

# **Extent of Obligation and Boundary of Precaution: Governing Arctic Fisheries under Climate Change**

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## **Abstract**

Following the increasing accessibility of the Arctic, emerging activities in the Arctic marine ecosystems are believed to cause harm and bring a higher level of uncertainty to Arctic fisheries and the ecosystems as a whole. The precautionary principle, a highly accepted and commonly applied principle in conservation practices, has been implemented in Arctic fisheries governance on various levels. In this context, the obligations for states to take precautionary measures in fisheries management began to shift towards a stricter implementation of this principle, thus extending the boundary of the norm. The shifting of balance will probably mark the change of status for precautionary principle in international law with the Arctic States pioneering in marine conservation practices.

## **Introduction**

This paper is set to examine the implementation of the precautionary approach in dealing with new emerging fisheries in the Arctic under climate change context, and to discuss the shifting balance in the obligations of states and precautionary approach threshold. In achieving this goal, challenges and legal gaps in Arctic fisheries will be identified, followed by a brief discussion on the rationale of precautionary approach to fisheries (PAF), along with the progress of its translation into legal frameworks and implementation on different levels. Then the discussion will move on to the status of precautionary approach in international law, before

concluding on the direction of the shifting trend.

The spatial scope of this research is limited to the 17 Arctic Large Marine Ecosystems (LMEs) defined by the Protection of the Arctic Marine Environment (PAME). Therefore, the United States, Canada, Russia, Norway and Greenland (Denmark) are to be considered coastal states. Iceland, whose EEZ is located mostly within the LMEs in question and whose fishery management is strongly relevant to this area, though conventionally not considered as an Arctic coastal state, will be also discussed in the manner of a coastal state for the purpose of this paper.

## **Challenges and Gaps of Arctic Fisheries: In the Face of Scientific Uncertainty**

### **New Challenges Posed by Climate Change**

Rapid changes of the climate and environment of the earth have been observed and documented throughout the last decades, among which the changes in the Arctic has been especially obvious. According to NASA and National Snow and Ice Data Center of Canada, the September average extent of Arctic sea ice has been significantly reduced (NASA, 2013) and a decline in sea ice of thirty percent since 1979 has been observed through satellite (Millerd, 2011) .

The rising temperature has not only impact on sea ice extent, but also many other features of the ocean. It is believed that climate change will likely alter the geographical location of global weather systems, levels of precipitation, ocean currents, location and intensity of upwelling, ocean nutrient contents, pollution levels and other crucial attributes of marine habitats (Arnason, 2012). These will inevitably affect the reproduction and distribution of marine living resources and therefore impact on the harvesting of such resources by Arctic societies.

The melting and thinning of Arctic sea ice have also triggered incentives for increasing marine activities, among which the most significant are shipping and petroleum exploitation. Pollution caused by spills, invasive species introduced by ballast water, increased marine traffic and other disturbance of the ocean are all possible sources of unexpected impacts to the fisheries. The marine Arctic has been

facing challenges like nothing else we have dealt with before, with faster pace of changes which brought higher level of complex uncertainties in both biological and economical aspects.

Since the upcoming ecosystem impacts caused by climate change still remain largely unknown, inadequate scientific knowledge, information and understanding is another major obstacle on the way to achieving sustainable utilization and management of fishery resources. The relationship between the physical effects of climate change and effects on the ecosystem is so complex that it is not possible to isolate, quantify, or forecast the effects posed on biological resources and potential changes in fish stocks and fisheries. Elements of uncertainty exist throughout the fishery management process, including: (1) uncertainties in identifying the reasons for past changes in fish biology, (2) uncertainties in the projections of potential changes in the ocean climate under climate change scenarios, and (3) uncertainties relating to the socio-economic effects of changes in fish stocks (Alexander, Symon, & Corell, 2004). Fishery management decision-making can be also flawed by imperfections of the methods and frameworks. Therefore, statistical error in detecting stock status and environmental trends, errors in population analysis, and wrong decisions led by inefficient management framework can all add to potential sources of uncertainty (Caddy, 1997).

Arctic Environmental Impact Assessment (AEIA) has mentioned the challenges for fisheries management in the future: a better understanding of species interactions in order to achieve multi-species management; more reliable data from scientific surveys; and a better understanding of the impact of physical factors – such as changing climatic conditions – on stocks (Vilhjálmsson et al. 2004). It went on and concluded that the major challenge is the development and implementation of an integrated ecosystem-based approach to the management of living marine resources, where the effects of climate change are also considered. Therefore, limited practical experience in integrating fisheries and environmental considerations is also considered as one of the barriers to effective management of fishery resources (Paterson et al., 2012).

## **Gaps in Governing Framework**

Despite of the fact that Arctic states generally have a long history in management of fisheries and established an extensive framework in regional level, some gaps still remain. On the other hand, the framework also starts to reveal its imperfections when climate change and growing fishing capacity pose new pressure and challenges to the fisheries and vulnerable ecosystems. Some commonly identified legal and regulatory gaps are presented below.

First of all, some state obligations, especially relating to scientific research before new emerging fisheries, duty to cooperate in conservation measures, and the responsibility of user states (flag states) fishing on the high seas are not defined or vaguely defined. Lack of clear definition of such obligations and responsibilities make international law incapable for guiding states to cope with new and potential challenges in Arctic fisheries with a precautionary manner.

Second, the standard of applying PAF varies greatly within the Arctic states, and each state has different performances in implementation. On the other hand, even though Arctic coastal states have been involved in active cooperation, there is little or no interaction with user (flag) states from outside of the Arctic region. There is a lack of means to conduct scientific research in cooperation with user states, and to provide or share scientific information and knowledge on stocks and ecosystems with them. While there are a few relevant international instruments that allow for the participation of non-user states, these do not seem to have led to a satisfactory balance between socio-economic interests and the sustainability factor (Molenaar, 2009). The gap reflects the lack of unified standard for appliance and implementation of PAF on a broader scale than regional and sub-regional level, and the lack of mechanism or instrument for cooperation in reaching this goal.

Last but not least, species gaps and spatial gaps still remain to be closed. There is a lack of RFMOs or regulation dealing with shared and anadromous species, and species other than tuna/tuna-like species (Koivurova & Molenaar, 2009). The spatial gap of a number of high sea pockets has drawn much attention, especially concerning the Central Arctic Ocean.

Essentially, the species/spatial gaps and the lack of unified implementing standard and can be solved by more clarified state obligations concerning new emerging fisheries. To achieve this end, the role of precautionary principle should be emphasized in the developing of international law. The acceptance of precautionary principle is driving states to move towards practices that deal directly with scientific uncertainty, and accompanying relevant international law to evolve and become more equipped to face climate change challenges.

## **The Precautionary Approach to Fisheries and Arctic Fisheries**

### **The Precautionary Principle and its Thresholds**

From the last decades, precautionary principle has been emerging as a widely and increasingly accepted basic principle in environmental law and natural resources conservation in the face of scientific uncertainties. It provides for action to avoid serious or irreversible environmental harm in advance of such harm. The precautionary principle finds its roots in the earlier attempts of environmental protection with the preventive principle, which imposes obligation on states to prevent known or foreseeable harm; in the absence of such evidence no action would be required according preventive principle. The development of precautionary principle can be traced back to the international effort to protect the Antarctic environment in the Antarctic Treaty System (ATS), which has been a successful example of environmental moratorium for over fifty years. The first explicit incorporation of precautionary principle to environmental protection is believed to have originated from Germany's effort to find the most appropriate measure to deal with a series of large-scale environmental problems of the North Sea and global climate change in the 1970s (DeFur and Michelle Kaszuba, 2002). Since then, this principle began to be included in various frameworks and regimes on environmental protection and natural resources conservation. The precautionary principle became the heat of discussion in 1992 Earth Summit where the Rio Declaration was contracted. In Rio Declaration it states:

“In order to protect the environment the precautionary approach shall be widely applied by States according to their capabilities. 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.” (Rio Declaration, 1992)

Various definitions of precautionary approach in similar or different contexts have been developed and raised discussion on criteria of this approach, including the 1998 US Wingspread Statement, Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) and many others. A stronger precaution was required in Wingspread Statement (Raffensperger and Tickner, 1999), where it stated, “When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.” Compared with the Rio 15 definition and the Wingspread definition, where “threats of serious or irreversible damage” or “threats of harm” shall raise precautions, the OSPAR Convention definition requires the highest level of precaution, where only “reasonable grounds of concern” is sufficient to trigger precautionary measures. However, the Rio 15 definition is by far the most commonly referred to and cited definition, and is believed to have best reflected the core value of this approach.

Discussions on the differentiation of precautionary principle and precautionary approach began when the purpose expanded from preventing environmental pollution to managing marine living resources. It is necessary to differentiate the precautionary approach, set up different risk assessment methods and establish different criteria on a sector-by-sector basis. The triggering threshold of precautionary actions and the level of precaution required are determined by the degree of uncertainty, causal link between threat and outcome, and seriousness of potential consequences. Higher level of uncertainty, stronger causal link, and more serious consequences if measures were not taken in due time, would call for higher level of precaution.

In the context of fisheries, since scientific uncertainty is dominant in this sector, the straight forward application of the principle will inevitably put almost all marine fishing activities to a halt (Marr, 2000). Therefore, a softer and more flexible application of the principle, namely the precautionary approach, evolved in the fisheries management efforts (Vicuña, 1999). One example of precautionary approach to fisheries is that the International Council for the Exploration of the Sea (ICES) identifies limit and precautionary reference points as triggering levels to take into account of the uncertainty in managing fish stocks. By setting the precautionary point way above limit point, allowing fluctuation between years, the reference points give reasonable certainty to the future status of the stock. In the context of this paper, precautionary approach is treated as the practical form of adopted or implemented precautionary principle; therefore the two terms are used interchangeably.

### **Precautionary Approach to Fisheries (PAF) in Arctic Legal Framework**

The PAF has been translated into various operational measures and accepted into Arctic fisheries framework of law and policies. However, the implementation has been marked by controversy and confusion (Cooney, 2004).

The most fundamental document of the marine legal regime is the 1982 United Nations Convention on Law of the Sea (UNCLOS), which gives coastal States rights and responsibilities for the management and use of fishery resources within their Exclusive Economic Zones (EEZs) which embrace about 90 percent of the world's marine fisheries. UNCLOS has made no direct reference to the Arctic region, and the only indirectly provision that casts special concern on ice-covered areas made in Article 234 is concerning marine pollution and has no relation with fisheries. There is no direct definition of PAF in UNCLOS, either. However, in the provisions on conservation and management of living resources of the high seas, it requests States “in determining the allowable catch and establishing other conservation measures for the living resources in the high seas” to “take measures which are designed, on the best scientific evidence available to the States concerned”(UNCLOS Art.119.1(a)). The “best available scientific evidence” requirement is one of the core elements in

precautionary principle, and has been incorporated in many other legal instruments and policies developed later on.

For better implementation of UNCLOS, The Fish Stocks Agreement (FSA) was adopted in 1995. In its General Principles it calls for impact assessment, conservation and management measures for “target stocks and species belonging to the same ecosystem or associated with or dependent upon the target stocks” (FSA Art.5(d)(e)). The FSA is also the first international fisheries agreement that has included the impact of fishing activities on non-target species (by-catch, for instance) into account, as well as existing and predicted socio-economic conditions along with oceanic and environmental conditions (FSA Art.6(c)(d)). The implementation of the FSA is generally realized through establishing Regional Fishery Management Organizations/Agreements (RFMO/As). There are a number of RFMO/As’ competence area overlap with the marine Arctic but there is no such instrument dealing particularly with the entire Arctic.

Apart from legally binding instrument as UNCLOS and the FSA, some guidelines and recommendations also provide important standards for fisheries management. FAO Code of Conduct 1995 reassures the precautionary approach in fisheries governance in its Article 6 and 7. The next movement by FAO was made jointly with Iceland and Norway, namely the Reykjavik Declaration on Responsible Fisheries. In this Declaration it pointed out the importance to advance scientific basis for incorporating ecosystem considerations, building on existing and future available scientific knowledge (Reykjavik Declaration, Para.5). Followed by the Code of Conduct and Reykjavik Declaration, FAO subsequently issued Technical Guidelines for Responsible fisheries in 1996 and 2003 concerning precautionary approach ecosystem approach. The Technical Guidelines provide useful guidance to the states on the basis of knowledge and experience, and to some extent set up a standard for the application and implementation of the approaches. However, due to the nature of the documents, they are merely advisory and do not impose any legal obligations to states in complying with the guidelines.

The UN General Assembly (UNGA) has also noticed and recognized the



importance of implementing PAF in its series of Resolutions. In its Resolution 61/105, UNGA recognizes “the urgent need for action at all levels to ensure the long-term sustainable use and management of fisheries resources through the wide application of the precautionary approach” (UNGA, 2007). It calls upon states to apply widely PAF and encourages efforts to promote science in achieving this purpose. Followed by Resolution 61/105, UNGA has been issuing Resolutions each year on sustainable fisheries addressing particularly on precautionary and ecosystem approaches.

On regional level of governance, there are a number of RFMOs that cover a part of the marine Arctic. NAFO, an intergovernmental fisheries science and management body responsible for the management and conservation of most stocks outside of national jurisdiction within the Northwest Atlantic, has its Regulatory Area overlapping a number of Arctic LMEs. NAFO Party States are “committed to apply an ecosystem approach to fisheries management [...] that includes safeguarding the marine environment, conserving its marine biodiversity, minimizing the risk of long term or irreversible adverse effects of fishing activities, and taking account of the relationship between all components of the ecosystem” (NAFO,2013). In its Conservation and Enforcement Measures PAF is requested in conservation of certain fish species, and special concern on ecosystem is given on bottom fisheries in particular. In 2007 the Scientific Committee recommended prohibiting all forms of trawling and gillnet fishing in the SEAFO area to take a precautionary view towards the vulnerable marine ecosystems (VMEs) that are not currently closed areas (SEAFO, 2007), consistent with UNGA 61/105. However, implementation of the PAF in NAFO has generally been slow to occur, and reasons for this have included the lack of reference points and/or related harvest control rules. On the other hand, NEAFC is the RFMO for the North East Atlantic. Its Regulatory Area also covers parts of the Arctic marine area including the Barents Sea Loophole and the Norwegian Sea Banana Hole. Its constituent treaty has been amended in 1998 to incorporate the emerging environmental principles and recent legal developments which includes PAF.

Another notable regional framework in the Arctic is the Arctic Council, which has

been serving as an active forum of dialogues and a platform for developing policies and agreements between Arctic States. With the objective of promoting co-operation between the Arctic states, the Arctic Council addresses common Arctic issues such as environmental protection (Ottawa Declaration, 2010). Arctic Council working group PAME and CAFF has also mentioned the pressure to marine ecosystem from fish harvest in its Arctic Biodiversity Monitoring Plan (CBMP). Followed by CBD's emphasis on Arctic at its 10th Meeting, CAFF and CBD issued their joint resolution on cooperation, in which concerns were given to the impacts of climate change and overall balance of Arctic ecosystems. However, these references are not intended to deal with fisheries, rather than the overall impacts from marine activities in which fishery is a part of. The Arctic Council itself has not directly dealt with fishery management so far and explicitly expressly its lack of mandate to do so. This situation is understandable, because fisheries in the Arctic have been commonly management within regional frameworks, which appear to be the most effective and beneficial for all Parties.

Like mentioned above, cooperative fisheries management have been proven to be effective and relatively successful in a smaller scale. There is an extensive framework of direct cooperation between Arctic states concerning fisheries management on sub-regional or bilateral level. The Norwegian-Russian Federation Fisheries Commission and the Loophole Agreement and Protocols have served as examples of successful cooperation on fisheries management. The two states agreed to apply the PAF widely to conservation, management and exploitation of shared fish stocks, including straddling fish stocks. Since 1998, the scientific component of the Barents Sea management regime has established precautionary reference points for the shared stocks (ICES, 1999). Whereas the Norwegian-Russian agreements, which form the core of the Barents Sea regime, make no explicit mention of a PAF, the concept had made its way into regional management practice well before the adoption of the FSA (Stokke, 2001). Parties to the Loophole dispute regarded the provisions for a PAF as unproblematic because stricter domestic provisions were already in place.

Bilateral fishery agreements and organizations also include US-Russia Intergovernmental Consultative Committee (ICC), Norway-Iceland Agreement on Fishery and Continental Shelf and others. There are also fisheries agreement with states outside of Arctic region, for instance the "northern agreements" of EU – joint management of shared stocks with Norway, Iceland and the Faeroe Islands. However, except for the Norway-Russian fisheries framework, the rest of the bilateral fisheries agreements are to apply single-species approach or have no explicit reference to PAF.

## **Recent Developments and the Trend Towards a New Balance**

### **Has Precautionary Approach Become Customary International Law?**

The first judicial body to apply directly the PAF was the International Tribunal for the Law of the Sea (ITLOS) in the Southern Bluefin Tuna (SBT) Case, even though it did not expressly refer to the principle (ITLOS, 1999). On 27 August 1999, ITLOS adopted an Order in a dispute between Australia and New Zealand against Japan, requesting the parties to refrain immediately from conducting an experimental fishing programme of SBT in the face of scientific uncertainties of the parental biomass of the stock. It considered that the parties should ensure that effective conservation measures be taken to prevent serious harm to the stock, consequently calling for termination of the experimental fishing programme. The unexpressed application of PAF was heralded as an achievement for international law, but also received criticism on the lack of courage and urgency on the part of esteemed international arbiters to implement UNCLOS in a manner that would make it a truly effective mechanism (Telesca, 2003). The Order by ITLOS is historic and remarkable, since it prescribed environmental action in the face of scientific uncertainties, and provides guidance for setting a threshold for PAF. The SBT case, along with the acceptance of PAF in various international agreements, is also thought to have signified the crystallization of PAF into a binding norm of international customary law.

A practice is considered to have become customary international law when such practice is extensive and virtually uniform among states, and is accompanied by a

conviction that it is obligatory under international law. Article 38 of the Statute of the International Court of Justice (ICJ) recognizes customary international law as 'evidence of general practice accepted as law'. There are good grounds to believe that, at least as regards the sector of marine living resources, the precautionary approach has developed into a rule of customary international law (Marr, 2000). It has found worldwide acceptance with its translation into a vast number of international marine management and conservation agreements as discussed above. A number of International juridical bodies have also provides evidence for this movement. Judge Laing, states in the Fisheries Jurisdiction Case, that:

“It is one of the advances in maritime international law, resulting from the intensification of fishing, that the former laissez-faire treatment of the living resources of the sea in the high seas has been replaced by a recognition of a duty to have due regard to the rights of other States and the needs of conservation for the benefit of all. Consequently both Parties have the obligation to keep under review the fishery resources [...] in the light of scientific [...] information.” (ICJ, 1974)

In the Request for an Examination in the Nuclear Tests case, Judge Palmer, in his Dissenting Opinion, provides supports for precautionary approach developing into customary international law relating to environment (ICJ, 1995). Judge Weeramantry, in his Dissenting Opinion, has reached similar conclusion (ICJ, 1995).

Some European Court of Justice (ECJ) cases, including Danish Bees case (ECR, 1998) and Mondiet Drift-nets case (ECR, 1993), have also touched upon it. In the SBT case mentioned earlier, ITLOS essentially relied upon the precautionary principle to find *prima facie* jurisdiction over the dispute, and its preliminary measures invoked the precautionary principle as the standard for granting relief. The invocation by the ITLOS can be understood in a way that the precautionary approach has entered the evolving body of customary international law (Telesca, 2003). To confirm this statement, a thoroughly examination of *opinio juris* and state practice have to be

conducted. However, it is not too ambitious to conclude that PAF is at least heading towards crystallization into customary law, if has not done so already.

### **Recent Movements and the Shifting Trend**

In the Arctic context, the Arctic Climate Impact Assessment (ACIA) in 2004 stated in its chapter of fishery and agriculture (Vilhjálmsson et al. 2004) that: “The total effect of a moderate warming of climate on fish stocks is likely to be of less importance than the effects of fisheries policies and their enforcement.” The statement may be argued by some commentaries to have underestimated the potential impacts of climate change, but it is not to be denied that the importance of law and policy enforcement is apparent. The effective management will play an even more crucial role in the sustainability of Arctic fisheries than before under the climate change. This statement has brought discussions on whether fish patterns in the Arctic will have significant changes in the near future, and on whether a precautionary step should be taken to establish an integrated legal system concerning the whole Arctic, especially the Central Arctic Ocean.

As for the former, some believe that a commercial fishery in the Central Arctic Ocean is now “possible and feasible”, and refers the Central Arctic to be a new fisheries frontier (Mulvaney, 2012). The PEW Environment Group expects that commercial fisheries in the Arctic Ocean could soon become a reality at the current rate of melting. Some claim that the world’s fishing industry is watching the swift disappearance of Arctic sea ice and the potential fishing bonanza with great interest, and believe that melting sea ice could cast pressure on Arctic fisheries (Struzik, 2012). On the other hand, others believe there will not be any commercial fisheries in the Central Arctic in the near future. The Norwegian Institute of Marine Research finds it unlikely that the melting ice in the Arctic will lead to major changes in the fish patterns in the north, and is opposed to the “unqualified guesswork” which leads to the conclusion otherwise. This finding is reached by examination of the depth, temperature and food supply of the Central Arctic, which is considered not favorable for commercially profitable stocks to inhabit. Even if some stocks will migrate to the

central Arctic nevertheless, it will not likely to attract commercial fisheries of any significance because it is simply not cost-effective to conduct fishing in this area for stocks which are relatively abundant further north (Hoel and Skagestad, 2013). Therefore, there is unlikely to be any commercial fishing in the Central Arctic Ocean at least for a considerable long period of time.

As for the second part of the discussion concerning the statement by ACIA, namely whether a precautionary framework should be established for the Central Arctic, it has led to a substantial amount of literature and petitions. In the reports prepared for WWF International Arctic Programme, Koivurova and Molenaar called for an integrated cross-sectoral ecosystem-based legally binding instrument for the governance and regulation of the marine Arctic including shipping, pollution, fishery, scientific research and other possible emerging activities (Koivurova & Molenaar, 2009). Byers (2012) suggests that an international agreement on fisheries protection and management for the Central Arctic Ocean is needed to be negotiated and implemented ideally before any commercial fishing commences, and before the interests of non-Arctic fishing nations become vested in this uncertain and inherently fragile fisheries frontier. Duyck (2011) also criticizes the weak provisions concerning high seas fishery activities in UNCLOS for failing to address the “tragedy of the commons” of the Central Arctic. He suggests a moratorium to freeze any commercial fishery activities in the Central Arctic until a proper governance model is set in place. The petition does not limit to a few environmentalists and social scientists. On 22 April 2012, more than 2000 scientists from 67 countries issued an open letter with the Pew Environment Group urging Arctic leaders to develop an international fisheries accord that would protect the unregulated waters of the Central Arctic Ocean (PEW, 2013). In the open letter, they state that:

“The science community currently does not have sufficient biological information to understand the presence, abundance, structure, movements, and health of fish stocks and the role they play in the broader ecosystem of the central Arctic Ocean. In the absence of this

scientific data and a robust management system, depletion of fishery resources and damage to other components of the ecosystem are likely to result if fisheries commence [...]"

The open letter goes on and emphasizes that now it is time for the international community to create a precautionary management system for central Arctic Ocean fisheries to postpone fishing activity until such time as the biology and ecology of the region are understood sufficiently well to allow for setting scientifically sound catch levels. It also suggests the establishment of a robust management, monitoring, and enforcement regime before fishing is allowed. This system should be put in place before sea ice retreats further, before fishing begins and political pressure increases, and before precautionary management is no longer an option. The discussion is a good reflection of the emerging concern on Arctic fisheries from the international society, and their growing awareness of the necessity in applying PAF to this venerable marine area.

Recent developments of proactive measures also include the United States' enclosure of marine area north of the Bering Strait including the Chukchi and Beaufort seas. The North Pacific Fisheries Management Council voted unanimously in 2008 in favor of the plan, which has been approved by Obama administration on August 20, 2009. The closed 150,000 square nautical miles marine area has not been supporting commercial fishing activities, and has been closed due to overwhelming uncertainty in data (Kutil, 2011). It is only to be opened up for commercial fishing until strong scientific evidence and data is collected to ensure the protection of the area and sustainable use of fish resources within. The US enclosure could serve as an important precedence for other states whose territorial waters encompass parts of the vast Arctic Ocean.

The growing acceptance and emerging wide implementation of PAF by states, international juridical bodies and international society has marked the new era of development for this approach. Such development is best reflected in the efforts and incentives for marine living resources conservation in the rapidly changing Arctic

waters. A shift can be observed towards a higher level of precaution and stronger obligations of the states under current challenges of scientific uncertainty. This shift of balance is yet to be completed by better enforcement of the precautionary approach and more concrete definitions of relevant state obligations by international law.

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