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MITIGATING NEGATIVE IMPACTS OF MARINE RENEWABLE ENERGY ON BIODIVERSITY: THE ROLE OF INTERNATIONAL ENVIRONMENTAL LAW

Abstract:

Transition of the global energy sector is in progress. The share of renewable energies has increased over time and achieved 36.6% of global electricity capacity in 2020. Marine Renewable Energy plays a substantial role in this transition. However, while marine renewable energy will contribute to less GHG emissions, and thus enhance compliance with the Paris Agreement, there are concerns over potential impacts marine renewable energy installations may have on biodiversity. Such impacts include, among others, habitat loss, collision risks, noise and electromagnetic fields. This paper addresses these issues from the perspective of international environmental law, illustrating how potentially conflicting objectives (mitigating greenhouse gas emissions and preserving biodiversity) can be accommodated. This requires a discussion of broader concepts such as no harm and precautionary action as well as detailed rules extending from marine protected areas to the discussion of specific treaty issues, even public participation, including participation of indigenous peoples. The paper aims at illustrating the ability of international law to ensure not just an environmentally sound but a biodiversity-compatible transition towards marine renewable energy.

Keywords: Marine Renewable Energy, Multilateral Environmental Agreements, No Harm Concept, Concept of Precautionary Action, Impact Assessments, Public Participation

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1. INTRODUCTION

Transition of the global energy sector is in progress. Renewable energies, defined as any form of energy from solar, geophysical or biological sources that is replenished by natural processes at a rate that equals or exceeds its rate of use[1], accounted for 36.6 percent of global electricity capacity in 2020[2]. However, the use of Marine Renewable Energy (MRE) also poses significant threats to the marine environment. A major challenge is to ensure an appropriate balance between the need to effectively mitigate climate change, taking into account the need to maintain energy security[3], while at the same time limiting the threats to marine biodiversity resulting from the use of alternative energy sources to at least a tolerable level. The academic discourse on the development and use of renewable marine energy from the perspective of international environmental law (IEL) has only begun recently[4].

Against this background, we initially address the risks to marine biodiversity associated with the use of marine renewable energy technologies. We also consider the imperatives of making use of these technologies and exploiting their potential in the context of obligations under IEL. Subsequently, we scrutinize the available legal framework, which, at first glance, may make a positive contribution to the protection of the marine environment from degradation by the use of MRE. This first requires an assessment of relevant multilateral environmental agreements (MEAs) and their specific instruments like the designation of marine protected areas, with an analysis of their capacity to respond to new threats such as those examined in this paper. Concurrently, established concepts of IEL are considered, including no harm and precautionary action, without, however, neglecting more recent approaches, such as the concept of ecosystem approach or the concept of planetary boundaries. The authors argue that, building on the conceptual framework established, among others, by the Trail Smelter Case, these concepts need to be

[1] Intergovernmental Panel on Climate Change (IPCC), Special Report on Renewable Energy Sources and Climate Change Mitigation, 2011, p. 164.

[2] International Renewable Energy Agency (IRENA), Renewable Capacity Statistics 2021, p. 48, https://www.irena.org/publications/2021/March/Renewable-Capacity-Statistics-2021 (accessed: 26 April 2022). For a general overview of renewable energy facilities and conservation areas see: J.A. Rehbein, J.E.M. Watson, J.L. Lane, L.J. Sonter, O. Venter, S.C. Atkinson, J.R. Allan, *Renewable Energy Development Threatens Many Globally Important Biodiversity Areas*, Global Change Biology, vol. 26, 2020, pp. 3043–3048.

[3] M.M. d. Neves, *Offshore Renewable Energy and the Law of the Sea*, [in:] E. Johansen, S.V. Busch, I.U. Jakobsen (eds.), The Law of the Sea and Climate Change: Solutions and Constraints, Cambridge 2021, p. 206.

[4] Y.-C. Chang, *Marine Renewable Energy – The Essential Legal Considerations*, Journal of World Energy Law and Business, vol. 8, 2015, pp. 26–27.

taken more seriously in the development of MRE. In particular, linking 'no harm' and the ecosystem approach will help to refine the direction of how to develop MRE in the future, ensuring that this is not only well-intentioned but also well-done. In the same vein, identifying the possibility of a new way of construing existing treaty provisions and established concepts in light of the planetary boundaries concept will contribute to a more grounded discourse on the compatibility of biodiversity conservation and the realization of MRE technologies. Furthermore, it will also contribute to a more secure practical use of new MRE technologies. Finally, we conclude with recommendations. This paper focuses on the global level, but does not omit the opportunity to provide some perspectives on the intersection with regional and local responses.

2. MARINE RENEWABLE ENERGY GENERATION – CURSE OR BLESSING?

Marine renewable energy refers to renewable energy produced from the various natural processes in the marine environment[5]. Such processes include wind turbines, tidal turbines, and wave energy converters [6].

Assessing environmental effects in offshore areas remains a challenging exercise as the marine environment is a vastly complex ecosystem with physical, biological, and chemical characteristics working together at different spatial and temporal levels[7].

According to Garel, Rey, Ferreira and Koningsveld, it is possible to identify six stress factors: "1. *physical presence* of (fixed and moving) parts of the devices in the water and in the air (including the introduction of material or substrate at the bed); 2. *dynamics*, which relates to (near- and far-field) changes in the air and water pressure fields and in sediment dynamics (including changes in sediment distribution due to seabed disruption during construction); 3. *release of chemicals* in the area from the equipment and vehicles linked to the activity and from seabed removal; 4. *generation of sound*, both above and underwater; 5. *Electro-Magnetic Fields*, produced by cables (during the operational phase); and 6. *cumulative impacts* of stressors from several large-scale projects and other human activities."[8].

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[5] M. Abad Castelos, *Marine Renewable Energies: Opportunities, Law, and Management*, Ocean Development & International Law, vol. 45, 2014, p. 221.

[6] R. Nerzic and J.-P. Mazé, *Marine Environment and Energy Resources*, [in:] B. Multon (ed.), Marine Renewable Energy Handbook, London/Hoboken, 2012, pp. 2 et seq.

[7] E. Garel, C.C. Rey, Ó. Ferreira, M. v. Koningsveld, *Applicability of the "Frame of Reference" Approach for Environmental Monitoring of Offshore Renewable Energy Projects*, Journal of Environmental Management, vol. 141, 2014, p. 17.

[8] Ibidem, p. 18.

They also highlight so-called receptors, i.e. those who experience the impact of the stressors: "1. *the physical environment*, i.e., the atmospheric and marine (wave and current) climates and the bed sediment (near-field and far-field); 2. marine mammals and sea turtles; 3. *pelagic habitat and communities*, including planktonic and nektonic organisms (excluding marine mammals and sea turtles); 4. *benthic habitat and communities*, including macrophytes, invertebrates and vertebrates living in association to bed sediment; 5. *marine birds*, living or migrating near the project area; 6. *water quality*, measured based on its physical and chemical properties; and, 7. *ecosystem interactions*, such as (but not only) food web interactions, and trophic dynamics."[9] It is emphasized that with respect to the latter group, their sensitivity to stresses remains the hardest to assess due to their extreme complexity and the fact that effects can occur even when no apparent physical responses are noted at other receptors[10].

For instance, the three major methods presently in use worldwide for generating MRE at sea – wind turbines, tidal turbines, and wave energy converters – have significant negative impacts on cetaceans[11]. Except for birds and bats, marine mammals, especially if affected by intense noise in the course of constructing MRE infrastructure, sea turtles and some fish are also at risk from offshore wind turbines[12]. For mammals and sea turtles, there is a danger of collisions with vessels during the construction period whilst processes of habitat changes can adversely impact seabed species. In any case, it remains to be noted that current offshore renewable energy developments have not yet been adequately scrutinized with a view to the negative impacts of MRE use. In particular, the effects have not been quantified in terms of their severity[13]. For many available projections of impacts, modelling approaches are used that are not supported by empirical data. Furthermore, considerable funding is strongly required for further research on these matters[14].

At the same time, these technologies help to achieve the goals of the climate regime. In this sense, Article 2 of the United Nations Framework Convention on

[9] Ibidem, p. 18.

[10] Ibidem, p. 18.

[11] More about the interactions between MRE and cetaceans are available on the website of the International Whaling Commission: https://iwc.int/marine-renewable-energy-developments (accessed: 26 April 2022).

[12] IUCN, Mitigating Biodiversity Impacts Associated with Solar and Wind Energy Development: Guidelines for Project Developers, 2021, Executive Summary.

[13] BirdLife International, *Renewable Energy at Sea and Nature Conservation*, July 2021, https://www.birdlife.org//wp-content/uploads/2021/11/BirdLife-Position-on-Renewable-Energy-at-Sea-and-nature-conservation.pdf (accessed: 26 April 2022).

[14] Ramsar COP11 Resolution XI.10, Annex, https://www.ramsar.org/sites/default/files/documents/pdf/cop11/res/cop11-res10-e.pdf (accessed: 26 April 2022).

Climate Change (UNFCCC)[15] identifies as its long-term objective the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner." Simultaneously, it obligates states parties to "[p]romote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems" (cf. Article 4 [1] [d] UNFCCC). The Paris Agreement[16] in its Article 2 (1) (a) stresses that it "aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by: […] Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change".

Against this empirical and legal background, the question arises whether and how IEL provides options for balancing the conflicting interests involved in MRE.

3. INTERNATIONAL ENVIRONMENTAL LAW PROTECTING MARINE BIODIVERSITY IN THE FACE OF THREATS FROM MARINE RENEWABLE ENERGY

3.1. MRE-RELEVANT MULTILATERAL ENVIRONMENTAL AGREEMENTS

Among numerous MEAs protecting the marine environment, the main legal instrument for consideration is the United Nations Convention on the Law of the Sea (UNCLOS)[17], as it sets out the basics of the legal regime applicable to the oceans. The Convention lays down the general legal framework, among others, for the deployment of MRE in the various maritime spaces (internal waters, territorial seas and in an exclusive economic zone) by establishing rights and general environmental obligations of States – regarding protection of the marine environment for MRE developments[18].

[15] 31 ILM 849 (1992).
[16] 55 ILM 740 (2016).
[17] 21 ILM 1261 (1982).
[18] N. Giannopoulos, *Global environmental regulation of offshore energy production: Searching for legal standards in ocean governance*, RECIEL, vol. 28, 2019, pp. 289–292; Y.-C. Chang, *Marine*

Within its internal waters and its territorial sea (see Article 2 UNCLOS) a state can explore and exploit MRE freely and regulate the location and scale of the facilities for MRE. The state has full and exclusive sovereignty over its internal waters and territorial sea. According to UNCLOS[19] and customary international law, the coastal state may designate sea-lanes or prescribe traffic separation schemes around the areas of renewable energy facilities. For the development of renewable energy in internal waters and territorial seas, cable and pipeline protection regulations are necessary. Due to the peculiarities of the marine environment, the cables and pipelines are vulnerable to damage by natural or human factors. The state needs to take special protective measures regarding cables and pipelines and those used for transportation of MRE.

The provisions of UNCLOS (especially Article 56 UNCLOS) related to marine renewable energy within the Exclusive Economic Zone (EEZ) include: 1) "sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds"; (2) jurisdiction with regard to the establishment and use of artificial islands, installations and structures; and (3) jurisdiction with regard to the protection and preservation of the marine environment.

The High Seas as marine areas beyond national jurisdiction (ABNJ) are open to all states, whether coastal or land locked. All states are entitled to conduct activities which are not prohibited under international law. The freedoms related particularly to the development of marine renewable energy, as set out in Article 87 UNCLOS, are the freedom to lay submarine cables and pipelines, and the freedom to construct artificial islands and other installations not prohibited under international law but the list of the freedoms is non-exhaustive. UNCLOS does not specify how states should conserve and sustainably use biodiversity in the high seas. The lack of standards leaves them vulnerable to abuse. To address some of the existing gaps in respect of marine environmental protection, the United Nations General Assembly decided that negotiations for a new implementing agreement for marine biodiversity in ABNJ should address the elements identified in the package agreed in 2011[20]. The elements of this

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Renewable Energy – The Essential Legal Considerations, Journal of World Energy Law and Business, vol. 8, 2015, pp. 27 et seq.; See in general: S. McDonald, D.L. Vander Zwaag, *Renewable Ocean Energy and the International Law and Policy Seascape: Global Currents, Regional Surges*, Ocean Yearbook, vol. 29, 2015, pp. 299–326.

[19] See: R.A. Barnes, *United Nations Convention on the Law of the Sea, A Commentary*, A. Proelss (ed.), München/Oxford/Baden-Baden, 2017, pp. 208–213.

[20] Resolution adopted by the General Assembly on 24 December 2011, 66/231, Agenda item 76 (a).

package are: (1) marine genetic resources, including questions on the sharing of benefits; (2) measures such as area-based management tools, including marine protected areas; (3) environmental impact assessments; and (4) capacity-building and the transfer of marine technology.

During the United Nations Conference on Sustainable Development in 2012, States committed themselves "to address, on an urgent basis [...] the issue of the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, including by taking a decision on the development of an international instrument under the United Nations Convention on the Law of the Sea."[21]. In 2017, the United Nations resolved to develop an international treaty for the conservation and sustainable use of the high seas. The United Nations General Assembly adopted Resolution 72/249 (24 December 2017) to convene an intergovernmental conference (IGC) to develop an international legally binding instrument on marine biodiversity in areas beyond national jurisdiction. The negotiations for an implementing agreement under the United Nations Convention on the Law of Sea on the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction were interrupted by COVID-19[22]. The final session has been postponed to the earliest possible available date in 2022 to be decided by the General Assembly[23].

Part XII of UNCLOS specifies the legal regime for the protection and preservation of the marine environment, including the obligation to prevent, reduce and control pollution of the marine environment (Articles 192–237). This regime applies to the development of MRE. The obligation included in Article 192 UNCLOS requires States to exercise 'due diligence' and 'to ensure' that activities occurring within their jurisdiction and control do not harm the marine environment[24]. The duty of States to prevent pollution does not only entail the adoption of the necessary laws and regulations but they must also ensure that the activities of private actors engaging in such activities within their jurisdiction will not cause significant harm to the marine environment[25].

Parallel to the environmental framework of UNCLOS, other international conventions also have an impact on the regulation of MRE. However, these

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[21] Cf. https://www.iucn.org/theme/environmental-law/our-work/oceans-and-coasts/marine-biodiversity-areas-beyond-national-jurisdiction-bbnj (accessed: 26 April 2022).

[22] E. Papastavridis, *The negotiations for a new implementing Agreement under the UN Convention on the law of the sea concerning marine biodiversity*, International & Comparative Law Quarterly, vol. 69, 2020, pp. 586.

[23] See https://www.undocs.org/en/A/75/L.96 (accessed: 26 April 2022).

[24] Request for Advisory Opinion submitted by the Sub-Regional Fisheries Commission (SRFC), Advisory Opinion, 2 April 2015, ITLOS Reports 2015, p. 4 (pp. 38–40).

[25] Cf. with regard to the "responsibility to ensure" Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area, Advisory Opinion, 1 February 2011, ITLOS Reports 2011, p. 10 (pp. 40–44).

conventions do not normally specifically address MRE but they obligate States to protect marine areas/habitats or species in very general terms.

For example, the Convention on Biological Diversity (CBD)[26] includes, among others, obligations related to the conservation of biological diversity and the sustainable use of its components (Article 1 CBD). The CBD includes further fairly general obligations applicable to MRE[27], such as the one arising from its Article 7 (c), which requires the parties to "identify processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity and monitor their effects through sampling and other techniques". According to Article 8 (a) CBD, states parties shall establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity. Pursuant to Article 10 (b) CBD, the parties must adopt measures relating to the use of biological resources to avoid or minimize adverse impacts on biological diversity.

Furthermore, regional seas conventions, including the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention)[28], the Bucharest Convention for the Protection of the Black Sea against Pollution (Bucharest Convention)[29], and the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention)[30] provide a regulatory framework for the marine environment related to the prevention and reduction of pollution, as well as to the monitoring and assessment of the current status of marine regions. The provisions of these conventions hence establish general obligations which include, among others, the application of the ecosystem approach, the requirement to apply the principle of precaution, and references to the polluter pays concept. They do not address the deployment of MRE specifically, but they apply to MRE when "the deployment of MREs causes or is likely to cause 'pollution' in the marine environment, […] and (2) if the deployment of MREs involves activities that are expressly regulated in the […] [regional sea conventions]"[31].

The Convention on the Conservation of Migratory Species of Wild Animals (CMS)[32] does not include a direct reference to MRE installations. But the system

[26] 1760 UNTS 79.

[27] C. Soria-Rodríguez, *The International Regulation for the Protection of the Environment in the Development of Marine Renewable Energy in the EU*, RECIEL, vol. 30, 2021, pp. 50–52.

[28] 2102 UNTS 201.

[29] 1764 UNTS 4.

[30] 2354 UNTS 67.

[31] C. Soria-Rodríguez, *Marine Renewable Energies and the European Regional Seas Conventions*, Climate Law, vol. 6, 2016, p. 320.

[32] 19 ILM 15 (1980).

of protection brings about general obligations, which do not entail specific rules but may contribute to protection against the impacts of MRE. For example, it should be indicated, that in light of Article III (5) CMS the development of MRE must not lead to any 'taking' of the listed species (migratory species under Annex I of the CMS) as defined in Article I (i) of the CMS, i.e., among other things, harassing or deliberate killing. Thus, Article III (5) may serve as the legal basis for adopting measures to reduce harassment of migratory species by marine energy installations.

The conservation and protection of particular species that are receptors of environmental stressors associated with MREs is also dealt with by other agreements of the CMS family.

In particular, the development of MRE should not interfere with the provisions of the Agreement on the Conservation of Small Cetaceans in the Baltic, North-East Atlantic, Irish and North Seas (ASCOBANS)[33] and the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)[34]. According to Article 2.1. of the ASCOBANS, the states parties undertake to cooperate closely in order to achieve and maintain a favourable conservation status for small cetaceans. The potential impacts on cetaceans need to be considered during the whole life stages of MRE (from exploration, through construction and operation to maintenance and decommissioning)[35]. As has been pointed out the development of MRE should be assessed on a case-by-case basis[36]. The provisions of the Agreement on the Conservation of African–Eurasian Migratory Waterbirds (AEWA)[37], the Agreement on the Conservation of Seals in the Wadden Sea Area (Wadden Sea Seals Agreement)[38] and the Agreement on the Conservation of Populations of European Bats (EUROBATS)[39], should also be taken into consideration insofar as the MRE is located in the respective geographical area covered by each agreement. For example, according to the Wadden Sea Seals Agreement (Article VII.2.), the States shall preserve habitats and seals present

[33] 1772 UNTS 217.

[34] 2183 UNTS 30.

[35] More about the life phases of marine renewable energy: G. Goettsche-Wanli, *Sustainable Production of Offshore Renewable Energy: A Global Perspective, Sustainable Ocean Resource Governance*, Leiden, 2018, pp. 8–75.

[36] 21st ASCOBANS Advisory Committee Meeting, Information Document 3.7.2.b, Marine Renewable Energy: A Global Review of the Extent of Marine Renewable Energy Developments, the Developing Technologies and Possible Conservation Implications for Cetaceans, p. 57, https://www.ascobans.org/sites/default/files/document/AC21_Inf_3.7.2.b_Marine_Renewables_WDC.pdf (accessed: 26 April 2022).

[37] 2365 UNTS 203.

[38] 2719 UNTS 263.

[39] 1863 UNTS 101.

from undue disturbances or changes resulting, directly or indirectly, from human activities. Although this is not explicitly indicated in the Agreement, any development projects, such as planned MRE in this area, should be subject of rigorous environmental impacts assessments to avoid any impacts to the values and integrity of the property[40].

3.2. CONCEPTS OF IEL WITH A REGULATORY IMPACT ON THE USE OF MRE

In addition to their corresponding treaty obligations, insofar as they are in place[41], States are barred, first, under the customary international law rule of no-harm, from using or permitting the use of MRE technologies within their territories or common marine areas that may cause significant damage to the marine environment of other states or common marine spaces.

The substantive content of the no harm concept as one of the key rules of customary international environmental law covers two dimensions – it unfolds a prohibitive and a preventive guidance[42]. Its prohibitive dimension proscribes any state from engaging in significant transboundary environmental damage. In its preventive role, no harm requires each state of origin to undertake appropriate steps to monitor and provide for the *ex ante* regulation of sources of potentially significant transboundary damage[43]. Thus, states are obliged to minimise the risks of damage to the marine environment before they occur.

Whether the procedural obligations of the no harm concept belong to the realm of customary international law must be assessed in a differentiated manner. In any case, it is possible to state that among the different procedural obligations, there are the following which seem to have already become part of customary international law: the obligations to carry out an environmental impact assessment (EIA)[44] to exchange information, to give early warning, and

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[40] UNESCO, Decision 33 COM 8B.4, https://whc.unesco.org/en/decisions/1946 (accessed: 26 April 2022).

[41] See, for example, Article 3 CBD and Article 194 (4) UNCLOS.

[42] U. Beyerlin and T. Marauhn, *International Environmental Law*, Oxford 2011, pp. 40–41.

[43] Ibidem, p. 40–41.

[44] See Pulp Mills on the River Uruguay (Argentina v. Uruguay), ICJ Reports 2010, p. 14 (pp. 82–83); Certain Activities carried out by Nicaragua in the Border Area (Costa Rica v. Nicaragua) and Construction of a Road in Costa Rica along the San Juan River (Nicaragua v. Costa Rica), ICJ Reports 2015, p. 665 (p. 724); Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area, Advisory Opinion, 1 February 2011, ITLOS Reports 2011, p. 10 (p. 50). With regard to its applicability to areas beyond national jurisdiction, see HSA Policy Brief: *EIAs in ABNJ: Effects or location-based?*, May 2020, https://www.iucn.org/sites/dev/files/content/documents/eias_in_abnj_final-_effects_or_location_based_-may19_1.pdf (accessed: 26 April 2022).

to consult with other states. The EIA obligations are particularly relevant in the context of MRE technologies. EIA is also a component of several MEAs (including Article 2 [2] Espoo Convention on Environmental Impact Assessment in a Transboundary Context[45] and Article 14 CBD) and is a legal technique designed to allow environmental concerns to be considered when deciding whether to approve a project or a policy[46]. In the latter case, it is also referred to as 'strategic environmental assessment'[47]. As regards the content of the EIA obligation based on customary international law, state discretion is limited in some respects: In particular, the procedure must be carried out before a project is implemented[48].

The roots of the no harm concept in IEL go back to the so-called Trail Smelter Arbitration, where the arbitral tribunal held that "[u]nder the principles of international law […] no state has the right to use or permit the use of territory in such a manner as to cause injury by fumes in or to the territory of another of the properties or persons therein, when the case is of serious consequences and the injury is established by clear and convincing evidence."[49]. While the concept thus can be traced back to the prevention of transboundary damage, it has been extended over time to the protection of global common goods. This can already be taken from Principle 21 of the 1972 Stockholm Declaration: "States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction."[50]. As a due diligence obligation, the concept presupposes that the damage must have been reasonably predictable for the state of origin in the light of present knowledge[51]. Most importantly, it is not only a matter of enacting appropriate regulations and measures, but also of monitoring their enforcement and control by the administration, including

[45] 30 ILM 800 (1991).

[46] A. Epiney, *Environmental Impact Assessment*, [in:] A. Peters and R. Wolfrum (eds.), Max Planck Encyclopedia of Public International Law (online edition), 2009, para. 2, available at: www.mpepil.com.

[47] Ibidem, para. 2.

[48] P.-M. Dupuy and J.E. Viñuales, *International Environmental Law*, 2nd edition, Cambridge University Press, 2018, p. 80; Pulp Mills on the River Uruguay (Argentina v. Uruguay), ICJ Reports 2010, p. 14 (p. 83).

[49] Trail Smelter Arbitration (United States/Canada) (1938 and 1941) 3 RIAA 1905.

[50] Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972, UN Doc. A/CONF.48/14/Rev.1, p. 5.

[51] J. Gupta and S. Schmeier, *Future Proofing the Principle of No Significant Harm*, International Environmental Agreements: Politics, Law and Economics, vol. 20, 2020, p. 736.

vis-à-vis private actors[52]. Adopting this approach is even more important in a field such as the use of MRE technology, where private actors play a considerable role. What measures are reasonable and appropriate in a particular case also depends on the risks associated with a specific activity.[53] While the threshold to constitute 'significant harm' has not been conclusively clarified, it seems reasonable to argue that the occurrence of a species or habitat of special conservation concern, such as those listed in the OSPAR 'List of Threatened and/or Declining Species and Habitats'[54], in a particular sea area would meet the required threshold and trigger the stated obligations under this concept if they were threatened with extinction by the use of MRE technologies[55]. The violation of any obligation arising from no harm constitutes an act contrary to international law, entailing the international responsibility of the state of origin.

In addition to the 'principle of prevention' which is an integral part of the no harm concept[56], the concept of precautionary action is of major importance. Its particular significance emerges in circumstances when states identify a threat of serious or irreversible harm to the environment, yet also realize that there is an insufficient scientific basis for proving the causal link between a particular activity and the expected harm[57]. While 'prevention' entails reaction to a risk that can be determined scientifically, 'precaution' closes existing gaps when scientific causal relationships cannot be clearly determined[58].

The concept of precautionary action is particularly relevant in the context of the cases mentioned above, where the causal relationship between the use of MRE and potentially adverse impacts has not yet been proven and pertinent scientific knowledge is still fragmentary. Although the precise scope of

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[52] J. Brunnée, *Harm Prevention*, [in:] L. Rajamani and J. Peel (eds.), *The Oxford Handbook of International Environmental Law*, 2nd edition, Oxford, 2021, p. 274; Pulp Mills on the River Uruguay (Argentina v. Uruguay), ICJ Reports 2010, p. 14 (p. 79).

[53] Ibidem.

[54] See https://www.ospar.org/work-areas/bdc/species-habitats/list-of-threatened-declining-species-habitats (accessed: 26 April 2022).

[55] See in this context and with regard to the OSPAR List D. Wilhelmsson and O. Langhamer, *The Influence of Fisheries Exclusion and Addition of Hard Substrata on Fish and Crustaceans*, [in:] M.A. Shields and A.I.L. Payne (eds.), Marine Renewable Energy Technology and Environmental Interaction, Dordrecht et al. 2014, p. 51.

[56] M. Fitzmaurice, *Legitimacy of International Environmental Law. The Sovereign States Overwhelmed by Obligations: Responsibility to React to Problems Beyond National Jurisdiction?* ZaöRV, vol. 77, 2017, p. 342–349.

[57] J. Gupta and S. Schmeier, *Future Proofing the Principle of No Significant Harm*, International Environmental Agreements, vol. 20, 2020, p. 739.

[58] L.A. Duvic-Paoli and J.E. Viñuales, *Principle 2: Prevention*, [in:] J.E. Viñuales (ed.), The Rio Declaration on Environment and Development: A Commentary, Oxford, 2015, p. 136.

precautionary action has not yet been conclusively determined, in any case, the practice of MEAs indicates a growing willingness on the part of states to accept precautionary action as a justification for taking mitigation measures in cases of serious or irreversible threats to the environment. Various substantive and procedural obligations that may arise from precautionary action are still subject to discussions, including the provision of equal access to relevant information, the conduct of environmental impact assessments, the imposition of quantifiable limits to certain activities, and the application of best available technologies[59].

Leaving aside these debates, there are good reasons to assume that the concept as such has become part of customary international law: "[T]he precautionary approach has been incorporated into a growing number of international treaties and other instruments, many of which reflect the formulation of Principle 15 of the Rio Declaration. In the view of the [ITLOS Seabed Disputes] Chamber, this has initiated a trend towards making this approach part of customary international law."[60].

Moving to the ecosystem approach, this concept enjoys growing recognition in a number of areas forming part of international environmental law. In particular, it is increasingly important in the field of biodiversity protection, oceans and marine resources[61]. According to Article 2 CBD an 'ecosystem' is "a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit." Following the Conference of the Parties to the CBD, the ecosystem approach is 'a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.'[62]. While politically accepted, numerous challenges still exist as to how this concept should be treated legally, since it has emerged from natural science and is not easily integrated into legal categories. As Brunnée and Toope have rightly emphasized, the concept suggests that "[s]imply put, an 'ecosystem approach' requires consideration of whole systems rather than individual components [...] species and their physical environments must be recognized as interconnected, and the

[59] U. Beyerlin and T. Marauhn, *International Environmental Law*, Oxford, 2011, pp. 52–56 with further references.

[60] Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area, Advisory Opinion, 1 February 2011, ITLOS Reports 2011, p. 10 (p. 47).

[61] V. De Lucia, *Competing Narratives and Complex Genealogies: The Ecosystem Approach in International Environmental Law,* Journal of Environmental Law, vol. 27, 2015, pp. 91–92; D. Langlet and R. Rayfuse, *The Ecosystem Approach in Ocean Planning and Governance*: *An Introduction*, [in:] D. Langlet and R. Rafuse (eds.), The Ecosystem Approach in Ocean Planning and Governance, Leiden/Boston, 2019, pp. 2–3.

[62] Decision V/6, [in:] UNEP/CBD/COP/5/23 (22 June 2000), pp. 103 et seq., https://www.cbd.int/doc/meetings/cop/cop-05/official/cop-05-23-en.pdf (accessed: 26 April 2022).

focus must be on the interaction between different sub-systems and their responses to stresses resulting from human activity [...] Not only does interconnectedness imply management approaches that are broad-based in a spatial sense; it requires as well that human interaction with and use of the environment respect the need for maintaining 'ecosystem integrity', in other words, the system's capacity for self-organization [...] More recently, these ideas have also been expressed through the concept of 'ecosystem health' as an ordering principle for water management efforts […] Finally, given the complexity of ecosystems and their interactions, ecosystem-oriented regimes and management systems must account for the limited human ability to predict ecosystem responses to stress"[63]. Although it is not (yet) part of customary international law, lacking precise normative substance[64], the concept has been narrowed down and hence become more or less operative in the context of various MEAs. Indeed, specific action and certain measures can be drawn from the ecosystem approach. Initially, principles of the ecosystem approach were elaborated in the context of the CBD[65], a few of them are to be highlighted here. According to the principles and related operational guidelines, decentralized management is preferred, with a division of decision-making between central government, which is expected to confine itself to strategic decisions, and local government, which is expected to make operational decisions. In addition, the actual and potential impacts of activities on ecosystems must be considered in a prospective manner, making the acquisition of in-depth knowledge of ecosystem functions and the role of biodiversity components a vital part of any management process. These general guidelines have been reindorsed by other MEAs over the years, adapted to their specific object and purpose, and have been further refined. Since 2008, for example, the Barcelona Convention has defined measures to implement the concept in the particular context of the marine environment. Human activities have increasingly become subject to regulation with a view to sustainable development, with growing precision and concreteness, partly building on the guidelines established by the CBD Conference of the Parties[66]. In the

[63] J. Brunnée and S.J. Toope, *Environmental Security and Freshwater Resources: A Case for International Ecosystem,* Yearbook of International Environmental Law, vol. 5, 1994, p. 55.

[64] S.R. Enright and B. Boteler, *The Ecosystem Approach in International Marine Environmental Law and Governance*, [in:] T.G. O'Higgins et al. (eds.), Ecosystem-Based Management, Ecosystem Services and Aquatic Biodiversity, Cham, 2020, p. 335.

[65] V. De Lucia, *Competing Narratives and Complex Genealogies: The Ecosystem Approach in International Environmental Law,* Journal of Environmental Law, vol. 27, 2015, pp. 111-112.

[66] See G. Futhazar, *The Normative Nature of the Ecosystem Approach: A Mediterranean Case Study*, Transnational Environmental Law, vol. 10, 2021, pp. 110–118. With regard to the CBD see Decision V/6, [in:] UNEP/CBD/COP/5/23 (22 June 2000), https://www.cbd.int/doc/meetings/cop/cop-05/official/cop-05-23-en.pdf (accessed: 26 April 2022), and Decision VII/11, [in:] UNEP/

context of the implementation of the ecosystem approach in the Mediterranean marine and coastal environment, various steps that have been identified are of particular interest:

- definition of an ecological vision for the Mediterranean region, which has been specified as a healthy Mediterranean with productive and biologically diverse marine and coastal ecosystems;
- establishment of common strategic objectives for the region (the following are of particular interest in the special context:
  - "To protect, allow recovery and, where practicable, restore the structure and function of marine and coastal ecosystems thus also protecting biodiversity, in order to achieve and maintain good ecological status and allow for their sustainable use" and to
  - "prevent, reduce and manage the vulnerability of the sea and the coasts to risks induced by human activities and natural events;"
- determination of key ecosystem characteristics and evaluation of ecological strategic objectives;
- deduction of operational targets with indicators and target values;
- revision of available monitoring programmes for ongoing assessments and periodic revision of targets;
- drafting and reviewing related action plans and programmes[67].

Over time, these rather vague measures were expanded. For instance, operational goals were added. These include the objective that changes of permanent structures on the coast and in watersheds, marine facilities, and structures embedded on the seafloor will be minimized[68]. In addition, the 'Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria (IMAP)' was adopted[69] as a tool for assessing the status of the Mediterranean sea and coast.

As emphasized by the Conference of the Parties to the CBD, the concept builds upon three premises: First, it integrates environmental, economic, and social considerations into the management of living components, and second, it

CBD/COP/7/21, https://www.cbd.int/doc/meetings/cop/cop-07/official/cop-07-21-part2-en.pdf (accessed: 26 April 2022).

[67] Decision IG 17/6, 'Implementation of the ecosystem approach to the management of human activities that may affect the Mediterranean marine and coastal environment', [in:] UNEP (DEPI)/MED IG.17/10, Annex V, https://wedocs.unep.org/bitstream/handle/20.500.11822/7287/08ig17_10_annex5_17_06_eng.pdf (accessed: 26 April 2022).

[68] Decision IG.21.3 on the Ecosystem Approach including adopting definitions of Good Environmental Status (GES) and targets, [in:] UNEP(DEPI)/MED IG.21/9, Annex II, p. 44, https://wedocs.unep.org/bitstream/handle/20.500.11822/6008/13ig21_09_annex2_21_03_eng.pdf (accessed: 26 April 2022).

[69] Decision IG.22/7, [in:] UNEP(DEPI)/MED IG.22/28, https://wedocs.unep.org/bitstream/handle/20.500.11822/6090/16ig22_28_22_07_eng.pdf (accessed: 26 April 2022).

acknowledges the natural limits, and makes use of the natural functioning of ecosystems. Third, there is a need to engage communities of interest in decision-making and management[70]. Due to its thematic and conceptual openness and flexibility, it can be adapted and applied to specific situations in different contexts: "There is no single correct way to achieve the ecosystem approach to management of land, water, and living resources. The underlying principles can be translated flexibly to address management issues in different social contexts."[71].

Finally, the concept of planetary boundaries[72] appears to offer the potential to make a positive contribution to the protection of marine biodiversity in the context of the use of MRE technologies that should not be underestimated. Even though it lacks binding force under international law[73], the planetary boundaries concept provides a useful starting point for controlling human activities by defining planetary boundaries for, but not limited to, changes in biosphere integrity[74]. It is based on the assumption that basically environmentally harmful human activities can be reduced to tolerable limits regarding marine biodiversity.

In light of these findings, it is now appropriate to briefly contextualize the specific normative potential and implications of the concepts to be considered in respect of marine biodiversity conservation in the context of the use of MRE technologies. First of all, the need to link the concepts of no harm and the ecosystem approach should be emphasized. As a consequence, this would mean that 'ecosystem damage' would have to be taken into account to a greater extent than has been the case so far[75]. Above all, that would contribute to a necessary holistic perspective on the entire marine ecosystem – and not just its individual components – and facilitate the determination of the required 'significant damage' in individual cases. Second, with regard to the planetary boundaries concept, it shall be stressed that it can unfold its normative effect above all in

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[70] Decision VII/11, [in:] UNEP/CBD/COP/7/21, https://www.cbd.int/doc/meetings/cop/cop-07/official/cop-07-21-part2-en.pdf (accessed: 26 April 2022).

[71] Decision IG.22/7, [in:] UNEP(DEPI)/MED IG.22/28, https://wedocs.unep.org/bitstream/handle/20.500.11822/6090/16ig22_28_22_07_eng.pdf (accessed: 26 April 2022).

[72] With regard to the planetary boundaries concept see J. Rockström et al., *A safe operating space for humanity*, Nature, vol. 461, 2009, p. 472.

[73] J. Ebbesson, *Social-Ecological Security and International Law in the Anthropocene*, [in:] J. Ebbesson et al. (eds.), International Law and Changing Perceptions of Security: Liber Amicorum Said Mahmoudi, Leiden, 2014, pp. 78 – 82.

[74] See in this regard W. Steffen et al, *Planetary boundaries: Guiding human development on a changing planet*, Science, vol. 347, 2015, pp. 736–746.

[75] With regard to the ecosystem approach in general see N. Giannopoulos, *Global environmental regulation of offshore energy production: Searching for legal standards in ocean governance*, RECIEL, vol. 28, 2019, p. 295.

combination with the precautionary action concept[76]. Not so much by the specific boundaries that have been determined in scientific discourse. These do not form part of current international environmental law[77]. Rather, by the premise that whenever there is reliable evidence that tolerable limits are being exceeded, even if they are scientifically uncertain, these will guide the type of precautionary measures to be taken. The closer human activities are to tolerable limits, the stricter measures, up to and including abandonment of the use of MRE technologies, must be taken. The further away from tolerable limits, the less drastic measures can be taken, such as adaptive management measures[78]. Any gaps regarding specific planetary boundaries need to be filled by MEAs and, primarily, through the decisions of the Conferences of the Parties and other bodies. Still, the MEAs themselves provide numerous entry points for the planetary boundaries concept, for example through vague terms such as 'necessary'[79] or 'favourable conservation status' (see Article 2.1 ASCOBANS). Thus, in the light of the precautionary action concept, the planetary boundaries concept could help to specify the measures to be taken in an individual case and thus remove these from the sole decision-making power of the states[80].

3.3. THE MEA INSTITUTIONS' APPROACH TO MRE – SELECTED ISSUES

There are a number of COP decisions and other MEA documents that have already addressed the (possible) negative impacts of the use of MRE on (marine) biodiversity and that deserve closer consideration. As far as their legally binding nature is concerned, there has been much discussion about the extent to which

[76] J. Ebbesson, *Social-Ecological Security and International Law in the Anthropocene*, [in:] J. Ebbesson et al. (eds.), International Law and Changing Perceptions of Security: Liber Amicorum Said Mahmoudi, Leiden, 2014, pp. 80–82.

[77] D. Piselli and H. van Asselt, *Planetary boundaries and regime interaction in international law*, [in:] D. French and L.J. Kotzé (eds.), Research Handbook on Law, Governance and Planetary Boundaries, Cheltenham/Massachusetts, 2021, p. 125.

[78] With regard to the types of preventive measures see J. Peel, *Precaution* [in:] L. Rajamani and J. Peel (eds.), The Oxford Handbook of International Environmental Law, 2nd edition, Oxford, 2021, pp. 316–317.

[79] J. Ebbesson, *Compliance with planetary boundaries in international law*, [in:] D. French and L.J. Kotzé (eds.), Research Handbook on Law, Governance and Planetary Boundaries, Cheltenham/Massachusetts, 2021, pp. 186–187; J. Ebbesson, *Social-Ecological Security and International Law in the Anthropocene*, [in:] J. Ebbesson et al. (eds.), International Law and Changing Perceptions of Security: Liber Amicorum Said Mahmoudi, Leiden, 2014, p. 81.

[80] J. Ebbesson, *Social-Ecological Security and International Law in the Anthropocene*, [in:] J. Ebbesson et al. (eds.), International Law and Changing Perceptions of Security: Liber Amicorum Said Mahmoudi, Leiden, 2014, pp. 81–85, 89–90.

Conference of the Parties decisions are legally binding[81]. Notwithstanding their primarily legally (non-)binding nature, they can in any case serve as valuable guidelines from the project development phase to project implementation and continuous evaluation of the use of MRE as such decisions and other MEA documents play a decisive role in furthering and implementing the objectives of the MEAs. In the following, some selected decisions and other documents will be presented.

In a number of resolutions, states parties, among others, to the CBD, the CMS, the ACCOBAMS and the ASCOBANS have acknowledged underwater noise as a significant concern for many marine species[82].

Within the framework of the ASCOBANS, the 2009 Meeting of the Parties adopted a set of measures addressed to the states parties to reduce the negative implications associated with the use of marine renewables. In particular, it recommended that "1. [...] Parties and Range States consider a strategic approach to the siting of marine renewable energy developments; to include Strategic Environmental Assessments and Environmental Impact Assessments carried out prior to the construction of marine renewable energy developments and taking into account the construction phase and cumulative impacts; 2. Requests Parties and Range States... to introduce precautionary guidance on measures and procedures for all activities surrounding the development of renewable energy production in order to minimise risks to populations, and mitigate possible effects to small cetaceans following current best practice"[83].

Guidelines should, inter alia, include policies to avoid construction activities with high underwater noise levels during seasons with the greatest populations of small cetaceans, engineering measures to reduce noise emissions from construction activities, and steps to provide warning systems to small cetaceans of any potentially adverse construction noise[84].

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[81] P.-M. Dupuy and J.E. Viñuales, *International Environmental Law*, 2nd edition, Cambridge, 2018, pp. 40 et seq.; K. Houghton, *Identifying new pathways for ocean governance: The role of legal principles in areas beyond national jurisdiction*, Marine Policy, vol. 49, 2014, p. 124.; J. Brunnée, *COPing with Consent: Law-Making under Multilateral Environmental Agreements*, Leiden Journal of International Law, vol. 15, 2002, pp. 21–31.

[82] See UNEP/ASCOBANS/Res.8.11(Rev.MOP9), https://www.ascobans.org/sites/default/files/document/ascobans_res8.11_rev.mop9_cms-family-guidelines-eia-noise.pdf (accessed: 26 April 2022). Technical Support Information to the CMS Family Guidelines on Environmental Impact Assessment for Marine-Noise-generating Activities, UNEP/CMS/COP12/Inf.11/Rev.1 (18 September 2017) (https://www.cms.int/sites/default/files/document/cms_cop12_inf.11_rev1_tsi-noise-eias_e.pdf, accessed: 26 April 2022) with further references.

[83] Resolution No. 2, [in:] 6th Meeting of the Parties to ASCOBANS, UN Campus, Bonn, Germany, 16–18 September 2009, p. 2, https://www.ascobans.org/sites/default/files/document/MOP6_2009-2_UnderwaterNoise_1.pdf (accessed: 26 April 2022).

[84] Ibidem, p. 2.

A positive institutional progress with a special focus on renewable energies has been made in 2015 within the CMS, when the 'CMS Energy Task Force' was established[85]. Already at its 11th meeting, the Conference of the Parties to the CMS urged states parties "to implement, as appropriate, the following priorities in their development of renewable energy technologies:...c) ocean energy: to give attention to possible impacts on migratory species of injury, increased noise and electromagnetic field disturbance especially during construction work in coastal habitats; d) hydro-power: to undertake measures to reduce or mitigate known serious impacts on the upstream and downstream movements of migratory aquatic species, such as through the installation of mitigation measures such as fish passageways or adaptive operations mode and the conservation of regularly flooded areas as nursery and feeding areas nearby the hydroelectric dam"[86]. In 2020, the Task Force has been called upon 1. to examine best practices for the standardization of methodologies for designing and monitoring renewable energy infrastructure and its implications for biological diversity, evidence-based effective remedial actions, and assessment techniques; 2. to compile good practice and make proposals for the inclusion of biodiversity in national renewable energy policies, and Nationally Determined Contributions (NDCs); 3. to provide guiding principles and verification tools for evaluating and mitigating the effects of renewable energy and electricity transmission line developments on migratory species; this shall entail, among others, gathering data on species mortality and enhance national licensing and permitting processes for energy infrastructure[87]. The Task Force is expected to present a report on this to the upcoming 14th Conference of the Parties.

The 'CMS Family Guidelines on Environmental Impact Assessment for Marine Noise-generating Activities'[88] is a compilation of Best Available Techniques and Best Environmental Practice. It is relevant to several CMS instruments, including the AEWA, the ACCOBAMS and the ASCOBANS[89]. The document was endorsed by the 12th Conference of the Parties to the CMS, together with a technical support information document[90] and also adopted by

[85] See UNEP/CMS/Resolution 11.27 (Rev.COP13), paras. 3, 4, https://www.cms.int/sites/default/files/document/cms_cop13_res.11.27_rev.cop13_e.pdf (accessed: 26 April 2022).

[86] See UNEP/CMS/Resolution 11.27 (Rev.COP13), paras. 3, 4, https://www.cms.int/sites/default/files/document/cms_cop13_res.11.27_rev.cop13_e.pdf (accessed: 26 April 2022).

[87] Resolution 13.107, [in:] UNEP/CMS/Decisions COP13, p. 39, https://www.cms.int/sites/default/files/document/cms_cop13_decisions_e_rev.1.pdf (accessed: 26 April 2022).

[88] UNEP/CMS/Resolution 12.14/Annex, pp. 7 et seq., https://www.cms.int/sites/default/files/document/cms_cop12_res.12.14_marine-noise_e.pdf (accessed: 26 April 2022).

[89] Ibidem, pp. 4 et seq.

[90] Technical Support Information to the CMS Family Guidelines on Environmental Impact Assessment for Marine-Noise-generating Activities, UNEP/CMS/COP12/Inf.11/Rev.1

the 9th Meeting of the Parties to the ASCOBANS[91], for instance. These Guidelines are intended to provide specific advice to national and/or regional authorities. They can apply these guidelines in the context of environmental impact assessment standards regulating noise-generating activities in the ocean. According to the Guidelines, environmental impact assessments shall consist of monitoring measures, including

"a. periods of visual and other observation before a noise-generating activity commences
b. passive acoustic monitoring
c. marine mammal observers [and]
d. aerial surveys"[92].

Furthermore, it is recommended that noise mitigation measures also be implemented, such as delayed or soft startup and shutdown or alternative low/no noise options as identified in the OSPAR list of measures to mitigate emissions and environmental effects of underwater noise[93]. The document for technical support suggests a precautionary approach at numerous points, as there has been a lack of detailed research on the reactions of certain species to noises[94]. In addition, the use of strategic environmental assessments and environmental impact assessments is emphasized for these instances where negative impacts to waterfowl are likely to occur. Zoning maps indicating protected areas like Ramsar Sites are seen as a useful tool for effectively avoiding the construction of MRE facilities in such areas.

With its Resolution 5.16, the Meeting of the Parties to the AEWA calls upon its states parties to minimize the adverse impacts of marine wind farms on waterbirds by,

- concentrating research on mitigating negative effects of wind farms on waterbirds, for example, creating maps of key migration corridors and migration crossings;

(18 September 2017), https://www.cms.int/sites/default/files/document/cms_cop12_inf.11_rev1_tsi-noise-eias_e.pdf (accessed: 26 April 2022) with further references.

[91] UNEP/ASCOBANS/Res.8.11 (Rev. MOP9), https://www.ascobans.org/sites/default/files/document/ascobans_res8.11_rev.mop9_cms-family-guidelines-eia-noise.pdf (accessed: 26 April 2022).

[92] UNEP/CMS/Resolution 12.14/Annex, p. 9, https://www.cms.int/sites/default/files/document/cms_cop12_res.12.14_marine-noise_e.pdf (accessed: 26 April 2022).

[93] Ibidem, p. 9.

[94] Technical Support Information to the CMS Family Guidelines on Environmental Impact Assessment for Marine-Noise-generating Activities, UNEP/CMS/COP12/Inf.11/Rev.1 (18 September 2017), for example p. 32, https://www.cms.int/sites/default/files/document/cms_cop12_inf.11_rev1_tsi-noise-eias_e.pdf, accessed: 26 April 2022) with further references.

- continuing to promote the removal of wind turbines at existing facilities when waterbird mortality affects the population status of a species where other mitigation measures have proven to be unsatisfactory[95].

The CBD in its Decision XII/23 encouraged states parties as well as indigenous communities "to avoid, minimize and mitigate the potential significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity", and equipped them with sets of measures to apply, *inter alia*:

- characterization of noise by source;
- conducting studies to fill research and knowledge gaps;
- application of best available techniques and practices;
- using a combination of acoustic mapping with habitat mapping of noise-sensitive species with respect to spatial risk assessments to detect areas of potential exposure of these species to noise disturbances;
- carry out impact assessments covering activities that may have significant adverse effects on species, and carry out monitoring;
- incorporate noise factors into the development and preparation of marine protected area plans under national jurisdiction;
- take into account noise thresholds as a tool to safeguard noise-sensitive species;
- and to involve industry and other sectors in the development of guidelines to enhance ownership and participation in their implementation[96].

Also under the Bern Convention[97], documents, including recommendations addressing the impacts of MRE on biodiversity have been adopted[98]. Especially Recommendation No. 200 (2018) of the Standing Committee which builds on previous recommendations suggesting, inter alia, the application of strategic environmental assessments and environmental impact assessments, deserves a deeper analysis. It includes suggestions with regard to the development of wind farms, which can also be applied to other situations detached from the specific context of the document[99]. Specifically, the Standing Committee

[95] 5th Session of the Meeting of the Parties, 14–18 May 2012, Resolution 5.16, Renewable Energy and Migratory Waterbirds, https://www.unep-aewa.org/sites/default/files/document/res_5_16_renewable_energy_and_mwb_0.pdf (accessed: 26 April 2022).

[96] UNEP/CBD/COP/DEC/XII/23, https://www.cbd.int/doc/decisions/cop-12/cop-12-dec-23-en.pdf (accessed: 26 April 2022).

[97] 1284 UNTS 209.

[98] See C. Soria-Rodríguez, *The International Regulation for the Protection of the Environment in the Development of Marine Renewable Energy in the EU*, RECIEL, vol. 30, 2021, pp. 55–56.

[99] T-PVS(2018)11, Standing Committee, 38th meeting, Recommendation on the Windfarms Planned Near Balchik and Kaliakra, and other Windfarm Developments on the Via Pontica Route (Bulgaria), https://rm.coe.int/recommendation-on-the-windfarms-planned-near-balchik-and-kaliakra-and-/16808e84ed (accessed: 26 April 2022).

recommends the application of a comprehensive independent assessment of the impact of existing windfarms in the relevant area "according to scientifically appropriate methods". The assessment is expected to include information on collision mortality, but also to consider other impacts such as displacement, barrier effects, and habitat alteration. It shall enable information sharing among wind farm operators, regional authorities, and NGOs. Furthermore, operators are encouraged to identify options for creating conservation benefits for migratory birds and habitats in the area, among others, by the designation of additional protected areas.

Following the request of the so-called 'Blue Conference of the Parties' of the UNFCCC of December 2019 which was specifically dedicated to the marine environment[100] "to convene […] a dialogue on the ocean and climate change to consider how to strengthen mitigation and adaptation action in this context"[101], the Subsidiary Body for Scientific and Technological Advice (SBSTA) prepared a background paper addressing ocean and climate change action under the UNFCCC and the Paris Agreement[102]. This paper includes a compilation of 47 contributions the UNFCCC Secretariat has obtained from states parties and relevant stakeholders to support the dialogue. The report states that there is a need to assess how marine renewable energy structures may be able to mitigate negative impacts at the local level while providing benefits to ecosystems, biodiversity, and society. For instance, in its statement, the European Union points out that the European Union and its member states are world leaders in the generation of offshore wind energy (79% of worldwide installed capacity) and marine energy (78% of worldwide installed capacity) and have been working to develop a range of initiatives to address cost savings and to promote better conditions for marine energy and offshore wind[103]. It is also reported that Monaco has been one of the first countries to deploy seawater heat pumps and that it keeps working to improve their efficiency as well as mitigate their negative effects on the ecosystem[104].

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[100] See Subsidiary Body for Scientific and Technological Advice, Ocean and Climate Change Dialogue to consider how to strengthen adaptation and mitigation action, Information note by the Chair, 9 November 2020, p. 5, https://unfccc.int/sites/default/files/resource/OD_InformationNote.pdf, (accessed: 26 April 2022).

[101] Decision1/CP.25, [in:] FCCC/CP/2019/13/Add.1 (16 March 2020), p. 4 para. 31, https://unfccc.int/sites/default/files/resource/cp2019_13a01E.pdf (accessed: 26 April 2022).

[102] Subsidiary Body for Scientific and Technological Advice, Ocean and Climate Change Dialogue to consider how to strengthen adaptation and mitigation action, Information note by the Chair, 9 November 2020, https://unfccc.int/sites/default/files/resource/OD_InformationNote.pdf, (accessed: 26 April 2022).

[103] Ibidem.

[104] Ibidem.

In 2014, the second session of the Meeting of the Parties to the Espoo Convention serving as the Meeting of the Parties to the Protocol on Strategic Environmental Assessment[105] endorsed 'Good Practice Recommendations on Public Participation Strategic Environmental Assessment'[106] which can provide valuable input for national decision-makers, project owners, and other stakeholders. The role of engaging the public is highlighted as a pillar of effective strategic environmental assessment. While it can enhance transparency and reliability of the decision-making process, contribute to the consideration of all relevant issues during the planning process, and facilitate the incorporation of the public's view at an early stage of the programme development process, it can also ensure that the public's view is considered throughout the development process[107].

Sometimes it may be difficult to identify relevant public stakeholders in respect of marine plans. In such cases the 'Good Practice Recommendations' suggest that organizations representing the interests of or being familiar with the specific area are included in the process.

In its 'Guidance for addressing the implications for wetlands of policies, plans and activities in the energy sector', the Ramsar Convention identifies potential impacts of energy sector activities on wetlands and wetlands ecosystem services, and provides recommendations[108]. They include impacts to local climate that may decrease the potential for carbon sequestration and storage in peatlands. For instance, the potential and cumulative effects of all planned and ongoing energy projects on wetland ecosystems shall be fully evaluated. Furthermore, the Conference of the Contracting Parties highlights the importance of applying the 'Guidelines for Strategic Environmental Assessment' and the 'Guidelines for Environmental Impact Assessment'[109] in this respect. In that context, it is also suggested to adopt a precautionary approach whenever activities have irreversible impacts on wetlands or when significant or irreversible loss of wetland ecosystem services is anticipated in the Strategic Environmental Assessment or Environmental Impact Assessment.

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[105] 2685 UNTS 140.

[106] See Excerpt from ECE/MP.EIA/20/Add.2 - ECE/MP.EIA/SEA/4/Add.2, https://unece.org/DAM/env/eia/decisions/Decision_II.8.pdf (accessed: 26 April 2022).

[107] ECE/MP.EIA/SEA/2014/2 (19 March 2014), Good Practice Recommendations on Public Participation in Strategic Environmental Assessment, pp. 19-39, https://unece.org/fileadmin/DAM/env/documents/2014/EIA/MOP/ECE.MP.EIA.SEA.2014.2_e.pdf (accessed: 26 April 2022).

[108] Ramsar COP11 Resolution XI.10, Annex, https://www.ramsar.org/sites/default/files/documents/pdf/cop11/res/cop11-res10-e.pdf (accessed: 26 April 2022).

[109] Ramsar COP10 Resolution X.17, Annex, pp. 3 et seq., https://www.ramsar.org/sites/default/files/documents/pdf/res/key_res_x_17_e.pdf (accessed: 26 April 2022).

4. CONCLUSIONS AND RECOMMENDATIONS

As highlighted in section 2., the scientific evidence on the negative impacts of MRE technologies on marine biodiversity has not yet been sufficiently established. However, as discussed in section 3.2., the application of the concept of precautionary action is critical in this context. Addressing the question on to what extent the current legal framework can provide a positive contribution to biodiversity conservation, we highlighted in particular the need to link established concepts with newer ones. In this regard, linking 'no harm' and the ecosystem approach, in particular, will assist in clarifying the direction for the future development of MREs. Moreover, as we have highlighted, the concept of planetary boundaries has the potential to unfold its normative impact if it is approached through the lens of the precautionary principle. As raised in the introduction, a more holistic approach to IEL concepts will contribute to a more grounded discourse on the compatibility of biodiversity conservation and the realization of MRE technologies. And, not least, contribute to a safer practical use of new technologies.

As shown in section 3.3., MEA bodies have so far focused on equipment noise among the stressors identified. As part of an extended application of environmental impact assessments, MEA institutions recommend the establishment of monitoring programmes and a comprehensive collection of relevant data regarding, inter alia, the noise sensitivity of the species concerned. In addition, they advise to apply the precautionary approach.

By way of conclusion, we are convinced that current IEL, despite its lack of specific treaty provisions regarding the use of MRE, provides states with sufficient tools to ensure a biodiversity-compatible transition towards MRE. Therefore, the objective should not necessarily be to establish new comprehensive rules addressing the use of MRE. Rather, the aim should be to take advantage of the international institutional and normative framework that already exists.

In the following we include a set of recommendations outlining our approach to regulating the use of MRE in light of existing MEAs and more general international environmental law concepts. We believe that decisions and recommendations of the Conferences of the Parties are useful to be taken into account. These may serve as a general survey of possible approaches to implementing MRE regulation in national legislation/administrative processes. They do not relieve the national decision-makers from their responsibility to observe specific MEA obligations and to develop national legal requirements on a case-by-case-basis.

4.1. ABIDANCE BY MEA PROVISIONS

As indicated above, the analysis of MEAs shows that their combined application provides an additional but still rudimentary framework for the general protection of the marine environment. The legal framework of existing treaties should be further developed in order to guarantee comprehensive protection against potentially negative environmental impacts of MRE, and to enable states to adopt pertinent decisions jointly or in cooperation.

UNCLOS provides the general legal framework for the protection of the marine environment. It does not, however, include obligations focusing on MRE. In particular, there is a lack of specific rules for the various stages of the life span of MRE installations. The regulatory framework is even more deficient when it comes to the marine areas beyond national jurisdiction. The Convention only provides a starting point but necessitates further provisions at the international, regional and domestic level to effectively protect the marine environment against negative impacts of MRE.

The rules regarding environmental protection from the impact of MRE at the level of international treaty law are still very general and leave many aspects to the parties and their individual decision-making. But even if the environmental law framework is fragmented, the object and purpose of the various agreements provide meaningful guidance for MRE development. Any MRE activity should not only be cross-checked against specific obligations but also in light of treaty objectives. Apart from specific obligations, it is spirit and intentions that matter.

4.2. OBSERVATION OF CUSTOMARY RULES OF INTERNATIONAL LAW

States must observe customary international law in all phases of the implementation of the use of MRE, beginning with planning, construction, management and decommissioning. According to the no harm concept, they are required not to use or permit the use of MRE technologies within their territories or common marine spaces that may cause significant damage to the marine environment of other states or common marine spaces. In particular, each state of origin must undertake appropriate steps to monitor and provide for the *ex-ante* regulation of sources of potentially significant transboundary damage.

In the context of cases where scientific knowledge about the linkages between the use of MRE and the potentially adverse impacts that may result is still fragmentary, states need to observe the concept of precautionary action. This concept may serve to justify the adoption of mitigation measures in cases of serious or irreversible threats to the environment even in cases where verified data on negative effects are missing.

As one of the procedural obligations flowing from the no harm concept, the application of environmental impact assessments with regard to specific threats (e.g. noise, electro-magnetic fields, changes in sediment distribution due to seabed disruption) ensures that national decision-makers obtain sufficient information on potential impacts on the environment for deciding whether to approve the activity and to what monitoring procedures their project activities will be subject[110].

4.3. COMPLIANCE WITH MEA GUIDELINES

Although they are not legally binding in the strict sense, states should follow MEA guidelines, as well.

For instance, they should apply strategic environmental assessments, as specified in relevant documents[111], to the extent that states are not already obliged to do so under relevant international treaties. They shall ensure public participation at all stages, as appropriate (all relevant stakeholders shall be involved)[112].

Decision-makers should incorporate the concept of ecosystem approach in their planning activities, as far as possible and as appropriate, and, drawing on the example of the Barcelona Convention[113], adapt and apply appropriate guidelines to their specific situation.

Decision-makers should also take due account of relevant (technical) standards and thresholds with regard to the specific threats in order to stay within the 'safe operating space' with respect to marine biodiversity conservation[114]. Such technical standards and thresholds should be integrated into national policies[115] and applied on the basis of best available techniques and practices.

Furthermore, they should establish comprehensive zoning maps which can help avoiding protected areas in the phase of planning MRE facilities[116]. An

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[110] A. Boyle, *Developments in International Law of EIA and their Relation to the Espoo Convention*, https://unece.org/fileadmin/DAM/env/eia/documents/mop5/Seminar_Boyle.pdf (accessed: 26 April 2022).

[111] E.g., see Decision V/6, [in:] UNEP/CBD/COP/5/23 (22 June 2000), p. 148, https://www.cbd.int/doc/meetings/cop/cop-05/official/cop-05-23-en.pdf (accessed: 26 April 2022).

[112] See Excerpt from ECE/MP.EIA/20/Add.2 - ECE/MP.EIA/SEA/4/Add.2, https://unece.org/DAM/env/eia/decisions/Decision_II.8.pdf (accessed: 26 April 2022).

[113] Decision IG.22/7, [in:] UNEP(DEPI)/MED IG.22/28, https://wedocs.unep.org/bitstream/handle/20.500.11822/6090/16ig22_28_22_07_eng.pdf (accessed: 26 April 2022).

[114] J. Rockström et al., *A safe operating space for humanity*, Nature, vol. 461, 2009, p. 472.

[115] See UNEP/CBD/COP/DEC/XII/23, https://www.cbd.int/doc/decisions/cop-12/cop-12-dec-23-en.pdf (accessed: 26 April 2022).

[116] See UNEP/ASCOBANS/Res.8.11(Rev.MOP9), for example p. 9, https://www.ascobans.org/sites/default/files/document/ascobans_res8.11_rev.mop9_cms-family-guidelines-eia-noise.pdf (accessed: 26 April 2022).

adequate national maritime spatial planning policy[117] can be crucial in this regard for the sustainable management of the marine environment, balancing economic, social, and marine environmental needs.

Decision-makers should provide for positive incentives in order to enhance the use of sustainable MRE technologies that ensure full consideration of marine environmental concerns[118].

MITYGACJA NEGATYWNEGO WPŁYWU MORSKIEJ ENERGII ODNAWIALNEJ NA RÓŻNORODNOŚĆ BIOLOGICZNĄ: ROLA MIĘDZYNARODOWEGO PRAWA ŚRODOWISKA

Słowa kluczowe: morska energia odnawialna, wielostronne umowy środowiskowe, koncepcja *no harm*, koncepcja działań zapobiegawczych, oceny oddziaływania, udział społeczeństwa

Abstrakt

Transformacja światowego sektora energetycznego postępuje. Udział energii odnawialnej wzrasta i osiągnął 36,6% globalnej mocy elektrycznej w 2020 r. Morska energia odnawialna odgrywa istotną rolę w tej transformacji. Jednak chociaż odnawialna energia morska przyczyni się do zmniejszenia emisji gazów cieplarnianych, a tym samym zwiększy zgodność z porozumieniem paryskim, istnieją obawy dotyczące potencjalnego wpływu, jaki instalacje morskiej energii odnawialnej mogą mieć na różnorodność biologiczną. Takie oddziaływania obejmują m.in. utratę siedlisk, ryzyko kolizji, hałas i pola elektromagnetyczne. Niniejszy artykuł zajmuje się tymi zagadnieniami z perspektywy międzynarodowego prawa ochrony środowiska, ilustrując, w jaki sposób można uwzględnić potencjalnie sprzeczne cele (ograniczenie emisji gazów cieplarnianych oraz zachowanie różnorodności biologicznej). Wymaga to omówienia szerzej pojęć, takich jak brak szkody i działania zapobiegawcze, a także szczegółowych zasad dotyczących morskich obszarów chronionych, aż po dyskusję na temat konkretnych kwestii traktatowych, a nawet udziału społeczeństwa, w tym udziału ludów tubylczych. Artykuł ma na celu zilustrowanie zdolności prawa międzynarodowego do zapewnienia nie tylko przyjaznego dla środowiska, ale zgodnego z różnorodnością biologiczną przejścia na odnawialną energię morską.

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[117] Decision XII/23, Marine and coastal biodiversity: Impacts on marine and coastal biodiversity of anthropogenic underwater noise and ocean acidification, priority actions to achieve Aichi Biodiversity Target 10 for coral reefs and closely associated ecosystems, and marine spatial planning and training initiatives, [in:] UNEP/CBD/COP/DEC/XII/23 (17 October 2014), https://www.cbd.int/doc/decisions/cop-12/cop-12-dec-23-en.pdf (accessed: 26 April 2022).

[118] Ibidem, pp. 8–9.

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