based on the criterion of international political feasibility. The Barents Sea comprises waters shared mainly with Russia, but governance of the broader region involves all arctic countries and numerous international organizations. Each alternative's compliance with existing international laws and treaties, as well as any potential disputes that may arise from our recommendations, is considered here.

Third, we evaluate the degree to which each alternative is *administratively feasible*. The first criterion under this goal is ease of implementation, which considers projected costs, any foreseeable investments in infrastructure, and the process of staff recruitment. Using a second criterion, speed of implementation, we consider the estimated time frame for the center's commencement under each alternative. A swift launch is desirable, ensuring that a management scheme is in effect before emerging BEAR industries, such as marine shipping and oil extraction, begin or significantly expand operations.

Finally, we consider the extent to which our alternatives are *justifiable* by examining the current BEAR management structure and assessing whether our alternatives fill a policy gap. Besides the need to avoid redundancy, another consideration within this goal is to utilize the city of Tromsø's advantages as a site for this center. In addition, we consider how each alternative, to be justifiable, maximizes its impact given existing resources.

## Proposed Courses of Action

This section describes potential actions for the Tromsø Center in its management of the BEAR. These actions incorporate the “pressure points” described earlier, while involving potential stakeholders in accordance with an integrated approach to address key issues facing the region.<sup>4</sup>

### Policy Clearinghouse

This proposal’s principle idea is the creation of a centralized conceptual and physical location for the collection, research, and coordination of policies affecting the BEAR. The need for such a Policy Clearinghouse arises from a possible gap in the Norwegian government’s five-year integrated management plan for sustainable development in the region: This plan does not explicitly mandate a coordinating body or an institution to look at the issues affecting the BEAR in a systematic manner (RNME, 2007). Tromsø stands out as an exceptional location for such an institution due to its proximity to the BEAR and its main actors.

This proposal’s innovation is its creation of a physical location for the coordination of BEAR-related policy. The proposed center would achieve this objective by serving dual physical and conceptual functions. Physically, it would provide a permanent space for the region’s actors to engage in dialogue and research on the challenges facing the area. This systematic perspective would be facilitated by the center’s other more conceptual role as a clearinghouse for research, laws, regulations, and petitions. While primarily BEAR-focused, the center would have international implications, acting as an institutional model for other arctic countries and areas, and producing studies and recommendations on similar issues. Additionally, a Policy Clearinghouse would capitalize on Norway’s engagement and leadership in international and regional groups such as the Barents Council, an organization with considerable experience in coordinating international institutions and activities.

Because this alternative intends to facilitate the Norwegian government’s integrated management plan, its principal actors and stakeholders would be necessarily broad. As a physical and conceptual location for facilitating sustainable development in the BEAR, this proposal would involve representatives from all interested bodies: University of Tromsø scholars; petroleum industry representatives; Sami leaders; Norwegian and Russian scientists; and local, national, and perhaps Russian government officials. Representatives from each stakeholder group would rotate through the center, gaining experience with a systems approach to BEAR sustainable development and ensure that the center would be constantly infused with fresh perspectives on current issues. In addition to these representatives, the center would maintain a permanent staff dedicated to the administrative aspects of policy creation such as publishing, editing, dissemination, and general operations.

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<sup>4</sup> See Appendix C for a discussion of environmental issues beyond the scope of the Tromsø Center.

## Indigenous Peoples' Integrated Policy Center

The Indigenous Peoples' Integrated Policy Center (IIPIC) would mitigate global conflicts between indigenous communities and extractive industries. Using revenues generated by petroleum development in the BEAR, the IIPIC would promote social equity and political representation of local communities within national development agendas. It would also generate long-term, sustainable development in Norway's arctic region by providing an original model for resource management. The city of Tromsø's central position within the BEAR makes it an ideal location for such a center, and the IIPIC would ensure continued growth and relevance of this arctic city.

Funded with proceeds from BEAR oil and gas field development, the IIPIC could bring together academics, activists, and policymakers specializing in indigenous affairs from around the world. The city of Tromsø could become a center not only for Sami relations with extractive industries, but a world leader in the investigation and protection of indigenous peoples. Political support would be an important hurdle to clear; such a large investment could spur debate over this use of Norwegian funding. In addition to national political feasibility, implementation of the IIPIC could be slow. The center would have to establish itself and its reputation within the international community, a process that could prove time-consuming.

The IIPIC would have three types of stakeholders: the Sami, communities in northern Norway, and indigenous peoples worldwide. As policy agendas are developed, the IIPIC would seek to address the many challenges local communities face throughout the world. In time, the IIPIC would be available to any indigenous community that seeks its support or service to mitigate conflicts or difficulties related to resource extraction. Norway's stake in the IIPIC would create an opportunity for the nation's continued inclusion and relevance in international dialogue on indigenous peoples-extractive industries relations and natural resource wealth-sharing.

## Ecolabeling for BEAR Fisheries

This proposal promotes BEAR involvement with “ecolabeling,” a process that promotes producer incentives for compliance with environmental regulations. Supporters of ecolabeling claim that consumers prefer products with an environmentally friendly label, prompting producers to meet environmental standards so they can display this label. Thus, ecolabeling uses market forces as a compliance mechanism for common pool resource management.

The Marine Stewardship Council (MSC), the only worldwide ecolabeling organization for fisheries, bases its criteria for certification on the UN Food and Agriculture Organization Code of Conduct for Responsible Fisheries (Gulbrandson, 2005). Any fishery around the world can be considered for certification and must be represented by a client willing to fund the process.<sup>5</sup> The MSC relies on third-party accredited auditors to review each applicant fishery. It mandates that the certification process involve a range of stakeholders at all points. MSC clients have included government agencies, fishing industry associations, local authorities, and combinations of these parties.

This proposal involves recruiting a team of Norwegian and Russian experts to coordinate applications for MSC certification on behalf of select BEAR fisheries. At the outset, the team would implement a forum for discussion among the numerous parties involved with the BEAR fishing industry. Considering stakeholder interests, the team would arrange client partnerships among governmental, industrial, or non-profit stakeholders to submit formal applications for MSC certification. In addition to serving as a liaison among these organizations, the team would explore the prospect of sending a Tromsø Center-affiliated delegate to serve on the MSC Stakeholder Council, a governing board that provides the MSC with points of reference from diverse interests and does not include representation from the Barents Sea area.<sup>6</sup> Finally, the team would prepare reports to the governments of Russia and Norway regarding specific policy actions that would improve BEAR fisheries’ prospects for certification.

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<sup>5</sup> The MSC recognizes the need to expand its reach into bigger fisheries and markets to increase consumer awareness of the MSC label. This would enhance producer incentives for certification. Although the MSC has certified 21 fisheries since 2000, the process can be costly and lengthy. The program involves less than 6 percent of the world’s total edible fish capture. No fisheries from Norway or Russia have been certified. With the potential for national and international influence on sustainable development, it is critical for BEAR stakeholders to apply for MSC certification of Barents Sea fisheries. Of particular concern is the Barents Sea cod, a valuable fishery for Norway and Russia both commercially and in terms of maintaining the Norwegian and Russian indigenous communities’ involvement with cod fishing.

<sup>6</sup> See Appendix E, Table 7 for a list of members as of March 2007 (Marine Stewardship Council, 2007).

## Center for Integrated Maritime Transport and Technology

Due to the dynamic conditions of the BEAR, serious gaps in knowledge persist regarding maritime transport, oil response in arctic conditions, and overall environmental pressure (RNME, 2007).<sup>7</sup> The Center for Integrated Maritime Transport and Technology would use the latest information technology to fill these gaps and distribute information to stakeholders. It would enable policymakers and environmentalists to make integrated decisions on BEAR management. At the same time, this initiative would conduct risk assessments that could serve to decrease the uncertainty surrounding arctic shipping and help spur regional investment.

The center would use geographic information systems (GIS), global positioning systems, remote sensing, aerial photography, and satellite tracking to gather and coordinate new and existing information on three closely related issues in the BEAR: maritime transport, acute oil spill response, and overall environmental pressure. The center would conduct risk assessments of maritime activity to ensure the safety of the region's ecosystem. Staff would work closely with other research institutes to predict environmental impacts on shipping routes such as icebergs, fog, and wind patterns. The center would also conduct cost-benefit analyses to better inform the global business community. In addition, the initiative would conduct research on safe traffic separation schemes, minimum sailing distances from the coast, and accident histories—entering such information into a database.

The center would research and predict the probability and effects of acute oil spills in different areas of the BEAR. The initiative would create a comprehensive oil spill monitoring and response system using remote sensing, satellite tracking, and GIS mapping. It would compile knowledge on oil spill response mechanisms and their feasibility in arctic conditions.

Finally, center staff would work with the Barents 2020 project, an initiative of the Norwegian government that focuses on High North policy and aims to cooperate with Russia on northern undertakings, to synthesize multi-scalar and cross-area information into a series of integrative maps. Barents 2020 is initiating a project to collect information from multiple sources and make it accessible through an online, real-time portal (Royal Norwegian Ministry of Foreign Affairs, 2006). However, there is no effort to synthesize information for users. Using information from the Barents 2020 portal, the center would create and update interactive maps to identify feedback loops, monitor overall environmental pressure, and provide a visual model to assess change in the BEAR.

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<sup>7</sup> See Appendix F for a summary of the gaps in the Norwegian government's integrated management plan.

Collaboration would be central to ensure information sharing at all stages, and the center would emphasize making Russia a partner in these endeavors. It would identify and cultivate incentives for Russia to share its wealth of scientific knowledge, and it would cooperate with existing bilateral bodies. After analysis, the center would make information products available to government officials, business investors, and environmental organizations in both countries.

## International Ecotourism Partnerships

This proposal would partner Tromsø Center with ecotourism companies operating in northern Norway and northwest Russia. Scientists and those affiliated with the Tromsø Center would use these tours to educate visitors on the issues facing the BEAR. The center could capitalize on Norway's large ecotourism market to increase awareness while benefiting the local economy.

Because Tromsø and Murmansk, a city in Russia about 500 kilometers east of Tromsø, have established tourism fleets, Tromsø could focus its efforts on enhancing existing tour services. Working as scientific guides, representatives from center collaborators, such as the Kola Science Center in northwestern Russia, could join tourism cruises and inform passengers about the linkages within the arctic system and highlight the unseen effects of marine pollution, biodiversity loss, and climate change on the landscape. In addition to tourism trips, conferences held in Tromsø could benefit from an eco-cruise providing a physical context for the topics being discussed.

A second key component is the partnership that could be fostered between Norway and Russia. Ecotourism increases cultural and environmental awareness, an important factor if a region is to be protected from environmental degradation (International Ecotourism Society, n.d.). Since the majority of visitors to the arctic regions of both countries are citizens, fomenting cross-border visits and an understanding of relationships between the two countries would strengthen bilateral bonds.

Table 1 presents a detailed chart of our proposals and their capacity to meet these goals.

**Table 1: Goals and Criteria Matrix**

<b>Goals</b>	<b>Criteria</b>	<b>Policy Clearinghouse</b>	<b>Indigenous Peoples Integrated Policy Center</b>	<b>Ecolabeling for BEAR Fisheries</b>	<b>Center for Integrated Maritime Transport and Technology</b>	<b>International Ecotourism Partnerships</b>
Sustainability	Environmental	<b>High:</b> facilitates integrated management plan that emphasizes sustainable development for Norway's portion of the Barents Euro-Arctic Region.	<b>Medium:</b> environmental protection and indigenous advocacy are linked	<b>High:</b> annual audits and renewed certification every five years would be required	<b>High:</b> technological and scientific research would protect environment	<b>High:</b> ecotourism would raise awareness and create new interested parties
	Economic	<b>High:</b> facilitates integrated management plan that emphasizes sustainable development for Norway's portion of the Barents Euro-Arctic Region.	<b>High:</b> fundamental goal would be economic sustainability of indigenous peoples worldwide	<b>High:</b> compliance would be rewarded with profits	<b>High:</b> technological and scientific development would increase investment in north	<b>High:</b> tourism is an important sector of the economy of the north
	Social	<b>High:</b> facilitates integrated management plan that emphasizes sustainable development for Norway's portion of the Barents Euro-Arctic Region.	<b>High:</b> social equity and indigenous advocacy and protection would be the central focus	<b>High:</b> consultation with a range of stakeholders would be required	<b>High:</b> technological and scientific research would generate investment to sustain local communities	<b>Medium:</b> trips can incorporate cultural elements
Political Feasibility	National	<b>Medium:</b> some additional burden placed on existing resources	<b>Medium:</b> the high cost of funding this could create opposition	<b>High:</b> two Norwegian fisheries are currently under review	<b>Medium:</b> public values environmentally safe practices and economic growth	<b>High:</b> partnering with existing providers would cause little opposition
	International	<b>High:</b> threat to its international feasibility should be low	<b>High:</b> no foreseeable reason for international opposition	<b>Medium:</b> Russia has shown willingness to work with Norway on fisheries issues	<b>Medium:</b> new shipping routes must be approved by the international community	<b>High:</b> partners in Russia and Norway would increase international support
Administrative Feasibility	Ease of Implementation	<b>Low:</b> coordination among all actors would be difficult	<b>Low:</b> high cost of the endowment would be a serious constraint	<b>Medium:</b> would rely on stakeholders' interests and financial ability to pay	<b>Low:</b> staffing and equipping the facility with needed technology would take time	<b>High:</b> partnerships would eliminate the need for infrastructure to be developed
	Speed of Implementation	<b>Low:</b> coordinating and organizing visits from each stakeholder group could be difficult	<b>Medium:</b> time would be required to establish a reputation	<b>Low:</b> certification may take up to five years to complete	<b>High:</b> collaboration with scientific, research, and regional government bodies would be easy	<b>High:</b> since operators already exist, links could develop quickly
Justifiability	Fills a Gap in Current Management Plan	<b>Medium:</b> current delegation is to existing institutions, so an additional center may be redundant	<b>High:</b> no body exists that deals with this specific issue	<b>High:</b> would promote further cooperation with Russia	<b>High:</b> the center could provide information on understudied issues affecting the region	<b>Low:</b> numerous ecotourism companies already operate throughout the region

## Evaluation of Proposals

The next section analyzes each proposal using the goals and criteria outlined earlier. A critical analysis of each proposal plays an integral part in deciding the future of the Tromsø Center.

### Policy Clearinghouse

Because this proposal facilitates Norway's integrated management plan to advance sustainable development in its portion of the BEAR, we believe the Policy Clearinghouse proposal would do well along the criteria of environmental, economic, and social sustainability.

In terms of national political feasibility, we find this proposal to be weak because of the additional burden it places on existing resources and the opposition to the plan itself. In that sense, its performance along this criterion depends upon political will. With respect to international feasibility, because this proposal only facilitates the government's existing management plan, we think the threat to its international feasibility should be low.

Because this proposal involves coordination of numerous actors, we judge it weakest along the criterion of ease of implementation. In addition, it scores low because it involves the cost of establishing and operating an additional center. With regard to speed of implementation, coordination of the various actors may take a considerable amount of time, particularly in financing and scheduling visits of representatives from each stakeholder group.

We give this proposal a mixed score when judged according to the criterion of filling a gap. The current management plan delegates responsibilities to existing institutions; as such, this proposal may not be considered as one that fills an urgent need. Nevertheless, because the plan lacks a central body, the center would fill a gap. This proposal scores highly along the criterion of redundancy, as no other center focuses on integrated environmental management of the BEAR. With regard to maximum impact, the potential returns to this proposal are high, as a centralized location for policy creation and coordination promises maximum synergy.

### Indigenous Peoples Integrated Policy Center

The IPIPC proposal has promising overall long-term sustainability, with social sustainability as the priority: such a center would promote equity and protection for indigenous groups threatened by extractive industries worldwide. We also give the IPIPC a high score in terms of economic sustainability, as it promotes economic equity for its stakeholders. Regarding environmental sustainability, the IPIPC only scores a medium, reflecting the proposal's social and economic priorities. Although

the IPIPC would support environmentally responsible policies, the environment would not be the center's central focus.

In terms of feasibility, we give the IPIPC relatively low scores. Politically, the IPIPC might be more feasible internationally than nationally. This reflects the center's high costs and the controversy it may cause inside Norway. As there would be no international costs, there would be no reason for international political opposition.

Given the international aim of this center, and the difficulty in coordinating all the indigenous groups, researchers, and petroleum representatives involved, we assign a low score to the IPIPC on ease of implementation. We score it as medium on speed of implementation to reflect the time needed for the IPIPC to establish its reputation internationally and to convince the stakeholders to participate.

The IPIPC is justifiable as it deals specifically with the relationship between indigenous peoples and extractive industries, a mission for a center not yet matched by other institutions.

## **Ecolabeling for BEAR Fisheries**

Ecolabeling for BEAR fisheries scores high on all sustainability criteria. Economically, ecolabeling uses profit incentive as a market-based, non-coercive compliance mechanism. Environmentally, certified BEAR fisheries would be required to maintain MSC regulations (based on the UN Food and Agriculture Organization Code of Conduct for Fisheries), adding another layer of oversight to Norway's BEAR policies. Socially, ecolabeling aims to preserve fisheries, on which BEAR society depends heavily.

As MSC began full assessment of two applicant Norwegian fisheries in 2006, ecolabeling efforts would likely be supported among domestic stakeholders. This proposal's fulfillment of the second criteria set, political feasibility, is therefore considered high nationally but ranked medium internationally, due to the uncertainty of Russia's interests in ecolabeling.

We consider this proposal weakest in its administrative feasibility. Significant financial investment is required to obtain and maintain certification, giving this proposal a medium score on ease of implementation. The proposal receives a low score on its potential speed of implementation due to the lengthy certification process.

This proposal promotes cooperation with Russia on ecosystem management, a gap identified by the Norwegian Ministry of Environment in the integrated management plan for the BEAR. For this reason, we assign it a high score on the goal of justification.

## Center for Integrated Maritime Transport and Technology

This proposal scores high in the area of sustainability, with a focus on environmental and economic aspects. Scientific risk assessments and acute oil-spill response mechanisms would better protect the BEAR environment. Risk assessments and research on maritime transport would reduce uncertainty and increase investment in northern Norway, boosting economic sustainability. Increased investment in the High North would help to enhance the viability of local communities, thereby contributing to social sustainability.

We assign this proposal a medium score in its political feasibility. The shipping, environmental, and scientific communities generally should support risk assessments. The position of extractive industries with respect to the center's objectives is unclear, however. Furthermore, Russia may object to cooperation and information sharing with Norway on maritime issues.

The costs of staffing and equipping the center with the appropriate technology pose a serious constraint. Building a working relationship with Russia on information sharing likely would be time consuming, and long periods for monitoring and feedback would be necessary to determine overall environmental pressure. For these reasons, the proposal scores low on the administrative feasibility goal.

The proposal scores medium on the justifiability goal. A number of institutes are working on initiatives related to oil spill technology, maritime navigation, and the environment. At the same time, the Center for Integrated Maritime Transport and Technology would take a different approach within these areas, focusing on the use of information technology, information synthesis, and the marriage of science and policy in initiatives such as cost-benefit analyses and risk assessments. Finally, its emphasis on promoting information sharing with Russia would fill an important gap.

## International Ecotourism Partnerships

This proposal promotes environmental and economic sustainability by educating more people about the threats facing the BEAR's ecosystem and encouraging the growing tourism in industry in Norway and Russia. Socially, ecotourism can be designed to expose visitors to the region's unique culture (e.g., that of the Sami), producing benefits from heightened cultural and social awareness.

In terms of national and international political feasibility, barriers should be low. Tromsø and Murmansk are established ports of call for arctic cruises, and enhancement of extant services through partnerships should create a base of support and present little opposition within Norway and Russia. While trips

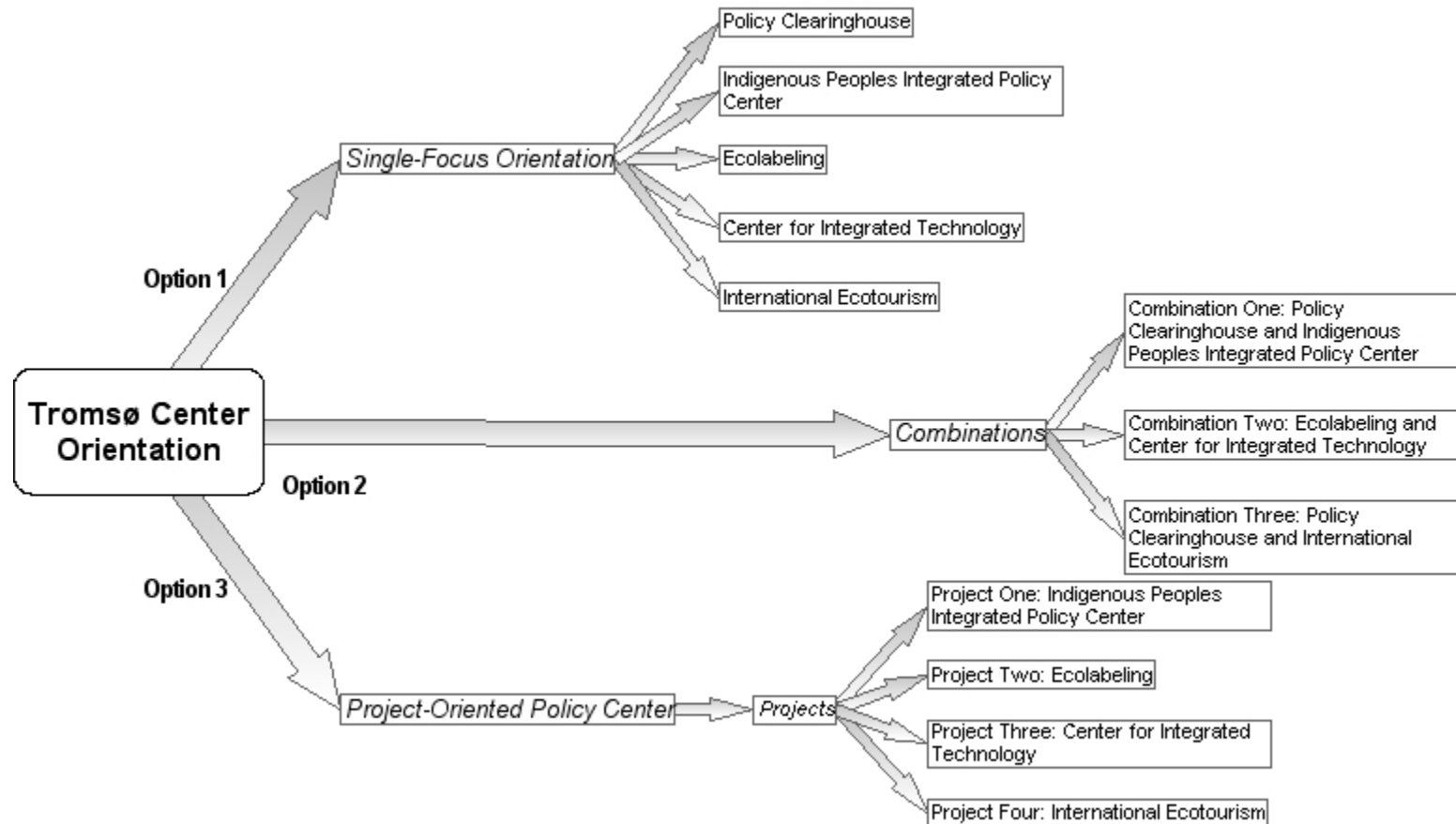
between the two countries would involve some additional burden, passenger ships regularly travel between Russian and Norwegian ports.

Administratively, the established tourism industry means that new infrastructure would not be needed. Therefore, this alternative ranks high in terms of ease and speed of implementation.

As ecotourism is relatively popular in the Arctic, this proposal is not unique as it does not fill a gap in existing services. Involvement of the Tromsø Center could, however, improve existing services and further the center's goals by incorporating the values of a systemic approach in the cruise program and by encouraging increased international travel.

Figure 3 illustrates the potential paths that could be followed in developing the Tromsø Center to incorporate the proposals outlined in this report.

Figure 3: Decision Tree



## Conclusion

As we conclude this report, we note that we intentionally use the term “proposals” because of its neutrality. We believe that this neutrality grants our client greater flexibility in choosing a direction for the Tromsø Center. This is crucial, as there are many ways our proposals could be implemented. The following paragraphs describe these options.

One option for the Tromsø Center would be to consider each proposal as a discrete, mutually exclusive focus for a center, such as ecolabeling or maritime technology. We see a single focus as both a strength and weakness. Its greatest advantage is in maximizing the impact and return on any center’s initial efforts; the center could choose one issue area and then consider how to make as large an impact as possible. A second advantage of having a single-focus center is that it promotes expertise in a specific area and has clear-cut objectives. Finally, from an organizational standpoint, a single-focus center would be inherently easier to implement. An obvious weakness to this option is that it significantly limits the extent to which the center could take an integrated approach to BEAR policy. Furthermore, a single-focus approach would limit the center’s scope and the number of stakeholders involved.

Another option treats each focus as a component that could be combined into a proposal for the Tromsø Center’s mission. We selected these combinations carefully, out of concern for the difficulty in unifying the conceptual foci and the pragmatic aspects (e.g., organizational culture) of our proposals. As an example, Ecolabeling for BEAR Fisheries and the Center for Integrated Maritime Transport and Technology could be combined to create an organization that maximizes the synergy between the two, amplifying their impact on BEAR marine issues. Likewise, combining the Policy Clearinghouse and the Indigenous Peoples Integrated Policy Center would unify the proposals into a single entity that showcases Norwegian policy. Finally, the combination of the Policy Clearinghouse and International Ecotourism Partnerships would capitalize on the continual influx of new personnel and the organization’s prestige to raise BEAR awareness.

A strength of this option is its integrated nature: by combining multiple proposals, it approaches BEAR policy in a more holistic fashion. Its balanced approach would entail the involvement of more stakeholders than would a single-focus center. Finally, revenue opportunities arise from the combination of different centers that would not exist individually. The weakness of the combination approach is in the actual implementation of incorporating an organization with multiple missions. Integrating the people, foci, outlooks, and cultures of different organizations could be a challenge. Certainly, if this option is preferred, the combinations should be chosen with care.

A final option would create a center with a broad approach similar to the Policy Clearinghouse proposal, yet focused on designing and implementing short-term projects. A key strength of this option lies in its flexibility, which would allow it to react to changing circumstances and to select how integrated an approach it would take. This option also addresses the lack of an environmental regulatory framework in the Norwegian government's integrated management plan for the BEAR, as outlined in Report No. 8 to the Storting. Finally, diverse groups and stakeholders would be brought together, giving this alternative a broad impact. A weakness is that time requirements for many of the proposals are unknown, and so consideration of them as potential projects may be problematic. Furthermore, short-term projects may be problematic for networking and building relationships among stakeholders. Temporal initiatives might impede collaboration among researchers, scientists, and others.

Norway faces substantial policy decisions on BEAR management issues due to new commercial developments and climate change in the Barents Sea. If managed incorrectly, these developments could generate long-term environmental, economic, and social degradation for area stakeholders. This underscores the appropriateness of establishing a center in Tromsø to focus on BEAR issues. Although we discuss the benefits and drawbacks of each implementation option, we remain neutral in recommending a specific course of action due to uncertainty regarding the allocation of resources to the Tromsø Center. Our report is intended to serve as a resource for the Nelson Institute and its Norwegian partners in their efforts to make informed decisions about the Tromsø Center's institutional focus and structure. In turn, the center's work will supplement Norway's current policy efforts in the High North and the arctic region as a whole.

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## **Appendix A: Sustainable Development and the Precautionary Principle**

To meet national and international standards, our analysis must adhere to the tenets of sustainable development, the concept that development of natural resources must meet the needs of the present generation without limiting how future generations will be able to fulfill requirements.

Sustainable development achieved international recognition in 1987 with publication of the World Commission on Environment and Development report. Since then, the goal of sustainable development appears in almost every international environmental agreement. The report's basic principles state that environmental protection and economic development must be integrated, and environmental and social concerns should be balanced with economic development objectives. In particular, environmental protection must be included in economic development planning, a principle that is now accepted as customary international law.

Norway's integrated management plan for the BEAR adopts this approach.

However, critics have rightly argued that the concept of sustainable development may be too ambiguous to adequately address environmental and social concerns. Although we recognize the disadvantages that this ambiguity entails, we nevertheless choose sustainable development as a goal precisely because its breadth allows us to evaluate multiple issue areas under one framework.

The precautionary principle compliments sustainable development and states: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation" (Hunter, Salzman, and Zaelke, 2007). Norway's endorsement of this principle is important in the arctic region, where the impacts of environmental degradation are most uncertain. When environmental problems intersect they often have a multiplier effect. Currently, there is insufficient knowledge about how the impacts of pollution, climate change, and the overexploitation of resources will interact in the BEAR. This is especially true because environmental outcomes are frequently non-linear and hard to predict, making adherence to the precautionary principle all the more salient.

## **Appendix B: The University of Tromsø**

The world's northernmost university, the University of Tromsø offers many opportunities for coordination with a Tromsø think tank. No matter which direction the Tromsø Center takes, the University of Tromsø will be a valuable ally as the leading research institution in the region. In addition to traditional natural and social sciences, law, and humanities, the university's course offerings reflect Tromsø's geographical location. In addition, the campus is home to these units: Centre for Sami Studies, the Roald Amundsen Centre for Arctic Research, Norwegian College of Fishery Sciences, and the Tromsø Geophysical Observatory (University of Tromsø, 2001). The university's library is also a valuable resource.

Should the Tromsø Center choose to establish the Indigenous Peoples' Integrated Policy Center (IIPIC), the Centre for Sami Studies would be a perfect partner. With the university's vast research facilities and infrastructure, the IIPIC would receive valuable support during its formative period. Similarly, a Center for Integrated Maritime Transport and Technology would benefit tremendously from a partnership with the University of Tromsø's Geophysical Observatory and the Roald Amundsen Centre for Arctic Research. The university's existing research and information about arctic systems would bolster efforts by the Tromsø Center. Finally, the Norwegian College of Fishery Sciences would be an ideal partner for a Tromsø-based eco-labeling marketing effort for the Barents.

As a progressive, innovative center of academic research in the Arctic, the University of Tromsø would be a perfect partner for a think tank, no matter the direction that this center chooses to take.

## Appendix C: Gaps Pertaining to Environmental Issues and Tromsø Center

This report identifies a number of pressure points that are not only specific points of action for the Tromsø Center but also interconnected junctures that, if targeted properly, can reverse the vicious cycle of environmental degradation. The beginning of the report discusses environmental issues as a “pressure point.” We consider bioprospecting, nuclear waste contamination, persistent organic pollutants, and climate change. While some of these environmental issues are targeted by the center designs in this report, existing arctic management and this report’s Tromsø Center proposals do not completely address all of them, creating gaps in management. This appendix briefly addresses the environmental issues that this report mentions and elaborates on those that would be beyond the scope of the Tromsø Center.

While shipping, oil and gas, and fishing industries are pursued for economic profit, environmental issues other than those resulting from natural resource extraction cannot be ignored. This report mainly focuses on responses to these industries, such as developing new methods to restore cod stock and safe practices to minimize acute oil spills from the extraction and transportation process. However, arctic biodiversity is threatened because all types of pollution

reduce the capacity of ecosystems to regenerate. ... Some terrestrial and marine ecosystems are rather simple, which can mean that disruption of one link in the food chain—for instance, through over-exploitation—will severely affect the rest of the system (Stokke, Honneland, and Schei, 2007).

Environmental governance encompasses the need to manage persistent organic pollutants and PCBs, nuclear waste, bioprospecting, alien species, hydrocarbon, and spills and leaks from gas and oil extraction.

In regard to persistent organic pollutants and hydrocarbons, cooperation and coordination among international governance organizations such as the Arctic Council have achieved success (Stokke, Honneland, and Schei, 2007). In relation to gas extraction, the environmental concern is leakages from freezing pipelines. However, Norway’s Snøhvit and Statoil<sup>8</sup> have developed plans for prevention of and response to gas leaks in adherence with high environmental standards, while environmental standards for Russia’s gas field Shtokman and natural gas company Gazprom remain unclear (Freedman, 2006; Upson, 2006).

As indicated by the Report No. 8 to the Storting and the Global International Waters Assessment of the Barents Sea, there is little information on the introduction of

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<sup>8</sup>Snøhvit is a natural gas field in the Barents Sea and a company developing it and neighboring fields Albatross and Askeladden. The state-owned Norwegian petroleum company Statoil is one of the largest net sellers of crude oil and a major supplier of natural gas through companies like Snøhvit.

invasive species and its potential harm. According to scientific assessments, there are approximately 45 alien marine species; humpback salmon, red king crab, and the snow crab are of particular focus (Matishov, et al., 2004). More research is needed on this environmental concern, but it falls outside the action-oriented schema intended for the Tromsø Center. Research falls upon institutions like the Fridtjof Nansen Institute or scientists based in Svalbaard whose primary purpose is research and monitoring. Soviet scientists first released humpback salmon in the 1930s in the Kola region. The Polar Scientific Research Institute of Fisheries and Oceanography reported that release of humpback salmon has not been conducted since 1989, and there is a lack of data on the sea-life period of the species after acclimatization (Matishov, et al., 2004). This highlights not only the need for more research but also the need for Russian contribution and cooperation.

However, the largest gaps in management and implementation remain in bioprospecting and nuclear waste, which are outlined in the following sections.

## Bioprospecting

Rosendal (2006; 2001) highlights the need to share the benefits of bioprospecting and the dangers of failing to do so. The technology<sup>9</sup> needed to extract marine genetic resources is not readily available. The process of patenting, making cost estimates, and price-tagging biodiversity is difficult because of philosophical conflicts between national sovereignty and genetic resources as an international common public good (Rosendal, 2006). The Convention on Biological Diversity aims to bridge these gaps in legal management and in the distribution of genetic resources. However, it falls short on enforcement and agreement.

The regulatory framework for the BEAR is deficient because of the dual perspectives on whether genetic resources are public or private goods. Many initiatives drafted by researchers and international lawyers (for example, through the Convention on Biological Diversity and Fridtjof Nansen Institute) do try to create an international regulatory framework to preserve biodiversity and avoid conflicts between stakeholders who view genetic resources as *res nullius*<sup>10</sup> and those who view them as public domain. Thus measures are being taken to address the lack of an international legal framework to extract resources and preserve marine diversity.

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<sup>9</sup> For example, high capacity analytical laboratories are expensive. It is in these laboratories where arctic benthos are cleaned and sectioned to identify bioactive compounds. High-performance liquid chromatography is used to clean and section organisms. Robots clean, section, and screen at Marbio, a costly procedure not readily available to organizations that wish to bioprospect.

<sup>10</sup> *Res nullius* is a term familiar in international public law (it can also be written as *terra nullius*). It embodies the idea that a state can assert private ownership and control over unclaimed territory and animals though the unclaimed territory and animals may fall under ownership of many parties.

The creation and the adoption of such an international regulatory agreement would be arduous. The implementation and enforcement of the pact would face difficult hurdles in the international sphere. The lack of a governance framework influences how the Arctic is managed, yet, while implementation and enforcement must be resolved, these challenges are outside the scope of the Tromsø Center.

## Nuclear Waste

The arctic countries are aware of Russia's low quality storage and safety practices for nuclear waste. However, Russia and other arctic stakeholders, like Norway and the European Union, are attempting to reduce the hazards of nuclear waste. Russia's commitment is clear: it has signed on to the Kirkenes Declaration on the BEAR and has received multilateral and unilateral aid from countries like Norway, Germany and Canada (Blagov, 2003). Emergency Prevention, Preparedness and Response, a working group of the Arctic Council, has expanded to include nuclear installations. This illustrates the rising concern about nuclear waste management.<sup>11</sup>

Although concern regarding radioactivity is increasing among arctic countries, regional attention given nuclear waste is limited. Although nuclear pollution is recognized as an international issue, the same concern does not necessarily extend to the regional level: nuclear pollution is viewed as a Russian problem because it is mainly concentrated in Russia's Kola Peninsula. Internationally, states may agree to offer operational guidance and projects to transfer equipment and technology, but this process is curtailed regionally. Monitoring, researching, and planning large-scale initiatives like transport, storage, and construction of treatment facilities for radioactive waste are constantly in the works; however, they result in a stalemate when Norwegian and Russian stakeholders and Russian institutions disagree over interests. Much like the issue of implementation for bioprospecting, nuclear waste management encounters the issue of barriers to implementation (Stokke, et al., 2007).

## Capacity of the Tromsø Center

Though no international environmental governance agreement addresses nuclear waste management or bioprospecting, filling that gap would be beyond the capacity of the Tromsø Center. Regional and international organizations and individual countries already work extensively on these issues, which could make redundant efforts by the Tromsø Center.

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<sup>11</sup> Other agreements exist among arctic countries that reflect Russia's and other arctic countries' commitment to preserve the environment and to protect it, especially from nuclear waste. Such agreements are the Rovaniemi Declaration on the Protection of the Arctic Environment, Convention on Nuclear Safety, Convention on Early Notification of a Nuclear Accident, Convention on the Physical Protection of Nuclear Material, and Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency.

## **Appendix D: Social Network**

An important task for the Tromsø Center would be to engage existing groups that are working on similar issues and initiatives. To facilitate this, we identify key partners for each proposal. The following series of tables lays out the relevant organizations, their areas of focus, and how each could benefit the Tromsø Center.

**Table 2: Potential Partners for Policy Clearinghouse**

<b>Proposal</b>	<b>Potential Partner</b>	<b>Focus Field</b>	<b>How Institution Could Assist Tromsø Center</b>
Policy Clearinghouse	Norwegian Ministry of the Environment	Designs and implements Norway's environmental policy.	The ministry could lend the Tromsø Center its expertise and political clout in policy setting for the BEAR.
	Norwegian Ministry of Petroleum and Energy	Manages Norway's petroleum resources.	The ministry would help Tromsø Center grapple with the implications of the petroleum industry's large footprint.
	Statoil-Nordisk Hydro	Norway's principle energy conglomerate.	The firm would provide crucial petroleum sector representation to the Tromsø Center.
	University of Tromsø	Research in BEAR-relevant fields like Sami studies, politics, history, and science.	The university would function as a crucial link to research opportunities and findings.
	Finnmark and Troms County Governments	Local governments of the two principle BEAR counties.	Local government participation would be crucial for setting and coordinating BEAR policy.
	Sami Council	Semi-autonomous Sami regional government.	Council could ensure that the interests of the Sami are well-represented during policy creation and research.
	Norwegian Polar Institute	Norway's primary institute for research, environmental monitoring, and mapping of the polar regions.	This institute could help Tromsø Center map regions vulnerable to acute oil spills.
	Fridtjof Nansens Institute	A polar and maritime-focused institute with considerable experience.	The institute could assist the Tromsø Center in considering larger ramifications of policy design.
	Ministry of Fisheries and Coastal Affairs Norway	Sets Norwegian fisheries policy.	The ministry could assist the center in dealing with fisheries issues.
	Fisheries Industry Representatives	Representatives of the private fisheries sector.	They could ensure that the private sector is represented in any discussion of fisheries policy.
	Norwegian Maritime Directorate (Branch of the Ministry of Trade and Industry)	The directorate has jurisdiction over ships registered in Norway and foreign ships arriving in Norwegian ports. Its main goals are accident prevention, health, safety, and protection of the environment.	The directorate could aid Tromsø Center's efforts to improve acute oil-spill response mechanisms and shipping regulations.

**Table 3: Potential Partners for Indigenous Peoples Integrated Policy Center**

<b>Proposal</b>	<b>Potential Partner</b>	<b>Focus Field</b>	<b>How Institution Could Assist Tromsø Center</b>
Indigenous Peoples Integrated Policy Center	International Development Research Centre (IDRC)	The IDRC is a Canadian agency that focuses on indigenous affairs.	The IDRC could assist Tromsø Center with information sharing and research.
	International Work Group for Indigenous Affairs (IWGIA)	The IWGIA is a Danish agency that focuses on indigenous affairs.	The IWGIA could assist Tromsø Center with information sharing and research.
	UN Permanent Forum on Indigenous Issues	A UN agency that specializes on indigenous issues.	This UN agency can lend credibility and help develop the reputation of Tromsø Center.

**Table 4: Potential Partners for Ecolabeling for BEAR Fisheries**

<b>Proposal</b>	<b>Potential Partner</b>	<b>Focus Field</b>	<b>How Institution Could Assist Tromsø Center</b>
Ecolabeling for BEAR Fisheries	Norwegian Ministry of Fisheries and Coastal Affairs	Marine Stewardship Council certification of Norwegian BEAR fisheries would depend in part on the Norwegian policy regarding the fisheries industry, for which this ministry is responsible.	The ministry could assist Tromsø Center with specific issues related to Marine Stewardship Council certification.
	State Committee for Fisheries of the Russian Federation	Marine Stewardship Council certification of Russian BEAR fisheries would depend in part on Russian government policy regarding the fisheries industry, for which this ministry is responsible.	Cooperation with Russia on the certification process would lend credibility to Marine Stewardship Council certification while promoting a stronger bilateral relationship.
	Norwegian Institute of Fisheries and Aquaculture	This institute performs research and development work for the fishery and aquaculture industry.	This institute could collaborate with Tromsø on research and standards for Marine Stewardship Council certification.
	Polar Research Institute of Marine Fisheries and Oceanography	This Russian institute researches marine stocks and works closely with several Norwegian organizations, including the Institute of Marine Research, the University of Tromsø, and the Norwegian Institute of Fisheries and Aquaculture.	This institute could collaborate with Tromsø on research and standards for Marine Stewardship Council certification.
	Fiskebat-Norwegian Association of Fishing Vessel Owners	Fiskebat is sponsoring the certification process of two Norwegian fisheries that are undergoing Marine Stewardship Council review.	Fiskebat would have an interest in assisting Tromsø because it would promote the certification process.

**Table 5: Potential Partners for Center for Integrated Maritime Transport and Technology**

<b>Proposal</b>	<b>Potential Partner</b>	<b>Focus Field</b>	<b>How Institution Could Assist Tromsø Center</b>
Center for Integrated Maritime Transport and Technology	Norwegian Polar Institute	Norway's primary institute for research, environmental monitoring, and mapping of the polar regions.	This institute could help Tromsø Center map regions vulnerable to acute oil spills.
	Norwegian Maritime Directorate (Branch of the Ministry of Trade and Industry)	The directorate has jurisdiction over ships registered in Norway and foreign ships arriving in Norwegian ports. Its main goals are accident prevention, health, safety, and protection of the environment.	The directorate could aid Tromsø Center's efforts at better acute oil spill response mechanisms and shipping regulations.
	Barents 2020	A Norwegian government initiative for research and development in the High North. Includes a project to explore how ice affects petroleum and a project on real time monitoring of northern sea areas.	Tromsø Center could synthesize data made available through "Barents Sea Online." Barents 2020 is researching petroleum production in arctic conditions that may be useful for developing oil spill response mechanisms.
	ICEWATCH and the Nansen Environmental and Remote Sensing Center—University of Bergen	The Nansen Center supports ICEWATCH, a joint project between the Russian and European space agencies to do real-time sea ice monitoring to support navigation, off-shore industry, and environmental studies.	ICEWATCH has ice information acquired through satellite monitoring. Tromsø Center could collaborate on information gathering and technology sharing.
	The Norwegian Marine Technology Institute	The institute develops technological solutions for shipping and off-shore petroleum industries.	The institute could share information from its Ship Management and Information Technology and Sea Transport and Logistics Projects for Tromsø Center to synthesize.
	National Oceanic and Atmospheric Administration Fisheries and the Institute of Marine Research	NOAA and the BRIDGE-IT project of the Institute of Marine Research to develop environmental information systems related to fisheries.	The Institute of Marine Research could provide Tromsø Center with information on fish stocks and algae blooms. The National Oceanic and Atmospheric Administration could share information on how to use information systems about commercial fishing.
	Geographic Information Systems Research Centre, Russian Academy of Sciences	A pioneer in developing and implementing Geographic Information Systems in Russia.	Could provide technical support to Tromsø Center as well as introducing Tromsø to other networking partners.
	The Circumpolar Infrastructure Task Force	A joint effort by arctic governments to encourage transport and telecom links among nations.	Could serve as a forum for multilateral cooperation on issues related to arctic maritime transport activities. This institute is important because it brings Russia into the dialogue.

**Table 6: Potential Partners for International Ecotourism Partnerships**

Proposal	Potential Partner	Focus Field	How Institution Could Assist Tromsø Center
International Ecotourism Partnerships	Norwegian Tourist Board	Official government body that manages travel resources across Norway. Provides suggested travel options (including extensive information on the north) and references to specific tour operators, activities, etc.	The board could consult Tromsø Center on travel routes and potential opportunities in the region.
	Ecotourism Norway	Co-sponsor of the Global Ecotourism Conference in Oslo in May 2007, Ecotourism Norway promotes environmentally and culturally sustainable travel throughout Norway.	Ecotourism Norway can assist Tromsø Center in highlighting important environmental and cultural aspects of the region.
	Destination Tromsø	Develops, markets, publicizes, and sells services that encourage visitor traffic to the Tromsø region. Provides information on local travel services.	Destination Tromsø Center could assist in the marketing of scientific tourism cruises.

## Appendix E: Marine Stewardship Council Stakeholder Council

**Table 7: Marine Stewardship Council Stakeholder Council**

<b>Public Interest Category</b>	<b>Commercial and Socio-Economic Category</b>
Scientific, Academic, and Resource Management Interests	Catch Sector Interests
<p><b>Professor Cathy Roheim</b> - University of Rhode Island, United States, co-chair  <b>Dr. Ussif Rashid Sumaila</b>- University of British Columbia, Canada  <b>Dr. Patrice Guillotreau</b> - University of Nantes, France</p>	<p><b>Annie Jarrett</b> - Pro-Fish Pty Ltd, Australia and Australian fishing industry representative, co-chair  <b>Knut Vartdal</b> - Vartdal Seafood, Norway  <b>Daniel Bailey</b> - Batostar, South Africa  <b>Guy Leyland</b> - Western Australia Fishing Industry Council Inc.  <b>Jim Gilmore</b> - At-Sea Processors Association, United States  <b>Per Swensson</b> - Binor Products AS, Norway  <b>Jens Peter Klausen</b> - J.P. Klausen &amp; Co. A/S, Denmark</p>
General Conservation Non-Governmental Organizations and Interests	Supply Chain and Processing Interests
<p><b>Gerry Leape</b> - National Environmental Trust, United States  <b>Otto Langer</b> - David Suzuki Foundation, Canada  <b>Isabel de la Torre</b> - Industrial Shrimp Action Network, United States</p>	<p><b>Cliff Morrison</b> - Youngs Bluecrest, United Kingdom  <b>Dr. Dierk Peters</b> - Unilever</p>
Marine Conservation Non-Governmental Organizations and Interests	Retail, Catering and Distribution Interests
<p><b>Dr. Esther Luiten</b> - North Sea Foundation, The Netherlands  <b>Alfred Schumm</b> - World Wildlife Fund Germany  <b>Burr Heneman</b> - Commonweal Ocean Policy, United States  <b>Eddie Hegerl</b> - Marine Ecosystem Policy Advisors P/L, Australia</p>	<p><b>Carol Haest</b> - World Organic Supermarketing Club, Belgium  <b>Margaret Wittenberg</b> - Whole Foods Market, United States  <b>Brid Torrades</b> - Eurotoque International, Ireland  <b>Peter Redmond</b> - Wal-Mart, United States  <b>Hans Jürgen Matern</b> - METRO GROUP International, Germany</p>
General Interests and Organizations (e.g. Marine Stewardship Council funders, consumer groups, UN Food and Agriculture Organization, Organisation for Economic Cooperation and Development, European Union, UN Commission on Sustainable Development)	Developing Nation and Fishing Community Interests
<p><b>Mike Boots</b> - Seafood Choices Alliance, United States  <b>Dr. Uwe Scholz</b> - Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), Philippines</p>	<p><b>Professor Eyiwunmi Falaye</b> - University of Ibadan, Nigeria  <b>Dr. Luis Bourillón</b> - COBI, Mexico  <b>Dr. Enir Reis</b> - Universidade de Rio Grande, Brazil</p>

Source: Marine Stewardship Council, 2007.

## Appendix F: Summary of Gaps in Norway's BEAR Management Plan

As identified by the Ministry of Environment in Report No. 8 to the Storting (RNME, 2007)

### *Data collection and reporting among institutions*

“Current knowledge of the ecosystem of the Barents Sea and the pressures on it is spread between a number of different institutions, and neither data collection nor reporting are adequately coordinated.”

### *Cooperation with Russia that targets ecosystem-based management*

“Our cooperation with Russia is extensive, but should be strengthened and targeted more specifically at acquiring the necessary knowledge for ecosystem-based management. Among the most important areas for cooperation are fisheries statistics, surveys, environmental monitoring and knowledge of developments and activities on the Russian side that could put pressure on the environment and that will influence what action needs to be taken during the period up to 2020.”

### *Knowledge of non-commercial species*

“We need to find out more about interaction between organisms and the energy flow in the food chain, especially for non-commercial species. There are serious gaps in our knowledge about seabirds and conditions on the seabed, partly because these resources are not commercially exploited.”

### *Knowledge of weather conditions*

“We need to know more about weather conditions in the area so that the data can be entered in the hindcast data archive, since the existing rules for the dimensioning of response measures make it necessary to take account of weather conditions.”

### *Knowledge of environmentally hazardous substances and their impacts*

“We do not know enough about trends in the levels of environmentally hazardous substances or their impacts, particularly in marine mammals and seabirds.”

### *Knowledge of introduction of alien species*

“Very little is known about the risks associated with the introduction of alien species, which makes it difficult to establish a robust management regime that can deal effectively with new introduction.”