

The “Earth system” as an actor in international law

“It is not down on any map; true places never are.” Herman Melville, *Moby-Dick*

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Introduction

International law has mapped the world in dimensions of territory, property, jurisdiction, ownership, and use of both sentient and non-sentient life, and the non-human world in general. However, with the now existential problem of global warming and general climate change, there is a need to add the extra dimensions of other aggregate states or spaces, including gases. In June 2017 *Science* published a paper by Andreassen et. al. with the title ‘Massive blow-out craters formed by hydrate-controlled methane expulsion from the Arctic seafloor’.¹ The research team found evidence of large craters embedded within methane-leaking subglacial sediments in the Barents Sea, Norway. The thinning of the ice sheet at the end of recent glacial cycles decreased the pressure on pockets of hydrates buried in the seafloor, resulting in explosive blowouts. This created giant craters and released large quantities of methane (CH₄) into the water above. The CH₄ from the hydrate reservoir concentrated in massive mounds before being abruptly released to form the craters. Andreassen et. al. propose that these processes were likely widespread across past glaciated petroleum zones and that they also provide an analog for the potential future destabilization of sub-glacial gas hydrate reservoirs beneath contemporary ice sheets. If CH₄ is allowed to leak into the air before being used, it rapidly absorbs the sun’s heat, warming the atmosphere² and contributing to the positive feedback loop of climate change in the Arctic, as well as the rest of the Earth System.

The release of CH₄ in the Arctic that was heretofore trapped under the now receding ice sheets, threatens to accelerate the pace of climate change. Space and time are becoming increasingly more relevant with the process of climate change: time to take measures to limit global warming to 1.5 °C is running out, and different spaces, such as the Arctic, are affected in the ways not seen before. This has been highlighted by the IPCC report published on 8 October 2018, which emphasized the need for urgent global action.³ Such action will also require the legal classification of ongoing autonomous changes to the climate that are by now independent of human action and a greater ecological reflexivity of the international legal regime.

The Arctic deglaciation also opens the way to the Arctic’s untapped natural resources. The Central Arctic Ocean beyond national jurisdiction is a global commons with many intersecting regional and sectoral interests, presenting complex governance challenges. The international community’s legal interest in such commons resources differs from traditionally defined sovereign legal interests, leading to a need for legal innovation.

New proposals for the protection of the Arctic environment indicate that in addition to the new extraterritorial ‘resource grabs’ and climate change, there is also an opportunity for the establishment of regulatory measures *ab initio* which would be more ecologically reflexive.⁴ For instance, the

¹ Andreassen et. al., ‘Massive blow-out craters formed by hydrate-controlled methane expulsion from the Arctic seafloor’, 356

Science 6341 (2017) 948.

² *Ibid.*

³ IPCC Special Report, *Global Warming of 1.5 °C - an IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* (2018).

⁴ See P.-M. Dupuy and J. E. Viñuales, *International Environmental Law* (2nd ed., 2018), 28-29 for a reference to the who ecosystem approach, highlighting ‘the need for a balanced approach to environmental protection because the environment is defined not only as the conditions surrounding humans (an ‘anthropocentric’ view) but also those surrounding any other organism (an ‘eco-centric’ view)’.

regulation of greenhouse gas emissions would need to be included in the attempts to mitigate the impact of climate change on the Arctic environment, as well as the rest of the Earth System. Among other things, new institutional architecture would need to facilitate cooperation, coordination, and capacity on a global scale.

This paper explores the theoretical and practical challenges of ecologically reflexive institutional design, through the lens of three different yet related processes caused by global warming: a.) The emissions from the autonomously active CH₄ craters; b.) Commercialization of the Central Arctic Ocean, especially deep-sea mining and the emerging dispute settlement framework; and c.) Ecologically reflexive and treaty-based regulation in the Arctic, which would be responsive to both, threats from global warming, as well as the new commercial interests in the global commons.⁵ The triad of these interconnected issues reveals the need to not only discuss the ‘protection’ of the environment, but to also recognize the Earth as a system in its entirety, as an actor, and therefore capable of autonomous reactions to climate change. This implies legal classification of the Earth System and the ongoing autonomous changes to the climate that are by now independent of human actions.

Importantly, the states and the extractive industries are currently contributing to the establishment of new extraterritorial regulation and politics of resource extraction. This is further facilitated by the existing international law applicable in the spaces beyond territorial jurisdiction and combined with sovereign state jurisdiction. International law developing in relation to climate change, the general international environmental law, special regimes affecting polar regions, as well as domestic laws, will need to address the multidimensional processes of continuous human activities, autonomous responses from the Earth system, such as the CH₄ blowouts, and how all this affects the biological and physical environments.

The methodology of this study involves a non-exhaustive mapping of the co-existing legal regimes in the Arctic, as well as the needs for precautionary and future regulation of safe and sustainable use of the Arctic high seas including, exploration, cooperation, and commercial activities. At the moment, the international environmental law, climate change governance, regional governance, corporate self-regulation, national laws, and so on, constitute a deeply fragmented legal regime governing the Arctic.⁶ This pluralism also demonstrates a hierarchy of norms, as international institutions such as the International Seabed Authority engage in a balancing act between commercial interests and environmental claims. Simultaneously, climate change scientists are pointing to the urgency for climate change mitigation policies. If the Arctic region is recognized not only as a space of strategic and commercial interest, but as the Global Arctic⁷ and part of the Earth System, new laws could adapt to the fact that the physical and biological changes taking place in the Arctic are global and that the future of the Arctic depends on more than just the Arctic actors.

The paper is divided into three sections. The first section elaborates on the current climate change governance and the market-oriented system of greenhouse gas emissions. It shows a complex relationship between climate change induced/and autonomous release of CH₄ into the Arctic waters and the atmosphere, and how international law currently responds to such phenomena.

⁵ Feichtner, ‘Mining for Humanity in the Deep Sea and Outer Space. The Role of Small States in the Extraterritorial Expansion of Extraction’ *Leiden Journal of International Law (LJIL)* (2019) forthcoming.

⁶ See generally, M. A. Young (ed.), *Regime Interaction in International Law: Facing Fragmentation* (2012).

⁷ See generally, L. Heininen (ed). *Future Security of the Global Arctic State Policy, Economic Security and Climate* (2016).

Building on this particular instance of climate change consequences, the second section proposes the recognition of the Earth System as an autonomous actor of international law, one that is neither an extension of human actors' wills, nor subject to easily predictable laws of nature, but of the linked ecological and social systems.⁸ The term Earth System is borrowed from the field of Earth System Science (ESS) studies. It refers to the Earth's interacting physical, chemical, and biological processes. ESS is the application of systems science⁹ to Earth sciences, to the study of the earth as a self-enclosed system. More simply, it involves viewing the Earth's environment in a holistic fashion, including the planet's oceans, lands, and atmosphere as an integrated system. Human social, legal, political, and economic systems are embedded within the Earth system. The definition of global warming or climate change is separate from the Earth's climate, which is evaluated as the average of all the world's regional climates. Climate change, therefore, is a change in the typical or average weather of a region, and is also a change in Earth's overall climate.

With the consideration of the Earth System as the actor in international law, the theoretical aspect of this argument engages with the legal pluralist approach of selected literature on regime fragmentation of the past two decades,¹⁰ which recognizes the multiplicity of specialized and relatively autonomous legal sub-systems such as the environmental law, or commercial law, each with its own internal ethos and norm-making, as well as the plural interests of individual states. In so doing, this paper emphasizes the importance of how and if the adequate timing of legal measures, rather than increased fragmentation, or a return to formalization, can address the discord between climate change and the current international law. The challenge of global warming requires a new strategy and adaptability of international law, as well as a coordinated effort to understand the Earth System as an actor. The recognition of the Earth System as a legal and natural actor, and therefore a social-ecological system, would be part of the potential shift towards a more ecologically reflexive framework of international law.

The third section will map specific regulatory challenges of both hard and soft law for the changing (or rather, thawing) Arctic Central Ocean. While there are some efforts to regulate public and private actors with interests in the Arctic Ocean, such as the international treaties, which have been created under the auspices of the Arctic Council, this development is still at an early stage and not all international legal tools have been used yet. One case in point is the lack of a regional seas agreement for the Arctic Ocean, although the work of the Arctic Council is fulfilling many of the functions a regional seas agreement might provide.

At this stage in the development of Arctic Law as an academic discipline and a set of practical legal tools, a number of questions present themselves, for example: Are the current international legal mechanisms sufficiently equipped to respond to the diverse and dramatic changes caused by climate change? How will this affect the Arctic States and their claims to maritime and coastal boundaries? The international legal response to potential new resources in the Arctic in the areas beyond national

⁸ Ebbesson, 'The Rule of Law in Governance of Complex Socio-Ecological Changes' 20 *Global Environmental Change (Glob Env Chang)* (2010) 414.

⁹ Systems science is the field of science surrounding systems theory, cybernetics, and the science of complex systems.

¹⁰ See, Koskenniemi, 'The Fate of Public International Law: Between Technique and Politics', 70 *Modern Law Review (MLR)* (2008) 70, at 27. M. A. Young describes 'regimes' as 'sets of norms, decision-making procedures and organisations coalescing around functional issue-areas and dominated by particular modes of behaviour, assumptions and biases.' M. A. Young, 'Introduction: The Productive Friction Between Regimes,' in M. A. Young (ed.), *supra* note 6, at 11.

jurisdiction (ABNJs) has been mostly connected to individual state interests: potential ‘grabs in the Arctic’, a competition for natural resources and questions of sovereignty and sovereign rights. The United Nations Convention on the Law of the Sea (UNCLOS), or, the Law of the Sea Convention or the Law of the Sea treaty of 1982 grants the Arctic state on whose continental shelf they are located the exclusive rights to exploit any resources potentially existing there. An extended continental shelf beyond 200 nm could mean access to profitable resources in the near future. These resources would not be subject to the rules applicable to the deep-sea bed, which is common heritage of mankind (CHM, or more appropriately humankind), and which is administered by the International Seabed Authority (ISA). At this time, the extent of continental shelves in the Arctic Ocean remains an open question.

This section it is not an exhaustive analysis of all existing regional and global instruments. Mainly, it explores the challenge of institutional design through the lens of deep-sea mining and dispute settlement under the ISA Legal and Technical Commission in contrast to calls for the of an International Legally Binding Instrument (ILBI) for conservation and sustainable use of marine biological diversity of ABNJs. In December 2017, the UN General Assembly adopted a Resolution on constructing an ‘International legally binding instrument 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’.¹¹ In this context, sovereign states can impact significantly the evolution of international law in its capacity to build ecologically sensitive instruments through interpretation and state practice, as they build on the international legal order through national legislation, and act as sponsoring states for companies wishing to mine the seabed.

To reiterate, the recognition of the Earth System as an independent actor would help in two ways. First, it could lead to better accounting of existing resources as not just an exploitable resource and property, but as materials already used by a complex biogeochemical system. The taking of what today is *res nullius* or *res communis* could then be better qualified as the despoiling of an actor/entity already reliant on those resources. Secondly, the global commons (the atmosphere, the high seas and deep seabed, the Arctic and Antarctic areas) have by definition no responsible owner or steward, and are therefore open to degradation more than sovereign territories. Recognizing the Earth System as an internationally recognized legal subject may increase responsibility for the global commons and strengthen the development of an ILBI.

1. The Earth System and CH₄ blowouts in International Law

The term -‘actor’ – in this paper refers to the already existing agency of the entire Earth System (i.e. physiological, meteorological, etc. changes),¹² and the need for the international legal adaptability to new contingencies. Overall, the examples demonstrated here are used to assess the dynamics of international regulatory change and inquires not only how climate change should be regulated but also *when* and *where*. However, the recognition as of an ‘actor’ in law is a climax of a formalisation processes, and not always timely. The path to formalisation of the Earth System under international law, could follow, for instance, proposals for formal actorhood of ‘nature’ or specific ecosystems in

¹¹ G.A. Res. 72/249 (Dec. 24, 2017). See also Payne, ‘Introduction to the Symposium on Governing High Seas Biodiversity’, 112 *American Journal of International Law (ASIL-unbound)* (2018) at <https://www.cambridge.org/core/journals/american-journal-of-international-law/article/introduction-to-the-symposium-on-governing-high-seas-biodiversity/32BD885B904226D5F43155BF77F3F5C0>

¹² Dupuy and Viñuales, *supra* note 4, at 28-29.

domestic laws.¹³ More concretely this process would need to recognize the driving force of the Earth System including the climate change induced physical changes within it, such as the CH₄ blowouts. Can, then, a greenhouse gas be an actor in international law?

CH₄ is the major component of natural gas, and anthropogenically released into the atmosphere from a variety of sources and activities including, coal mining, leaking natural gas pipelines, ruminant livestock such as cows, rice paddies, and solid waste facilities. CH₄ emissions in industry could be the result of leaks from compressors, pumps and pipelines or vented from oil and gas wells and petroleum storage tanks.¹⁴ Impacts of non-CO₂ climate forcers on temperature outcomes include the important role of methane emissions.¹⁵ CH₄ is considered a greenhouse gas, like CO₂ and both types of emissions need to be addressed in effective reduction of the impacts of climate change. However, like CO₂, complex metabolic heat production and CH₄ emissions need to be translated into the language of law. One tonne of carbon dioxide equivalent (1CO₂e) is already a ‘standardisable, exchangeable and commodifiable and ultimately tradable’ under international law.¹⁶ Annex A to the Kyoto Protocol lists the six different greenhouse gases covered by the Protocol: Carbon dioxide (CO₂); Methane (CH₄); Nitrous oxide (N₂O); Hydrofluorocarbons (HFCs); Perfluorocarbons (PFCs); and Sulphur hexafluoride (SF₆).¹⁷ Parties are required to report on their emissions of each of these gasses individually but also to aggregate emissions in terms of CO₂e. Different greenhouse gasses all have their own properties, characteristics and lifetimes or period of potency. In accordance with the Kyoto protocol they are represented in standardised terms of CO₂e.¹⁸ The global impact of greenhouse gases requires a global

¹³ See D. Shelton, ‘Nature as a legal person’, *VertigO. La revue électronique en sciences de l’environnement* (2015). See also, Stone, ‘Should Trees Have Standing?—Towards Legal Rights for Natural Objects’, *South California Law Review* (*South. Calif. Law Rev.*) (1972) 45, 450–501. There have been regional and domestic attempts to recognize nature as an actor, and in particular in response to some indigenous peoples’ rights claims. These have also been primarily tied to the recognition of human rights, or the rights of future generations. In 2017, the New Zealand Parliament finalized the *Te Awa Tupua (Whanganui River Claims Settlement) Act*, granting the Whanganui River legal status as an ecosystem with the river’s rights to be enforced through judicial action by appointed guardians who will ‘provide the human face of Te Awa Tupua’ and ‘owe [their] responsibilities to Te Awa Tupua, not the appointers.’ (Subpart 3, 18:3). The river becomes a rights-holder recognised for its inherent value. Available at: <http://www.legislation.govt.nz/act/public/2017/0007/latest/whole.html>.

On 15 November 2017, the IACtHR issued Advisory Opinion OC-23/17, establishing that ‘in order to protect the vital ecosystem for the global future, just as the Constitutional Court declared the Atrato river, the Colombian Amazon region is recognised as an entity, [a] ‘subject of rights’’ (para. 14). The Constitutional Court, in judgment T-622 of 2016, para. 9.27, had referred to the necessity to protect the environment ‘because it regards a living entity made up of other multiple life forms and cultural representations, [that] are subjects of individualizable rights.’ It mentions the emergence of a new socio-legal understanding in which nature and its environment have to be taken seriously, with complete rights, as subjects of laws (para. 9.31). These domestic and regional developments can potentially expand the possibility for future environmental legal actions to be brought.

¹⁴ T O’Connor, *Methane: Using New and More Data to Manage Rising Risk in a Carbon Constrained World* (2016).

¹⁵ IPCC 2018, *supra* note 3, Chapter 2.

¹⁶ In her recent study, Julia Dehm provides an analysis of how the imagining of 1tCO₂e as an ‘object’ of international law has allowed for more complex substitutions and equivalences to be made, in Dehm, ‘One Tonne of Carbon Dioxide Equivalent (1tCO₂e)’, in J. Hohmann and D. Joyce (eds), *International Law’s Objects* (forthcoming, 2019).

¹⁷ *Kyoto Protocol to the United Nations Framework Convention on Climate Change* (opened for signature 11 December 1997, entered into force 16 February 2005) 37 ILM 22.

¹⁸ As Dehm argues: ‘The legal discussions on climate change then determine whether we consider, for example, one tonne of methane leaked from a fracking site to be equivalent to 28tCO₂e or 86tCO₂e for carbon accounting purposes’, *supra* note 16. at 9.

response from a global regulatory framework, which would not only evaluate CH₄ emissions as objects but as actors of the Earth System.

The 1997 Kyoto Protocol provided for three different ‘flexibility’ mechanisms to assist parties in achieving their emission reductions commitments in the most *cost-effective* manner. The example of the 1tCO₂e involves numerous substitutions to make the emissions commensurable though different types of mitigation provisions. The Paris Agreement was adopted by the 195 parties to the UNFCCC on 12 December 2015 and has been ratified by 174 states (January 2018). It entered into force on 4 November 2016. Its purpose is: (1) to limit the global average temperature increase to ‘well below’ 2 degrees Celsius above pre-industrial levels and ‘to pursue efforts’ to achieve 1.5 degrees Celsius; (2) to enhance the ability to adapt to climate change, to increase the resilience, and to develop mechanisms to reduce greenhouse gas emissions; (3) to make financial flows consistent with a low-emissions pathway and climate-resilient development. Unlike the Kyoto Protocol, the core obligations under the Paris Agreement apply universally to all UNFCCC parties. It requires all parties to prepare and communicate nationally determined contributions (NDCs), which will have to be reviewed and updated every five years, with each new NDC required to be stronger than the previous one.

However, half the Parties to the Paris Agreement have specified that they will consider using carbon markets to achieve their mitigation commitments.¹⁹ Furthermore, there is no ‘guardianship’ over greenhouse emissions. Some of the biggest companies in the oil and gas industry, ExxonMobil, BP, Eni, Repsol, Shell, Statoil, Total and Wintershall, have launched voluntary initiatives to reduce CH₄ emissions from natural gas.²⁰ While these initiatives correspond to the final Paris Agreement’s aims, they are focused on voluntary activities of states and corporations and not on positive obligations. Translation of this call to action into law is necessary insofar as we still understand the international community as governed by international law.

The IPCC usage of ‘climate change’ terminology refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the UNFCCC, where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods. However, the changes in physical and biological systems and surface temperature are happening independently of law.

Hence, a key part of the international climate regime has been the establishment of complex international carbon markets as a dominant climate mitigation strategy. However, issues associated with climate change permeate national boundaries: emissions or actions in one state will have adverse consequences in another, and in areas over which states have no jurisdiction or sovereignty. How can a responsibility be allocated in situations such as the CH₄ emissions both directly human induced, and the blow out craters, which are the consequence of climate change?

¹⁹ *Paris Agreement on Climate Change* (opened for signature on 22 April 2016, entered into force 4 November 2016).

²⁰ Shakova, et.al. ‘Extensive Methane Venting to the Atmosphere from Sediments of the East Siberian Arctic Shelf’, (2010) *Science* 327, 1246, 1248.

2. The Earth System as an Actor in International Law

The term ‘Earth System’ is already used in climate change reporting.²¹ The inclusion of the Earth System as an actor in international law would help deal with theoretical questions prompted by current processes affecting the globe in a manner not previously considered. Consensus building is a difficult process at the international level, and asymmetry of interests is constantly re-negotiated. The law is supposed to act as an enforcement mechanism for policy, and so far, the policy towards the Earth System, as demonstrated in the greenhouse emissions regulation, is not clear in international law regarding its prioritization. Finally, states continue to bear primary responsibility for conduct, which has global consequences.

An inclusion and/or recognition of the Earth System, as a legal actor and not only as property, a resource, or a protectorate, would allow for a more coordinated international legal response to the current consequences of global warming. In a much-discussed recent paper, a team of noted climate scientists led by Will Steffen, Johan Rockström, and Katherine Richardson argue that unless drastic transformations were to occur, even increases of 1.5 or 2°C could lock in the ‘Hothouse’ scenario, the result of a “cascade of feedbacks” in ecological systems.²² Following Steffen et.al. it is here argued that the legal personification of the Earth System requires a re-organization of the understanding of the human and nature, as well as its representation through the law. Legal scholarship is opening up to the works that allocate human responsibility for the contemporary condition in the Anthropocene, or Capitalocene, or in some other concept, such as Donna Haraway’s ‘Chthulucene’.²³ The descriptive and analytic conclusion is that there is no longer an ‘outside’ or an ‘away’, but that the Earth System is affected as a whole. In this respect, the paper also builds on the lengthy transdisciplinary literature addressing the ‘bifurcation of nature’, or the relation among *inter alia* physics, metaphysics science, arts, and law.²⁴

Steffen et. al. specifically point to the current normative asymmetries of the dominant socioeconomic system ‘based on high-carbon economic growth and exploitative resource use. Attempts to modify this system have met with some success locally but little success globally in reducing greenhouse gas emissions or building more effective stewardship of the biosphere. Incremental linear

²¹ See generally, IPCC 2018 *supra* note 3.

²² Steffen, et. al., ‘Trajectories of the Earth System in the Anthropocene’. 115 *PNAS* 33 (2018) 8252-8259.

²³ See, Altvater (ed.), *Anthropocene or Capitalocene?: Nature, History, and the Crisis of Capitalism* (2016). Davis, ‘Inventing the Present: Historical Roots of the Anthropocene’ 30 *Earth Sciences History* 1 (2011) 63; D. Harraway, *Staying with the Trouble: Making Kin in the Chthulucene* (2016).

²⁴ A close engagement with this scholarship is beyond the scope of this paper. For instance, A.N. Whitehead, *The Concept of Nature* (1920) argues, ‘the mind is cut out altogether’ when we attempt to determine, ontologically, what belongs to the content of nature and what belongs only to the content of our minds. Rather, ‘For us the red glow of the sunset should be as much a part of nature as are the molecules and electric waves by which men of science would explain the phenomenon’, at 36, 29. See also, Isabel Stengers, *Thinking with Whitehead A Free and Wild Creation of Concepts*, trans. by Michael Chase (2013). In his foreword to Stengers’ book Bruno Latour writes: ‘if nature really is bifurcated, no living organism would be possible, since being an organism means being the sort of thing whose primary and secondary qualities—if they did exist—are endlessly blurred. Since we are organisms surrounded by many other organisms, nature has not bifurcated’, at xiii. He has also spoken about how contemporary philosophy should re-interpret the verdict of the 1922 exchange between the metaphysician Henri Bergson and the physicist Albert Einstein. He finds a re-interpretation of this debate important especially in light of the new *ecological* constraints upon 21st century thinking. At: <https://www.youtube.com/watch?v=EHswlIzk61k>

changes to the present socioeconomic system are not enough to stabilize the Earth System'.²⁵ In other words, fragmented approaches to the problem are not a credible solution. This is evidenced, for instance, in the market approach to greenhouse gas mitigation. A normative reorganization towards a more ecologically reflexive approach to regulation requires institutional and legal innovation, which would also respond in a timely manner.

As Will Steffen et al. argued in 2006, 'the environment at the scale of the Earth as a whole - the passing of the seasons, the vagaries of weather and climate, the ebbing and flowing of river systems and glaciers, the rich diversity of life in all its forms - has been something within which people have had to operate, subject only to the great forces of nature and the occasional perturbations of extraterrestrial origin.'²⁶ Many interacting systems make up the Earth, and many of them are dynamic. Human activities have the capacity to affect the Earth at a global scale in complex, interactive and apparently accelerating ways; and they thereby threaten the very processes and components, both biotic and abiotic, upon which the human species depends.²⁷

The Earth System depends on, and is controlled by life itself. Life affects the carbon, nitrogen, water, oxygen and other cycles and processes. The system consists of the land, oceans, atmosphere, and the poles. In the context of global change, the Earth System has come to mean the set of interacting physical, chemical, and biological global-scale cycles (often called biogeochemical cycles) and energy fluxes which provide the conditions necessary for life on the planet. Biological processes interact strongly with physical and chemical processes to create the planetary environment.²⁸ The force and feedbacks within the System are at least as important to the functioning of the System, as are the external drivers. In particular, the living organisms are active participants, not simply passive respondents. Hence, human beings, their societies, and their activities are an integral component of the Earth System, not external forces perturbing an otherwise natural system.²⁹ There are many types of natural variability and instabilities within the Earth System as well as anthropogenically driven changes, including global warming.

Steffen et. al. explore the risk that self-reinforcing feedbacks could push the Earth System toward a planetary threshold beyond stabilization of the climate at intermediate temperature rises and cause continued warming even if human emissions are reduced. Recent IPCC report affirms that collective human action is required to steer the Earth System away from this path, which "entails stewardship of the entire Earth System—biosphere, climate, and societies—and could include decarbonization of the global economy, enhancement of biosphere carbon sinks, behavioral changes, technological innovations, new governance arrangements, and transformed social values."³⁰ Their analysis argues that human societies and our activities need to be *recast* as an integral, interacting component of a complex, adaptive Earth System.

²⁵ Steffen et.al *supra* note 22, at 6.

²⁶ W. Steffen et al. (eds) *Global Change and the Earth System: A Planet Under Pressure* (2006) Preface.

²⁷ *Ibid.* at 1.

²⁸ *Ibid.*

²⁹ *Ibid.*

³⁰ *Ibid.*

One element of the appropriate legal response to climate change is the recognition and a *recasting*, to follow Steffen et. al., of human responsibility as being part of the Earth System. Human activities anywhere on Earth may affect the Earth's system and the resulting changes in that system may affect humans everywhere on Earth. Underlying global change are human-driven alterations of i) the biological fabric of the Earth; ii) the stocks and flows of major elements in the planetary machinery such as nitrogen, carbon, phosphorus, and silicon; and iii) the energy balance at the Earth's surface.³¹ Inserting this responsibility into our legal systems, properly distributed among state and non state actors such as corporations and individuals, as well as international organizations, is a challenging process and in part, this is due to the extent of legal fragmentation at international, transnational, and domestic levels. Asymmetries among regimes stem, in part, from what has been identified as the primacy of *homo oeconomicus*, who is 'endowed with criteria of agency and rationality which are different from the *homo juridicus*, the *homo politicus*, and the *homo sociologicus*', or *homo ecologicus*.³² *Homo oeconomicus* has been recognized in law as the rational actor of communicative fiction.³³ This is why global climate change governance still speaks in the language of markets and tradability. And as will be discussed below, the new deep-sea mining and dispute settlement frames environmental responsibility through this rationality. However, since human activities co-determine how the Earth system (re) acts, this understanding needs to be reflected in the recognition of new *homo ecologicus* rationality in relevant law. There is uncertainty and debate about how this can be done—technically, ethically, equitably, or economically—and there is no doubt that the normative, policy, and institutional aspects are highly challenging.

A. Regime Fragmentation and Possibilities for Ecological Reflexivity

A type of recasting proposed by Steffen et. al. requires a transformation not only in the international regime governing the environment and climate change, but also in other areas of law. For instance instead of market-based language of tradability of greenhouse gases, the law would treat, identify, and define them as actors independent of human-created formalized systems such as the law, or economics. In evaluating diverse norm-producing sites and interactions among them, some scholarship on the Arctic environmental assessment and protection, as well as broader international environmental law, has emphasized the role of regime collision in consideration for the development of new environmental protection regimes.³⁴

The fragmentary nature of regulation has been theorized by the legal pluralist analysis, which recognized that global law emerges from and through regime collision. Each regime seeks to maximise its own self-rationality in relation to other regimes. Its internal norms and institutions have highly specialized functions, and specific risks associated with those functions (e.g. environmental impact of deep-sea mining) are 'absorbed' in ways that may be incompatible with the risk absorption strategy of

³¹ *Ibid.*

³² Teubner, 'Rights of Non-Humans? Electronic Agents and Animals as New Actors in Politics and Law', 33 *Journal of Law and Society* (Dec., 2006), 514

³³ *Ibid.*

³⁴ Young and Friedman, 'Biodiversity Beyond National Jurisdiction: Regimes and Their Interaction' 112 *American Journal of International Law* (ASIL-unbound) (2018), available at <https://www.cambridge.org/core/journals/american-journal-of-international-law/article/biodiversity-beyond-national-jurisdiction-regimes-and-their-interaction/ADCEF50CAD5F77329F0B50B569EC8560>

other functional systems (e.g. climate change governance).³⁵ This approach reconstructs global law through the logic of systems theory.³⁶ The approach does not account for the asymmetries among the norm-producing regimes and why, for instance, the risks related to environmental impact are not as development in market-oriented strategies. Overlapping jurisdictions, regime interaction,³⁷ inconsistent doctrinal interpretations, transnationalism,³⁸ and competing worldviews, characterize the contemporary legal terrain. Such a conceptualization of this multiplicity and polycentrality of norm-production sites has been questioned regarding the nature of the full effects of political and economic power wielded by sovereignty.³⁹ And particularly how are such approaches helpful in response to the global environmental problems, new technologies, and new emergencies?

If we focus primarily the inner function of one of these systems, such as the law, then we have what Martti Koskenniemi describes as the ‘strategic formalism’.⁴⁰ As he argues, ‘To present the world as fragmented, chaotic, senseless, is often a prologue for a hierarchy in which the speaker’s perspective is imposed on the world. Unity is a hegemonic project. It seeks the predominance of my perspective, my institution.’⁴¹ And elsewhere, ‘regime interaction is part of a managerial vocabulary that emphasizes the technical nature of social problems, and promoting efficiency as the overriding value of the relevant complexes of norms and institutions.’⁴² For Koskenniemi, the very formality of legal norms and the judicial and quasi-judicial institutions could provide platform for transformative politics under current global conditions, provided such strategic legal interventionism is aware of its own contingency and that the practitioners have progressive intentions. However, the ‘functional’ aspect of self-regulating structures as ‘trade law’, or ‘environmental law’, does not imply that anything in this process is deterministic, normative, or teleological; neither does it include an assurance for preservation, or an assurance of progressive strategic formalism.⁴³

³⁵ Hoffman, ‘Teaching General Public International Law’, in J. D’Aspremont and J. Kammerhofer (eds.), *International Legal Positivism in a Post-Modern World* (2014), at 349

³⁶ N. Luhmann, *Law as a Social System* (2004).

³⁷ M. A. Young describes ‘regimes’ as ‘sets of norms, decision-making procedures and organisations coalescing around functional issue-areas and dominated by particular modes of behaviour, assumptions and biases.’, in ‘Introduction: The Productive Friction Between Regimes,’ in M. Young *supra* note 10, at 11.

³⁸ See, for example, Zumbansen, ‘Defining the Space of Transnational Law: Legal Theory, Global Governance and Legal Pluralism’, 21 *Transnational Law and Contemporary Problems (Transnat’l L. & Contemp. Probs)* (2012); ‘The Rule of Law, Legal Pluralism, and Challenges to a Western-Centric View: Some Very Preliminary Observations’ (November 14, 2016), King’s College London Law School Research Paper No. 2017-05. Teubner, ‘Constitutionalising Polycontextuality’, *Social and Legal Studies* 19, 2010.

³⁹ P. Paiement, *Transnational Sustainability Laws* (2017) at 213.

⁴⁰ Koskenniemi, ‘The Politics of International Law – 20 Years Later’ 29 *European Journal of International Law (EJIL)* (2009) 7–19; Scobbie, ‘On the Road to Avila? A Response to Koskenniemi’ *EJIL: Talk!*, 20 May 2009, available at www.ejiltalk.org/on-the-road-to-avila-a-response-to-koskenniemi/.

⁴¹ M Koskenniemi, ‘Global Legal Pluralism: Multiple Regimes and Multiple Modes of Thought’, Harvard, 5 March, 2005. Certainly, the debate on legal pluralism has been quite extensive in the past two decades. For a less critical approach see D. Kennedy, ‘One, Two, Three Many Legal Orders: Legal Pluralism and the Cosmopolitan Dream’, 3 *New York University Review for Law and Social Change (N.Y.U. Rev. L. & Soc. Change)* (2007) 641.

⁴² Koskenniemi, ‘Hegemonic Regimes’, in M. A. Young *supra* note 35 at 305-324.

⁴³ See generally R. Michaels, ‘Global Legal Pluralism’, 5 *Annual Review of Law and Social Science* (2009).

While both fragmentation and unity can hide a hegemonic agenda, the unity required by climate change exists beyond the human agenda. The ethical and epistemological challenge of climate change cannot rely on descriptive understanding of legal fragmentation and the existing asymmetries. It also requires a prescriptive approach, which would emphasize ecological reflexivity of law and human responsibility for climate change. The understanding and reform of each regime or a system requires modifications and a recasting in this regard, because phenomena such as the CH₄ blowouts are happening outside of the existing (human) languages of ‘social’ systems, with a simultaneous capacity to affect all of them. Systems and fragmentation are rooted in specifically human experience and particular developments in modernity and law, a discussion, which is beyond the scope and content of this paper, but warrants serious further consideration and study.⁴⁴

An argument for the legal personality of non-humans as a strategy of addressing the uncertainty about the identity of the non-human ‘other’, needs to be extended also in contrast to the ‘commercial modernity’.⁴⁵ It is this particular argument that needs to be brought to the fore of the regime collisions approaches, and pushed further to include the ecological movement and the cyber revolution, as Gunther Teubner argues.⁴⁶ More than a proposal for the recognition of the ‘other’, different regimes would need to become more ecologically reflexive to not to an otherness, but rather the encompassing nature of the Earth System. In other words, greenhouse gases, and specific changes in the Arctic region cannot be compartmentalized into a space separate from humanity considering their capacity to affect the entire Earth System.

The proposal for a new normative hierarchy in international law, which would consider the environmental concerns as taking precedence to commercial and state interests, or other value hierarchies of social systems identified in the regime fragmentation literature, is founded in the existence of autonomous physical and biological actions, which are related to human actions and climate change, and which require further regulation (such as the regulation of greenhouse gas emissions). This proposal needs to go beyond ‘strategic formalism’, as it also needs to understand agency beyond human communication. But even more than that, it would need a reorienting of values within and among regimes. Teubner and others have identified the existing hierarchy and the demonstrated capacity of *homo oeconomicus* to overrun the interests of the *homo juridicus*. In other words: commercial values can take precedence over purely legal formal values. This has been a widely discussed topic, including in relation to environmental governance.⁴⁷ From the philosophy of science perspective, Isabelle Stengers has also argued for a re-consideration of the pace of scientific discovery, not because of the process itself, but because of its cooptation by commercial interests. The problem lies with forcible mobilization of scientific practices in economic competition. This, as she argues, challenges ‘the very social fabric of scientific reliability’.⁴⁸ This argument can be extended to the

⁴⁴ The present argument builds, in part, on the perspective on the relationship between law and modernity forwarded in B. Latour, *We have never been modern* (1993) and *The Making of Law. An Ethnography of the Conseil d'Etat* (2009). See also, P. Fitzpatrick, *The Mythology of Modern Law* (1992).

⁴⁵ M. Koskenniemi, ‘Epilogue’, W. Werner, M. de Hoon, A. Galán (eds), *The law of international lawyers. Reading Martti Koskenniemi* (2017), 394.

⁴⁶ Teubner, *supra* note 31.

⁴⁷ See Young *supra* note 35. See also O. Perez, *Global Legal Pluralism and Multipolar Conflicts* (2005).

⁴⁸ I. Stengers, *Cosmopolitiques, vol. 1, La guerre des sciences* (1996); *Au temps des catastrophes. Résister à la barbarie qui vient* (2009).

cooptation of law for similar interests, as will be evident in the examples of the regulation of the commons.

Transformation towards a more ecologically reflexive system needs to step away from the fundamental ethos of the state-*homo oeconomicus*-nexus. The current institutional diversity reflects the complex structure of multiple systems of governance and law. However, the institutional asymmetry between the global environmental problems on the one hand, and trade, commerce, politics, and other regimes, on the other, calls for solutions, which would either place explicit environmental responsibilities on the existing institutions or demand a creation of new ones. The functioning, scope, and/or methodological basis for environmental assessment vary, both nationally and regionally.⁴⁹

What is then the ‘worth of the legal and international relations idioms’⁵⁰ in assessing phenomena such as the global investment law or the environmental crisis? While the process of Arctic deglaciation requires scientific and technological advances, these are also translated into the language of economic gain. Excursions into the melting Arctic areas, which have been seen through both the lens of human and scientific achievement, and military state power; are now transitioning into the power of commerce, or what Koskenniemi, in his reference to Adam Smith, terms as the ‘dark sides of commercial modernity’.⁵¹

Regime interactions and systems theory methodology exposes the complex nature of mapping the ecological insensitivities of different international, transnational, and domestic domains, which can expose obstacles to the development of better environmental protection in a variety of institutions. On the one hand, this plurality might offer some hope, because when there is no single uniform hierarchical system, the possibilities are numerous. However, if climate change is a problem for the survival of the entire Earth System, the argument, ultimately, has to be a normative one, the basis of which, remains to be explored more fully through interdisciplinary scholarship. The Earth System approach reveals that parts, relations, and wholes are not so easily distinguishable. The proposal for a legal recognition of the Earth System would take greater consideration of the impacts of international economic, political, and other interests on global warming and prioritize the latter. In the end, we still need to resolve the ambiguity of the increasing proliferation and hybridization of legal regimes on the one hand, and the hopes for a more ecologically unified and responsive regime on the other.

3. Legal Framing of the Earth System and the Arctic Central Ocean

This section connects the changes in climatic conditions with the new industrial opportunities and a need for *ab initio* legal instrument (s) for the environmental protection of the Arctic region, and especially the high seas beyond national jurisdiction. As already discussed, global warming has caused a variety of unintended and autonomous processes, including the increased greenhouse gas emissions of previously concealed gases. The regulatory response so far has been deferential to state interests and

⁴⁹ See generally, Koivurova and Caddell, ‘Managing Biodiversity Beyond National Jurisdiction in the Changing Arctic’ ASIL-unbound Vol 112 (2018) Available at: <https://www.cambridge.org/core/journals/american-journal-of-international-law/article/managing-biodiversity-beyond-national-jurisdiction-in-the-changing-arctic/34BE3549098CA4ABBF2F0CC383CD6A1D>

⁵⁰ M. Koskenniemi, ‘Epilogue’, W. Werner, M. de Hoon, A. Galán (eds), *The law of international lawyers. Reading Martti Koskenniemi* (2017), 394.

⁵¹ Koskenniemi, *supra* note 49 at 441; See also, Koskenniemi, ‘It’s not the Cases, It’s the System’, in M. Sornarajah, *Resistance and Change in the International Law on Foreign Investment* (2017).

the market-based approaches to the regulation of emissions. A new international legally binding instrument for the Arctic would need to create step ahead from the currently fragmented approaches to regional and global environmental protection. In addition to the new interests and possibilities for exploitation of Arctic resources, there is also an opportunity to establish precautionary supervisory measures through the development of new regional governance.

On the basis of international law, all of the Arctic land, islands, and most of the waters are under the sovereignty and jurisdiction of the Arctic states. The Arctic high seas are the 2.8 million square kilometers that lie beyond the combined Exclusive Economic Zones (EEZ) of the coastal states of the Arctic. While there are many new state and non state entities engaging in ocean activities, the structure of the Arctic governance is influenced by the combination of the UNCLOS framework of treaties, institutions, and implementing agreements, as well as the interests of sovereign nation-states. For instance, the recent China's rejection of the South China Sea arbitral award issued by tribunal established under UNCLOS, to which China is a party, exemplifies the continuous sovereign challenge to international governance.⁵²

Due to a combination of changing climatic conditions and increased human activity, the region will have greater geostrategic and industrial interest in the mid-term future. With deglaciation, approximately forty percent of the Arctic Central Ocean is now open during the summer months, presenting commercial and industrial opportunities. The Arctic is being re-assembled as a resource for global investment by many different actors, including: the Arctic states, and other states which are increasingly interested in the new possibilities for trade, exploration, shipping, and natural resources; the Arctic Council, which includes the indigenous organizations; transnational and state owned companies; international organizations; and numerous other actors such as the environmental non- governmental organizations, or the academic institutions.

The most recently adopted outline of the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate⁵³ focused on the implications of climate-related ocean and cryosphere changes for resources, and what it defines as natural systems (e.g., change and loss of habitat, extinctions), human systems (e.g., social, political, cultural and economic aspects), and vulnerability assessments, adaptation limits, and residual risks.⁵⁴ At the same time the changing Arctic contributes to further global warming (albedo effect, methane releases, etc). It also alters the dynamics of the Earth system altogether (eg. ocean currents, ocean salinity). These processes have immediate consequence for the ongoing debates regarding, among others, regime fragmentation and interactions, and also can serve as a test for the possibilities of future forms of supranational governance, transnational governance, and treaty making.

In reference to the Arctic region, the emergent terminology is that of the 'Global Arctic' or the 'Arctic Paradox'.⁵⁵ The Arctic is warming at least twice as fast as anywhere else on Earth. According to estimates of up to a quarter of the world's undiscovered fossil fuel reserves are concealed beneath

⁵² *South China Sea Arbitration, Philippines v China*, Award, PCA Case No 2013-19, ICGJ 495 (PCA 2016), 12th July 2016, Permanent Court of Arbitration [PCA]

⁵³ Decision IPCC/XLV-2. Sixth Assessment Report (AR6) Products, Outline of the Special Report on climate change and oceans and the cryosphere. Available at:https://www.ipcc.ch/meetings/session45/Decision_Outline_SR_Oceans.pdf

⁵⁴ *Ibid.*

⁵⁵ L. Heininen (ed). *Future Security of the Global Arctic State Policy, Economic Security and Climate* (2016).

the sea north of the Arctic Circle. The Global Arctic clearly implies that the processes taking place in the region are global. The future of the globalized Arctic depends on more than just the Arctic actors, and requires that the Arctic be seen as the global commons. On the other hand, the ‘Arctic Paradox’ describes how the faster we use fossil fuels, the sooner we get an access to new under-ice and in-shelf oil and gas resources.⁵⁶ Understood as a physical space, which includes resources, the Arctic region has faced increasing environmental security issues. A resource becomes an assemblage of ‘materialities, relations, technologies and discourses’ that render it investible.⁵⁷ But instead of remaining a ‘user-friendly’ resource,⁵⁸ the Earth System also reacts in its own ways. An observation of simultaneous processes—the climate change regime and the regulation of greenhouse gas emissions; developing deep-sea dispute settlement regime; the existing constitutional architecture under UNCLOS, and new environmental conservation methodologies—demonstrates regime fragmentation and collisions, rather than a unitary approach. This could have positive and negative consequences for the development of a new set of regulations in the region.

A. The Law of the Sea and Market-oriented Approaches

The international legal response to the extraction of resources in the Arctic has been mostly connected to individual state interests: potential ‘grabs in the Arctic’; question of territorial sovereignty; and access to the deep seabed mining (and other forms of natural resource exploitation).⁵⁹ The UNCLOS grants the Arctic state on whose continental shelf they are located the exclusive rights to exploit any resources potentially existing there.⁶⁰ An extended continental shelf could mean access to profitable resources in the near future. These resources would not be subject to the rules applicable to the common heritage of mankind, or more appropriately ‘humankind’ (CHM), which are administered by the ISA. Thus the environmental and ecology concerns have not corresponded to the commercial or strategic interests of individual states and corporate actors; nevertheless, with significant climate change concerns, international law has yet to respond to both.

The ocean ABNJs are a global commons with many intersecting regional and sectoral interests. Currently, there is an overlapping and complex governance framework in the Arctic, which is similar in the outer space, cyberspace, and Antarctica. Interests and activities in these areas are different from traditional sovereign legal interests, requiring international legal reflexivity, institutional reform through cooperation, and capacity building on a global scale. Under the Article 139 of UNCLOS on Responsibility, in order to ensure compliance and liability for damage, States Parties shall have the responsibility to ensure that activities in the Area, whether carried out by States Parties, or state enterprises or natural or juridical persons which possess the nationality of States Parties or are effectively controlled by them or their nationals, shall be carried out in conformity with this Part. The same responsibility applies to international organizations for activities in the Area carried out by such

⁵⁶ *Final Report*, Calotte Academy (2016) at 17.

⁵⁷ Murray Li, ‘What is land? Assembling a resource for global investment’, 39 *Transactions of the Institute of British Geographers* (2014) 589-602, at 589.

⁵⁸ Christie, ‘Indigeneity and Sovereignty in Canada's Far North: The Arctic and Inuit Sovereignty’. 110 *South Atlantic Quarterly* (*S Atlantic Q*) (2011) 329, explaining how different indigenous communities in Canada choose to frame the use natural resources, a traditional approach to protection, or a ‘resource based’ approach.

⁵⁹ Holmes, ‘Breaking the Ice: Emerging Legal Issues in Arctic Sovereignty’. 9 *Chicago Journal of International Law* (*Chi. J. Int'l L.*) (2008).

⁶⁰ Convention on the Law of the Sea 1982, 1833 UNTS 3.

organizations. Article 153:2 stipulates that commercial mining enterprises Activities in the Area shall be carried out as by the Enterprise, and in association with the Authority by States Parties, or state enterprises or natural or juridical persons which possess the nationality of States Parties or are effectively controlled by them or their nationals, when sponsored by such States, or any group of the foregoing. Currently, only licenses for exploration are being issued, as the work on a mining code is still ongoing.⁶¹ Also, deep-sea mining activities in the Area shall be carried out in such a manner as to foster healthy development of the world economy and balanced growth of international trade, and to promote international cooperation for the overall development of all countries, especially developing States (Article 150). If a corporation mines the seabed minerals the title to minerals shall pass upon recovery in accordance with UNCLOS (Annex III, Article 1).

The Implementation Agreement of 1994 weakens Part XI of UNCLOS in response to the lack of support by a number of industrialized states for the 1982 outcome of UNCLOS negotiations. In the Preamble it refers to ‘the political and economic changes, including market-oriented approaches, affecting the implementation of Part XI’ and its overall purpose to ‘facilitate universal participation in the Convention’. The Agreement emphasizes the role of individual states, as well as the globalized values of market economics.⁶² This compromise has created a further asymmetry in the international law’s support for economic interests in reserved areas, including the Arctic.

Finally, claims to extension of national jurisdiction over the continental shelf run counter to more coordinated approaches towards the environmental conservation of the Global Arctic, as they focus on the extension of national boundaries, and not the recognition of the ‘commons’. Importantly, with indigenous peoples’ claims to self-governance in the Arctic region, conflicts may arise, if/when the countries bordering the Arctic Ocean assert claims to territorial sovereignty in this region. Importantly, indigenous peoples have inhabited the region for more than 4000 years.⁶³ In addition, in the cases of pollution from seabed activities (Article 208), such as the deep-sea mining and by dumping (Article 210) the UNCLOS gives priority to national legislation and other measures taken by states against such pollution. Hence, an understanding of the Earth System as a self-contained and inclusive system requires a thinking ‘beyond the borders’ which might require a bold step to expanding the commons rather than shrinking the already recognized areas.

B. Deep-Sea Mining and Dispute Settlement

A variety of factors have contributed to the ongoing resource development of deep-seabed. This paper will only focus on one aspect thereof: the ISA deep-sea mining and dispute settlement, and the potential for building more ecologically reflexive and treaty based institutions. In reference to deep -sea mining regulation as a field of international law, recently, there have been some important developments in the debate around the contractual and environmental rules that will organize the

⁶¹ Feichtner, “Mining for Humanity in the Deep Sea and Outer Space The Role of Small States in the Extraterritorial Expansion of Extraction (2019) *Leiden Journal of International Law*, forthcoming.

⁶² 1994 UNCLOS Implementation Agreement, Preamble and Annex, Section 8.

⁶³ Indigenous peoples’ participation and worldview is an additional challenge to the international legal system as they are non-state actors who also claim different type of sovereignty. It is beyond the scope of this paper to address the important matter of how the state centric international law, and climate change affect the world’s indigenous peoples’ claims to permanent sovereignty over natural resources in general, as well as in the Arctic. See for instance, See, e.g., T. Koivurova, C. Keskitalo, and N. Bankes (eds), *Climate Governance in the Arctic* (2009); L. Heinämäki, *The Right to Be a Part of Nature: Indigenous Peoples and the Environment* (2010); N. Bankes and T. Koivurova (eds), *The Proposed Nordic Saami Convention: national and International Dimensions of Indigenous Property Rights* (2013).

exploitation of mineral resources in the areas of the seabed beyond the continental shelf. Hence, arbitration can be one of the multiple spaces for the evolution for the interpretation of environmental duties for the contractors.

The dispute settlement around deep-sea mining is organized under a complex architecture, with various options and exceptions. Art. 187 of the UNCLOS allows for a wide jurisdiction upon the Seabed Disputes Chamber of the International Tribunal for the Law of the Sea over disputes arising from activities in the Central Arctic Ocean. But there are exceptions under articles 188 and 189 of the Convention. Amongst these exceptions, one opens the possibilities for commercial arbitration. Article 188 (2) (a) of UNCLOS states that disputes between parties to a contract concerning the interpretation or application of a contract or work plan under article 187(c) (i) shall be submitted, at the request of any party to the dispute, to binding commercial arbitration unless the parties otherwise agree, and unless it concerns the interpretation of UNCLOS. The UNCLOS gives a short indication on the arbitration procedure in its article 188 (2) (c): In the absence of a provision in the contract on the arbitration procedure to be applied in the dispute, the arbitration shall be conducted in accordance with the UNCITRAL Arbitration Rules or such other arbitration rules as may be prescribed in the rules, regulations and procedures of the ISA, unless the parties to the dispute otherwise agree.

In April 2018, the ISA Legal and Technical Commission issued the revised draft regulations on the exploitation of mineral resources in the Area⁶⁴ for consideration and adoption. It makes no clear references to either the specific regions or climate change. However, it states that one of its fundamental principles is to ‘Provide for the effective protection of the Marine Environment from the harmful effects that may arise from Exploitation, in accordance with the Authority’s environmental policy and regional environmental management plans, if any, based on the following principles’(Draft regulation 2 (5)). The draft regulation 104 reaffirms the regime of dispute settlement set by the UNCLOS and thereby reaffirms the regime of arbitration set by article 187(c) (i). According to the Annex X of the document, section 3.2, the standard clauses for exploitation contract specify that *the contractor* shall implement the work plan, which includes the environmental and monitoring plan. Schedule 1 is dedicated to the use of terms and scope of the contract and includes several key terms in regard to environmental duties such as ‘best environmental practices’, ‘environmental effect’, ‘serious harm’, ‘mitigation’. Part IV on the Protection and preservation of the Marine Environment, Section 1 Obligations relating to the Marine Environment Draft regulation 46 stipulates that the Authority, sponsoring States and Contractors shall each, as appropriate, plan, implement and modify measures necessary for ensuring the effective protection of the Marine Environment from harmful effects under article 145 of UNCLOS in respect of activities in the Area. Accordingly, ‘they shall apply the precautionary approach, as reflected in principle 15 of the Rio Declaration on Environment and Development, to the assessment and management of risk of harm to the Marine Environment from Exploitation in the Area’; but also ‘Develop incentive structures, including market-based instruments that support and enhance the environmental performance of Contractors, including technology development and innovation.’ The draft regulations also mention that the content and the terms defined are indicative at this stage and that definitions will evolve as regulations content evolves and a common approach towards terms based on internationally accepted definitions is established. This evolutionary approach results in a rather open situation in the case of arbitration.

The definition of ‘good industry practice’ in Schedule 1 stipulates that the requirements under applicable standards adopted by the ISA consist of the implementation of the skills and diligence reasonably expected to be applied as good industry practice. In this regard, the environmental concerns

⁶⁴ *Draft Regulations on Exploitation of Mineral Resources in the Area ISBA/24/LTC/WP.1*

are specifically weighted against what is constituted as reasonably necessary for the industry. Furthermore, Regulation 47 states that the Contractor shall take necessary measures to prevent, reduce and control pollution and other hazards to the Marine Environment as far as reasonably practicable, and in accordance with the applicable standards. However, the Regulation 46 states that contractors shall integrate Best Available Scientific Evidence in environmental decision-making, including all risk assessments and management undertaken in connection with the management measures taken under or in accordance with Good Industry Practice. This can emphasise the market-based instruments as a tool for enhancement of environmental performance, framed as the ‘incentive structures’ and open the door for a self-regulating character of the contractor. However, if the regulation is to develop in a more ecologically reflexive manner, this would and should also include adoption of evidence provided by climate change scientists.

It is not clear how this regime would correspond to, or improve upon the current climate change governance. The ISA has conflicting mandates: to promote the exploitation of the deep seafloor that covers about half the planet while ensuring its protection. In fact, as is here argued, the internal ‘regime’ process contradicts the need to provide greater environmental protection and mitigate climate change. Since 2001, the ISA has issued licenses to 29 corporations and state-backed companies and organizations to explore 500,000 square miles of the deep sea outside national jurisdiction for minerals.⁶⁵ Specific environmental standards for what constitutes unacceptable harm to deep-sea ecosystems and guidelines for conducting environmental assessments and reviews have yet to be developed. Finally, only one regional environmental management programme for the Clarion-Clipperton Zone has been developed so far. In addition given the growing knowledge of area’s biodiversity scientists have argued that the programme should be revised before mining is allowed.⁶⁶

C. Ecologically Reflexive and Treaty based approaches

The theoretical proposition in this paper seeks a re-thinking of corresponding and precautionary measures to the ongoing and future developments in the further commercialization in the Arctic. Recognizing the Arctic as part of the Earth System, would account for the concomitant processes of climate change. This is a normative proposal, which seeks a recasting of values and continues to emphasize the need for incentives to greater environmental protection in the deep-sea mining industrial processes (as well as other activities in the region). A normative reorganization would be a timely mirroring of an increase of proposals by the Arctic states for an overarching Arctic treaty. The treaty would enable better coordination of the responses to climate change in the Arctic, especially now when the Arctic Council is being served by a permanent secretariat.

The five Arctic Ocean coastal states emphasized in their Ilulissat declaration⁶⁷ that the overarching legal framework for the region is represented by the law of the sea and that there is ‘no need to develop a new comprehensive legal regime to govern the Arctic Ocean.’⁶⁸ This echoes the

⁶⁵ *Deepsea Minerals Contractors*, ISA Available At: <https://www.isa.org.jm/deep-seabed-minerals-contractors>

⁶⁶ *Environmental Management Plan for Clarion-Clipperton Zone*, ISA <https://www.isa.org.jm/environmental-management-plan-clarion-clipperton-zone>

⁶⁷ Arctic Ocean Conference, Ilulissat, Greenland, May 27-29, 2008, *The Ilulissat Declaration* (May 28, 2008). See, Koivurova, ‘Increasing Relevance of Treaties: The Case of the Arctic’, in *Agora: the End of Treaties*, 108 *American Journal of International Law (AJIL-unbound)* at 54.

⁶⁸ *Ibid.*

consensus among most of the states and other stakeholders in the Arctic.⁶⁹ Moreover, the possibility for such a treaty to be ‘ecologically reflexive’ is currently one of various stipulations and priorities balanced against concepts such as the ‘reasonably acceptable’ good practices of extractive industries.

The Arctic Council itself has called for the use of what it refers to as Ecosystems-Based Management (EBM). The EBM system, articulated nine constituent principles, some of which recognizes, *inter alia*, ‘that ecosystems and human activities are dynamic, that the Arctic is undergoing rapid changes, and that our understanding of these systems is constantly evolving, successful EBM efforts are flexible and adaptive’.⁷⁰ The EBM recognizes the need to reconcile a plurality of interests in the region. There is no single responsible institution whereby assessments would be coordinated in a central way, nor do the scientific understandings of the approaches to use converge. Indeed, this is necessary due to the expertise-based diversity of all the involved sectors. However, the global nature of the climate change consequences requires an added unifying dimension, which would step beyond regime pluralism.

Other binding policy developments in different sectors include, for instance, special navigational rules to improve shipping safety elaborated by the International Maritime Organization (IMO) through the adoption of the Polar Code, which entered into force on January 1, 2017.⁷¹ The working group of the Arctic Council responsible for biodiversity, The Conservation of Arctic Flora and Fauna, has provided scientific and technical support to identify Ecologically and Biologically Significant Areas within the marine space of the Arctic. Notably, on 3 October 2018, the Governments of Canada, China, Denmark (in respect of Greenland and the Faroe Islands), Iceland, Japan, Norway, the Russian Federation, the Republic of Korea and the US and the EU signed an Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean (CAOF Agreement or CAOFA).⁷² This agreement is the first to use a legally binding and precautionary approach to protect an area from commercial fishing before fishing has begun in the area. The ten Parties concerned have agreed to ban commercial fishing in the high seas portion of the Central Arctic Ocean at least until scientists confirm that it can be done sustainably and until the Parties agree on mechanisms to ensure the sustainability of fish stocks. However, the Central Arctic Ocean requires a more concentrated and not only sector specific ecologically reflexive regime.

Indeed, linking of changing physical characteristics with evolving regulatory frameworks; articulation of ecological criteria; determinations of scales of governance; or consensus-building within and among social and legal organizations upon the value and importance of ecological criteria, is a difficult process. Consequently, regimes in the Arctic differ in their scale, scope, and timing in response to environmental effects. Nor is it easy to respond to some physical and biological processes, as is demonstrated in the example of greenhouse gases. At the same time, the processes in ABNJs, especially new opportunities for resource extraction, require a clear set of procedures and objectives by

⁶⁹ Koivurova and Caddell, *supra* note 45.

⁷⁰ Arctic Council, *Ecosystem Based Management in the Arctic. Report submitted to Senior Arctic Officials by the Expert Group on Ecosystem-Based Management May 2013 Principles*, at 13.

⁷¹ *Shipping in polar waters: Adoption of an International Code of Safety for Ships Operating in Polar Waters (Polar Code)*, IMO.

⁷² Schatz, Proelss and Liu, ‘The 2018 Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean: A Primer’, October 25, 2018 *EJIL Talk!*, at: <https://www.ejiltalk.org/the-2018-agreement-to-prevent-unregulated-high-seas-fisheries-in-the-central-arctic-ocean-a-primer/>

which to promote conservation tools. The coordinated effort to create such procedures would depend not only on the regional symbiosis of regimes, but also on the global shift in language concerning the climate change and contemporary requirements for environmental protection.

The process initiated by the UN General Assembly (UNGA) Resolution 69/292 to develop the elements of an ILBI for conservation and sustainable use of marine biodiversity in ABNJs has contributed to a discussion regarding a more integrated and cross-sectoral system of oceans governance at a global and regional scale.⁷³ The first session of the Intergovernmental Conference on an international legally binding instrument under the UNCLOS on the conservation and sustainable use of marine biological diversity of ABNJs follows an organizational session (held in April 2018) and the conclusion of the fourth and concluding session of the Preparatory Committee on the elements of a draft text of an ILBI on the conservation and sustainable use of marine biodiversity in ABNJs under UNCLOS, which was held in July 2017.⁷⁴ On the draft elements of the ILBI, the final recommendation sets out broad contextual issues, such as, *inter alia*: a description of the considerations that led to the ILBI development; a recognition of the central role of the UNCLOS and the role of other existing relevant legal instruments and frameworks and relevant global, regional and sectoral bodies for ABNJ conservation and sustainable use; a recognition of the need to enhance cooperation and coordination for ABNJ conservation and sustainable use; a recognition of the need for assistance to countries; a recognition of the need for the comprehensive global regime to better address ABNJ conservation and sustainable use; an expression of conviction that an agreement for the implementation of the relevant UNCLOS provisions would best serve these purposes and contribute to the maintenance of international peace and security; and an affirmation that matters not regulated by UNCLOS, its implementing agreements or the ILBI continue to be governed by the rules and principles of general international law.

In addition, the ILBI could: set out exclusions from the ILBI scope and address, consistent with UNCLOS issues relating to sovereign immunity; set out additional objectives, if agreed, such as furthering international cooperation and coordination, to ensure the achievement of the overall objective of BBNJ conservation and sustainable use; and recognize that the legal status of non-parties to UNCLOS or any other related agreements with regard to those instruments would not be affected.⁷⁵ However, this is a very limited approach, considering the already described limits of UNCLOS itself. It is also not clear how the sectoral approach would coordinate with broader climate change concerns and consequences.

The ILBI specifies that it would work in conjunction with the existing regional instruments and as such it can be a platform for a further elaboration of mutual objectives among different sectors. At the same time, it does not elaborate on how it would contribute to climate change mitigation. This process appears to be allocated to global climate change instruments. This is highly problematic considering the significant impact of climate change on the Arctic region. Constructing a new regulatory architecture in the high seas would need to be legally binding on the parties to that treaty. In addition, existing institutions such as the Arctic Council could provide a foundation for the realization of new conservation mechanisms in the Arctic. However, to adequately respond to the encompassing

⁷³ Koivurova and Caddell, *supra* note 45.

⁷⁴ *Ibid.*

⁷⁵ Payne, *supra* note 12.

and cyclical nature of climate change, it would have to recognize the Arctic as a part of the Earth System and the Earth System itself, instead to primarily coordinate among different sectors.

Conclusion

In the summary of the IPCC 2018 Report, Debra Roberts, Co-Chair of IPCC Working Group II states, ‘This report gives policymakers and practitioners the information they need to make decisions that tackle climate change while considering local context and people’s needs. The next few years are probably the most important in our history.’⁷⁶ Combining the work of ninety-one authors and review editors from 40 countries the report stresses that we are already seeing the consequences of 1°C of global warming through more extreme weather, rising sea levels and diminishing Arctic sea ice, among other changes. The report highlights a number of climate change impacts that could be avoided by limiting global warming to 1.5°C compared to 2°C, or more. For instance, by 2100, global sea level rise would be 10 cm lower with global warming of 1.5°C compared with 2°C. The likelihood of an Arctic Ocean free of sea ice in summer would be once per century with global warming of 1.5°C, compared with at least once per decade with 2°C. These are fairly dramatic differences that require a coordinated global effort.⁷⁷

When connected to CH₄ emissions from not only the industry but also geological sources, climate change and melting permafrost allows for significant amounts of CH₄, produced within the Earth’s crust to be released into the atmosphere. This process thus correlates with the deglaciation of the Arctic.

In this context, the relevance of international law is called for as adaptations to changing climatic conditions are more likely to be implemented if they are consistent, or integrated with decisions or programs that address nonclimatic stresses. As the IPCC 2013 report already emphasized, ‘Vulnerabilities associated with climate change rarely are experienced independent of nonclimatic conditions. Impacts of climatic stimuli are felt via economic or social stresses, and adaptations to climate (by individuals, communities, and governments) are evaluated and undertaken in light of these conditions.’⁷⁸ Accordingly, the effectiveness of climate change adaptation will depend on the extensive consideration of other nonclimatic stresses and be consistent with existing policy criteria, development objectives, and management structures. In this respect communication is key among academic and professional disciplines, fields, and interest groups, as adaptive capacity varies considerably among regions, countries, and socioeconomic groups.

However, as this paper elaborates, the international law continues to be rooted in the definition of the sovereign space, demarcation of territory, ownership, market-oriented approaches, and exploitation. In addition the nexus of interests among individual states and extractive industries continues to prioritize the extraction and use of economic resources in the Arctic region. The law in this regard is developing in adaptation to the needs of the industry, such as the ISA deep-sea mining and dispute settlement framework. While evolving, it is not certain that such a framework is the best location to prioritize interests of mitigating climate change.

⁷⁶ 2018/24/PR IPCC PRESS RELEASE 8 October 2018 Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C approved by governments.

⁷⁷ *Ibid.*

⁷⁸ IPCC, *The Physical Science Basis Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (2013) Conclusions. Available at: <http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=655>

The paper has engaged with literature on regime interactions and global legal pluralism due to the current debates over the best venues where matters of climate change could be addressed. Following the conclusion of the IPCC report and work of climate scientists, the paper argues that while sectoral approaches might be necessary due to expertise divergences, they also require a normative reorganization that would recognize the unifying characteristic of our Earth System, its capacity to act independently of human legal and other systems, and also the law's (as well as other disciplinary) need to recognize that it is embedded in the Earth System.

How are we to engender communication in the area of climate change in a more inclusive and communicative manner, in an overall system? International law's universality is related to its function as a formal common denominator of a society, local or global. Nevertheless, it becomes unstable when it is no longer able to maintain a certain overarching status and narrative. Consequently, climate change is one of the most profound challengers of the present temporal and spatial narrative of international law.