REGULATING THE IMPACTS OF OFFSHORE ENERGY ACTIVITIES ON ARCTIC MARINE BIODIVERSITY

AN ANALYSIS FROM THE NORWEGIAN PERSPECTIVE

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Foreword and Acknowledgements

This research seeks to bring elements to understand better how complex and fragmented the regulation of offshore energy projects and activities in the Norwegian Arctic is. Figures of various sorts (mind maps, maps, diagram, etc.) have been added in Annexes to help for such understanding. To ease the reader's mind and facilitate a faster referencing, a hyperlink sends the reader to each figure (cited as follows: [*Figure 1*]). The reader only needs to click on it to be sent to the Figure.

I would like to thank my co-supervisors Mana Elise Tugend and Arnaud Tarroux whose patience, expertise and kind support have considerably helped me to write this thesis. Both their follow-up and review of my writings have been crucial for the progress of this research. Thank you, Mana, for relentlessly believing in my work and for providing me with insightful comments and tips from your experience. Thank you, Arnaud, for your valuable help in finding relevant scientific articles and explaining to me the most basic notions of biology and ecology. I would also like to thank NINA and UiT for providing me with the best working environment I could have dreamed of. It has been essential for keeping up the pace and motivation to do research and write during the past months.

Wishing the reader a pleasant and insightful journey.

Abstract

There does not exist any established legal framework nor any comprehensive treaty regulating offshore activities in the Arctic, although they are being developed at an exponentially increasing rate. Offshore energy projects have a direct impact on Arctic marine biodiversity. In order to lower this impact, human activities in this sector must be regulated. There cannot be a choice between protecting marine wildlife and ensuring energy supply. Both should coexist. To ensure such coexistence, regulations are needed. However, they are not sufficient by themselves. An integrated approach is to be favored, taking into account both legally binding and non-binding instruments, as well as norms coming from various related sectors. Due to the fragmentation of the considered legal framework, UNCLOS dispositions must be interpreted in an evolutive and holistic way, using systemic integration. This impact-oriented research on adaptation policies and planning from local to global scales aims at influencing policy- and decision-makers.

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Abbreviations

ABNJ	Area Beyond National Jurisdiction
AMAP	Arctic Monitoring and Assessment Programme
art.	Article
BAT	Best Available Technique/Technology
BEP	Best Environmental Practice
CAFF	Conservation of Arctic Flora and Fauna
CBD	Convention on Biological Diversity
CBDR-RC	Common But Differentiated Responsibilities and Respective Capabilities
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CO_2	Carbon Dioxide
COP	Conference of the Parties
EA/EBM	Ecosystem Approach/Ecosystem-Based Management
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EFTA	European Free Trade Association
e.g.	For example
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EPPR	Emergency Prevention, Preparedness and Response
et al.	And others
FPSO	Floating Production Storage and Offloading units
FRAM	High North Research Centre for Climate and the Environment
GHG	Greenhouse gas
Ibid.	Same source as the previous citation
ICJ	International Court of Justice
i.e.	That is
IEA	International Energy Agency
IMO	International Maritime Organization
IMP	Integrated Management Plan

IPCC	Intergovernmental Panel on Climate Change
ITLOS	International Tribunal for the Law of the Sea
IWC	International Whaling Commission
JCD	Joint Committee Decision
MPA	Marine Protected Area
MPE	Ministry of Petroleum and Energy
MRED/MREI	Marine Renewable Energy Device/Marine Renewable Energy Installation
MSFD	Marine Strategy Framework Directive
NCS	Norwegian Continental Shelf
NEA	Norwegian Environment Agency
NINA	Norsk Institutt for Naturforskning/Norwegian Institute for Nature Research
NPD	Norwegian Petroleum Directorate
OPRC	Oil Pollution Preparedness, Response and Co-operation
ORJIP	Offshore Renewables Joint Industry Programme
OSPAR	OSlo PARis Convention
p.	Page
PA	Petroleum Act
PAME	Protection of the Arctic Marine Environment
para/§	Paragraph
PCA	Pollution Control Act
POPs	Persistent Organic Pollutants
PR	Petroleum Regulations
PSA	Petroleum Safety Authority
PW	Produced Water
SDG	Sustainable Development Goal
SEIA	Strategic Environmental Impact Assessment
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
U.S.	United-States

1. Introduction

1.1. Background

Nowadays more than ever, a myriad of articles, reports and documentary movies[1] are shining a light on the many threats the Arctic is facing. Climate change has the lead role (along with its direct and indirect consequences such as temperature and sea-level rise, ocean acidification, and permafrost melting), closely followed by human activities, and what is considered to be the sixth mass extinction of global diversity.[2] This non-exhaustive list shows the complexity and wide variety of inter-related issues that are threatening the Arctic wildlife. Oceans represent 71% of the Earth's surface and roughly provide half of the primary production (using raw materials and natural resources) on the planet.[3] Oceans and their ecosystems regulate the Earth's atmosphere and by doing so, they also absorb most of the CO_2 human activities are currently generating. The Convention on Biological Diversity (CBD) defines the term ecosystem as "a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit".[4] The fact that rain comes from the ocean's evaporation is another example of how vital oceans are to all types of life. Therefore, it is essential to preserve and protect planet's oceans, including the Arctic marine biological diversity. The term biological diversity means "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems".[5] While scientists are increasingly raising awareness on the irreversible effects of climate change,[6] oceans are attracting more and more attention as a rich source of energy. To create energy, ocean currents and tides are exploited, offshore wind farms are being developed at an exponential rate, and finally, oil and gas from undersea deposits are being extracted by offshore platforms. Indeed, States are aiming at decarbonizing their energy production in order to achieve international environmental goals. Decarbonizing means reducing the amount of CO_2 and other greenhouse gas (GHG) emissions

[1] To name only a few: the IPCC and CAFF reports, Bluhm 2011, Hollowed 2017, Wassmann 2011, and the documentary films *Chasing Ice* and *The Last Ice.*
[2] Which is the loss of numerous species at a global scale. See Shivanna, K. R., 2020, p. 93-109.
[3] IPCC's Special Report on the Ocean and Cryosphere in a Changing Climate, 2019, p. 73-129.
[4] Art. 2, para. 7 of the United Nations Convention on Biological Diversity, 1992. This definition is widely accepted by the international community.
[5] Art. 2, para. 1 CBD.
[6] IPCC AR6 SYR, 2023, p. 1-85 and Ripple et al., 2017, p. 1026-1028.

released into the atmosphere by human activities. In contrast with carbon-intensive conventional energy production (derived from the combustion of non-renewable fossil fuel resources such as oil, gas, and coal, whose regeneration takes millions of years), the production of renewable energy (derived from resources that are naturally replenished such as sunlight, wind, tide or geothermal heat) does not directly release CO_2 into the atmosphere.[7] However, the production of materials used in such production (solar panels, wind turbine blades) does emit CO_2. Thus, offshore wind farms are currently being heavily developed, notably next to offshore oil and gas platforms to electrify conventional energy production and make it 'carbon-free'. Offshore wind farms are a group of mechanical devices composed of blades (wind turbines) and located in marine environments, most commonly shallow coastal areas, and that, in the presence of wind or tides, rotate and spin a generator to produce electricity.[8] Such electricity is then transported via undersea cables, either to the mainland or to oil and gas platforms. By using this form of energy and providing a local energy supply, the risks of environmental degradation during both transportation and production (e.g., oil spills) are lessened. Between 2010 and 2018, the global offshore wind market nearly grew by 30% each year.[9] It has benefitted from rapid technological advances, declining production costs and increasing amounts of subsidies from governments and investors.[10] In line with its 2050 carbon neutrality goal,[11] the European Union (EU) has heavily been developing offshore wind activities. According to the International Energy Agency (IEA), "in 2018, more than 80% of the global installed offshore wind capacity was located in Europe".[12] The EU aims to impose itself as the global leader in clean technologies.[13] In the case of Norway, "offshore oil and gas activities have been established on the Norwegian Continental Shelf (NCS) over the past 40 years".[14] Indeed, Norway is the third largest gas exporter in the world, after Russia and Qatar, as well as the 11th largest global oil producer.[15] Equinor Energy SA, the main oil and gas producer in Norway and former Statoil, is planning on building a considerable amount of wind turbines along the Norwegian coast for its Utsira Nord, Sørlige Nordsjø II and Trollvind projects.[16] Moreover, at the United Nations (UN) level, the same momentum can be observed with the 2011 "Sustainable Energy for

[7] Wright et al., 2020, p. 235-244.
[8] Ibid.
[9] IEA, 2019.
[10] Galparsoro et al., 2022, p. 1-8.
[11] COM(2018) 773 and COM(2019) 640 final, p. 4.
[12] Ibid.
[13] IEA, 2019.
[14] Bakke et al., 2013, p. 154-169.
[15] Norwegian Ministry of Petroleum and Energy, Norwegian Petroleum Directorate, 2023.
[16] Equinor's website.

All*"* initiative.[17] As shown by the European, Norwegian and UN examples, financial investments in offshore energy projects, and especially in marine renewable energy devices or installations (MREDs or MREIs) are growing in numbers. The International Energy Agency (IEA) estimates that "US$4.6 trillion in capital investment in all types of offshore energy" is needed by 2040 for States to reach their environmental commitments.[18] However, all these offshore activities are having significant direct and indirect impacts on local wildlife, including habitat loss and degradation, electromagnetic disturbances, collision risks, as well as noise, light and water pollution. Offshore energy generation companies are currently consulting scientists for advice but providing studies and results takes time, much more time than it takes to build and run an MREI. Most international scientific articles agree on the fact that there is a crucial need for more research on the impacts of offshore energy activities on marine biodiversity.[19]

1.2. Purpose and Research Questions

Human activities have severe direct and indirect impacts on global ecosystems.[20] Lowering such acts begins with looking at their origin. The expansion and development of human societies are based on the extensive exploitation of energy-producing resources. Energy is at the core of our society and should be produced in a way that is not detrimental to marine life. This is the reason why this thesis specifically studies energy-related activities. The focus is set on offshore energy projects in the Arctic, notably in the NCS, and their impact on marine biodiversity. The aim of this project is to better understand to what extent human activities are detrimental to ecosystems. This thesis pays exclusive attention to the research, development and exploitation of resources in marine environments for the generation of energy. Indeed, it is a common concern of mankind to know how to ensure an energy supply, which is essential to humankind's survival, without jeopardizing species and ecosystems' thriving. As mentioned in part. 1.1, such questioning appears relevant to the Arctic in the context of climate change and of the development of human activities in the region. Knowing how fragile marine ecosystems are, it seemed important to find out more about how they

[17] The "*Sustainable Energy for All*" initiative has been launched in November 2011 by the Secretary-General Ban Ki-Moon. Its goal is to support the promotion of renewable energy and to achieve worldwide access to clean energy.
[18] IEA, 2018.
[19] Including articles such as and amongst others: Inger et al., 2009, p. 1145-1153; Galparsoro et al., 2022, p. 1-8; Shapovalova, 2020, p. 275-304; Gasparatos et al., 2017, p. 161-184; Beyer et al., 2020, p. 105-155.
[20] Ripple et al., 2017, p. 1026-1028.

are protected against human interference, and especially how to improve such protection. Arctic ecosystems must adapt to rapid changes induced by climate change,[21] and considering their current hegemony on Earth, humans have a role to play in downscaling activities and in helping ecosystems to adapt.[22] Regulations are a necessary tool to reduce anthropogenic impacts on Arctic marine biodiversity, including international law, domestic law from Arctic Coastal States,[23] as well as guidelines and other non-binding instruments. This thesis aims at analyzing such regulations and at reflecting on their efficiency in ecosystems protection. One of the main issues on that matter is: *how to regulate fields in which scientific knowledge is lacking?* Indeed, this research also focuses on highlighting the fact that both additional scientific research and more stringent regulations are needed in this field. Until a larger amount of data is collected, and strict enough laws are implemented, the precautionary approach[24] must be privileged. The inclusion within this thesis of a first chapter focused on scientific findings will hopefully help communicate those to a larger audience beyond the scientific community, i.e., the legal practitioners. This work intends to provide an important contextual analysis for decisionmakers and policymakers, one which the existing literature is lacking. Conversely, providing a summary of the relevant legal framework can be of help to scientists. Therefore, this thesis also analyzes the interaction between the United Nations Convention on the Law of the Sea (UNCLOS) and scientific knowledge. The law applying to the Arctic is not a well-defined framework. This research aims at helping systematize part of it by offering a general overview of the legal framework surrounding the conservation and protection of Arctic marine biodiversity.

To summarize, this thesis is an impact-oriented research on adaptation policies and planning from local to global scales and aims at influencing policy- and decision-makers. Finally, this thesis seeks to answer the following research question: *how to regulate the effects of offshore energy generation projects on the Arctic marine biodiversity without compromising energy supply?*

1.3. Methodology and literature review

[21] Wassmann, 2011, p. 1-17.
[22] On that matter, see Louis J Kotzé, 2014, p. 121-156.
[23] The five Arctic Coastal States which are part of the Arctic Council are: Norway, Russia, The United States of America, Canada and Denmark.
[24] As understood in Principle 15 of the 1992 Rio Declaration.

Firstly, it was necessary to look for energy projects in the Norwegian part of the Arctic, between Spitzbergen and Troms region, using EMODnet Map Viewer.[25] It appeared that sixteen projects are currently under construction and twenty are operational [*Figure 1*]. This includes oil, gas and tidal turbines activities. The map also shows a considerable amount of abandoned and/or suspended petroleum platforms for crude oil and natural gas research, called boreholes. In this geographic zone, companies extracting oil and gas (such as Equinor Energy SA and Vår Energi AS) have active licenses over large areas until ±2030. These licensed areas are all surrounded or very close to protected areas including: Bjørnøya (2002) and Hopen (2003) wilderness areas, Svalbard Strict Natural Reserve (1973), Seiland National Park (2006), Lyngsalpan Protected Landscape (2004).

Secondly, in order to develop the legal analysis on how the impacts of offshore energy projects on Arctic marine biodiversity are regulated, it was clear that an initial description of those impacts was needed. This is why a section describing and synthesizing the scientific context was included in this legal thesis in the form of a literature review of scientific articles on the matter. Including this part in the research represented a considerable amount of additional work and research. However, this interdisciplinarity was necessary to provide a more accurate and coherent analysis. Besides, it appears more than ever needed to integrate and collaborate with other disciplines in legal research.[26] To summarize the current scientific research on that matter, scientific articles and books were used, as well as primary legal sources comprising relevant definitions and dispositions. It is the case of, for instance, the CBD, the UNCLOS and the recent Convention on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (BBNJ). The knowledge about the impacts of offshore energy projects on Arctic marine biodiversity can vary from one specific taxonomic group to another. For example, research on their impacts on marine mammals is still lacking, especially compared to the large number of studies existing on their impacts on seabirds.[27] This is one of the reasons why this analysis could not focus on particular species. Therefore, the second chapter rather gives a broad overview of the scientific findings concerning all marine species that can be encountered around offshore energy projects. Finding research that can be applied to the chosen scope has also been a challenge, as more research could be found on birds and mammals in the Pacific Arctic.[28] More

[25] EMODnet Map Viewer is a free web service documentation tool to visualize various data, created by the European Marine Observation and Data Network.
[26] Inger et al., 2009, p. 1151.
[27] See Christensen-Dalsgaard et al., 2008 or O'Hanlon et al., 2020.
[28] Moore et al., 2014, p. 337-392.

research has been done on offshore wind farms than oil and gas offshore platforms as, nowadays, it is being massively developed alongside European coasts. Similarly, much more research has been done on land-based wind farms as they are more easily accessible than offshore ones.[29] Globally, scientific research highlights the fact that climate change's impact on marine ecosystems is difficult to establish with certainty due to cumulative stressors having indirect and long-term effects. Besides, research has been done on the impacts of climate change on marine biodiversity, but it is often focusing on how it affects human activities such as fisheries.[30] Biological diversity is not as much considered by decision-making and law for its intrinsic value. Most of the time, natural ecosystems are protected by law because of their usefulness for human consumption. However, the recent development of the Rights of Nature (with some countries including it in their domestic law) could help to change the anthropocentric and utilitarian vision over natural resources and increase interest towards nature itself, for what it is.[31]

The scope of the legal analysis is limited to the regulations applying to the Arctic, including international, domestic, and regional regulations. Legal doctrinal research, formal legal sources, case law and regional legal practice have been used to build up the legal analysis. Providing a list of relevant regulations was probably the most challenging part, as there exist no clear nor comprehensive legal framework. Thus, the amount and scope of sources used is very large and diverse. It is close to impossible to scientifically prove with absolute certainty some impacts of offshore energy projects on marine biodiversity. Therefore, regulating such an area is a complex task. This is why the precautionary approach (see part 5.1.2) is at the core of this legal analysis, along with the Environmental Impact Assessment (EIA) requirement. The different lexical vocabulary between the legal and scientific disciplines has constituted another challenge. Finally, focusing on one specific area in the Arctic, with Norway as a case study, enables a deeper analysis and makes the research more tangible.

1.4. Scope and Limitations

[29] Wright et al., 2020, p. 235-244.
[30] See the Research for the PECH Committee on the impact of the use of offshore wind and other marine renewables on European fisheries. European Parliament, 2020.
[31] For example, the concept of the Rights of Nature has been transcribed in the Ecuadorian Constitution in 2008.

The geographical scope of this research is limited to the Arctic part of the Norwegian territorial sea, Exclusive Economic Zone (EEZ) and continental shelf. The EEZ is an "area beyond and adjacent to the territorial sea, subject to the specific legal regime established in [UNCLOS Part V]".[32] The continental shelf of a Coastal State includes

> Tthe seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured.[33]

This scope corresponds to the sub-Arctic part of the Arctic Ocean, the European Economic Area coastline, and for some part, the Barents Sea. For this research, such region was chosen as it falls under the 1992 Oslo-Paris Convention (OSPAR)'s mandate[34] and it is regulated by national jurisdiction. Areas Beyond National Jurisdiction (ABNJ), including the high seas and the Area, fall outside of the scope of this thesis.[35] The Area means the "seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction".[36] Indeed, most offshore energy projects are developed in coastal areas rather than in ABNJ. Although the international community has recently come to an agreement (the BBNJ) on how to regulate those areas, how such an agreement will be implemented is still unclear. However, it would have been quite impactful if the BBNJ agreement had taken into account the effects of offshore energy production on marine biodiversity and had regulated them.[37] It would provide a comprehensive framework for the protection of marine wildlife independently of where they are located and beyond the jurisdiction of States (where they nonetheless have obligations under UNCLOS). This analysis will not cover benthic zones nor specifically look at Marine Protected Areas (MPAs), as they are more strictly regulated.[38] This analysis considers marine protection in general, outside of MPAs as, in theory, energy projects are not to be developed in such protected areas. Norway was chosen as a focus point for this research

[32] Art. 55 UNCLOS.
[33] Art. 76 (1) UNCLOS.
[34] Convention for the Protection of the Marine Environment of the North Atlantic ('The OSPAR Convention'), 1992. Created by the merging of both the 1972 Oslo Convention on dumping and the 1974 Paris Convention on land-based pollution (OSlo PARis Conventions). A mechanism by which 15 governments and the EU cooperate to protect the marine environment of the North-East Atlantic.
[35] Art. 1 (4) of the Draft agreement under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, 2023.
[36] Art. 1.1.(1) UNCLOS.
[37] For more elements on the BBNJ agreement, see De Lucia, 2022, p. 1-24.
[38] On that matter, the work of Ingvild Ulrikke Jakobsen is very timely and relevant, see Jakobsen, Chap. 10 of the book Arctic Marine Governance: Opportunities for Transatlantic Cooperation, 2014, p. 215-233.

as it would not be possible to analyze each Arctic Coastal State's regulations on the matter within the limited length of this thesis.[39]

Concerning the theoretical scope and the subject itself, existing energy sources can be divided into two categories. On the one hand, the 'conventional' sources which are exploited on oil and gas offshore platforms. On the other hand, MREDs, that produce energy from renewable energies: wind turbines (offshore wind farms) and marine energy converters (from tidal & wave). This research only considers regulations on the impacts of offshore activities related to oil, gas, and wind energy sources since these are the most developed ones in the region. Other activities related to the production of energy such as Carbon Capture and Storage (CC&S), transportation, trade, shipping of oil and gas (and with it, the risks of oil spills) will not be analyzed here as they fall outside of the scope of this research. Other human activities taking place in the Arctic, such as fisheries and shipping, are also surpassing this research's scope (although it is relevant to take them into account while assessing environmental risks associated with energy activities).

Finally, some crucial subjects and issues exceed the scope of this research and are not included either in the analysis (apart from mentioning them along with related challenges). It is the case of Particularly Sensitive Sea Areas (PSSA)[40] and Indigenous Rights. Indeed, these aspects deserve an in-depth analysis of their own. Local and indigenous communities' culture and livelihood can be affected by offshore energy projects in a direct (sharing of space) and indirect way (decrease in population numbers of species they rely on). Their contribution to the Arctic governance is essential and should be better integrated in the policy- and decision-making.[41]

1.5. Structure

After a first introductory chapter, chapter 2 summarizes the existing scientific findings on the impacts of offshore energy projects on Arctic marine biodiversity, while highlighting the knowledge gaps. That chapter aims at answering the following sub-questions*: what makes the Arctic region special and unique, and why does it need additional protection compared with other*

[39] For an extensive comparison of the Arctic States' legislation on the matter, see Shapovalova, 2020, p. 275-304.
[40] A concept defined by the IMO. See A24/Res.982.
[41] See the works of Johnson et al., 2015, p. 28-40 and Williams et al., 2018, p. 547-559.

regions? Which direct and indirect effects do offshore energy projects have on Arctic marine biodiversity? How severely is Arctic marine biodiversity affected by offshore energy projects?

Chapter 3 presents the legal analysis by providing a description of the legally binding instruments currently applicable to the above-mentioned subject and scope. It is the case of international, regional and Norwegian legislations. That part develops the regulatory framework that must be effectively implemented in order to lower the environmental impacts mentioned in the previous chapter. It is a descriptive and normative research of existing relevant law that aims at answering the following sub-questions: *which steps have been taken so far to protect Arctic marine biodiversity? How are the direct and indirect impacts of human activities in the field of energy production on marine biodiversity regulated in the Norwegian part of the Arctic? How are international instruments implemented in Norway and how can they be applied in casu? By which international and regional obligations is Norway bound in relation to the protection of marine biodiversity?*

Developing further the legal analysis, chapter 4 complements chapter 3 by providing a description of the applicable non-binding instruments. This includes guidelines, COP decisions, standards, and management plans at international, regional, and domestic levels. In fact, both chapters must be read together to fully answer the previous sub-questions. Chapter 4 aims at answering the following sub-questions: *to which extent is hard law sufficient by itself to efficiently regulate human activities? How can non-binding texts be legally relevant? Which soft law applies to the regulation of offshore energy activities in the Norwegian sub-Arctic?*

Finally, as the last part of the legal analysis, chapter 5 stands as a synthesis of the legal framework analysis by evaluating the effectiveness of applicable regulations mentioned in chapters 3 and 4. Chapter 5 sets out recommendations for reforms and measures to ensure a better protection of the Arctic marine biodiversity. This last chapter is more of a personal analysis that goes beyond the sole description and review of the currently applicable legal framework. In that part, the objective is to complete the research with some ideas of how regulations could be more stringent and efficient. Are also mentioned the various constraints that are in place, such as, e.g., politics, economy, investment, and energy security. Indeed, law cannot be considered outside of its context. The type of research undertaken is called ‘applied research’ as it seeks to influence the legal framework and the energy sector surrounding the protection of Arctic marine biodiversity from the consequences of human activities. That chapter aims at answering the following sub-questions: *is*

the applicable regulation stringent enough to ensure an effective protection of Arctic marine biodiversity, and if not, why is it not more stringent? How to regulate fields that are lacking scientific knowledge? Is the arctic legal framework well defined? Where is the compromise between the non-interference and preservation of marine ecosystems and the production of energy for current and future human consumption? How to exploit resources that are essential for human survival without damaging ecosystems and species? How to minimize human activities' effects on marine biodiversity? Is regulation enough by itself to protect marine ecosystems in the Arctic? Which additional means or measures could be used to protect them?

2. Review of the scientific research on the impacts of offshore energy generation projects on Arctic marine biodiversity

As mentioned above, the purpose of this first chapter is to expose the current scientific findings on the impacts of offshore energy projects on Arctic biodiversity. The question to answer here is: *how can offshore energy development projects affect marine biodiversity?* This question is even more relevant in a period during which offshore energy projects (especially those linked to renewable sources) are quickly proliferating. On top of being 'blue', the energy sourced from the ocean must also be 'green'.[42] The goal of scientific reports is, of course, to provide data and results, but also to identify necessary mitigation measures and to make recommendations (on the most suitable technologies, for instance) according to which law practitioners and politicians should adapt their decision-making.[43] As mentioned in the introduction, this review is limited in scope. Before diving into the listing of positive and negative impacts, it will be useful to describe the features that make the Arctic region unique and particularly vulnerable.

2.1. Specificities of the Arctic

The Arctic possesses very unique ecosystems with distinctive properties. It is considered to be a biodiversity hotspot (meaning that it hosts a high concentration of biodiversity, it is to say, many different species with different functions in the ecosystem) as many rare species with high

[42] Wright et al. 2020: p. 235-244. The term 'blue' (e.g., blue economy) refers to activities using resources from (or being related to) oceans, seas, and shorelines. The term 'green' equals to 'environmentally friendly'.
[43] Giannopoulos, 2019, para. 4.2, p. 298.

endemism live there, such as the Atlantic cod *(Gadus morhua*). Several Arctic species are listed as vulnerable or endangered by the IUCN Red List. It is the case of the blue and fin whales (*Balaenoptera musculus* and *Balaenoptera physalus)*, the polar bear (*Ursus maritimus*), the walrus (*Odobenus rosmarus)*, the Greenland shark (*Somniosus microcephalus*), and the Greenland halibut (*Reinhardtius hippoglossoides*).[44] Although various knowledge gaps remain, it has been assessed that there is a considerable richness of species in the Arctic seafloor, water column and on sea ice.[45] On top of that, many people's livelihoods depend on Arctic resources. It is the case of local and indigenous communities living in Arctic Coastal States. Indeed, four million people live in the Arctic,[46] and rely on what is considered to be the most productive ocean in the world.[47] From a legal point of view, there is no comprehensive regional agreement regulating the marine areas of the Arctic. Additionally, not all Coastal States are Parties to relevant global conventions (see chapter 3). Knowing this, assessing the relevant regulations does not seem like a straightforward process. One explanation for such difficulty is the severe changes the Arctic is facing. Indeed, many new and developing issues are threatening this already fragile region.[48] To name only a few: climate change, ocean acidification, reduced subsurface oxygen concentration, permafrost melting, sea-level rise, temperature rise and the melting of glaciers, and changes in sea ice extent and in ocean currents.[49] Most importantly, global warming is stronger at the poles.[50]

Seeing how fast the sea ice extent is reducing over the years [*Figure 2*] several economic sectors are already planning on developing human activities in the Arctic Ocean, increasing opportunities for economic development.[51] It is important to mention that these are all cumulative stressors to marine life, pushing its tolerance to change to its limits. Cumulative means that these mechanisms can act synergistically. Some might compensate for the impacts of others, while some are amplifying each other (for example, disturbances and stress from human activities can affect the health of species and increase their vulnerability to other stressors such as chemical pollution). Art. 1(8) of the BBNJ agreement[52] defines cumulative impacts as "combined and incremental

[44] IUCN Red List website.
[45] Bluhm et al., 2011, p. 232-248.
[46] Einarsson et al., 2004, *Arctic Human Development Report*, p. 1-242.
[47] Beyer et al., 2020, p. 105-155.
[48] CAFF 2017.
[49] To these environmental changes can be added economic and geopolitical ones. For example, the fact that the Arctic Council's activities are paused because of the Russian war in Ukraine.
[50] IPCC SR15, 2018, p. 1-616.
[51] Arctic Climate Impact Assessment, AMAP, 2013.
[52] According to the current latest draft published, approved during the 5th UNGA session of the 4th of March 2023. Paragraphs may change (pending paragraph renumbering).

impacts resulting from different activities, including known past and present and reasonably foreseeable activities, or from the repetition of similar activities over time, and the consequences of climate change, ocean acidification and related impacts". Arctic biodiversity's survival is thus jeopardized. Arctic species are not more sensible to, for instance, pollutants because of the rough conditions, but rather because of cumulative stressors. It should be noted that many species use Arctic habitats only seasonally, providing them with vital resources during critical periods of their life cycles (e.g., during the breeding season for seabirds). The term habitat can be defined as "the place or type of site where an organism or population naturally occurs".[53] Besides, the increase in human activities in the Arctic [*Figure 3*] might be causing, in addition to climate change, the displacement of Arctic species. Therefore, the impacts of the above-mentioned stressors do not limit themselves to Arctic biodiversity nor to the NCS. This is one of the reasons why the conservation of Arctic marine ecosystems is also important for global biodiversity.[54]

2.2. Impacts of offshore energy projects on Arctic Marine biodiversity

This part of the thesis presents a review of the current scientific research on the topic. As this is a legal research thesis, such review is not extensive, but rather lists the main positive and negative impacts offshore energy projects can have on Arctic marine biodiversity. Most scientific publications highlight the fact that scientific knowledge is still crucially lacking to fully understand the direct and indirect impacts of human activities on biodiversity.[55] Therefore, this part will cover what is known and relevant to the scope of this thesis. Mentioning the lack of scientific knowledge is important as it shows how little attention is paid to the 'environmental costs' of energy technologies (especially when impacts are occurring underwater or far offshore, out of sight). As Inger et al. (2009) mention, "[MREIs] will increasingly be part of the seascape tomorrow".[56] Research mostly covers offshore wind farms in Europe, following the line of European leadership on the matter. Nevertheless, this review deals with MREDs or MREIs as well as offshore oil and gas activities. The term MRED comprises wind turbines, marine energy converters (from tidal and waves) and ocean thermal energy conversion devices. The latter is less developed and will not be

[53] Art. 2, para. 11 CBD.
[54] Jakobsen, 2014, p. 215-33.
[55] Inger et al., 2009, p. 1145-1153, CAFF 2013. See also the concept of 'global connectivity'.
[56] Inger et al., 2009, p. 1145-1153, CAFF 2013.

considered here. Careful and rigorous case-by-case assessments are needed as both projects' scale and ecosystems' sensitivity vary. The latter can depend on the species present in the area, on the population density and size, or on the ecosystem's vulnerability (*in casu*, the Arctic). Most importantly, each energy project does not enter the marine environment in isolation from other factors. Its direct and indirect impacts are added to the ones of already existing stressors on marine life. As Wright et al. (2020) explain: "every new offshore development represents an incremental addition to the pre-existing human 'footprint' on the marine ecosystem".[57] Therefore, such impacts also depend on other industries using the area, such as shipping, tourism, and fisheries, potentially creating cumulative impacts. However, additional layers of stress and potential synergistic effects among stressors are very difficult to anticipate or model, and unforeseen effects may arise in the future with potential 'new' stressors discovered later by research. Ocean acidification, persistent organic pollutants (POPs) and microplastics constitute good examples. In that context, future energy projects should be planned with precaution, taking into account other activities surrounding the area [*Figure 3*], so as not to add any considerable pressure on marine ecosystems.

2.2.1. Positive impacts

Each offshore energy infrastructure has impacts on marine biodiversity throughout its lifecycle: from its construction to its decommissioning, including its operation. Starting with the positive impacts, the light used on offshore infrastructures can attract fish and increase their density and biomass in that area.[58] Such fish aggregation represents a higher density of species being introduced into the food web and can further attract predators like birds and marine mammals.[59] Additionally, MREDs and offshore energy platforms (especially for remaining parts after decommissioning, as structures are not necessarily completely removed) create shelters from currents, predation, and other human activities. Indeed, large boats pursuing industrial fishing (especially bottom trawling), shipping and tourism activities are naturally excluded from these areas, for safety reasons. The risks of local over-exploitation and bycatch[60] for large mammals and endangered species are thus

[57] Wright et al., 2020, p. 235-244.
[58] Biomass can be defined as "weight or total quantity of living organisms of one animal or plant species (species biomass) or of all the species in a community (community biomass), commonly referred to a unit area or volume of habitat". Encyclopedia Britannica.
[59] As shown by a study with harbor porpoises (*Phocoena phocoena*) in the Dutch North Sea: Scheidat et al., 2011, p. 25-102.
[60] See Basran et al., 2020, p. 95-115.

reduced, which can create a kind of sanctuary for marine wildlife. In addition, they can lead to the development of artificial reefs[61] on offshore installations.[62] Smaller fishing boats may still access the installations' surrounding waters but would fish in a less intrusive way. Creating such a refuge zone where species can thrive resonates with the purpose of MPAs which are known to be functioning tools for marine conservation.[63] Decommissioned offshore platforms can also provide aquaculture opportunities.[64]

2.2.1. Negative impacts

However, these artificially created ecosystems might not have the same species composition as natural reefs, which could negatively affect surrounding biodiversity.[65] They might indeed modify local habitats by, for example, altering benthic substrate and its fauna. It is notably the case for installations drilled or anchored in the sea floor, potentially changing it from a soft to a hard substrate.[66] However, some species depend on soft substrate to thrive and will have to migrate in cases of such transformation. Forced migrations and deviations of cetaceans' migratory routes by offshore energy activities can induce individual stress, thereby reducing survival and ultimately leading to a decline in overall population density. However, these are hardly quantifiable. Offshore installations can induce habitat loss and disturbance of the habitat structure as they become physical barriers to access essential feeding grounds. The possible introduction of alien species is also a threat to local ecosystems. Another major negative impact is water pollution from chemicals used during the energy production process. It can originate from leakages of hydrocarbons, from introducing toxins in the water against biofouling and corrosion of offshore platforms and/or from decommissioning, which releases dust, waste and chemicals.[67] The OSPAR Commission underlines the fact that, so far, 170 offshore installations have been decommissioned in the OSPAR maritime area. A number that will indubitably increase in the next two decades with installations soon reaching their end-of-life. The OSPAR maritime area currently hosts more than 1'350

[61] Elden et al., 2019.
[62] According to Bennun et al., 2021, p. 1-7, reef effects of offshore platforms have been heavily documented by research.
[63] Jakobsen, 2014, p. 215-233.
[64] Kulkarni and Edwards, 2022, p. 211-222.
[65] Inger et al., 2009, p. 1145-1153.
[66] Wright et al., 2020, p. 235-244.
[67] Herrera Anchustegui et al., 2021, p. 1-92.

operating offshore installations.[68] These numbers highlight the fact that decommissioning must be more stringently regulated and considered as an activity increasing risks of pollution and of adverse effects on marine wildlife. Drilling waste and produced water (PW) can also modify water quality [*Figure 4*] PW is a byproduct of offshore oil and gas extraction which is, after being treated, either discharged into the sea (the most used management option) or reinjected into geological formations (considered as the Best Environmental Practice for PW management but not always feasible).[69]

Those discharges contaminate continental shelf ecosystems as they contain a considerable amount of chemicals: dispersed crude oil, polycyclic aromatic hydrocarbons (PAHs), alkylphenols (APs), and metals. Although regulations have been issued to reduce PW's impacts (cleaning systems, monitoring surveys, greener offshore chemicals), PW is still considered as the "largest operational source of oil pollution to the sea from offshore petroleum industry".[70] Indeed, research has found that PW can seriously impact reproduction amongst fish and can modify endocrine physiology in Atlantic cod.[71] The same research also mentions the fact that sub-arctic species' sensibility to PW exposure is comparable to temperate species, on which most research has been done. Once more, according to the OSPAR Commission, about 300 million standard cubic meters of PW were annually discharged to sea in the OSPAR-covered oceanic area during recent years (Norwegian PW discharges accounted for about 130 million cubic meters).[72] Additionally, "in 2017, the amount of dispersed oil in these discharges was reported to be about 1600 tons for Norwegian installations, and about 4000 tons for the whole OSPAR area".[73] There exists much concern because of the increasing amount of oil and gas activities, the prospects of maintaining year-round operations (enabled by sea ice melting [*Figure 2*]) and above all, due to the remaining scientific unknowns about the impacts on marine ecosystems. Light pollution from platforms can also alter birds' vision and thus, their flight trajectory, which can ultimately lead to collision. The latter is one of the direct impacts of offshore energy platforms and occurs both above (for birds) and underwater (for mammals such as dolphins). Collision creates risks of blunt trauma from blades, with knock-on risks of injury and/or tissue damage resulting in higher risks of infection. There is also the risk of birds and bats electrocution and colliding with onshore transmission lines (on top of colliding with offshore blades) which are necessary to dispatch the energy produced on

[68] OSPAR website on offshore installations.
[69] Beyer et al., 2020, p. 105-155.
[70] Bakke et al., 2013, p. 154-169.
[71] Ibid.
[72] OSPAR website.
[73] Bakke et al., 2013, p. 154-169.

offshore platforms.[74] Indeed, when talking about MREDs and offshore platforms creating energy, one should not forget that it includes a very broad system, from the production of the energy to its transmission and distribution (including undersea power cables or on land lines, oil tankers, etc.). Here, the focus is mainly put on offshore infrastructures. There is considerable uncertainty regarding the risk of underwater collision as the probability of observing such a phenomenon is low.[75] Besides, most research is done on terrestrial wind farms, as they are more easily accessible.[76] Still, as a direct impact, collision cannot be denied and can cause (depending on the frequency and relative population density) an abundance decline.[77] On that matter, wave and tidal energy collectors might be posing greater hazards compared to wind turbines. On top of light pollution, noise pollution is quite impactful as it can reduce marine animals' ability to communicate and use echolocation as a navigational and hunting tool.[78] This can have severe indirect impacts such as reducing the feeding capacity and the energy intake rates, while at the same time increasing energy expenditures. Altogether, resulting in changes to annual breeding output and survival as the overall population size may ultimately vary [see *Figure 12*]. A distinction must be made between the construction, operation and decommission stages. Although noise from the construction stage is well documented, knowledge is missing on noise from the operational phase.[79] This is due to physical and technical difficulties in assessing it. More generally, noise pollution can cause stress, displacement, hearing damage, and masking,[80] which means that sounds from prey species and of communications from similar species can be covered. However, marine mammals highly depend on those sounds for all their life functions. Percussive pile-driving[81] is used to install offshore wind turbines by pushing their foundations into the seafloor. It is known to be, along with tankers and bulk carriers, the loudest and most deleterious activity on cetaceans and seals as it affects their behavior.[82] It is even more damaging for animals using the same (low) frequencies such as baleen whales. Those species have shown an increase in calling rates (hypothetically to compensate for the masking) during seismic survey days, as well as avoidance behaviours.[83] Small echolocating

[74] Bennun et al., 2021, p. 1-7.
[75] Wright et al., 2020, p. 235-244.
[76] Inger et al., 2009, p. 1145-1153.
[77] Wright et al., 2020, p. 235-244.
[78] CNRS, 2021.
[79] Wright et al., 2020, p. 235-244.
[80] Basran et al., 2020, p. 95-115.
[81] A heavy weight is repeatedly raised and dropped, or a steam hammer hits the pile head.
[82] Inger et al., 2009, p. 1145-1153.
[83] Signals from airguns are produced in the same low-frequency range as blue whale calls. See Basran et al., 2020, p. 95-115.

cetaceans ("toothed cetaceans that use biosonar to detect prey and explore their environment in a similar way to bats"[84]) such as dolphins and porpoises,[85] still remain impacted as they use higher frequencies.[86] Fish can also detect such noise over large distances and thus, avoid wind farms.[87] On the other hand, noise from an operating wind turbine is considered to be much lower than that of a ship. Indeed, for MREIs, the main amount of noise comes from construction whereas for conventional energy production, it comes from both construction and operation. For example, floating wind turbines have recently been developed as an alternative to turbines drilled into the seabed. During the construction phase, the anchoring of floating wind turbines into the seabed and the burying of cables produces noise pollution as undersea noise travels faster and longer distances. It also creates vibrations that can be sensed by benthic fauna.[88] However, it is assessed as being similar to the level of noise from ships and is still considerably low compared to pile-driving sound levels.[89] Experiments have enabled scientists to define theoretical noise impact thresholds for different categories of fish. Despite ongoing monitoring, there are still logistical challenges to knowing the exact effects of noise. There is a good overall understanding and scientific knowledge about the strong impacts of noise emissions on marine mammals and fish, but not concerning more moderate effects on individuals. Moreover, it has been proven by Scottish studies that harbor seals (*Phoca vitulina)* temporarily move out from tidal active areas during the construction phase, "maintaining a separation distance of up to 500 meters from the sound source".[90] However, they came back as soon as the operational phase started and the sound got reduced. In the continuity of noise frequencies, an electromagnetic disturbance is also produced by offshore energy activities, notably by submarine electrical cables. These subsea power cables are needed to transfer power between devices, to transformers and to the mainland. Electromagnetic fields (EMF) are detectable by electrosensitive marine species such as fish, mammals, and sea turtles. Just like noise, EMF can become a barrier to movement or communication, can increase displacement distances and thus, energy consumption. Another way of transferring energy (for oil and gas) is by using floating production storage and offloading units (FPSO). These are vessels used to produce and process hydrocarbons (or only stock them) until being offloaded into tankers or pipelines. FPSO can be

[84] Wright et al., 2020, p. 235-244.
[85] Harbour porpoises are considered as the most sensitive cetaceans to airgun noise from oil exploration. See Basran et al., 2020, p. 95-115.
[86] Wright et al., 2020, p. 235-244.
[87] CNRS, 2021.
[88] Wright et al., 2020, p. 235-244.
[89] CNRS, 2021.
[90] Ibid.

very detrimental to marine life as they produce noise and light pollution as well as increase risks of navigational hazards of ships and leakage. Navigational hazards with vessels pursuing site characterization, construction, maintenance, operation, and decommissioning are a threat to marine life and mammals especially. Indeed, they can cause injury, behavioral changes and even mortality. A study on whales has shown that where vessels' speed was regulated, the "overall expected relative mortality is approximately 30% lower".[91]

To conclude, as previously mentioned, human activities in the Arctic are expected to increase, and so will the above-mentioned stressors. Therefore, the "need for effective environmental protection has become even more urgent". [92] Scientific findings do not suggest one specific measure should be adopted by Coastal States' governments, leaving them with a considerable discretion power to take protective measures. This discretion could be restricted if more scientific findings were to be released and influenced the assessment of the due diligence principle (see part 3.1.2.). It would ensure a minimum threshold for implementing environmental measures. However, this first chapter has shown that both scientific uncertainty and physical barriers are exacerbating the difficulties for such findings to emerge. A solution might be for legal practitioners and lawmakers not to wait for more scientific findings to be issued and to rather implement preventive regulations, using the precautionary principle (see part 5.1.2.). To which extent is it already the case and how could those issues be better included in existing law? This matter is examined in the following sections.

3. Legally binding instruments

There cannot be a choice between protecting marine wildlife and ensuring energy supply. Both should coexist. In order to ensure such coexistence, regulations are needed. Building up the analysis from the evidence presented in the previous part, this chapter summarizes the various legally binding instruments forming the fragmented legal framework that applies to offshore energy projects' impacts on Arctic marine biodiversity, notably in the northern part of the NCS. So far, the pollution from offshore oil and gas infrastructures has been the most regulated. Other impacts have received less consideration, especially marine renewable industries, nearly considered as

[91] Bennun et al., 2021, p. 1-7.
[92] Warner, 2020, p. 326-345.

benign to the marine environment.[93] There does not exist any established legal framework nor any comprehensive treaty regulating offshore activities in the Arctic,[94] although they are being developed at an exponentially increasing rate. An integrated approach is needed, taking into account both legally binding and non-binding instruments, as well as norms coming from various related sectors. It can be useful to mention that, when legally binding (*hard law*) an instrument creates legal obligations to which a State is bound, and if violated, the State's responsibility is engaged. By contrast, breaching a non-binding instrument (*soft law)* can 'only' entail political, reputational, or economic repercussions. In this chapter, international, regional, and domestic regulations are considered since international law is not sufficient to identify best practices in addressing Arctic challenges.[95] Indeed, several "coordinated responses" to environmental protection can be perceived through the Arctic Council's governance, but implementation has primarily occurred "through the national environmental laws of the Arctic states".[96] In light of this research's scope, regional regulations correspond to European and Arctic instruments, whereas the term 'domestic' encompasses Norwegian legislation. Additionally, international environmental principles[97] and customary law apply[98] and are considered throughout the analysis. This chapter first considers the UNCLOS,[99] which is the most relevant internationally binding instrument for this research. It then summarizes the numerous international conventions, environmental agreements and Norwegian regulations that are applicable *in casu.*

3.1. UNCLOS

UNCLOS is often described as the 'Constitution of the Oceans'[100] because of its near-universal acceptance, with the exception of the United-States (U.S.), and since it offers a comprehensive legal regime. Indeed, it addresses all activities and matters related to the law of the sea and its

[93] Giannopoulos, 2019, p. 289-303.
[94] Maggio et al., 2020, p. 443-463.
[95] Shapovalova, 2020, p. 275-304.
[96] Warner, 2020, p. 326-45.
[97] Art. 31(3)(c) of the Vienna Convention on the Law of Treaties, 1969.
[98] As sources of international law, according to art. 38 of the Statute of the International Court of Justice, 1945, 33 UNTS 993.
[99] United Nations Convention on the Law of the Sea (UNCLOS), Montego Bay, 10 December 1982. In force 16 November 1994, 1833 United Nations Treaty Series 396.
[100] Koh, 2020, p. 85-93.

resources (although several legal gaps can be noted).[101] It entered into force in 1982 and was ratified by Norway in 1996. Many of its dispositions include customary law and thus bind all states, including the U.S., which is quite relevant in the Arctic context. UNCLOS' main principles establish a crucial background for activities taking place in the NCS as they are either reflected in Norwegian law or part of international customary law. The latter is established by State practice (from governments, courts and parliaments) conforming to what is considered by the State to be a legal obligation, also called *opinio juris*.[102]

3.1.1. Main principles and rules

UNCLOS recognizes the rights of coastal States to establish the extent of their territorial waters, EEZ and continental shelf, and to exercise thereby their sovereignty.[103] Thus, the Convention confers to coastal States, such as Norway, the exclusive[104] sovereign right to conduct, authorize, and regulate energy-related activities in its EEZ and continental shelf.[105] Such activities are mentioned as 'installations and structures'[106] or more specifically as 'submarine cables and pipelines'[107] or 'drilling'.[108] However, it also imposes on Norway duties related to such activities. The most relevant one *in casu* is the 'protection and preservation of the marine environment' (see part 3.1.3.).[109]

What is important to note is that UNCLOS is a living treaty,[110] meaning that it is shaped and evolves through the incorporation of standards and rules originating from other relevant instruments. Indeed, this central instrument not only introduces new definitions and legal concepts but also creates innovative regimes dealing with new concerns.[111] This mechanism is called the *rule of reference* and is included in several UNCLOS dispositions, especially the ones concerning

[101] Bustnesli et al., 2021, p. 249. Examples of legal gaps are ABNJ, the EBM, ocean acidification, marine genetic resources, etc.
[102] *North Sea Continental Shelf* cases (1969).
[103] Dispositions on the EEZ and the continental shelf are respectively in parts V and VI of UNCLOS.
[104] Art. 77(2) and 60(1) UNCLOS.
[105] Art. 77 UNCLOS refers to 'exploring' and 'exploiting' the continental shelf, which corresponds to Section 1-1 of the Norwegian Petroleum Act on exclusive and inherent sovereign rights over marine resources.
[106] Art. 56(1)(b)(i), 60(1)(b) and 80 UNCLOS.
[107] Art. 79 UNCLOS, which corresponds to Section 3-12 of the Norwegian Petroleum Act.
[108] Art. 81 UNCLOS.
[109] Art. 56(1)(b)(iii) UNCLOS.
[110] Holst, 2017, p.382-385.
[111] Bustnesli et al., 2021, p. 249.

marine environmental protection against pollution. It is notably the case of art. 197 which stipulates that

> States shall cooperate on a global basis and, as appropriate, on a regional basis, directly or through competent international organizations, in formulating and elaborating international rules, standards and recommended practices and procedures consistent with this Convention, for the protection and preservation of the marine environment, taking into account characteristic regional features.

This disposition creates an obligation for States to cooperate via other multilateral frameworks than the UNCLOS regime, e.g., the International Maritime Organization (IMO), in order to implement regulations and create norms applying to the preservation of the marine environment. UNCLOS is thus complemented by other instruments, legally binding or not, which act as additional obligations and/or interpretative guidance. However, the Convention shall prevail over subsequent environmental treaties[112], as States are allowed to conclude international conventions on the protection and preservation of the marine environment as long as those new obligations are "consistent with the general principles and objectives of [UNCLOS]".[113] Due to the fragmentation of the legal framework considered, the interpretation of UNCLOS dispositions must be done in an evolutive and holistic way, using systemic integration.[114] Witnessing an increased understanding of the marine environment and of its degradation through human activities, the International Tribunal for the Law of the Sea (ITLOS) has been using such a dynamic interpretation of UNCLOS for environmental matters. For instance, in the *South China Sea Arbitration*, the ITLOS mentioned that UNCLOS must be interpreted in the light of subsequent environmental instruments, and thus, entails the protection of marine biodiversity.[115] Besides, non-binding norms (see Chapter 4) can become legally relevant, fill legal gaps and strengthen protection.[116] They can also be used as standards of proof for the fulfilment of the due diligence duty, which is another major feature of UNCLOS, as will be examined in the following section.

3.1.2. Due diligence

[112] Giannopoulos, 2019, p. 289–303.
[113] Art. 237 (1), (2) and art. 311(3) UNCLOS, which restricts States from concluding subsequent treaties or from developing practice that might go against or modify the core principles of UNCLOS.
[114] Art. 31 of the Vienna Convention on the Law of Treaties, 1969.
[115] §941-942 of the *South China Sea Arbitration Award*, 2016.
[116] Giannopoulos, 2019, p. 298-303.

As an obligation of conduct rather than of result,[117] the due diligence obligation is the basis of the precautionary principle and has been defined by the International Court of Justice (ICJ) as "an obligation which entails not only the adoption of appropriate rules and measures, but also a certain level of vigilance in their enforcement and the exercise of administrative control applicable to public and private operators, such as the monitoring of activities undertaken by such operators".[118] *In casu*, it comprises several requirements: multilateral, global and regional cooperation in good faith[119], consultation and notification of any transboundary danger or risk of damage[120], the monitoring of impacts on the marine environment[121] and last but not least, the conducting of an EIA[122] for each offshore energy generation project. Due diligence is a variable and evolutionary concept as it transforms itself over time, adapting to technological and scientific discoveries, as well as to legal changes.[123] It imposes on States a higher than ever standard of care, requiring them to review their obligations[124] and to use the most up-to-date technologies and technical knowledge available.[125] Indeed, as we learn more about climate change and anthropogenic effects on climate and ecosystems, some traditional measures and standards are not considered as appropriate anymore since they are now proven to be detrimental to natural ecosystems. It is notably the case of industrial activities releasing too much CO_2 or considerably polluting. An example is the quite recent discovery of POPs and microplastics. States must therefore adapt their actions and decision-making to the contextual knowledge available. If not, their action would be in breach of the due diligence duty, violating UNCLOS' legal obligations and ultimately, engaging the State's responsibility. Interestingly, even if a State acts with vigilance and precaution, damages can still occur. The State's liability and responsibility might not necessarily be involved if enough evidence can prove due diligence has been observed.[126] Therefore, legal clarity is of crucial importance for both States and investors, hence the importance of the EIA process.

[117] Seabed Disputes Chamber of ITLOS, Responsibilities and obligations of States Sponsoring Persons and Entities with respect to Activities in the Area, §110, ITLOS Advisory Opinion N°18, 2011.
[118] §197, *Pulp Mills on the River Uruguay* (Argentina v. Uruguay), Judgment, 20 Apr. 2010, ICJ Reports (2010).
[119] Art. 197 and 208(5) UNCLOS.
[120] See, amongst others, art. 198 UNCLOS.
[121] Art. 204 UNCLOS.
[122] See section 3.1.3.
[123] ITLOS Advisory Opinion (2011) N°18, §117.
[124] ITLOS Advisory Opinion (2011) N°18, §222.
[125] Also called best available techniques.
[126] International Law Commission's Commentary to article 3 of its Articles on Prevention of Transboundary Harm from Hazardous Activities, adopted in 2001.

3.1.3. Environmental protection

The conflict between resource development and the protection of the marine environment is visible through UNCLOS' legal framework. On the one hand, the 1982 Convention establishes States' sovereign rights over natural resources present in areas under their jurisdiction and protects all States' navigational freedoms.[127] On the other hand, in its preamble, UNCLOS claims to be "establishing a legal order to promote the study, protection and preservation of the marine environment"[128] which applies throughout all sectors of the law of the sea activities and in all maritime zones. The above-mentioned conflict is further balanced in Part XII of UNCLOS, which defines States' responsibilities towards not only their own but also the global marine environment.[129] Indeed, "States have the sovereign right to exploit their natural resources pursuant to their environmental policies and in accordance with their duty to protect and preserve the marine environment".[130] According to the ITLOS in the *South China Sea Arbitration*,[131] States are obliged by art. 192 UNCLOS to *protect* the marine environment "from future damage" and to *preserve* it "in the sense of maintaining or improving its present condition". This central disposition binds States by a positive obligation to take active measures that ensure more resilience and by a negative one not to degrade ecosystems. Resilience can be defined as the capacity for species and ecosystems to adapt to environmental changes.[132] Art. 194 UNCLOS is central here as it clarifies the scope of art. 192, requiring States to take all necessary measures using "the best practicable means at their disposal and in accordance with their capabilities" to prevent, reduce and control pollution of the marine environment. This part of the text refers to the international principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC).[133] Such measures can be taken on a domestic level as well as jointly, aiming at international policy harmonization. Art. 194 UNCLOS lists the various sources of pollution States' measures should tackle. It explicitly mentions pollution from "installations and devices used in exploration or exploitation of the natural resources of the seabed and subsoil" and from "other installations and

[127] Art. 17 and 24 UNCLOS for the territorial waters, art. 78(2) UNCLOS for the continental shelf and art. 194(4) UNCLOS.
[128] §4 of the Preamble.
[129] See para. 941 of the *South China Sea Arbitration Award*, stating that States are required by the "corpus of international law relating to the environment, which informs the content of the general obligation in Article 192 [...] to ensure that activities within their jurisdiction and control respect the environment of other States".
[130] Art. 193 UNCLOS.
[131] *South China Sea Arbitration* §941.
[132] Moore and Reeves, 2018, p. 1-7.
[133] Articles 3(1) and 4(1) of the 1992 United Nations Framework Convention on Climate Change (UNFCCC), ratified by Norway in 1993.

devices operating in the marine environment".[134] Both indubitably refer to offshore oil and gas platforms as well as offshore wind devices. Two special mentions in art. 194 UNCLOS are worth highlighting: transboundary pollution[135] and additional measures to preserve rare or fragile ecosystems, like the Arctic ones.[136] It can be deducted from this that Norway shall implement more stringent and special regulations in the northern part of its continental shelf as offshore activities occurring there put at risk fragile and endangered ecosystems. The general obligations included in Part XII of UNCLOS entail the use of regional cooperation, monitoring and assessment. Dispositions from Part XII are guiding and interpretive principles rather than standard-setting principles.[137] They correspond to the "first attempt at a global response to the problem of marine pollution",[138] are part of international customary law, and, following the systemic interpretation principle, must be read in conjunction with other regulations.[139] One example is art. 235 UNCLOS, which reinforces States' responsibility and liability towards their environmental obligations by requiring 'prompt and adequate compensation' for any damage from pollution.

UNCLOS' main environmental objective is to prevent pollution of the marine environment which is defined as "the introduction by man, directly or indirectly, of substances or energy into the marine environment, [...] which results or is likely to result in such deleterious effects as harm to living resources and marine life".[140] Then, it can be inferred that, as sources of energy, sound, light and electromagnetic disturbances fall into this definition and are considered by UNCLOS as sources of marine pollution. Oil leakages, CO_2 emissions and chemical discharges (notably from PW) into the ocean by offshore platforms also fall into this definition, as 'substances' introduced by man into the marine environment. Therefore, chemicals released in the ocean during drilling and pile driving fall under the scope of art. 208(1) UNCLOS,[141] regulating pollution from seabed activities, installations, and structures under a State's jurisdiction. Art. 211 regulates pollution from vessels, which can apply to oil spills from oil tankers and any release of chemicals by vessels

[134] Art. 194(3)(c) and (d) UNCLOS.
[135] Art. 194(2): "and that pollution arising from incidents or activities under [States'] jurisdiction or control does not spread beyond the areas where they exercise sovereign rights".
[136] Art. 194(5): "measures taken [...] shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life". Which resonates with the ecosystem approach and art. 234 UNCLOS on ice-covered areas.
[137] Mcconnell, Gold, 1991, p. 83-105.
[138] Ibid.
[139] §941 of the *South China Sea Arbitration* states that "the content of art. 192 is informed by the other provisions of Part XII and other applicable rules of international law".
[140] Article 1(1)(4) UNCLOS.
[141] See also art. 214 UNCLOS on the enforcement of art. 208.

accessing the platforms and MREI (for construction, maintenance, and decommissioning). More information on that matter is given in section 3.4.2. of this research. UNCLOS also regulates pollution from offshore activities once they are terminated. Art. 60(3) states that "any installations or structures which are abandoned or disused shall be removed [...] to ensure [...] the protection of the marine environment". Coastal States and operators have a legal obligation from both international and domestic law to remove formerly used offshore platforms, installations, and devices. This procedure, called decommissioning, happens once the license or permit granted by the government reaches its time limit.[142] However, if the removal process represents an unacceptable risk, the coastal State can decide not to engage in such a perilous endeavor.[143] States must then provide 'appropriate publicity' regarding the 'depth, position and dimensions' of any installation that is not entirely removed, to avoid any collision or accident.[144] The decision of a coastal State to allow parts of an offshore installation or structure to remain on-site must be made using a case-by-case assessment. The latter must take into account the safety of navigation (and of other sea uses) in the area, as well as the technical, financial and physical feasibility, and above all, the potential impacts on marine ecosystems.[145] Due to the limited length of this thesis, the quite complex legal framework surrounding decommissioning will not be extensively discussed here. Still, knowing that a considerable amount of Norway's offshore platforms and installations are reaching the end of their lifespan, it is crucial for this Arctic coastal State to observe the rules on decommissioning on its continental shelf. However, it appears that, in practice, exemptions are quite easily granted in Norway, which creates a wide controversy around these concrete giants abandoned at sea.[146]

To ensure the protection of the marine environment, States can use, amongst other measures, two valuable tools: MPAs and EIAs.[147] For some scholars, the terms "exploring and exploiting" included in art. 77 UNCLOS are wide enough to include sovereign rights for coastal States to adopt measures for management and conservation of natural resources on the continental shelf.[148] Thus, Norway may establish MPAs on its continental shelf to restrict offshore activities such as oil and gas extraction or wind farms, that may threaten sedentary species. However, such

[142] Herrera Anchustegui et al., 2021, p. 1-92.
[143] Corresponding to Section 5-1 of the Norwegian Petroleum Act.
[144] Art. 60(3) UNCLOS.
[145] Bustnesli et al., 2021, p.253.
[146] See the interactive article by Stian Espeland, NRK, May 20, 2023 (in Norwegian).
[147] Art. 206 UNCLOS. See also the *South China Sea Arbitration Award*, 2016.
[148] Jakobsen, Chap. 10 of the book Arctic Marine Governance: Opportunities for Transatlantic Cooperation, 2014, p. 215-233.

protective measures cannot interfere with other States' rights and freedoms, especially navigational ones.[149] As mentioned in section 1.4., due to the limited length of this research, the analysis will not go further into detail about MPAs. An EIA is a process to identify and evaluate the potential impacts of an activity on the environment, in order to inform decision-making.[150] It entails a prior assessment[151] of the risks of activities to pollute the marine environment (whose results shall be made public),[152] along with an ongoing monitoring of such activities.[153] It is required from States not to allow any project that may negatively impact the marine environment without establishing a prior assessment of such impact. The ITLOS stated that "the sponsoring State is obliged not only to cooperate with the Authority in the establishment and implementation of impact assessments, but also to use appropriate means to ensure that the contractor complies with its obligation to conduct an environmental impact assessment".[154] As an integral part of the precautionary principle, the requirement of fulfilling an EIA is a customary obligation and is included in several international instruments (see sections 3.2. and 3.3.). Indeed, according to the ICJ in the *Pulp Mills on the River Uruguay* case, "it may now be considered a requirement under general international law to undertake an environmental impact assessment where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context, in particular, on a shared resource".[155] An EIA is a complex process as it must take into account the various stressors having impacts on marine ecosystems[156] with the considered activity.

To conclude, UNCLOS provides a high standard of obligation towards environmental protection for States. Additionally, UNCLOS requires States to ensure their laws, regulations and measures are not less effective than international standards and practices.[157] If a State is breaching its duty to protect and preserve the marine environment, it would automatically be violating customary obligations from international law.[158] However, these obligations are further limited by the duty not to hamper lawful activities of other states (e.g., fisheries and shipping) or not to create

[149] Art. 17 and 24 UNCLOS for the territorial waters, art. 78(2) UNCLOS for the continental shelf and art. 194(4) UNCLOS.
[150] Art. 1(10) BBNJ Agreement, 2023.
[151] Art. 206 UNCLOS.
[152] Art. 205 UNCLOS.
[153] Art. 204 UNCLOS.
[154] ITLOS Advisory Opinion (2011) N°18, Part VI, §142.
[155] *Pulp Mills on the River Uruguay Case* (Argentina v Uruguay), Provisional Measures, ICJ Reports 2006, p. 113.
[156] See additional definition of cumulative impacts: "changes to ecosystems determined by a combination of past, present and future actions or events". From V. De Lucia, 2015, p. 91-117.
[157] Art. 208(3) UNCLOS.
[158] Mcconnell, Gold, 1991, p. 89.

unjustifiable interference while taking protective measures. UNCLOS obligations must be read in a large corpus of other international instruments requiring States, such as Norway, to collectively take active measures to protect the marine environment.

3.2. Regional Conventions

3.2.1. European Obligations

Although Norway is not an EU member State, it is part of the European Economic Area (EEA)[159] and inherits legally binding regional obligations from the EU. The 1994 EEA Agreement extends the European single market to States participating in the European Free Trade Association (EFTA), such as Norway. The fundamental objectives of the single energy market[160] are to ensure energy security and energy efficiency, the development of renewable energies, and above all, legal homogeneity.[161] Art. 102(1) of the EEA Agreement is crucial here as it states that the EEA Joint Committee shall take its decisions concerning amendments of the EEA Agreement's Annexes "as closely as possible" to the EU legislation. According to the legal doctrine, Norway's political position has been that the geographical scope of the EEA Agreement does not extend to its continental shelf. However, in practice, Norway has been accepting such application.[162] Therefore, obligations from various EU Directives that have been implemented in the EEA Agreement apply to Norway and to the specific scope of this research. It is the case of the Environmental Impact Assessment Directive and the Strategic Environmental Impact Assessment Directive[163] which were incorporated into the EEA Agreement by Joint Committee Decisions (JCD)[164] and are in force. The EIA Directive requires applicants to conduct an EIA if their development project is included in the list of Annex I and II of the Directive, which is the case for offshore oil, gas and wind activities.[165] The Renewable Energies Directive[166] is also relevant for offshore energy generation activities but is only marked by the EU as EEA relevant and is under scrutiny for its future incorporation into

[159] Art. 126 (1) EEA Agreement states the 'Kingdom of Norway' as one of the territories to which the Agreement applies.
[160] See art. 194 TFEU for the legal basis.
[161] Bustnesli et al., 2021, p. 237.
[162] Ibid.
[163] Respectively Directive 2014/52/EU amending Directive 2011/92/EU, and Directive 2001/42/EC.
[164] Respectively JCD 117/2015 and JCD 090/2002.
[165] Annex I §14, 16(a), 21 and Annex II §3.
[166] Directive 2018/2001.

the EEA Agreement. Regarding hydrocarbons licensing, the Norwegian system complies with the obligations of the Hydrocarbons Licensing Directive,[167] incorporated since 1995 in the EEA Agreement. The Offshore Safety Directive 2013/30/EU is dedicated to the preservation of the marine environment against pollution (notably from oil and gas activities). It aims to prevent accidents and to improve response mechanisms. However, Norway has implemented more stringent measures than those required from Directive 2013/30/EU in its continental shelf. It would then be deleterious if Norwegian safety standards were to strictly apply EU requirements.[168] Norway has indeed a well-developed and extensive legal framework related to offshore activities, especially oil and gas activities. Therefore, it serves more the purpose of this research to analyze specific national legislation on the matter than European ones that are less stringent. This is further analyzed in section 3.4. Still, listing European legislation is useful as they have inspired the Norwegian implementation of measures and laws. Concerning the strict preservation of marine ecosystems, obligations from the Habitats and Species Directive, the Bird Directive and the Marine Strategy Framework Directive (MSFD)[169] would be relevant, but they have been excluded from the EEA Agreement's scope and considered by the EEA EFTA States "not to be relevant for incorporation into the EEA Agreement".[170] Norwegian legislation on this matter is not as stringent as the EU obligations, which is why obligations from other international instruments must be considered. This specific matter is further developed in section. 3.3.

3.2.2. OSPAR

The OSPAR Convention has been ratified by Norway in 1996 and entered into force in 1998. Its application scope is divided into three regions. The one corresponding to this research's scope is OSPAR Region I: Arctic waters [*Figure 5*]. OSPAR has sixteen contracting parties to which its obligations are legally binding. As one of them, Norway is bound by several central duties: the duty to review the condition of the marine area, the duty to review the effectiveness of the measures adopted and to assess if additional ones are necessary, and the duty to control activities that may

[167] Directive 94/22/EC.
[168] Bustnesli et al., 2021, p. 246.
[169] Respectively directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, directive 2009/147/EC on the conservation of wild birds and directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy.
[170] See parliamentary question E-5231/2008(ASW) on the EU Parliament website and the EFTA website.

adversely affect the maritime area.[171] Knowing that Norway and Russia have a common boundary in this region (Barents Sea), it is relevant to note the fact that Russia is not a Party to the OSPAR Convention. The main general obligation from OSPAR Convention is to protect the North-East Atlantic against the "adverse effects of human activities" (including offshore energy generation activities)[172], so as to safeguard and conserve the marine environment.[173] OSPAR integrates international environmental principles into its dispositions. The precautionary principle is cited in its preamble and in art. 2(2) stating that

> Preventive measures are to be taken when there are reasonable grounds for concern that substances or energy introduced, directly or indirectly, into the marine environment may bring about hazards to human health, harm living resources and marine ecosystems [...] even when there is no conclusive evidence of a causal relationship between the inputs and the effects.

Art. 2 also mentions the polluter pays principle,[174] the use of best available techniques (BAT) and best environmental practice (BEP),[175] which are both elements of the precautionary principle and of the due diligence duty. Appendix I para. 2 defines BAT as "the latest stage of development (state of the art) of processes, of facilities or of methods of operation which indicate the practical suitability of a particular measure for limiting discharges, emissions and waste". The appendix also lists criteria to helps States in defining which techniques are BAT. BEP is defined as the "application of the most appropriate combination of environmental control measures and strategies".[176] The term 'appropriate' leaves room for interpretation and thus, for States to implement measures. It also gives flexibility to assess on a case-by-case basis, which corresponds to the ecosystem approach (EA) or ecosystem-based management (EBM). Indeed, OSPAR "promotes the adaptation of the management of human activities to the scientific realities of the marine environment".[177] According to the OSPAR Commission, "the essence of EA is to allow sustainable exploitation of natural resources while maintaining the quality, structure and functioning of marine ecosystems".[178] More information on EA and EBM is laid out in section 3.3.

[171] Wong, 2022, p. 191.
[172] According to Appendix 3 of the OSPAR Convention (especially paras. 1(b) and (c)), listing the criteria for identifying human activities.
[173] Wong, 2022, p. 193. See also art. 2(1)(a) OSPAR.
[174] Art. 2(2)(b) OSPAR.
[175] Art. 3(b)(i) and appendix 1 OSPAR.
[176] Appendix 1 para. 6 OSPAR.
[177] Wong, 2022, p. 194.
[178] OSPAR Commission, QSR, 2010.

OSPAR also requires States to adopt measures jointly, through regional and international cooperation in order to "harmonize their policies and strategies".[179] This cooperation obligation is strengthened by the duty to make available any information on the state of the marine environment.[180] OSPAR obligations, notably its annex III on the prevention and elimination of pollution from offshore sources, are in accordance with the above-mentioned aim of UNCLOS Part XII to prevent and reduce pollution of the marine environment. Indeed, para. 7 of the OSPAR preamble directly refers (*rule of reference*) to UNCLOS Part XII and to its art. 197. Interestingly, art. 3(1) of Annex III prohibits the "dumping of waste or other matter from offshore installations". Discharges and emissions from offshore sources, such as PW, are however exempted from this prohibition (see art. 3(2) of Annex III). The subsequent article states that "the use on, or the discharge or emission from, offshore sources of substances which may reach and affect the maritime area shall be strictly subject to authorization or regulation by the competent authorities of the Contracting Parties". Art. 4 Annex III also requires States' authorities to implement a monitoring and compliance system. This is further developed in Annex IV which requires states to regularly assess the quality status of the marine environment, to publish such assessments and to report them to the OSPAR Commission. These requirements correspond to the obligation to conduct an EIA but do not provide for transboundary EIA procedures. Annex V is also relevant as it builds a bridge between the OSPAR and the CBD mandates. It refers (*rule of reference*) to obligations under the CBD that Contracting States should follow to ensure the protection and conservation of OSPAR maritime areas' ecosystems and biodiversity (i.e., the development of plans, strategies and programs to control human activities).[181] Section 3.4. of this research analyses to which extent Norwegian regulations respect these obligations.

The OSPAR Convention is a perfect example of how regional instruments play a crucial role in supplementing the international legal framework for marine biodiversity conservation. In addition to legally binding dispositions from the Convention, OSPAR requires States to follow its non-binding guidelines and recommendations (see section 4.1.2.).

3.2.3. Arctic Council Mandate

[179] Art. 2(1)(b) OSPAR.
[180] Art. 9(1) OSPAR.
[181] Art. 2(b) Annex V of the OSPAR Convention.

Another important regional framework applying to this study is the Arctic Council governance. The establishment of the Arctic Council by the 1996 Ottawa Declaration[182] fulfills the obligation of regional cooperation under art. 197 UNCLOS. Paragraph 4 of the preamble from the Ottawa Declaration formally sets forth that State Parties jointly aim for the "protection of the Arctic environment, including the health of Arctic ecosystems, maintenance or biodiversity in the Arctic region and conservation and sustainable use of natural resources". The five Arctic Coastal States (Canada, Denmark via Greenland, Norway, Russia, and the U.S.) have thus put in place a multilateral structure allowing them to notify each other of any threat or danger to the marine environment, to exchange knowledge, data, good practices and information. Above all, the goal is to "provide scientific criteria for the development of rules, standards, procedures and practices to reduce, prevent or control pollution".[183] Besides, in 2017, the Arctic States have concluded an Agreement on Enhancing International Arctic Scientific Cooperation. The ecosystem approach is an overarching principle under the Arctic Council and is "based on best available scientific and traditional knowledge about the ecosystem and its dynamics".[184] Scientific knowledge and the application of the EA go hand in hand.

The Arctic Council stands as an "intergovernmental forum [that has served] for the negotiation of legally binding instruments".[185] The Arctic Council, although not a law-making instrument with implementation and enforcement powers, has helped create law by cooperation.[186] Hence the primary importance of national laws and initiatives. A general set of regulations would not be suitable for the high heterogeneity (in terms of geology, climatic conditions, or infrastructure) of the Arctic region. Therefore, Arctic Coastal States have rather regulated offshore energy generating activities occurring on their continental shelves in their domestic legal framework, taking into account their international obligations. Still, they have adopted joint political agreements and guidelines that are non-binding through the Arctic Council governance (those are analyzed in section 4.1.3. of this thesis).

Arctic ecosystems are at the center of many interrelated and conflicting interests, with numerous stakeholders sharing the use of space, which enhances their vulnerability.[187] In case of

[182] Joint Communiqué of the Governments of the Arctic Countries on the Establishment of the Arctic Council, Ottawa, Canada, September 19, 1996.
[183] Mcconnell, Gold, 1991, p. 83-105.
[184] EA Guidelines: Implementing an Ecosystem Approach to Management of Arctic Marine Ecosystems, PAME 2019.
[185] Maggio, 2020, p. 443-463.
[186] Warner, 2020, p. 326-345.
[187] Stelzenmüller et al., 2020, p. 1-104.

environmental accidents, clean-up or rescue operations in the Arctic require extra caution and effort. Therefore, drilling in the Arctic has to be extensively regulated, compared to other regions in order to avoid facing accidents causing pollution.[188] As mentioned in section 1.4., the analysis of the regulation of oil spills falls outside of the scope of this research. However, it is relevant to promptly mention the following binding instrument that forms part of a large joint effort to tackle the pollution of Arctic marine ecosystems from oil spills. In 2013, the Arctic Council member States signed the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic. It applies to marine areas above the Arctic Circle in Norway[189] and obliges signatory parties, such as Norway, to set up national systems to respond to oil pollution incidents.[190] Pollution of the marine environment from various sources is the main concern of Coastal States, which is why it can be found not only in UNCLOS and in regional law but in most international instruments.[191]

3.3. Additional International Instruments

3.3.1. IMO Conventions

The International Maritime Organization has under its umbrella more than 50 international conventions and agreements. Three of them are relevant to this research: the Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter (London Convention), the Convention for the Prevention of Pollution from Ships (MARPOL 73/78) and the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC).

Firstly, the 1975 London Convention has been updated by a Protocol which entered into force in 2006 and to which Norway is a party. The purpose of the London Convention and its protocol is to "promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter".[192] To achieve such an objective, dumping is forbidden by the Convention, except for a list of explicitly permitted types of dumping,[193] listed in Annex 1, for which a permit is required.[194] According to

[188] Shapovalova, 2020, p. 275-304.
[189] Art. 3(1) para. 6 of the Agreement.
[190] Art. 4(1).
[191] Warner, 2020, p. 334.
[192] IMO website.
[193] Art. 4(1)(1) of the Protocol. See also art. 1(4) of the Protocol for a definition of 'dumping'.
[194] Art. 4(1)(2) of the Protocol.

Annex I of the Protocol, offshore activities on the NCS fall under the exception of para. 4: "vessels and platforms or other man-made structures at sea". Thus, a permit is needed to discard offshore structures, installations and MREIs at sea. Moreover, Norway "shall adopt administrative or legislative measures" that are in accordance with the recommendations from Annex 2 para. 17 and 18 of the Protocol. The London Convention and its Protocol are very important to consider for the decommissioning of offshore activities. The precautionary approach is prioritized in the Protocol and highlighted as a general obligation, along with the polluter pays principle and prohibition of transboundary harm.[195]

Secondly, MARPOL might not seem relevant to this research at first sight since it regulates pollution from ships. However, in its definition of 'ship' as "any vessel of any type whatsoever operating in the marine environment", art. 2(4) MARPOL includes "fixed or floating platforms". This corresponds to offshore oil and gas platforms and MREDs such as floating wind turbines. MARPOL was adopted by the IMO in 1973 but was later integrated into and modified by a Protocol, in 1997, hence the name MARPOL 73/78. It aims at avoiding pollution of the marine environment by harmful substances, which are "any substance which, if introduced into the sea, is liable to create hazards to human health, to harm living resources and marine life". Such substances are introduced into marine ecosystems by a discharge from human activities. Art. 2(3)(a) MARPOL defines 'discharge' as "any release howsoever caused from a ship" which includes "disposal, spilling, leaking, pumping, emitting". Therefore, it can be inferred that pollution from offshore activities falls under the scope of MARPOL. One example mentioned above is PW. However, a few exceptions are made to what is considered as a discharge by MARPOL. It does not include 'dumping' as it is understood by the London Convention, nor does it include releases from the "exploration, exploitation and associated off-shore processing of sea-bed mineral resources".[196] This could be interpreted as relating to deep sea-bed mining; however, it is a recent practice that was not even considered in 1973. Therefore, this disposition might be interpreted as excluding discharges from offshore oil and gas activities. If it is the case, MARPOL still applies to discharges from drilling of MREDs and to their decommissioning. Additionally, MARPOL's reference to standards and rules that the private sector must adopt shows it is a powerful and binding instrument. It is also relevant for the regulation of oil spills from oil tankers.[197]

[195] Art. 3(1), (2) and (3) of the Protocol.
[196] Art. 2(3)(b)(ii) MARPOL.
[197] See Annex I of MARPOL.

Finally, the 1990 OPRC Convention and its 2000 Protocol on Preparedness, Response and Co-operation to pollution Incidents by Hazardous and Noxious Substances (OPRC-HNS Protocol) also aims at fighting against the pollution of the marine environment. They require State Parties to adopt measures and cooperate to establish a preparedness and response system to major incidents and threats. However, as those instruments are only focusing on pollution from hydrocarbons (notably oil spills), they are not the most relevant ones. It would not be beneficial for this research to analyze them further. Rather, the analysis will now be considering marine biodiversity-related instruments.

3.3.2. Marine Biodiversity-Related Instruments

Environmental Agreements are crucial for the preservation of the marine environment as they create obligations for States to integrate environmental considerations in their policy plans, programs and measures. It is notably the case of the Convention on the Conservation of Migratory Species of Wild Animals (CMS),[198] the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES),[199] the Convention on Wetlands of International Importance (Ramsar),[200] the International Convention for the Regulation of Whaling,[201] and the Convention on Biological Diversity (CBD).[202] As mentioned in section 3.1., UNCLOS must be interpreted in the line of biodiversity-related conventions, their recommendations and environmental standards. Along the same line, in the *South China Sea Arbitration*, the Tribunal found that "CITES forms part of the general corpus of international law that informs the content of Article 192 and 194(5) of [UNCLOS]".[203] CITES is not as relevant here as, for instance, the CBD, but this ITLOS statement highlights the importance of marine biodiversity-related instruments for the fulfilment (and interpretation) of UNCLOS obligations. Dispositions from these environmental instruments qualify as the 'generally accepted rules' mentioned in UNCLOS.[204] Due to the thesis' limited amount of space and the necessary prioritization, this sub-chapter specifically focuses on the CBD.

[198] 1651 UNTS 333.
[199] Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, D.C., 3 March 1973.
[200] 996 UNTS 245. Norway is a Party since 1975.
[201] 161 UNTS 72.
[202] 1760 UNTS 79.
[203] *South China Sea Arbitration* (n°27) para. 956.
[204] Giannopoulos, 2019, p. 293.

The CBD, to which Norway is a party, entered into force in 1993 with near universal acceptance, and guides States in their implementation of measures for the protection of biodiversity. This Convention defines the EA or EBM as a "strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way".[205] Sustainable use is done "in a way and at a rate that does not lead to a long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations".[206] The EBM goes beyond more traditional management objectives (that are usually focusing on one species) since it considers species interrelationships and interdependence within their ecosystems.[207] This approach helps extend the general obligations of UNCLOS, which are mostly focusing on pollution.[208] Still, the application of the EA can be inferred from art. 194(5) UNCLOS.[209] Besides, the EA takes into account scientific knowledge highlighting cumulative effects and impacts, which makes it an adaptive and flexible tool, at the foundations of the sustainable development principle. However, it is still a vague, unstable, and contested concept. The EA is about finding the balance between conservation and sustainable use of biodiversity. It provides for a more holistic type of management, which superposes natural and administrative boundaries or borders. The CBD is a quite remarkably modern and innovative instrument as it is the first legally binding international instrument to explicitly refer to the intrinsic value of nature. However, it should be noted that this reference is done in the non-legally binding part of the Convention, i.e. its preamble.[210] It also binds Contracting States with the obligation to identify and monitor the components of biodiversity within their national jurisdictions.[211] Indeed, to implement measures and plans aiming at protecting them, ecosystems must firstly be identified and assessed, especially those for which urgent conservation measures are necessary. Quite interestingly, the CBD goes beyond the EIA requirement by introducing the obligation for States to pursue strategic environmental impact assessments (SEIAs).[212] The goal of a SEIA is to ensure that States consider and monitor national and international "plans and programmes likely to affect biodiversity".[213] Indeed, while EIAs are about individual projects, SEIAs are assessing

[205] CBD Decision V/6 para. 7(A)(1) UNEP/CBD/COP/DEC/V/6. See also §13,16 of art. 2 CBD and art. 8 CBD.
[206] Art. 1(16). of the BBNJ Agreement.
[207] §5.1 of the CBD Guidelines on the Ecosystem Approach, 2004.
[208] Warner, 2020, p. 330.
[209] De Lucia, 2015, p. 91-117.
[210] Para. 1 of the CBD preamble.
[211] Art. 7(1)(b) CBD.
[212] Jakobsen et al., 2014, p. 226.
[213] Art. 14(b) CBD. Also see the EU Directive 2001/42/EC.

environmental impacts of multiple projects or plans mainly undertaken by authorities. Another important requirement from the CBD legal framework is to identify and monitor "processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity".[214] Therefore, Norway should closely and continuously monitor (through samplings and other techniques)[215] offshore energy generating activities taking place in its continental shelf, as they are likely to have adverse effects on marine biodiversity.[216] All these provisions are supplemented by non-binding decisions issued during the various Conferences of the Parties (COP Decisions, see section 4.1.1.).

3.3.3. Other International Conventions

Two more international conventions are relevant *in casu* and deserve further attention in this legal analysis. The first one is the Geneva Convention on the Continental Shelf, which entered into force in 1964 and was ratified by Norway in 1971. It codifies the customary rules of international law on the continental shelf and provides its legal definition.[217] It also acts as a steppingstone that led to the conclusion of UNCLOS. This follows the historical practice of the U.S. government proclaiming its continental shelf in 1945, which allowed the State to establish its sovereignty over resources present on the continental shelf, and thus, its exclusive right to explore and exploit them.[218] Norway proclaimed its continental shelf in 1963, at the start of its petroleum exploitation.

Then, the 1991 Convention on Environmental Impact Assessment in a Transboundary Context, also called the Espoo Convention,[219] was ratified by Norway in 1993. This international instrument is the only one specifically focused on EIA. As a customary principle, the requirement of conducting an EIA is included in both international and national law, but the Espoo Convention is precisely related to activities having impacts on areas that are under the jurisdiction of one, or several, neighboring States. The Convention provides States with detailed guidance on how to pursue the EIA and on what it should include.[220] Most importantly, offshore hydrocarbon

[214] Art. 7(1)(c) CBD.
[215] Ibid.
[216] See part 2.2.
[217] Art. 1 of the Geneva Convention on the Continental Shelf.
[218] Art. 2(1) of the Geneva Convention on the Continental Shelf.
[219] Convention on Environmental Impact Assessment in a Transboundary Context, adopted 25 February 1991, entered into force 14 January 1998, 1989 UNTS 309.
[220] See Appendix II of the Espoo Convention.

production and large-diameter oil and gas pipelines are listed[221] as activities which "are likely to cause significant adverse transboundary impact".[222] In the case of Norway, in order to avoid any negative impact from its offshore activities to a marine environment which is under the jurisdiction of a neighboring country, an EIA procedure must be conducted. This includes notification, monitoring and other processes developed in section 3.1.2. To do so, Norway shall engage in regional collaboration, regardless the non-ratification of the Espoo Convention by Russia.

In addition to the international conventions that apply to Norway, domestic regulations are to be considered to grasp an idea of how offshore energy activities are regulated in the Norwegian part of the Arctic. This will be analyzed in the following section.

3.4. Norwegian Regulations

As Norway follows the dualist legal system, incorporation into national law is necessary for international and regional law to be applicable under Norwegian law. This means that international obligations binding Norway are not directly applicable on its territory and require Norwegian legislators to translate and incorporate (or transform) them into the domestic legal framework.[223] Still, even without incorporation, international instruments are useful for the interpretation of domestic law and can include customary law that nonetheless binds Norway.

3.4.1. Nature-Related Legislation

The Norwegian legal and management system concerning environmental sustainability and safety is described by many as a model.[224] This is also due to the fact that a vast majority of its energy input comes from a renewable source of energy: hydropower. Norway can thus appear to be at the forefront of the global energy transition.[225] However, Norway is highly committed to its oil and gas extraction activities (whose exportation ensures a large income) and is determined to maintain such activities by making them 'greener'. The State-owned oil and gas company Equinor has recently made public its ambitious plans to electrify its oil and gas platforms with energy from

[221] See Appendix I, paragraphs 8 and 15 of the Espoo Convention.
[222] Art. 2(2) of the Espoo Convention.
[223] Bustnesli et al., 2021, p. 127.
[224] Hanson, 2011, p. 555–575.
[225] Herrera Anchustegui, Glapiak, 2021, p. 1-22.

connected offshore wind farms [*Figure 6*]. The aim is to change the way those platforms are powered, by replacing their gas turbines with electricity from offshore wind turbines.[226] This process falls within Norway's determination to prolong its oil and gas exploitation, while at the same time, decrease its GHG emissions and carbon footprint, and respecting its international environmental commitments. Indeed, Norway aims at reducing by 50% its GHG emissions by 2030, compared to 1990 levels.[227]

Up until the highest piece of legislation, considerations are granted to the environment. Indeed, art. 112 of the Norwegian Constitution grants citizens the right to a healthy and clean environment. According to the Supreme Court in a 2020 judgement,[228] Norwegian authorities bear the responsibility to implement measures that ensure good environmental status. Therefore, the task to properly manage the country's natural resources (and protect them from human activities) is incumbent upon Norwegian authorities. In its judgement, the Supreme Court considered that the government's decision to grant new oil and gas licenses (for the new licensing round) on the Barents Sea was not violating art. 112 of the Constitution. The Court also highlighted that such decision was supporting the 'greenification' of the oil and gas industry. Norway's approach for integrated ocean management is based on scientific cooperation and knowledge sharing,[229] with several pieces of legislation that directly relate to the environment. It is the case of the Nature Diversity Act, the Climate Change Act, the Environment Information Act, and the Svalbard Environmental Protection Act. The Norwegian legal framework surrounding environmental protection is based on international environmental principles such as the polluter pays and the precautionary ones, as well as the EBM.[230] Not to fall outside of the scope of this research, the analysis will rather put emphasis on pollution- and energy-related legislations.

3.4.2. Pollution-Related Legislation

In order to drastically reduce pollution of the Barents Sea ecosystems, in 1998, Norway put in place a *zero-physical-discharge* regulation, for any oil or gas new project in this region of the NCS.[231]

[226] For more information and data on the electrification process, see Herrera Anchustegui, Glapiak, 2021, p. 17.
[227] Norwegian Government, Submission of the Nationally Determined Contributions, United Nations-Climate Change and Paris Agreement, 2020.
[228] Supreme Court of Norway, Judgment 22 December 2020, HR-2020-2472-P.
[229] Shapovalova, 2020, p. 288.
[230] Herrera Anchustegui, Glapiak, 2021, p. 1-22.
[231] Beyer et al., 2020, p. 105-155.

This regulation helped highlight the fact that more knowledge was needed on the biological impacts of offshore discharges, and especially of environmentally hazardous substances. However, judged as too strict, the government had to replace it with zero-*adverse-effect* targets included in a White Paper, applying to all offshore fields on the NCS. In 2017, those targets have been included in the updated Norwegian Sea management plan.[232] It should be noted that the quantity of discharges in the Barents part of the NCS is still much lower than in the rest of the NCS since, so far, there are only two oil and gas fields in production in the area (see section 3.4.3.). Those discharges are mostly due to drilling as PW is only discharged from an onshore facility called Melkøya.[233] There is much uncertainty regarding the ecological effects of PW discharges on Arctic ecosystems, and those in the Barents Sea are not expected to increase.[234] Still, efforts to tackle the negative impacts of offshore discharges on Arctic marine biodiversity should be carried on. To do so, measures implemented by the Norwegian authorities follow a very central instrument: the Pollution Control Act (PCA).[235]

As the "first unified piece of legislation in Norway on pollution and waste issues",[236] The PCA was adopted in 1981. It establishes general rules and principles regarding pollution and waste, with the duty to avoid pollution as its main obligation.[237] The PCA applies to petroleum activities on the NCS[238] as they are not included in the exception of its chap. 1 §8. The PCA requires exploiting companies to obtain a permit for their operational discharges that represent a risk of pollution. The Norwegian Environment Agency (NEA), as the "pollution control authority", issues and administers permits.[239] Besides, the PCA has invested in the NEA inspection and enforcement powers. Naturally, a permit is not required for pollution that occurs from unforeseen accidents and unintentional releases. Interestingly, disturbances from noise, vibrations and light are included in the definition of pollution by the PCA.[240] Cumulative impacts resulting in pollution of the marine environment also fall under the scope of this definition.[241] Chap. 2 §2(5) of the PCA restates the polluter pays principle from international environmental law: "the costs of preventing or limiting

[232] Meld. St. 35 (2016–2017).
[233] Beyer et al., 2020, p. 105-155.
[234] Ibid.
[235] Act of 13 March 1981 N°6 Concerning Protection Against Pollution and Concerning Waste.
[236] Bustnesli et al., 2021, p. 157.
[237] Chap. 2, §7 PCA: "No person may possess, do, or initiate anything that may entail a risk of pollution".
[238] See Chapter 1, §4 of the PCA.
[239] See Chapter 3, §11 PCA. The Norwegian Environmental Agency works under the Ministry of Climate and Environment.
[240] Chap 2, §6(2) and (3) PCA.
[241] Chap 2, §6, last para. PCA.

pollution and waste problems shall be met by the person responsible for the pollution or waste". Any person or entity pursuing an activity that may result in severe pollution must possess a ready-to-proceed preparedness and response management system. The aim behind this requirement is to detect pollution early enough for it to be stopped and removed, and for its impacts on marine life to be limited.[242] Along with those lines, any violation of a granted permit can be subject to administrative or criminal sanctions.[243] The PCA also requires cooperation in preparedness and response to pollution incidents on all three administrative levels: private, municipal and governmental.[244] Besides, the PCA establishes a notification duty and requires the fulfilment of an EIA for any offshore oil and gas activities as they may involve major pollution problems.[245] EIA procedures must also be followed by ongoing monitoring of activities.[246] Efforts by petroleum companies to avoid pollution of the marine environment (notably from oil spills) are supervised by the Petroleum Safety Authority (PSA). Norway has a considerably extensive and strict legislation on discharges from petroleum activities. This statement shows how its oil and gas resources management plans integrate environmental considerations, throughout all phases of these offshore activities.[247] A more tangible example of such consideration is that the Government and the Parliament can restrict offshore activities in specific geographical areas and over precise time periods. For example, seismic surveys or drillings can be prohibited (or conditions can be added) during breeding, spawning and migration seasons in order to avoid environmental damage to sensitive and vulnerable species. These restrictions take into account other industries sharing the use of the NCS and, above all, are indicated in production licenses at the beginning of each licensing round.[248] Another example is the adoption of soft-start procedures (slowly and gradually increasing the air guns power) which reduce potential shock and trauma from sudden high seismic noise disturbances and enhance the possibility for marine organisms to avoid the area.[249]

3.4.3. Energy-Related Legislation

[242] Meld. St. 20, 2019–2020.
[243] Bustnesli et al., 2021, p. 157.
[244] Meld. St. 20, 2019–2020.
[245] Chap 3, §13, last para. PCA.
[246] Warner, 2020, p. 326-345.
[247] Meld. St. 20, 2019–2020.
[248] Ibid.
[249] Shapovalova, 2020, p. 275-304.

Out of all offshore activities related to energy generation, it is the oil and gas ones that Norway has the most extensively regulated. This is the reason why this section more specifically focuses on legislation for petroleum and gas activities. Hydrocarbons activities is Norway are imbued with a strong State intervention.[250] Indeed, the licensing system is led by the government and regulation is closely supervised by administrative authorities. The Ministry of Petroleum and Energy (MPE) is the responsible authority, with, two subordinate entities: the Norwegian Petroleum Directorate (NPD) and the PSA. While the latter regulates matters such as safety, environmental management, emergency preparedness and drilling technology,[251] the NPD is rather a technical body whose consent is necessary for starting any production. Besides, the fact that Equinor, a State-owned company, is leading the above-mentioned 'greenification' of Norwegian offshore oil and gas platforms, highlights the central role of the State in this sector. On the international sphere, and especially in Europe, Norway is seen as a leader, not only in offshore petroleum development, but also in environmental sustainability and safety. Since the 1980's, Norway has been extending its oil and gas activities to the North part of its continental shelf.[252] For example, the Snøhvit project is the "first Norwegian Arctic field to be developed".[253] At a hundred kilometers North of Snøhvit, the Johan Castberg oil extraction project is currently being developed by Equinor and will be, once operating, "the world's northernmost offshore development".[254] Finally, a third example worth mentioning is the Gøliat platform built by Eni, in production since 2016 as the first oil platform in the Barents Sea. This trend is only expected to increase in the coming years as fields in the South are soon reaching their maturity age. Petroleum activities inherently present high risks for the environment and, thus, require strict regulations. Norwegian environmental standards applying to oil and gas activities are quite high and can be seen as 'best practices'.[255] Domestic regulations on offshore petroleum activities, however, do not distinguish between Norwegian Arctic and non-Arctic waters.[256] The Norwegian legal framework surrounding EIA and offshore activities is a performance-based system, which means that it sets goals to achieve and identifies functions for entities. Although their expected outcomes are highly regulated, those entities still have a large discretionary power regarding how to undertake their tasks and reach the set goals.[257] For example,

[250] Herrera Anchustegui, Glapiak, 2021, p. 1-22.
[251] Shapovalova, 2020, p. 288.
[252] Shapovalova, 2020, p. 275-304.
[253] More information about this gas field developed by Equinor is found in the White Paper Meld. St. 20, 2019–2020.
[254] Ibid.
[255] Herrera Anchustegui, Glapiak, 2021, p. 1-22.
[256] Shapovalova, 2020, p. 288.
[257] Ibid., p. 280.

authorities are left with wide discretionary power concerning their decisions on decommissioning and final disposal.[258] They must still observe Norway's obligations originating from the international instruments mentioned above. In contrast, Russia follows a prescriptive system, which rather sets the required procedures to follow and technicalities of the tasks. A performance-based system is considered by experts as corresponding better to Arctic conditions and realities. Indeed, it allows for more flexibility and enables the adoption of newly emerged practices.[259]

The main instrument applicable *in casu* is the 1996 Petroleum Act (PA).[260] It requires high environmental standards[261] and establishes the conditions of liability for damage from pollution.[262] Another central instrument is the 1997 Petroleum Regulations (PR) which supplements the PA with more details. Section 1-1 of the PA restates Norway's exclusive and inherent sovereign rights to exploit the resources of its continental shelf. The PA includes the application of the precautionary principle by requiring prudent petroleum activities towards the environment.[263] However, the "prudent operations principle" stated in its section 4-1 has not the same meaning as the precautionary principle since the former only requests the avoidance of petroleum or energy waste.[264] The requirement of using the BAT is also included in the PA.[265] At the core of the PA lies the EIA. Chap. 3 section 3-1 PA states that, before opening a new field, for exploration or operation, "an evaluation shall be undertaken of the various interests involved in the relevant area [including] an assessment [...] of the impact of the petroleum activities on [...] the environment, and of possible risks of pollution". The EIA shall also be made available for public consultation and comments.[266] Concerning the licensing process, two different licenses are granted by the MPE: either a production or exploration license[267] or a specific one for laying down and using pipelines.[268] In its qualitative assessment, the MPE takes into account environmental considerations and bases its choice on "fair, objective, and non-discriminatory criteria".[269] In addition to those two

[258] Bustnesli et al., 2021, p. 1-527.
[259] PAME Arctic Offshore Oil and Gas Guidelines, 2014.
[260] Act 29 November 1996 N°72 relating to petroleum activities.
[261] Herrera Anchustegui and Glapiak, 2021, p. 13.
[262] Chap. 7 PA establishes strict liability of the licensees, without limitations on liability nor regard to fault. See sections 7-3 and 7-4.
[263] See section 10-1 PA.
[264] Bustnesli et al., 2021, p. 1-527.
[265] Section 9-1 PA.
[266] Bustnesli et al., 2021, p. 66.
[267] Section 3-3 PA.
[268] See section 3-12 PA.
[269] See section 3-5 of the PA and sections 10 and 11 of the PR, implementing the EU Directive 94/22/EC on the conditions for granting and using authorizations for the prospection, exploration and production of hydrocarbons.

types of licenses, companies need governmental approval (i.e., by the MPA) for both their Plan for Environmental Impact Assessment[270] and their Plan for Development and Operation.[271] The latter must include environmental aspects and decommissioning plans.[272] After receiving their licenses, operators must cooperate (via Production License Coordination Agreements) by sharing technical knowledge in order to reduce to its minimum any impact on the environment.[273] According to Section 1-2 PA, "petroleum resource management shall [...] contribute to ensuring [...] an improved environment", which can sound quite unsettling knowing the adverse effects of the petroleum industry, not only on marine ecosystems but also on global ones via GHG emissions.

Altogether, Norwegian regulations seem quite strict about the fact that oil and gas companies operating in the NCS must assess, and share publicly, the impacts of their operations on the marine environment. It is only once such assessment is judged and after the competent authorities have granted licenses that the production can start. Norwegian domestic law seems to be more stringent on the matter than international and regional law. Finally, to the legally binding international, regional and national obligations exposed in this section, complementary non-binding instruments must be added, in order to grasp an idea of the whole legal framework that applies *in casu*. These will be developed in the following chapter.

4. Non-legally binding instruments

Non-legally binding instruments (secondary source of law) are as important as binding ones to analyze States' obligations towards environmental protection. Indeed, they inform how to interpret binding regulations as they highlight the States' will and efforts to respect their due diligence duty. This chapter dresses up a list of non-binding but legally relevant regulations for the protection of Arctic marine biodiversity against the impacts of offshore energy projects. This list includes guidelines, decisions and recommendations that come from international, regional, and national institutions.

[270] See sections 22 and 22(a)-(c) PR, including transboundary environmental effects.
[271] Section 4-2 PA and Sections 20 and 21 PR.
[272] See §2 of section 4-2 PA. See also chap. 5 PA and chap. 6 PR on decommissioning.
[273] Section 4-7 PA.

4.1. International guidelines and requirements

Over time, resolutions and decisions of treaty bodies shape the evolution of international environmental law. Obligations that apply to offshore energy activities must be interpreted in a contextual and systemic way. Several environmental agreements have a Conference of the Parties (COP) that is competent to interpret the agreement's dispositions and obligations in a binding decision. Still, the vast majority of those decisions are non-binding. It is the case of scientific committees, the International Renewable Energy Agency's Code of Conduct, the World Bank's guidelines, or even COP decisions supplementing the CBD dispositions.

4.1.1. COP decisions

COP decisions are not subsidiary practice[274] but rather have a recommendatory nature, even if adopted by consensus. Still, COP decisions are important as they reinforce legal obligations from environmental instruments by providing normative guidance for their interpretation. They also guide States' practice which leads to the development of subsequent practice and can ultimately change the applicable law.[275] Numerous COP decisions or resolutions are inciting Contracting States to both conduct EIAs and to use BATs and BEPs since it shapes the fulfilment of their due diligence duty.[276] It is notably the case with the CMS Resolutions 7.5, 9.19, 10.24 and 10.19,[277] the CBD COP Decision 7/7 on EIA and SEIA,[278] or even the Ramsar Resolutions X.26 and XI.10.[279] Indeed, as argued in the *Pulp Mills* case,[280] a State's compliance with its due diligence obligations is better guaranteed if the State ensured the use of state-of-the-art technologies or equipment on its territory. Other CBD COP Decisions directly address anthropogenic impacts on marine

[274] See articles 31(3)(a) and (b) and 32 of the Vienna Convention on the Law of Treaties.
[275] Giannopoulos, §4.2.1., 2019, p. 299.
[276] Ibid., p. 289-303.
[277] CMS Res 7.5, 'Wind Turbines and Migratory Species' (24 September 2002), repealed in part by Doc.21.1.10 (18 May 2017); CMS Res 9.19, 'Adverse Anthropogenic Marine/ Ocean Noise Impacts on Cetaceans and Other Biota' (5 December 2008); CMS Res 10.24, 'Further Steps to Abate Underwater Noise Pollution for the Protection of Cetaceans and Other Migratory Species' (25 November 2011); CMS Res 10.19, 'Migratory Species Conservation in the Light of Climate Change' (7 February 2017).
[278] UNEP/CBD/COP/DEC/7/7 from 2004. See also DEC/8/28 on voluntary guidelines on biodiversity-inclusive impact assessment.
[279] Ramsar Res X.26, 'Wetlands and Extractive Industries' (4 November 2008); Ramsar Res XI.10, 'Wetlands and Energy Issues' (July 2012).
[280] The ICJ agreed that the technology used by Uruguay was the most appropriate to prevent pollution. *Case concerning Pulp Mills on the River Uruguay* (Argentina v. Uruguay), Judgment, 20 Apr. 2010, ICJ Reports (2010).

biodiversity such as underwater noise pollution.[281] As mentioned above, the CBD COP Decision V/6 also guides States on the integration of the EA in their measures and policies. Various principles guiding State practice have emerged from COP Decisions. The most indicative example is the Malawi Principles, which originate from the CBD COP 4 and clarify the meaning of the EA.[282] Decision IV/5 of the same COP[283] also highlights six basic principles which include the EA, the precautionary principle, and the importance of science. In addition to that, the International Whaling Commission (IWC) scientific committee has issued a report explicitly mentioning the environmental impacts of MREDs.[284] The report puts the IWC in the spotlight for coordinating efforts towards the implementation of a management strategy and to develop best practice guidelines.

4.1.2. OSPAR

The 1998 Ministerial Meeting of the OSPAR Convention adopted a decision on decommissioning,[285] which prohibits the disposal of disused offshore installations, with possible derogations.[286] The OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development[287] assists "OSPAR contracting parties, developers, consultants, regulators or any other interested parties or individuals in the identification and consideration of some of the issues associated with determining the environmental effects of offshore wind farm developments". It dresses a list of potential impacts of offshore wind farm installations on marine biodiversity and indicates mitigation measures for each. The OSPAR Offshore Industry Committee has established regulatory limits on the treatment of PW and on its discharge into the sea.[288] It also calls for the carrying out of a risk-based approach assessment, which corresponds to the precautionary approach [*Figure 7*]. Along the same line, OSPAR Recommendation 2001/1 requires the use of BAT and

[281] See UNEP/CBD/COP/DEC/11/18 on addressing adverse impacts of human activities on marine and coastal biodiversity, or DEC/12/23 and DEC/13/10 on addressing the impacts of anthropogenic underwater noise on marine and coastal biodiversity.
[282] Bratislava, Slovakia, 4-15 May 1998, UNEP/CBD/ COP/4/Inf.9, Malawi Workshop.
[283] Jakarta Mandate Work Programme on marine and coastal biological diversity, arising from Decision II/10.
[284] Report of the IWC Scientific Committee Workshop on Interactions between Marine Renewable Projects and Cetaceans Worldwide, SC/64/Rep6 Rev1, 2012.
[285] Decision 98/3.
[286] Bustnesli et al., 2021, p. 254.
[287] Agreement N°2008-3, which replaces agreements N°2003-16, 2005-2, 2006-5, and 2007-9.
[288] Beyer et al., 2020, p. 105-155.

BEP.

4.1.3. Arctic Council

As mentioned above, applying to the Arctic the same safety and environmental protection standards or rules as in other regions is not enough to protect Arctic fragile ecosystems. This is why the Arctic Council has issued documents recommending special rules as regional solutions to be adopted by Arctic Coastal States.[289] Collaboration between these latter is essential to protect the Arctic environment and is highlighted in the Arctic EIA Guidelines.[290] Those guidelines participate in establishing Arctic States' responsibility to implement EIAs for activities that may affect the marine environment,[291] which means that each national legal framework on that matter will differ (common international obligations must still be complied with). However, such Guidelines have never been updated and lack precise recommendations or clear guidance on measures to adopt.[292] By signing the non-binding Ilulissat Declaration in 2008,[293] the five Arctic States have agreed to consider UNCLOS as the framework treaty regulating the marine Arctic and have committed to continue nurturing and strengthening their close cooperation in the protection of the marine environment, including with the IMO. Arctic States have decided together the future governance of the Arctic, rejecting the possibility of establishing a new comprehensive legal order for the Arctic.

The Arctic Council's working group on the Protection of the Arctic Marine Environment (PAME) has also issued guidelines on offshore oil and gas activities.[294] They impose high standards for oil and gas activities in the Arctic as well as stricter oil spill response planning, considering Arctic specificities. Chapters 3 and 4 of the Guidelines restate the importance of EIAs and of ongoing monitoring. PAME has issued numerous Guidelines related to the preservation of Arctic ecosystems.[295] The Arctic Council's Emergency Prevention, Preparedness and Response (EPPR)

[289] Shapovalova, 2020, p. 275-304.
[290] Non-binding guidelines adopted at the final meeting of the Rovaniemi Process, under the 1991 Arctic Environmental Protection Strategy (the Finnish Initiative).
[291] Warner, 2020, p. 326-345.
[292] Ibid., p. 340.
[293] Arctic Ocean Conference in Ilulissat, Greenland, 2008.
[294] Arctic Council, protection of the Arctic Marine Environment Working Group, Arctic Offshore Oil and Gas Guidelines 2009.
[295] Systems safety management and safety culture: Avoiding major disasters in Arctic offshore oil and gas operations, PAME, 2014; The Ecosystem Approach to Managing Arctic Marine Ecosystems: Concept Paper, PAME, 2014; EA Guidelines: Implementing an Ecosystem Approach to Management of Arctic Marine Ecosystems, PAME 2019.

program drew a list of best practices in the use of standards in the Arctic and in oil spills prevention.[296]

4.1.4. Additional relevant guidelines

The World Bank Group and the International Finance Corporation have provided a set of guidelines that developers must follow in order to get economical funds, which are necessary to bring to completion their large-scale project. Those guidelines require EIAs for offshore wind farm projects to list all significant environmental effects. This includes impacts that are cumulative, long and short term, direct and indirect, positive and negative, as well as unavoidable and irreversible.[297] These guidelines show that law is not always the only solution to adopt new measures. Indeed, non-binding sources can condition the access to financial means to the respect of environmental standards, which could even be considered by some as a more efficient tool.

Furthermore, industry standards can be of importance as they set a performance level. They cannot be considered as "generally accepted international rules or standards" as mentioned in art. 60(3) UNCLOS since they are not issued by a competent international organization. It is more arduous for a State than for an industry association to follow the latest developments concerning such industry. Therefore, in many cases, the private sector has been put in charge of indicating best practices and help industries improve their environmental performance. For example, industry associations have developed standards applying to the Arctic.[298] Besides, in the case concerning *Pulp Mills on the River Uruguay* (on the requirements to respect the standard of due diligence in preventing environmental harm), the ICJ states that domestic legal systems prescribing measures and rules must be in accordance with "recommendations of international technical bodies".[299] In addition to international guidelines, Norwegian authorities are competent to issue various types of guidance, as shown in the next section.

4.2. Guidance from the Norwegian government

[296] Emergency Prevention, Preparedness, and Response (EPPR), 2017, Overview of measures specifically designed to prevent oil pollution in the Arctic marine environment from offshore petroleum activities.
[297] Wilhelmsson et al., 2010, IUCN, p. 1-104.
[298] International Organisation for Standardisation (ISO): Standards for Arctic Offshore Structures, 2010, ISO 19906:2010, which applies to Petroleum and Natural Gas industries.
[299] §196 of the Pulp Mills ruling, referring to art. 41 (a) of the 1975 ICJ Statute.

4.2.1. Management Plans and Goals, Political Action Plans and Strategies

An Integrated Management Plan (IMP) is a soft law tool used by the Norwegian government to holistically manage various aspects of ocean-use while including environmental aspects.[300] The Barents Sea and Lofoten are jointly managed in a comprehensive IMP[301] which introduces restrictions on drilling for several locations (marked as 'particularly valuable and vulnerable areas'[302]) around Lofoten and the Northern Barents Sea.[303] For example, operations are prohibited in the 'marginal ice zone' [*Figure 8* and *Figure 9*]. Those 'particularly valuable and vulnerable areas' are established to be "of great importance for biodiversity and for biological production in the entire Barents Sea–Lofoten area, and where adverse impacts might persist for many years".[304] Therefore, it seems clear that Norway is aware of the specificities and vulnerable nature of some parts of its territory. In order to protect them, Norwegian IMPs establish more stringent rules for the Lofoten and the Barents Sea regions than for the rest of the NCS.

Additionally, research and cooperation are enhanced by the government. The Nansen Legacy (2018–2024) is an Arctic interdisciplinary research project run by students, researchers, and technicians from ten Norwegian research institutions. The aim is to collect holistic and integrated scientific knowledge on the rapid changes in marine ecosystems.[305] It is funded by the Research Council of Norway and the Norwegian Ministry of Education and Research, which highlights the government's will to develop good practices by supporting environmental research. Norway has also developed cooperation with Russia, to strengthen environmental protection. Indeed, as the two Arctic Coastal States share a common boundary, they are both responsible for protecting marine biodiversity in the Barents Sea. Bilateral negotiations have been fruitful as, in 1992, a Joint Norwegian–Russian Commission on Environmental Protection was created. Its main objective is to jointly provide an EBM of the Barents Sea using the best possible scientific data and knowledge inherited from both countries and by using Norway's experience with IMPs. Besides, the Barents 2020 project, as another cooperation tool between Norway, Russia, and the oil industry, restates non-binding environmental and safety standards for petroleum activities in the Barents

[300] Herrera Anchustegui and Glapiak, 2021, p. 13.
[301] Norwegian Ministry of Environment 2005, Integrated management of the marine environment of the Barents Sea and the sea areas off the Lofoten Islands (Storting Report 8), 2014 Update of the integrated management plan for the Barents Sea–Lofoten area including an update of the delimitation of the marginal ice zone (Storting White Paper 20).
[302] In Norway, these areas are the marginal ice zone, the polar front and the Eggakanten area.
[303] Shapovalova, 2020, p. 290.
[304] Hoel, 2010, p. 186–206.
[305] Meld. St. 20, p.63.

region.[306]

4.2.2. White Papers

The Norwegian government regularly issues non-binding guidelines and recommendations that its authorities, its municipalities and the private sector must follow in order to ensure an effective implementation of the law. Those recommendations are usually reported to the Parliament (*Storting*) in the form of White Papers (WP). These latter provide a long-term perspective, necessary to the management of natural resources and ecosystems.

The WP Meld. St. 20 (2019-2020)[307] is an example that relates to the scope of this research since it defines Norway's integrated ocean management plans in 2020 (valid until 2024) for the Barents Sea–Lofoten area, the Norwegian Sea, and the North Sea and Skagerrak. These are the three management plan areas in Norway [*Figure 10*] (brought together in a management plan for the first time). By providing an overall review of ecological status and targets (also reviewing progress made towards such targets), this WP helps develop collaboration and avoid future conflicts btw various sectors. It also gives more clarity on the legal framework surrounding ocean-based activities in Norway and more predictability regarding measures to implement, so as to promote sustainable development. Indeed, as stated in chap. 2 of the WP, "value creation from [Norway's] ocean-based activities now and in the future depends on maintaining good environmental status and high biodiversity in the marine and coastal environment, safeguarding the oceans as a source of food and using ocean resources sustainably." Still, activities referred to in an IMP or a WP are regulated by existing legislation governing different sectors. Under the latter, each sectoral authority is responsible for administering and implementing measures set out in the management plans, which are updated every four years. The WP analyses current ocean-based industries, their development, and activities. For instance, chap. 6 assesses the risks of acute pollution from petroleum activities, describing the preparedness and response system. Norway intends on continuing to develop its petroleum activities, as stated in the WP:

> Steps will be taken to facilitate the long-term profitable production of oil and gas [and] activities will be carried out within a predictable framework [...] on the basis of health, environment and

[306] Norwegian Government. (2006). Barents 2020: A tool for a forward-looking high North policy.
[307] Meld. St. 20 (ENG) (2019–2020), Report to the Storting.

> safety requirements and standards that are adapted to environmental considerations and the needs of other industries.[308]

Concerning offshore wind activities, the WP officially mentions that "the development of offshore renewable energy production will be facilitated, taking into account environmental considerations and other activities".[309] On the matter of pollution and especially underwater noise, the government acknowledges that "activities entailing a noise level that may affect species' behavior will be limited to avoid the displacement of populations or other effects that may have negative impacts on the marine ecosystem".

To conclude chapters 3 and 4 of this thesis, as there exists no convention comprehensively regulating the environmental protection of the Arctic Ocean, especially offshore energy-generating activities, a myriad of international, regional, and national instruments apply, from hard to soft law. On the one hand, some scholars argue that there is a "pressing need for the development and adoption of an international treaty designed to protect the Arctic environment and its natural resources"[310] (in the same way the 1959 Antarctic Treaty was established).[311] On the other hand, it is feared that an additional treaty would only increase legal fragmentation and the current treaty fatigue or confusion States are facing. Thus, which alternatives to supplementary legislation can be followed? This burning question will be answered in the next chapter.

5. Synthesis of the legal framework analysis

The analysis of the legal framework has been developed through this research while, at the same time, extensively listing applicable regulations. This section specifically focuses on the limits and restrictions of such regulations as well as the improvements Norway could develop. The latter include favoring the use of precautionary approach, multidisciplinary cooperation, and efficient regulatory tools (such as, for example, newly improved designs).

[308] Chap. 2§4 Meld. St. 20.
[309] Ibid.
[310] Verhaag, 2003, p. 555-579. Also see Koivurova, 2014, p. 52-56.
[311] The Antarctic Treaty, 1959, UNTS 402, 71.

5.1. Regulation evaluation

5.1.1. Contextual Interpretation and Limits

The fact that the considered international legal framework is fragmented and that numerous international instruments are overlapping can undermine their effectiveness and make uncertain which institution is competent on a particular matter. Still, there is certainty about the fact that coherence and coordination are needed for regulations to efficiently achieve their goals. Besides, an increase in human activities means an increase in risks of accidents and of adverse effects on marine biodiversity. Therefore, stricter regulation is needed on the global level. This thesis has shown that Norwegian regulations surrounding offshore petroleum activities are stricter than those from most countries as they apply to fragile regions, i.e., the Arctic.

Throughout this thesis' legal analysis, it has been highlighted that, although environmental protection is present in regulations, numerous limits exist to the development of policies and measures aiming for ecosystems conservation. For instance, UNCLOS' navigational freedoms are to be observed. Another limit is the fact that States and companies have made heavy long-term investments (see the current controverse around the Energy Charter Treaty) and would lose considerable amounts of money if those investments were to be reassessed. However, according to the 2019 United Nations Environment Programme (UNEP) Emissions Gap Report, the level of global ambition is still considered insufficient.[312] Another central reason behind such a statement is that nature is seen as a product and a provider of services, as a resource to exploit for the ever-growing human consumption. In the current situation, marine ecosystems are to be exploited to the most optimized level (as shown by the EU Common Fisheries Policy and fishing quotas). Indeed, as mentioned in Meld. St. 20 (2019-2020), "human activity in the management plan areas will not damage the structure, functioning or productivity of ecosystems."[313] Indeed, the Norwegian government recognizes the impacts of climate change on ecosystems of the Barents Sea,[314] and directly links it to the productivity of human activities. The latter are thus regulated to avoid damaging "the structure, functioning or productivity of ecosystems".[315] Ecosystems could be protected in a better way if they were considered for their intrinsic value. Adopting such a short-

[312] §3.3 of the UNEP Emissions Gap Report, 2019.
[313] Chap. 2 §4 Meld. St. 20 (2019-2020).
[314] Chap. 1 Meld. St. 20 (2019-2020).
[315] Chap. 2 §4, Meld. St. 20 (2019-2020).

term approach oriented towards economic gain is not viable and does not respect sustainable development goals. This is the reason why applying EBM is crucial. Addressing ecosystems' needs and monitoring them allows for the development of a long-term vision and the establishment of 'recovery periods', allowing biomass to recover and to redevelop itself (as is done in natural reserves). To find a way to cohabit with marine species without jeopardizing their ecosystems and well-being, interdisciplinary cooperation is necessary, along with a more diverse governance, including all stake- and rights-holders and actors in the process (the Arctic Council being one example). Governance is defined by the IPCC as

> "A comprehensive and inclusive concept of the full range of means for deciding, managing, implementing and monitoring policies and measures. Whereas government is defined strictly in terms of the nation-state, the more inclusive concept of governance recognizes the contributions of various levels of government (global, international, regional, sub-national and local) and the contributing roles of the private sector, of nongovernmental actors, and of civil society to addressing the many types of issues facing the global community."[316]

Governments are able to agree on setting thresholds or precautionary reference points for fisheries stocks, to conserve straddling and highly migratory fish stocks.[317] They should be able to establish (using an inclusive governance system) stricter thresholds maintaining a healthy status of Arctic ecosystems. Management strategies should then be developed according to the adopted thresholds and not only following maximum 'sustainable' yields. Another limit to the development of more stringent regulations and measures is the need to provide energy supply for human daily activities, which means that enough energy is delivered to answer the demand, without any interruption or 'black out'.

5.1.2. Precautionary Approach

The precautionary *approach* is usually used instead of the precautionary *principle* in international conventions and treaties as its less binding nature leaves more room for State Parties to interpret any legal text by its letter.[318] Such flexibility is necessary as States are more prone to agreeing on signing binding instruments that include the precautionary approach. Besides, the precautionary

[316] IPCC SR15, 2018, p. 550.
[317] See art. 6 of the UN Fish Stocks Agreement, 2001.
[318] There exists a doctrinal disagreement on that regard: some consider them as interchangeable terms; others estimate they have different meanings.

approach is crucial in the fields where scientific knowledge is lacking.[319] In Meld. St. 20, the Norwegian government recognizes that "there are still major gaps in our knowledge and understanding of the marine environment, and further mapping, research and monitoring are needed".[320] Norway has a well-organized monitoring system, especially in the context of offshore oil activities, which applies the precautionary approach. Ever since WPs have been issued (early 2000's), the *Storting* has "considered and approved integrated ecosystem-based management plans for all Norwegian sea areas", using a holistic approach [*Figure 11*].[321] *Integrated* means that all the relevant parts of the public administration (ministries and local administration) are brought together. The use of best scientific advice, BAT and BEP, along with the EIA and SEIA requirements form an integral part of the precautionary principle.

Altogether, the PA extends States' obligations to regulate and manage situations where there is no scientific certainty about the risk of planned activities. Indeed, lack of information and knowledge should not be used as a reason for States not to act.[322] They must thus demonstrate precaution and act so as to take into account and avoid any potential risk of adverse effects on marine biodiversity from offshore activities. Here lies the difference between prevention and precaution. The term precaution (and all precautionary measures) extends the scope of the term prevention (along with all preventive measures) as the former applies to wider situations void of any scientific evidence.[323] As established by the ITLOS, the precautionary principle[324] is now a customary principle of international environmental law: "the incorporation of the precautionary principle in numerous environmental agreements has initiated a trend towards its crystallization as a rule of customary international law".[325] Therefore, approaches should be "integrated in content" and 'precautionary and anticipatory in ambition'.[326]

To conclude, defining in legal terms impacts that are scientifically unknown and not clearly delimited is an arduous task, resulting in the even harder endeavor that is ensuring an effective legal protection. The precautionary principle must therefore be used in order to create and adapt

[319] McDonald, VanderZwaag, 2015, p. 299-326.
[320] Chap. 3§6 Meld. St. 20.
[321] Chap. 1 Meld. St. 20 (2019-2020).
[322] "Where there are threats of serious or irreversible damage to the environment, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation", Principle 15 of the United Nations Conference on Environment and Development, the Rio Declaration.
[323] Giannopoulos, 2019, p. 298.
[324] For more information on the precautionary principle, see Warner, 2020, p.331.
[325] ITLOS Advisory Opinion (2011) N°18, §135. See also §131.
[326] Introduction of Chapter 17, para. 1, Rio Convention, A/CONF.151/26 (Vol. II).

policy and legal instruments relating to standards and thresholds which are built without proper definition nor clear data.

5.2. Beyond the legal analysis?

This analysis has proven that a systemic interpretation of the legal framework is needed to include environmental considerations into legal instruments. Each legal instrument should be interpreted considering its context as no legal text can and should exist in isolation. Therefore, this section of the legal analysis goes beyond a more traditional analysis that would only focus on applicable law. It highlights the fact that, in order to ensure an effective protection of the Arctic marine biodiversity against offshore energy projects, interdisciplinarity must be favored as a complementary mean, rather than only relying on regulations.

5.2.1. Multidisciplinary Cooperation

Multidisciplinary cooperation is needed to ensure better governance and spatial planning. Following the EA, case-by-case analysis (and measures) are necessary, as each area and ecosystem are unique and suffer various stressors.[327] Additionally, to palliate the cumulative stressors imposed on marine ecosystems, cooperation between the various activities taking place at sea is crucial. Cooperation in research is also necessary as "multi and inter-disciplinary biodiversity orientated research ranging from engineering to policy" will provide effective assessments of the impacts on biodiversity.[328] Moreover, conflicts of interest could be lessened by including key stakeholders in not only the decision-making, but also in the design, siting, pre-construction, monitoring and EIA, construction, operational phases, and decommissioning of the installations.[329] Those key stakeholders are local communities, energy companies, engineers, scientists, governmental agencies and authorities, non-governmental organizations and academic institutions. It also implies that other sectors should be involved in joint marine conservation efforts, notably because of cumulative impacts. One example is the re-routing of commercial shipping lanes to avoid ships

[327] Wright et al., 2020, p. 240.
[328] Inger et al., 2009, p. 1151.
[329] Ibid., p. 1150.

passing through sensitive areas or close to offshore facilities.[330] Besides, more public participation would allow decision-makers to adapt their policies and measures to the realities of local communities and to the ecosystems they depend on. New policy tools are needed to ensure more public participation. One example is the inclusion of indigenous groups in the Arctic Council. The inclusion of multidisciplinary cooperation will facilitate the development of a globally much-needed knowledge-based approach.[331] Norway is already quite aware of the necessity to base its decision on science and has been developing measures using a science-based approach. For example, Equinor is a partner in the Offshore Renewables Joint Industry Programme (ORJIP) for offshore wind. Private companies also have a lot to gain from knowledge sharing and exchange.

A new type of governance would help the protection of marine biodiversity. It can also consist in delegating powers and authority to indigenous groups that know best the considered areas. Indigenous and local communities are aware of which areas are more fragile or endangered, and so, where activities must be strictly regulated or avoided. Nowadays, most threats are global and transboundary, and species are likely to migrate North due to climate change, travelling across maritime zones of various Coastal States.[332] Therefore, international and regional collaboration (also between indigenous groups from various regions) is vital, especially in the Arctic region where interconnected ecosystems[333] are facing higher risks. Collaboration could be enhanced by recognizing traditional knowledge as equally valuable and legitimate as scientific knowledge. Although its political developments are currently uncertain due to the Ukrainian war, the Arctic Council must continue its efforts. The question as to whether the Council can successfully continue to exist while one of the major Arctic Coastal States is at war remains to be seen. Norway has much responsibility on the matter as it recently received the Chair of the Arctic Council (transferred from Russia) for the period 2023-2025.[334]

Along the same lines, the development of a network of protective MPAs (which are based on scientific knowledge) where human activities are restricted could help protect marine ecosystems.[335] Indeed, “recent work has demonstrated that networks of MPAs have a rapid positive effect on fish abundance and, as such, the introduction of networks of MPAs associated with MREI

[330] Petruny et al., 2014, p. 24-32.
[331] Shapovalova, 2020, p. 275-304.
[332] Jakobsen, 2014, p. 215-233.
[333] For more information on oceans inter-connectedness see Johansen et al., 2021, p. 190-206.
[334] Article by Trine Jonassen, "Russia Will Stay in The Arctic Council as Long as it Serves Our Interests", High North News, May 11 2023.
[335] Jakobsen, 2014, p. 215-233.

may provide a powerful tool for restoration ecology".[336] Surprisingly, the Arctic is the region where the fewest MPAs are to be found.[337] Therefore, careful, integrated and precautionary spatial planning is essential to protect marine ecosystems, along with measures increasing the attractiveness of more environmentally friendly behaviors from energy companies. Strictly following EIA requirements is in the developer's own interest as any accident or severe impact on marine ecosystems can adversely affect its reputation. The assessment of environmental impacts is more than a mere "regulatory box-checking exercise".[338] Finally, to achieve efficiency, in addition to multidisciplinary cooperation, several regulatory measures and policies are needed.

5.2.2. Efficient Regulatory Tools

Regulatory tools must rather be efficient than stringent. Following the principle of sustainable development, mitigation and adaptation measures cannot be considered efficient if their implementation uses energy that is sourced in a way that is detrimental to the environment. There must be consistency throughout each process of the whole joint management of marine areas.

Regular and rigorous monitoring, assessments and analysis of data are crucial to firstly gain more knowledge about adverse anthropogenic impacts on marine wildlife and secondly, to devise solutions to tackle them. They also "generate more reliable data and ensure the fulfilment of sustainable potential".[339] The monitoring of Arctic marine biodiversity must be done in a "public, open access fashion in order to provide comprehensive data to inform management, conservation, and other decisions".[340] Such assessments must include how species react to the activity and structure concerned.[341] Therefore, there is a need for monitoring to be "site-, time-, and even project-specific given the unique mixture of human activities, geographical features, and species present at any given development location".[342] Authorities' or companies' "immediate political or economic mandates" should not rush and thus hinder the fulfilment of an EIA.[343] Standards are

[336] Inger et al., 2009, p. 1150.
[337] Jakobsen, 2014, p. 215-233.
[338] Wright et al., 2020, p. 240.
[339] Gasparatos et al., 2017, p. 161-184.
[340] Bluhm et al., 2011, p. 232–248.
[341] Wright et al., 2020, p. 235-244.
[342] Ibid., p. 240.
[343] Ibid.

also very important and must be kept to a high level of requirement, especially for maintenance of offshore platforms and installations.

Numerous technical improvements could also help reduce the impacts of offshore energy projects on Arctic marine biodiversity. To avoid the risks of collision and mortality with rotating blades from MREDs, their rotor design or speed could be adapted.[344] As mentioned in section 2.2.1., reducing vessels' speed is also an efficient measure to lower anthropogenic impacts on marine life. Besides, newly improved designs and innovations can considerably reduce such impacts. Some examples are floating turbines that do not require intense drilling and are easy to decommission, or underwater barriers to avoid any collision. Noise mitigation systems[345] are tools that are reputed to be efficient in either reducing noise disturbances or in deterring marine species from coming close to an offshore installation.[346] However, it should be noted that not all marine species would react to the same extent, and that they can get used to such devices, which decreases their effectiveness.[347] Therefore, low-noise installations with sound reduction methods at the source should be favored. Historically, dynamite was used during offshore seismic surveys as an acoustic source to detect oil and gas deposits. It however became obsolete and was replaced by air guns because dynamite was considered as too detrimental to marine ecosystems and disrespectful towards environmental standards from oil and gas activities. Air guns have also been slowly phased out due to the same environmental concerns and replaced with a less impactful (in terms of noise emissions) and newer technology: the marine vibrator.[348] This inspiring example demonstrates that industries should regularly be looking out for new technologies to develop in order to lower their impact on marine biodiversity. Regulations appear to be a key tool to incentivize such behavior. Some buffer measures can also be applied such as delaying operations if an animal has been sighted in the area. One limit that has been raised is that it can render the project non-viable in the long run if the construction is delayed or if it is not operating on a regular basis. Once more, it all comes down to deciding what the most important point of focus is: keeping marine species safe and sound or ensuring economic gains (but also communities' livelihood) and securing energy supply. As it

[344] Gasparatos et al., 2017, p. 161-184.
[345] E.g., sound attenuation methods such as the bubble curtain method, hydro sound dampers, insulating blocks and cofferdams, but also deterring ones such as seal scarers, acoustic repellents and other species-specific methods.
[346] They can reduce the impact area by 90%. Verfuss et al., Chap. 147, 2016, p. 1175-1182.
[347] Ibid.
[348] Basran et al., 2020, p. 95-115.

appears impossible to choose one at the expense of the other, one question remains, where does the compromise stand to enable both?

To answer this question, a very specific tool can sometimes be considered more efficient than regulation as it is at the core of society: education. Educating younger generations means educating the future decision-makers. The author believes that increasing awareness on biodiversity loss and anthropogenic impacts on ecosystems through education is the most viable way to ensure an integrated approach in the long run, as environmental concerns will then be considered in each sector of activities.[349] The question of how to ensure energy supply is directly related to how and how much society consumes resources, and to how a more energy-efficient society can be developed. The journey to decarbonization would be smoother if policies and plans included concrete measures to improve energy efficiency and drastically reduce the energy demand (especially in highly 'developed' and energy-intensive regions). Then only (as there would be less limitations and controverse), could minimum global conservation objectives ruling over human activities development be applied to marine areas affected by offshore energy projects. Education only proposes a long-term solution, which is the reason why investments in education must be coupled with other measures mentioned above, as well as with regulations. The solution is complex and includes various domains.

6. Conclusion

The Arctic is a region where "the threat of environmental damage to ecosystems and biodiversity is particularly severe"[350] and where access to scientific evidence can be arduous. Indeed, scientific work in the Arctic poses logistical challenges due to the harsh climate and inherent difficulty in collecting data, a dire lack of infrastructures and a high mobility of species complicating monitoring. All these conditions amount to a scarcity of empirical evidence. Despite the existing limitations and gaps in the available scientific research, it already reveals clearly enough that offshore energy projects can have considerable direct and indirect impacts on Arctic marine

[349] Which corresponds to the Sustainable Development Goals (SDGs) n°13.2 and 13.3.
[350] Maggio, 2020, p. 443-463.

biodiversity. MREIs and offshore oil and gas platforms can have both positive and negative (more numerous and impactful) effects on marine biodiversity. The main positive aspects are the increased food availability due to reduced fishing activities, artificial reef effects and the absence of vessels. The principal negative impacts are the risks of habitat loss and modification, collisions leading to injuries and/or mortality, pollution in various forms and from various sources, and finally, electro-magnetic disturbances. Altogether, the various impacts are converging in behavioral changes from species all along the food chain. Therefore, those negative impacts must be closely monitored and regulated to be limited as much as possible. To do so, more scientific research is needed, as it will help develop a better understanding of how ecosystems react to such activities. However, not only do research and investment lack, but also the certainty of such impacts. Indeed, because of how complex and layered reality is, more research might not even provide for more assured answers. Consequentially, in light of scarce evidence, all multisectoral actors must use the precautionary principle when implementing measures, adopting laws, regulations and guidelines, or during any decision-making that might affect Arctic marine ecosystems.

The international and regional legal framework that applies to activities in the Arctic is highly fragmented and the governance that applies is quite complex.[351] Indeed, there exists no single agreement regulating environmental externalities of offshore energy activities in the Arctic,[352] which complicates the task of finding which rule to apply. Given the scattered nature of the considered legal regime, synergy is needed. Non-binding instruments must be considered as they provide additional flexibility and protection. They can be considered as supplementary means of interpretation of legally binding texts.[353] Recommendations, COP decisions and guidelines require States in a non-authoritative manner to use BAT and BEP as a way to commit to their due diligence obligation. The duty to cooperate also shapes the due diligence principle included in UNCLOS. The UNCLOS operates under a dual system as it draws general obligations that bind States but also requires them to develop a more specific regime within its general framework. This dynamic treaty from 1982 enables adaptation to ongoing changes,[354] which is the reason why it is still a relevant instrument for the environmental protection of marine ecosystems.[355] This is

[351] Maggio, 2020, p. 443-463.
[352] Giannopoulos, 2019, p. 289-303.
[353] See art. 32 of the Vienna Convention of the Law of Treaties.
[354] See for example, the recent BBNJ Agreement.
[355] Maggio, 2020, p. 443-463.

permitted by both the rule of reference and the fact that environmental protection is an overarching obligation of UNCLOS. Along with other instruments such as the London Convention, UNCLOS covers most specifically pollution. This term must be interpreted in an evolutionary and larger sense so as to include other detrimental activities and ensure a better preservation of ecosystems. Still, "global instruments seem to fail to offer concrete environmental standards for offshore energy production activities".[356] There is a need to look beyond the law *stricto sensu,* to evaluate law in its current context (political, social, economic, etc.) and to include other manifestations of the exercise of public and social authority in our considerations. Multi-disciplinarity, collaboration and more effective regulatory standards must be further developed.

Arctic legislation has stricter requirements for offshore activities as they take place in areas where the safety and environmental situation is particularly challenging. The Arctic Council promotes environmental cooperation between the five Arctic Coastal States. All of them, (including Norway) have either already started producing offshore energy or have interests in it. Therefore, they have developed a comprehensive set of safety and environmental rules that are more stringent than in more conventional regions.[357] The Norwegian legal framework surrounding offshore activities on the NCS is very extensive when it comes to petroleum activities, not as much regarding MREIs. Still, it has become timely and vital for Norway to develop regulations on offshore wind farm projects as they have gained considerable popularity, with "an annual growth of over 25%".[358] Besides, due to its central role in the matter, it is easier for the Norwegian government to regulate the so far limited but increasing offshore activities that can be harmful to marine life in the Arctic. By considering the safeguarding of the natural environment, Norwegian law has implemented its international environmental obligations. Indeed, approval from authorities (through a permit granted under the PCA) is necessary for all phases of offshore oil and gas activities, which includes the exploration, development, operations, and decommissioning.[359] Norwegian legislation includes OSPAR obligations such as the required implementation of monitoring and compliance systems and the authorization and regulation of activities by the authorities using the EBM. Norway seems to have more stringent measures implemented than most countries (especially EU member states), which is important when such measures apply to fragile ecosystems like the Arctic.

[356] Giannopoulos, 2019, p. 289-303.
[357] Shapovalova, 2020, p. 275-304.
[358] Kulkarni and Edwards, 2022, p. 211-222.
[359] Meld. St. 20 (2019-2020).

In addition to the above-mentioned anthropogenic impacts on marine wildlife, other stressors must be considered, including sea-level rise, ocean temperature rise, sea-ice melting, ocean acidification, reduced subsurface oxygen concentrations, which are all linked to climate change, a broader human-induced stressor.[360] Including those impacts in rigorous EIAs and comprehensive mitigation plans is imperative[361] as they often cumulate with the previously mentioned effects, worsening their impacts on marine biodiversity. Moreover, "a threat to any single element of the ecosystems has potentially adverse impacts on all other components of the marine biodiversity".[362] As mentioned in section. 2.2, existing studies show that alterations in Arctic marine species' behavior can already be observed, and more changes are expected to happen in the next decades, with the increase of human activities in the region. Marine species' thriving and survival will depend on both their resistance and adaptability to change (i.e., their behavioral plasticity). Human society can be portrayed as an old machinery running at full speed with a velocity ensuring productivity and short-term economic revenue. Each time a gearwheel is broken, the whole machinery must be stopped, and it takes a considerable amount of time and energy to restart it.[363] Reducing its pace would ensure a longer-term functioning as it would take a longer amount of time for the gear to get damaged. Also, shifting gear would have a lower impact if the machinery was running slower, since it would require less time and energy to put it back on 'cruise speed'. However, currently, lowering its pace will result in reducing economic revenue, and the fewer ones profiting the most from it want to avoid this outcome, at any cost. Ecosystems and wildlife are the first ones to pay this cost (along with poorer communities and the Global South). Which can be seen as counterproductive, as this old machinery was built in such a way that its functioning depends on these exact ecosystems (called resources). Although it is currently impossible to drastically stop the human machinery and the harm it can produce, its rhythm and impact on wildlife can still be lowered. *In casu*, it is possible by regulating the offshore energy production sector with a multisectoral and holistic approach. As a first step, it will leave more space and time for marine species to shift their habits (increase their behavioral plasticity) until human impacts are reduced to the most insignificant level possible, or at least to a level species can adapt to, that does not induce any negative change in ecosystems. As such a process is already happening,

[360] IPCC final report, 2023.
[361] Wright et al., 2020, p. 240.
[362] Giannopoulos, 2019, p. 289-303.
[363] Here referring to global financial, economic and pandemic crisis.

what this research aims at doing is to inform more scientists, policy-, and decision-makers, for them to develop cooperation and speed up the process.

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Annexes

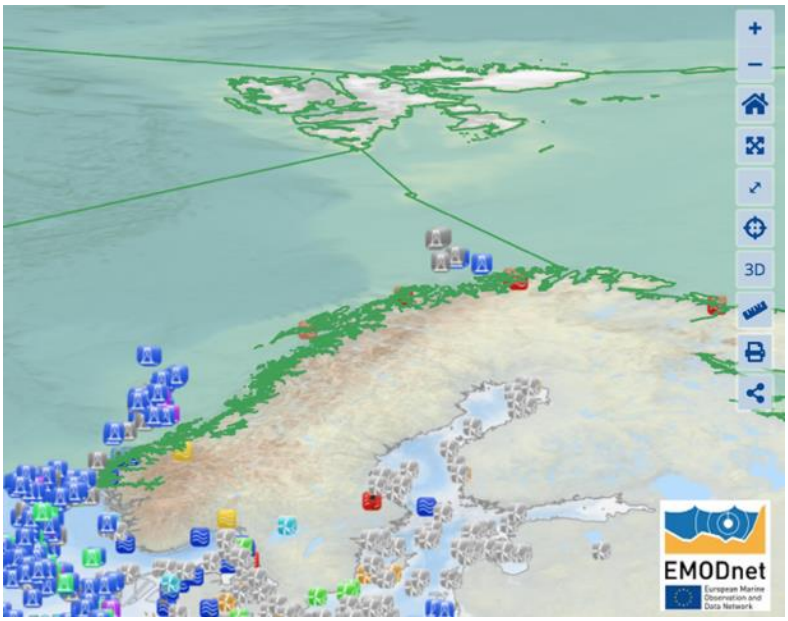

Figure 1. Screenshot from the EMODnet Map Viewer, showing the current and past oil and gas offshore activities around Norway.

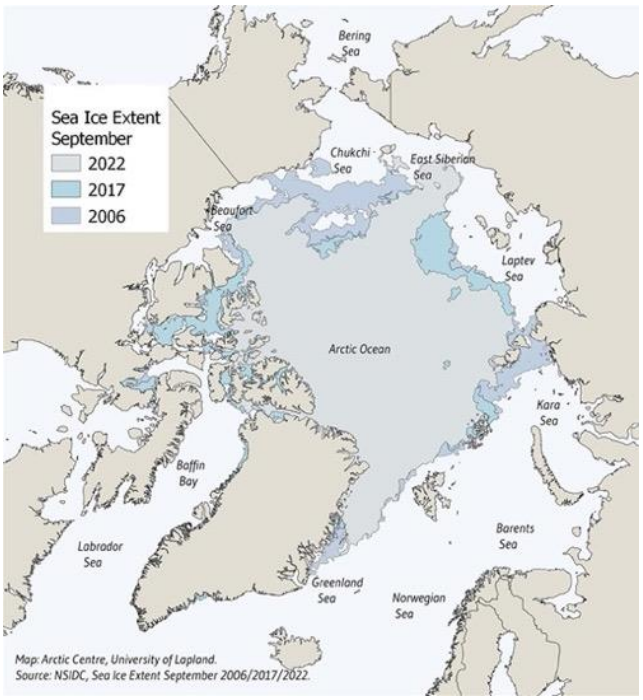

Figure 2. Evolution of the Arctic Ocean's minimum sea ice extent from 2006 to 2022. Source: The Arctic Center, University of Lapland.

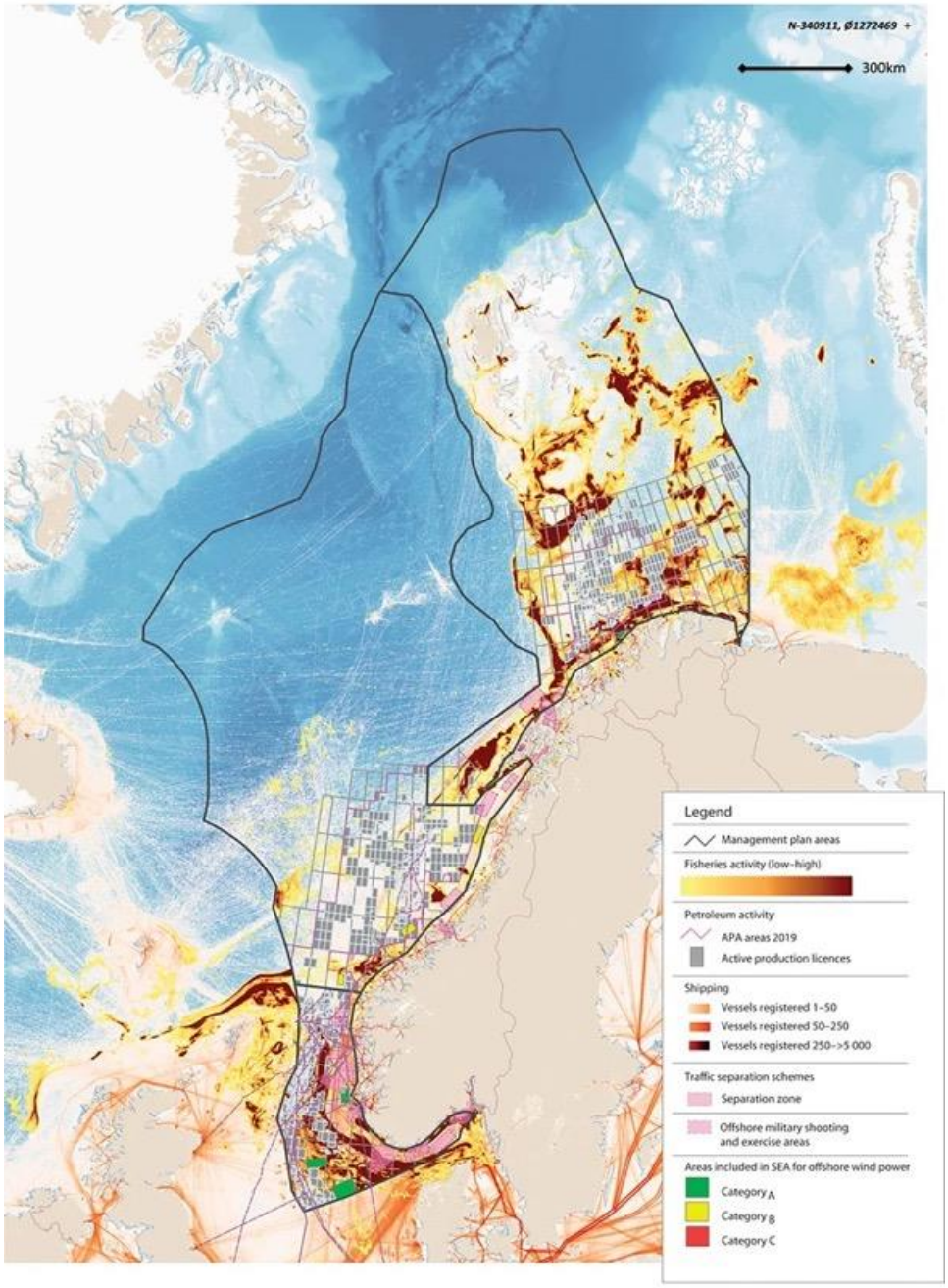

Figure 3. Overview of marine industrial activities over the Norwegian continental shelf and OSPAR management plan areas. From the Ministry of Climate and Environment, Meld. St. 20 (2019-2020). Source: Directorate of Fisheries, Norwegian Coastal Administration, Norwegian Environment Agency, Norwegian Water Resources and Energy Directorate, Petroleum Directorate/Marine spatial management tool. Base map for the marine spatial management tool: GEBCO and Norwegian Mapping Authority.

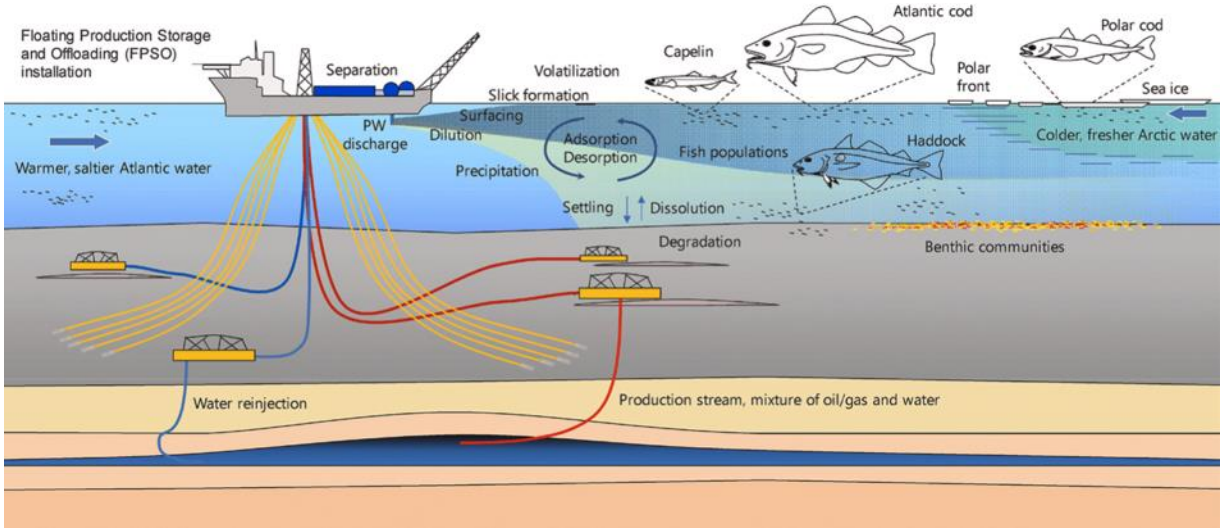

Figure 4. Illustration of a simplified Barents Sea system in which PW is discharged from offshore oil and gas platform, spreading with oceanic currents over downstream ecosystems. Source: Beyer et al. (2020).

Figure 5. Map of the regions under the OSPAR mandate. Source: OSPAR website.

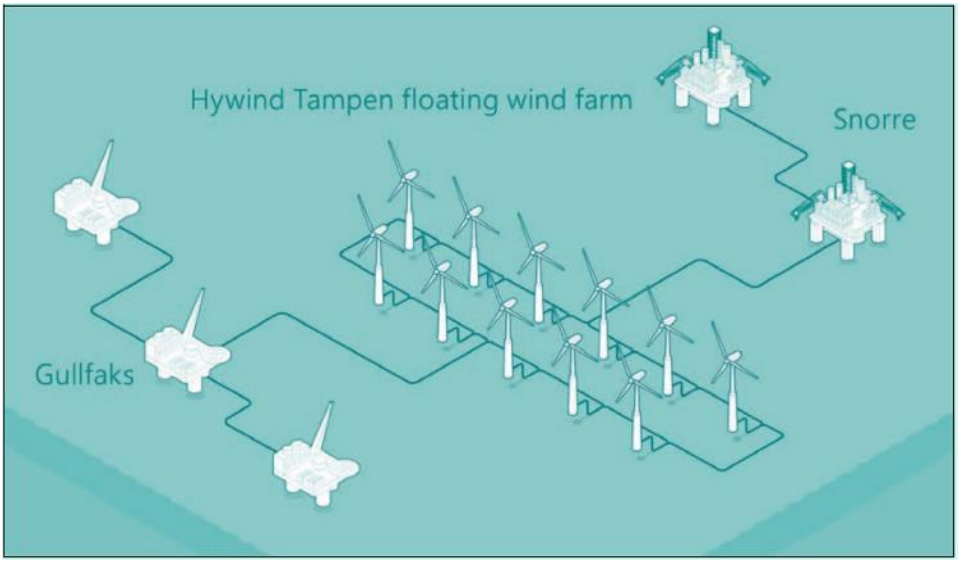

Figure 6. Diagram of the Hywind Tampen floating wind farm, located off the coast of Norway in the North Sea, inspiring Equinor projects in the Arctic. Source: Equinor's website.

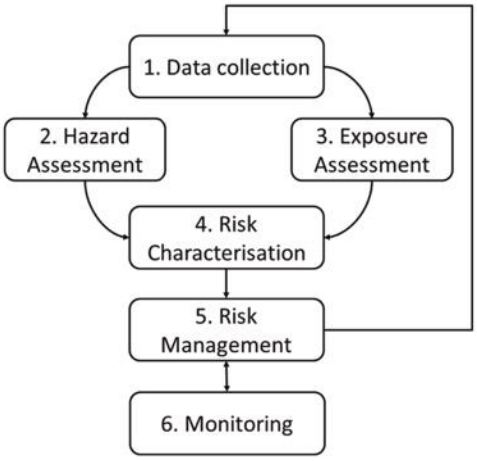

Figure 7. Structure of the risk-based approach assessment used for the management of all operational waste discharges in the offshore oil & gas industry. Source: Figure 3 of Beyer et al., (2020), p. 7.

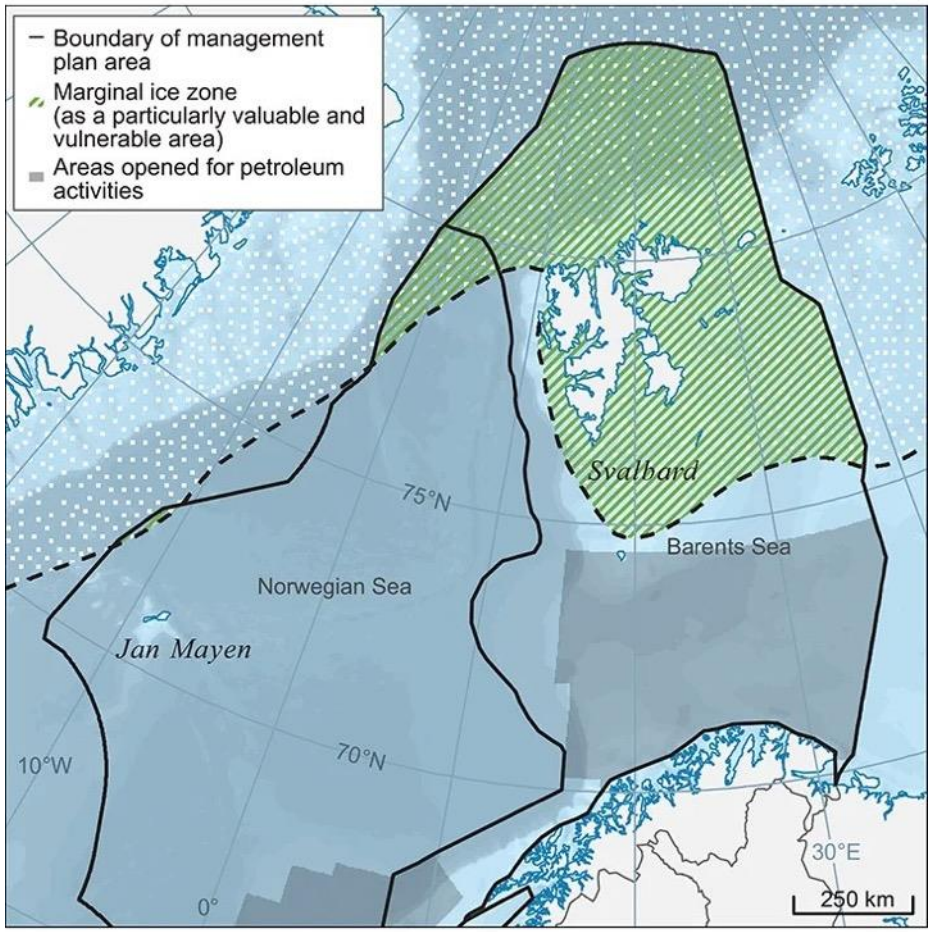

Figure 8. Updated delimitation of the marginal ice zone as a particularly valuable and vulnerable area based on ice data for the 30-year period 1985–2014. Source: Meld. St. 20 (2014–2015). Map from the Norwegian Polar Institute.

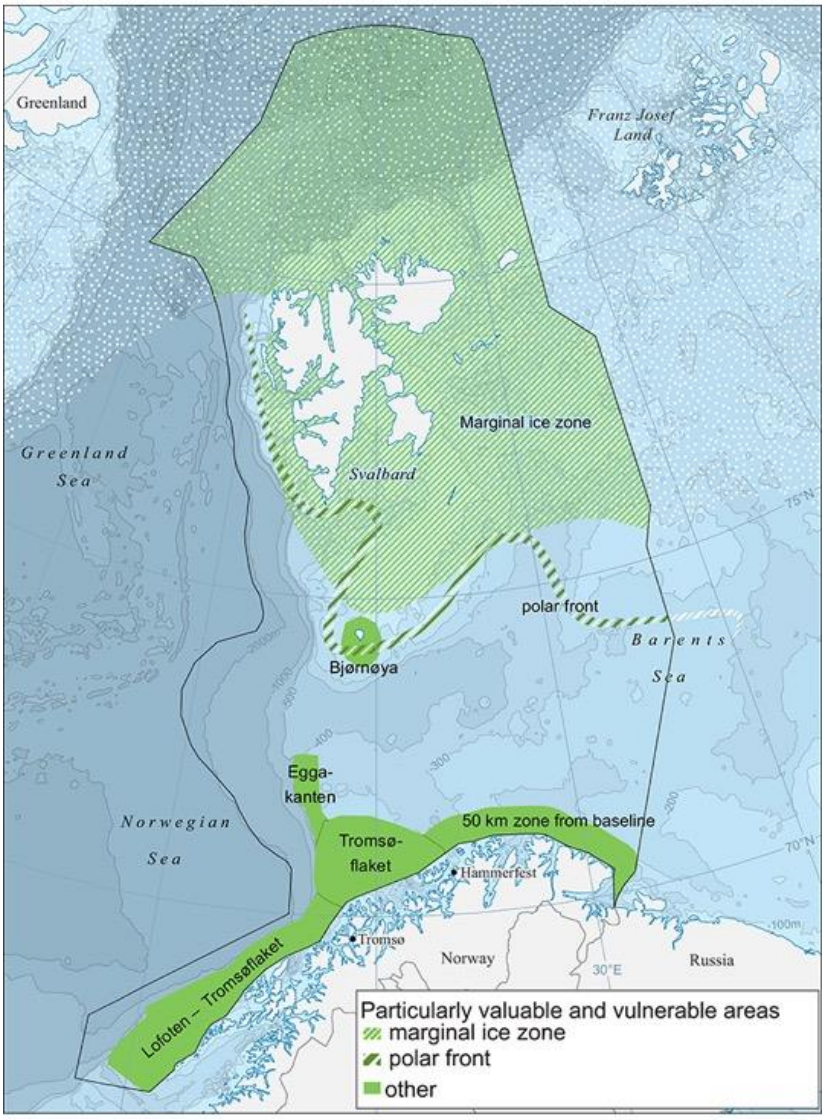

Figure 9. Particularly valuable and vulnerable areas in the Barents Sea–Lofoten management plan area. Source: Meld. St. 20 (2014–2015). Map from the Norwegian Polar Institute.

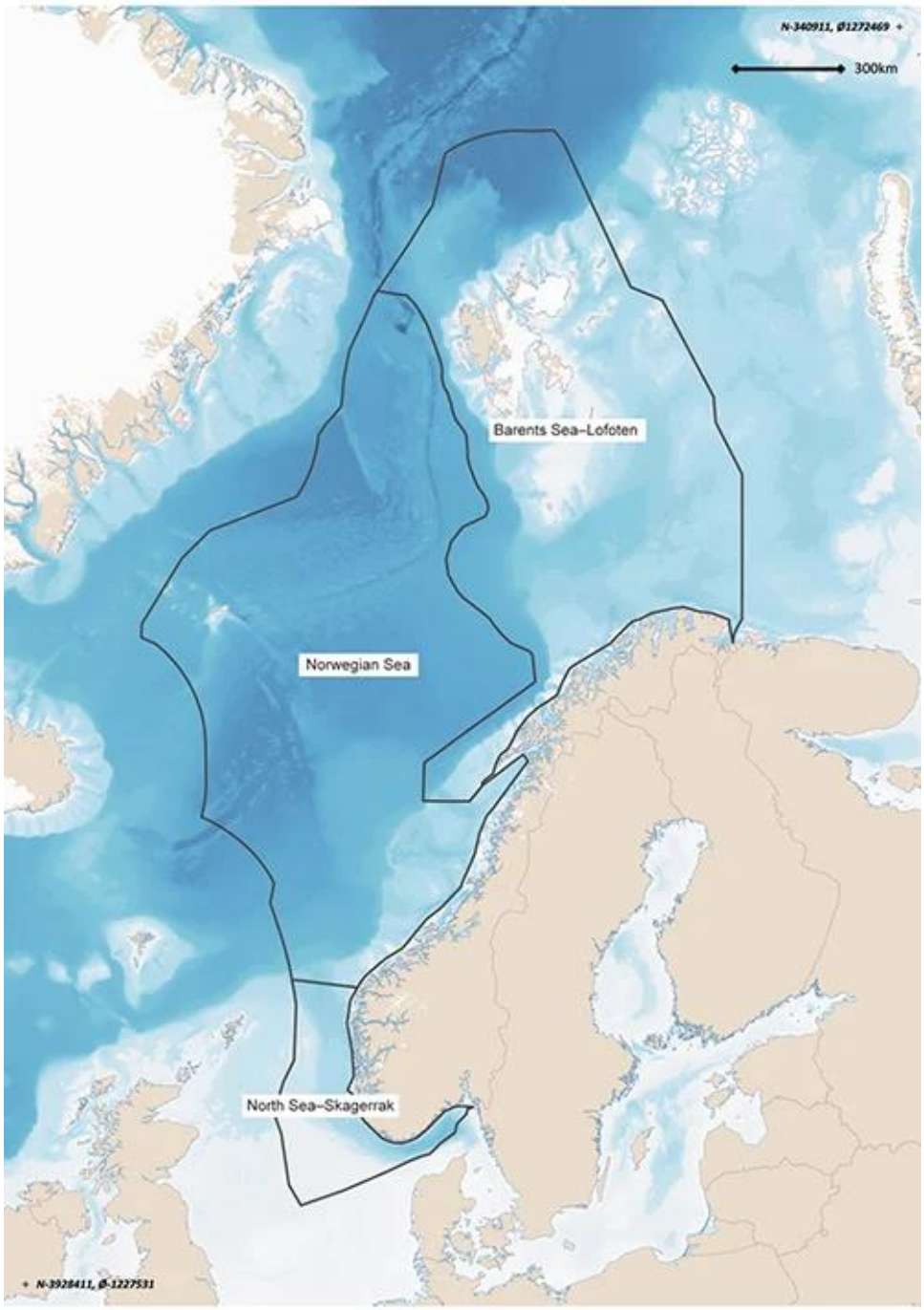

Figure 10. Map of the three management plan areas: the Barents-Lofoten area, the Norwegian Sea and the North Sea and Skagerrak. Source: Meld. St. 20 (2019–2020). Map from the Norwegian Environment Agency.

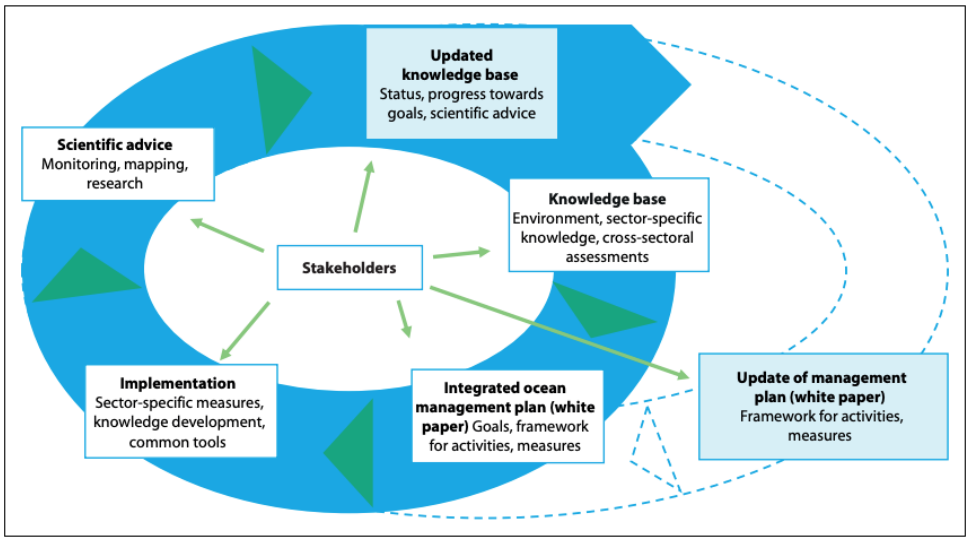

Figure 11. The ecosystem-based management structure. Source: Meld. St. 20 (2019–2020), the Norwegian Environment Agency.

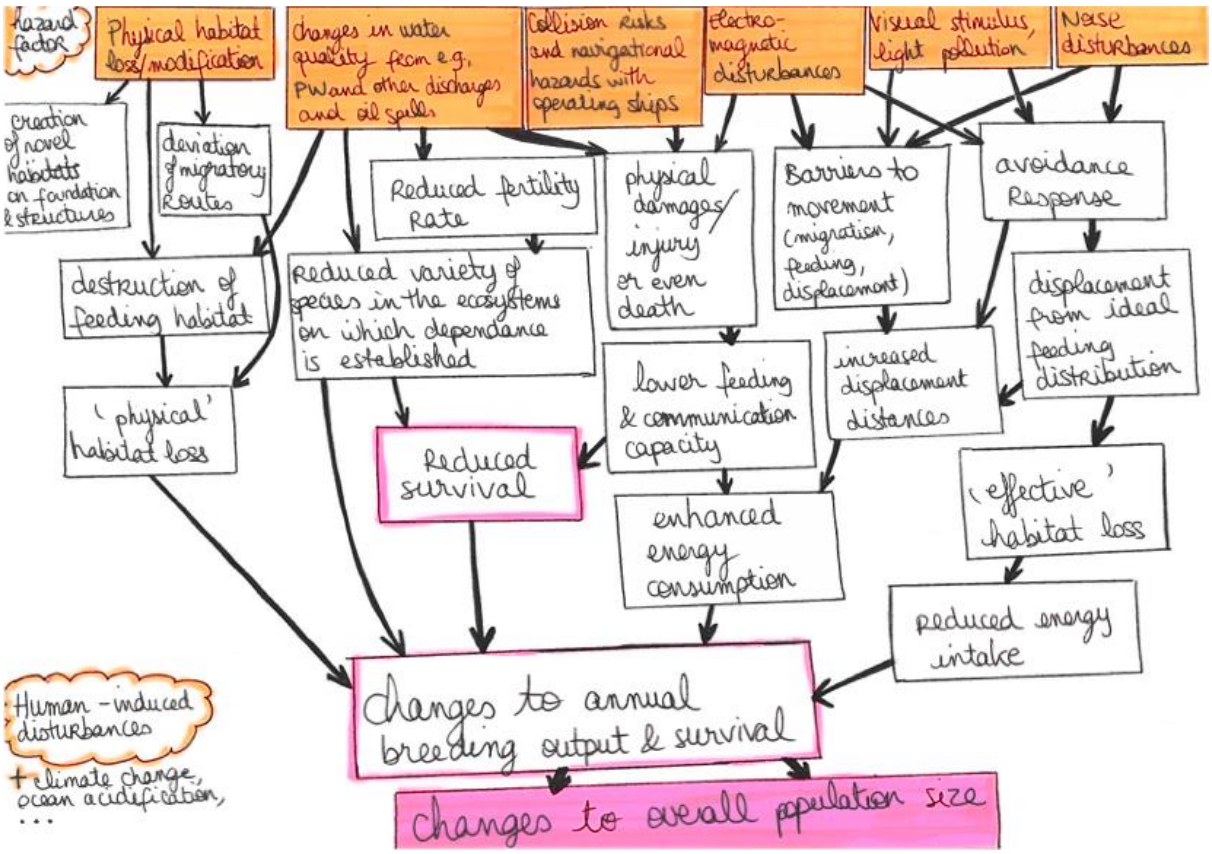

Figure 12. Mind map summarizing the main human-induced impacts from offshore energy production on Arctic marine biodiversity. Source: made by the author.

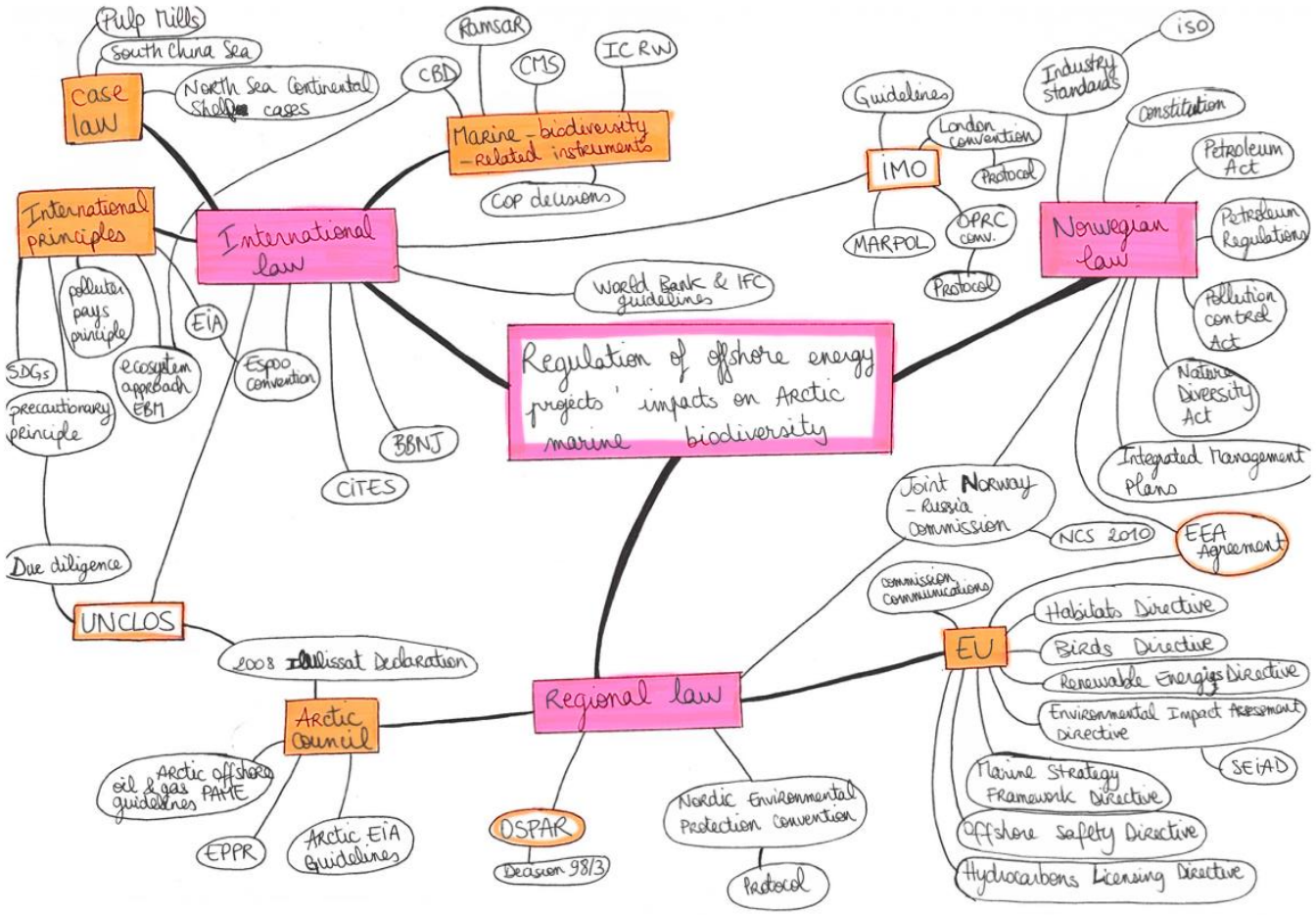

Figure 13. Mind map summarizing the applicable legal framework considered in this thesis. Source: made by the author.