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# DEEP-SEA MARINE BIOPROSPECTING UNDER UNCLOS AND THE CBD

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## 1. Introduction

The deep ocean was long viewed as an immense, lifeless expanse of water. It was of little concern or interest to international lawyers and policy makers until the late twentieth-century. Only then did scientists begin to realize that the abyss in fact teems with life and is home to a vast array of both biological and chemical diversity. Today, it is believed that the deep ocean constitutes 80 to 97% of our planet's biosphere, the sum of all ecosystems on our planet.<sup>[1]</sup>

Most of that biodiversity is as yet undiscovered. Scientists began exploring deep-sea habitats in the 1970s and have yet to grasp a full understanding of life forms in such extreme environments of high pressure, total darkness, and low temperatures.<sup>[2]</sup> Yet, both scientists and the biotechnology industry agree that the genetic makeup of deep-sea organisms hold a massive potential for large-scale industrial development and commercialization, including for pharmaceutical, cosmetic, chemical and other products.<sup>[3]</sup>

In order to tap into unknown genetic resources of the deep sea, public and private investors set up an increasing number of bioprospecting cruises since the early 1990s. Those cruises have led to the sampling and sometimes commercialization of new marine biotech products.<sup>[4]</sup> The purpose of this paper is to survey briefly the legal regime applicable to such activities happening in areas beyond the territorial seas of coastal States.<sup>[5]</sup> Special attention is devoted to the United Nations Convention on the Law of the Sea ('UNCLOS' or the 'Convention') and other relevant international instruments, including the Convention on Biological Diversity ('CBD'). However, this paper does not address the impact of other international instruments such as those made in the framework of the World Trade Organization and World Intellectual Property Organization.

The structure of this paper will follow the zonal division established by UNCLOS, although some overlapping will become apparent between the legal regimes applicable to marine bioprospecting in the various zones. After a very brief description of marine bioprospecting and of its processes in Section 2, Section 3 will set out the legal regime applicable to marine bioprospecting in areas under national jurisdiction, and Section 4 will discuss the regime applicable in areas beyond national jurisdiction, and finally, Section 5 will briefly summarize the existent regime and identify potential avenues for future improvements.

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<sup>[1]</sup> S. Arnaud-Haond, 'Ressources génétiques en environnement océanique profond : exploration, valorisation et conservation', Abstract of a presentation made at the Eighth Meeting of the United Nations Informal Consultative Process on Oceans and the Law of the Sea, Discussion Panel on Marine Genetic Resources, 25-29 June 2007, available at [www.un.org/depts/los/consultative\\_process/.../8\\_abstract\\_arnaud\\_haond.pdf](http://www.un.org/depts/los/consultative_process/.../8_abstract_arnaud_haond.pdf).

<sup>[2]</sup> See D.K. Leary, 'Bioprospecting and the Genetic Resources of Hydrothermal Vents on the High Seas: What is the Existing Legal Position, Where Are we Heading and What are our Options?', 1 Macquarie Journal of International and Comparative Environmental Law 137 (2004), at 137-141.

<sup>[3]</sup> See e.g. R. WARNER, PROTECTING THE OCEANS BEYOND NATIONAL JURISDICTION (Martinus Nijhoff Publishers, 2009), at 20.

<sup>[4]</sup> See the examples given by M. Slattery in 'Marine Genetic Resources: Experiences in Commercialization', Abstract of a presentation made at the Eighth Meeting of the United Nations Informal Consultative Process on Oceans and the Law of the Sea, Discussion Panel on Marine Genetic Resources, 25-29 June 2007, available at [www.un.org/depts/los/consultative\\_process/.../8\\_abstract\\_slatter.pdf](http://www.un.org/depts/los/consultative_process/.../8_abstract_slatter.pdf) and by Leary, supra note 2, at 142-143.

<sup>[5]</sup> Marine bioprospecting in territorial seas is subject to the jurisdiction of the coastal State under Article 2 of the United Nations Convention on the Law of the Sea.

## 2. What is marine bioprospecting?

Marine bioprospecting basically consists in procuring and analyzing samples of marine genetic material, and identifying potentially marketable products to be developed from them.<sup>[6]</sup> There is some disagreement in the literature as to whether commercialization activities down the line should be included in the definition.<sup>[7]</sup> This paper retains the broad definition of marine bioprospecting recently put forward by an International Expert Group convened by the Research Council of Norway on the subject:

‘Bioprospecting covers commercial purpose research and development, building on use of natural occurring compounds, all the way from first discovery, over patenting, benchmarking, improvement, development and commercialization.’<sup>[8]</sup>

Leary has identified four phases of bioprospecting activities.<sup>[9]</sup> While bioprospecting is quite complex and may vary depending on the particulars of a given venture, Leary’s four phases provide a useful schema of the usual progression of bioprospecting activities. They are: Phase 1: on-site collection of samples; Phase 2: isolation, characterization and culture of specific compounds; Phase 3: screening for potential uses, such as pharmaceutical or other uses; and Phase 4: product development and commercialization, including patenting, trials, sales and marketing.<sup>[10]</sup>

In practice, deep-sea bioprospecting occurs mostly, although not exclusively, in specific habitats such as hydrothermal vents, cold seeps, submarine trenches.<sup>[11]</sup> Bioprospecting cruises have been commissioned in most parts of the world’s oceans by both public and by private institutions.<sup>[12]</sup> Many cruises were also co-sponsored, with private and public institutions sharing the costs of the dives.<sup>[13]</sup> Once on-site, researchers and prospectors collect samples using high technology submersibles or remotely operated vehicles (ROVs). The collection of samples raises a number of technical problems including the risk of contamination or damage to the samples due to temperature and pressure changes.<sup>[14]</sup> Once collected, samples are stored under controlled laboratory conditions and screened for potential industrial uses.<sup>[15]</sup> Where industrial development ensues, resources may be reharvested from

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<sup>[6]</sup> Genetic resources are defined at Article 2 of CBD as ‘[any material of plant, animal, microbial or other origin containing functional units of heredity] of actual or potential value.’

<sup>[7]</sup> See D.K. LEARY, *INTERNATIONAL LAW AND THE GENETIC RESOURCES OF THE DEEP SEA* (Martinus Nijhoff Publishers, 2007), at 157-158.

<sup>[8]</sup> International Expert Group convened by the Research Council of Norway, ‘Possibilities for a bioprospecting commitment in Norway 2008 – 2020’, 2008, report available at [www.forskningssradet.no](http://www.forskningssradet.no). See also the definition put forward by the CBD Secretariat quoted by in S. Hart, ‘Elements of a Possible Implementation Agreement to UNCLOS for the Conservation and Sustainable Use of Marine Biodiversity in Areas beyond Nation Jurisdiction’, IUCN Environmental Policy and Law Papers online – Marine Series No. 4, at 15 (*‘the exploration of biodiversity for commercially valuable genetic and biochemical resources... the process of gathering information from the biosphere on the molecular composition of genetic resources for the development of new commercial products.’*) Some commentators have referred to the definition used for prospecting of polymetallic nodules – see A. de Marffy, ‘Les Espaces marins au-delà des juridictions nationales entre droit applicable et modernité’, *Annuaire du droit de la mer* 2005, 25, at 66-67.

<sup>[9]</sup> See Leary, *supra* note 7, at 164-165.

<sup>[10]</sup> *Id.*

<sup>[11]</sup> See Warner, *supra* note 3, at 20.

<sup>[12]</sup> See the database maintained by the United Nations University – Institute of Advanced Studies at [www.bioprospector.org](http://www.bioprospector.org).

<sup>[13]</sup> See Leary, *supra* note 7, at 167. Such mixed-purpose campaigns, which combine scientific research and commercially-driven ventures, raise specific legal issues, as described below at Section 4.1.

<sup>[14]</sup> See Leary, *supra* note 7, at 166.

<sup>[15]</sup> See A. de Marffy, ‘Les Espaces marins au-delà des juridictions nationales entre droit applicable et modernité’, *Annuaire du droit de la mer* 2005, 25, at 70.

their original environments and/or artificially reproduced through various procedures like aquaculture.<sup>[16]</sup>

### 3. Marine bioprospecting in the EEZ and on the Continental Shelf

UNCLOS does not mention marine genetic resources, let alone marine bioprospecting. At the time the Convention was drafted, little was known of the potential value of such resources, and indeed of their very existence. This may explain its failure to address such a major issue despite its drafters' wish to settle 'all issues' relating to the law of the sea.<sup>[17]</sup>

It would be disingenuous, however, to say that UNCLOS fails to provide a legal regime for deep-sea marine bioprospecting. While UNCLOS fails to address the issue explicitly, many of its general provisions do apply to marine bioprospecting. In conjunction with relevant provisions of other legal instruments like the CBD, they suggest a comprehensive, if inconsistent, legal regime applicable to marine bioprospecting.<sup>[18]</sup>

This section focuses on marine bioprospecting in Exclusive Economic Zones ('EEZs') (1) and on the Continental Shelf (2).

#### 3.1 Marine bioprospecting in the EEZ

Article 56(1) of UNCLOS provides that States have

'sovereign rights [in their EEZ] 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'.

Marine genetic material extracted from living organisms clearly fall under the category of 'natural resources' as defined by Article 56(1). Coastal States therefore have sovereign rights to undertake, authorize, and/or supervise the exploration and commercial exploitation of marine genetic resources in their EEZs.<sup>[19]</sup> This includes the crucial right to impose taxes and/or royalties on benefits accrued as a result of commercialization of marine biotech products.<sup>[20]</sup>

The freedom of coastal States to explore marine genetic resources in their EEZ is not unfettered. Article 192 of UNCLOS imposes upon States a general 'obligation to protect and preserve the environment', which covers marine genetic resources falling under their territorial jurisdiction.<sup>[21]</sup> Therefore, when engaging or permitting private and public entities to conduct marine bioprospecting, States have a duty to ensure that those activities will not damage the environment. In practice, Article 192 arguably compels States to implement an

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<sup>[16]</sup> See e.g. S.A. Pomponi, 'The Potential for the Marine Biotechnology Industry' in B. CINCIN-SAIN ET AL. (EDS.), *TRENDS AND FUTURE CHALLENGES FOR US NATIONAL OCEAN AND COASTAL POLICY* (NOAA, National Ocean Service, August 1999) 101, at 101, and D. Rowley, 'Services Provided by Marine Genetic Resources', Abstract of a presentation made at the Eighth Meeting of the United Nations Informal Consultative Process on Oceans and the Law of the Sea, Discussion Panel on Marine Genetic Resources, 25-29 June 2007, available at [www.un.org/Depts/los/consultative\\_process/.../8\\_abstract\\_rowley.pdf](http://www.un.org/Depts/los/consultative_process/.../8_abstract_rowley.pdf), at 3.

<sup>[17]</sup> Preamble of UNCLOS, paragraph 1. See also E. Canal-Forgues, 'Les ressources génétiques des grands fonds marins ne relevant d'aucune juridiction nationale', *Annuaire du droit de la mer* 2005, 99, at 104.

<sup>[18]</sup> It is worth noting that the CBD expressly refers to UNCLOS and provides that it should be implemented 'consistently with the rights and obligations of States under the law of the sea' (Article 22(2)).

<sup>[19]</sup> See Leary, *supra* note 2, at 149.

<sup>[20]</sup> See e.g. Article 10 of the Norwegian Maritime Resources Act of 2009, which provides that marine bioprospecting permits in areas under Norwegian jurisdiction 'may lay down that a proportion of the benefits arising out of the use of Norwegian marine genetic material shall accrue to the state'

<sup>[21]</sup> On the broad scope of Article 192, see M. NORDQUIST, A. YANKOV, N. GRANDY, SH. ROSENNE (EDS.), *UNITED NATIONS CONVENTIONS ON THE LAW OF THE SEA 1982: A COMMENTARY, VOLUME IV* (Brill, 1991).

effective environmental preservation framework applicable to marine bioprospecting activities conducted within their EEZ.

This general obligation to protect and preserve the environment is supplemented by a specific obligation to prevent, reduce, and control pollution arising out of marine bioprospecting cruises conducted in the EEZ.<sup>[22]</sup> Articles 194 to 196 of UNCLOS cover all sorts of pollution, including light and noise pollution which are of particular concern in the total darkness and nearly absolute silence of the abyss.<sup>[23]</sup> Pollution may also result the introduction of invasive alien species by the machines used for exploring and sampling deep-sea habitats.<sup>[24]</sup>

Environmental duties under UNCLOS are complemented and indeed refined by various obligations arising out of the CBD.<sup>[25]</sup> Under Article 7 of the CBD, States must identify and monitor marine genetic resources in their areas of national jurisdiction, with a particular emphasis on any resource requiring conservation measures.<sup>[26]</sup> Although the CBD does not define ‘areas of national jurisdiction’, it can be safely argued that such identification and monitoring obligations apply in the EEZ. In addition, Article 7(c) of the CBD forces States 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.’

Marine bioprospecting plainly qualifies as an activity that may have ‘significant adverse impacts on the conservation and sustainable use’ of marine genetic resources seen by the CBD as part of biological diversity.<sup>[27]</sup> Under the CBD, States are, therefore, under an obligation to monitor the environmental effects of marine bioprospecting cruises conducted under their control, including in their EEZ.<sup>[28]</sup>

Finally, and perhaps most importantly, the CBD calls for the implementation of access and benefit-sharing (‘ABS’) mechanisms by State Parties.<sup>[29]</sup> ABS is beyond the scope of this paper, but it is worth noting that marine genetic resources will likely be covered by the Protocol to the CBD which State Parties may adopt in late October 2010 in Nagoya.<sup>[30]</sup>

### 3.2 Marine bioprospecting on the continental shelf

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<sup>[22]</sup> Articles 194 to 196 of UNCLOS. See also the monitoring and assessment obligations established by Articles 204 and 206 of UNCLOS.

<sup>[23]</sup> See Leary, *supra* note 2, at 167-168.

<sup>[24]</sup> *Ibid*, at 165.

<sup>[25]</sup> Virtually all States Parties to UNCLOS are also Parties to CBD. There are a few notable exceptions, however, including Canada, Russia, Australia and ... Monaco – the list maintained by the CBD Secretariat, available at <http://www.cbd.int/convention/parties/list/>. The CBD applies, pursuant to its Article 4, to ‘components of biological diversity [...] in areas within the limits of [...] national jurisdiction, and [to] processes and activities, regardless of where their effects occur, carried out under [the] jurisdiction or control [of Member States] within the area of [their] national jurisdiction or beyond the limits of national jurisdiction.’ It is, therefore, entirely applicable to marine bioprospecting activities conducted within the EEZ, while only its relevant provisions apply

<sup>[26]</sup> Article 7(a) et 7(b) of the CBD.

<sup>[27]</sup> See Article 2 of the CBD.

<sup>[28]</sup> Other obligations under the CBD include *in situ* and *ex situ* conservation of samples, the latter of which may be of utmost relevant to the conservation of samples of deep-sea marine genetic resources in the future – see Warner, *supra* note 3, at 93.

<sup>[29]</sup> See Article 15 of the CBD.

<sup>[30]</sup> See the Draft Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity, UN Document No. UNEP/CBD/WG-ABS/9/3, at 44-60. For an update on the status of the negotiations, see the information portal maintained by the CBD Secretariat at [www.cbd.int/abs/ir](http://www.cbd.int/abs/ir).

Article 77(1) of UNCLOS provides that coastal States exercise ‘sovereign rights for the purpose of exploring [...] and exploiting [the] natural resources’ of their continental shelf. Article 77(4) states that such natural resources include ‘living organisms belonging to sedentary species’.

The definition of ‘sedentary species’ under Article 77(4) has been the subject of academic and diplomatic debate. It is clear, however, that marine bioprospecting associated with sedentary species, including certain fish and octopus species, falls under the purview of Article 77.<sup>[31]</sup> In other words, coastal States have the right to undertake, or authorize and supervise, marine bioprospecting activities over the genetic resources of sedentary living organisms on their continental shelf.

Yet, many believe that the distinction between ‘sedentary’ and ‘moving’ genetic resources makes little scientific and policy sense.<sup>[32]</sup> Genetic material in microbial form is often found suspended in the water column and on the sea floor. While the distinction may make sense in relation with fishes and marine mammals, many scientists see little logic in having the right to sample genetic materials that have settled on the ocean floor, but not those in suspension in the water-column.<sup>[33]</sup> The limits of the existing provisions of UNCLOS appear when it comes to applying those provisions to new uses such as bioprospecting.

As for the sedentary resources located within their EEZs, the freedom of coastal States to tap into the marine genetic resources of their continental shelf is not unqualified. The obligations deriving from UNCLOS and the CBD are also applicable to marine bioprospecting activities on the continental shelf.<sup>[34]</sup> States have the duty to protect and preserve the environment (Article 192 UNCLOS), to prevent, reduce and control pollution (Articles 194 to 196, 204 and 206 UNCLOS), and to identify and monitor genetic resources and the processes and activities which may adversely impact them (Articles 7 and 8 of the CBD). It is unclear whether the ABS regime established under the CBD also apply to genetic resources of the continental shelf; although the wording of Article 15(1) of the CBD (‘their resources’) suggests all genetic resources falling under the jurisdiction of a State in any given way are eligible for ABS. Subject to these obligations and to potential ABS regimes, however, coastal States clearly have the right to engage and supervise any private or public engagement in the bioprospecting of marine genetic resources associated with the sedentary species of their continental shelf.

#### **4. Marine bioprospecting in areas beyond national jurisdiction**

UNCLOS endorsed the Grotian principle of freedom of the high seas and effectively established a free-access regime for living resources in areas beyond national jurisdiction. Jurisdiction over marine bioprospecting in such areas lies with individual States (1) although some cooperation obligations apply (2).

##### **4.1 Individual State regulation of marine bioprospecting in the high seas**

Article 87(1) of UNCLOS states the fundamental principle of freedom of the high seas and enumerates a number of applications for that freedom. Because marine bioprospecting was in

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<sup>[31]</sup> See Leary, *supra* note 2.

<sup>[32]</sup> Leary, *supra* note 2, at 149 points out *inter alia* that the distinction has no connection with biological taxonomy and that no ‘harvesting stage’ can be said to exist for microbial forms.

<sup>[33]</sup> Leary points out, however, that many valuable genetic resources are located on deep-sea hydrothermal vents, which are generally located on oceanic ridges and thus not on the continental shelf of any coastal State as per Article 76(3) of UNCLOS – see Leary, *supra* note 2, at 150-151. On the identity of marine genetic resources in the water column and on the ocean floor, see E. Canal-Forgues, ‘Les ressources génétiques des grands fonds marins ne relevant d’aucune juridiction nationale’, *Annuaire du droit de la mer* 2005, 99, at 108.

<sup>[34]</sup> See *supra* Section 3.1.

its infancy at the time of drafting the Convention, the exploration and exploitation of genetic resources are not mentioned in Article 87(1). Some commentators believe that the freedom to engage in marine bioprospecting derives from Article 87(1)(f), which covers marine scientific research.<sup>[35]</sup> Bioprospecting is, however, distinct from scientific research and has a distinct legal regime, as will become apparent below. Nor can marine bioprospecting fall under the freedom to fish enshrined at Article 87(1)(e), to which a number of specific and detailed regimes apply.

The freedom to conduct marine bioprospecting in the high seas more likely stems from the general principle set out at the first paragraph of Article 87(1). The list of freedoms at Article 87(1)(a-f) is not exhaustive, as apparent from the words ‘inter alia’ in Article 87(1). Freedom of the high seas covers other uses of the seas unforeseen at the time of drafting, including marine bioprospecting.<sup>[36]</sup> That freedom extends to genetic resources both in the water column beyond the limits of EEZs, and on the seabed beyond the outer edge of the continental shelf, since living resources are not covered by the exploration and exploitation regime applicable to the Area’s mineral resources codified at Part XI of the Convention.<sup>[37]</sup>

Marine genetic resources in the high seas, therefore, remain subject to a free-access regime. This does not mean that any private operator is free to explore, collect, and exploit such resources; nor does it mean that UNCLOS fails to provide a legal regime for marine bioprospecting. Simply put, the free-access regime means that each State, rather than the international community, may implement a legal regime for marine bioprospecting in the high seas. Those national regimes will then apply to their nationals, whether individuals or corporate entities, and to activities conducted by vessels flying their flags.

Arguably, States are not entirely free to decide whether, and how, to regulate high sea marine bioprospecting activities conducted by their nationals and/or vessels. They arguably cannot collect genetic samples in the high seas with a view to developing military applications.<sup>[38]</sup> General obligations relating to the protection and preservation of the environment (Article 192 UNCLOS), to the prevention, reduction, control, monitoring and assessment of pollution or polluting activities (Articles 194 to 196, 204 and 206 UNCLOS) are also applicable. Specific obligations relating to the conservation and management of high seas living resources also apply under Articles 116 to 120 of UNCLOS.<sup>[39]</sup> Because marine bioprospecting activities may harm the deep-sea environment, in particular deep-sea habitats such as hydrothermal vents, States may have a duty under such provisions to establish a legal framework for assessing potential harm to the marine environment caused by such activities,

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<sup>[35]</sup> See e.g. A. de Marffy, ‘Les Espaces marins au-delà des juridictions nationales entre droit applicable et modernité’, *Annuaire du droit de la mer* 2005, 25, at 68.

<sup>[36]</sup> See A. Proelss, ‘ABS in Relation to Marine GRs’, in E.C. KAMAU & G. WINTER (EDS.), *GENETIC RESOURCES, TRADITIONAL KNOWLEDGE AND THE LAW* (Earthscan Publishers: 2009), 57, at 62.

<sup>[37]</sup> See *ibid.*, at 63-64. Although Article 136 provides that the ‘Area and its resources are the common heritage of mankind’, Article 133(a) of UNCLOS defines ‘resources’ for purposes of Part XI as ‘all solid, liquid or gaseous mineral resources in situ in the Area at or beneath the seabed, including polymetallic nodules’. There is common agreement in the literature that the operation of all relevant Articles of UNCLOS exclude marine genetic resources from the scope of Part XI – see e.g. E. Canal-Forgues, ‘Les ressources génétiques des grands fonds marins ne relevant d’aucune juridiction nationale’, *Annuaire du droit de la mer* 2005, 99, at 102. A number of States, however, maintains that marine genetic resources are part of the common heritage of mankind and that Part XI applies to them – see *infra* Section 5.2 and Letter dated 16 March 2010 from the Co-Chairpersons of the Ad Hoc Open-ended Working Group to the President of the General Assembly, UN Doc. No. A/65/68, at para. 71. See also Report of the Secretary-General on Oceans and the Law of the Sea, UN Doc. No. A/60/63/Add.1, at para. 201.

<sup>[38]</sup> Articles 88 and 141 of UNCLOS provide that the high seas and the Area shall be used by peaceful purposes only.

<sup>[39]</sup> There is widespread agreement in the literature on the fact that ‘living resources’ within the meaning of Articles 116 to 120 of UNCLOS include marine genetic resources – see e.g. A. de Marffy, ‘Les Espaces marins au-delà des juridictions nationales entre droit applicable et modernité’, *Annuaire du droit de la mer* 2005, 25, at 65.

and to prevent and/or mitigate that harm. Article 7(c) of the CBD supports this approach by imposing upon States an obligation to identify processes and activities that may adversely impact biological diversity and to monitor their effect.<sup>[40]</sup>

States must also ensure that marine bioprospecting conducted under their control does not interfere with other legitimate uses of the high seas. Specifically, States must regulate marine bioprospectors so as to prevent unreasonable interference with marine scientific research activities<sup>[41]</sup> and mining activities in the Area.<sup>[42]</sup>

Not all obligations applicable to EEZs and continental shelves apply to the high seas. States have no duty under the CBD to identify and monitor genetic resources in areas beyond national jurisdictions, as they do within their EEZ and on their continental shelf.<sup>[43]</sup> Crucially, the ABS regimes and mechanisms set up under the CBD do not cover marine genetic resources located in areas beyond national jurisdiction.<sup>[44]</sup> States are entirely free to decide whether and how to implement benefit-sharing or royalties mechanisms for commercial uses of resources located in the water column beyond the limits of their EEZ and on the seabed seaward from the outer edge of their continental shelf.

Ironically, the only exception to the rule might be where commercial uses are developed from initially scientific endeavors. Under Article 241 of UNCLOS, no claim to “any part of the marine environment and its resources” (which clearly includes marine genetic resources) may be based on marine scientific research activities. The rule appears to be that, where sampling has been conducted for industrial development and commercial purposes, the appropriation of such resources by States and/or their nationals is permitted while, where sampling has been conducted for scientific purposes, no such appropriation may occur.<sup>[45]</sup> Similarly, the results of marine scientific research must be published and disseminated under Article 244 of UNCLOS while the results of commercial bioprospecting may (and indeed must, if it is to be economically viable) remain confidential. The rule is not only ironic but often impracticable. Due to the high costs and risks associated with deep-sea marine bioprospecting, research institutions and biotechnology companies often set up joint cruises. It remains unclear whether samples collected during such cruises should be treated as results of marine scientific research or of commercial bioprospecting.<sup>[46]</sup>

#### **4.2 Duty to cooperate for the conservation and management of marine genetic resources of the high seas**

Subject to these various constraints, jurisdiction to regulate bioprospecting in the high seas rests with individual States. They are responsible for enacting and enforcing appropriate

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<sup>[40]</sup> Although the CBD does not apply to marine genetic resources located in areas beyond national jurisdictions (Article 4(a)), it is applicable to ‘*processes and activities, regardless of where their effects occur, carried out under its jurisdiction or control, [...] beyond the limits of national jurisdiction*’, which arguably includes marine bioprospecting. Under Article 5 of the CBD, States must also cooperate with respect to the conservation and sustainable use of biological diversity.

<sup>[41]</sup> See Article 240(c) UNCLOS (‘*marine scientific research shall [...] be duly respected in the course of [other legitimate] uses [compatible with this Convention.]*’)

<sup>[42]</sup> See Article 147(3) UNCLOS. In practice, the duty not to interfere unreasonably with mining activities may become a real concern. Research has shown that marine genetic resources and mineral resources are often found together on the ocean floor – see Warner, *supra* note 3, at 46.

<sup>[43]</sup> See Article 7 of the CBD and above at Section 3.

<sup>[44]</sup> As mentioned above, Article 15 of the CBD that the obligations of States with respect to ABS apply to ‘their’ resources. Article 4(a) also makes it clear that the CBD does not apply to genetic resources located in areas beyond national jurisdiction. See A. Proelss, ‘ABS in Relation to Marine GRS’, in E.C. KAMAU & G. WINTER (EDS.), *GENETIC RESOURCES, TRADITIONAL KNOWLEDGE AND THE LAW* (Earthscan Publishers: 2009), 57, at 62.

<sup>[45]</sup> See E. Canal-Forgues, ‘Les ressources génétiques des grands fonds marins ne relevant d’aucune juridiction nationale’, *Annuaire du droit de la mer* 2005, 99, at 105.

<sup>[46]</sup> See Leary, *supra* note 2, at 151-152 and T. Treves, ‘Marine Scientific Research’, in *Max Planck Encyclopedia of Public International Law*, 2008, at paras. 2-4.

rules. Yet, States are also under an obligation to cooperate with each other in implementing their regulations. Article 118 of UNCLOS provides that:

‘States shall cooperate with each other in the conservation and management of living resources in the areas of the high seas. States whose nationals exploit identical living resources, or different living resources in the same area, shall enter into negotiations with a view to taking the measures necessary for the conservation of the living resources concerned [...].’

Although Article 118 was primarily intended to apply to fish and marine mammals, it applies to all living resources, including marine genetic resources.<sup>[47]</sup> A careful reading shows that States must cooperate not only where their nationals conduct marine bioprospecting in the same area, but also where their nationals conduct bioprospecting for ‘identical living resources’. While scant attention has been devoted to this issue in the literature, defining ‘identical’ marine genetic resources is likely to spark heated debates among States if and when the issue comes up on the international stage. Indeed it should come up since cooperation under Article 118 is not an option but rather a duty for the States concerned, as is apparent from the use of the word ‘shall’. However, the practical impact of Article 118 may be limited, because it applies only to conservation and probably not to management of the resources.

## **5. Summary and future prospects**

This section shall provide a summary of the existing legal regime applicable to deep-sea bioprospecting (1) and discuss briefly the various avenues for further improvement of such regime (2).

### **5.1 Summary of current regime**

The following tentative restatement of the legal regime applicable to deep-sea marine bioprospecting does not purport to be comprehensive. Some of its conclusions may be subject to debate. Yet, based on the above developments, we understand the main features of that regime as follows:

- Coastal States have the sovereign right to allow, prohibit, and regulate marine bioprospecting in the water column of their EEZ, and on the seabed (including the subsoil) until the farther of either the limits of their EEZ or the outer edge of their continental shelf;
- State regulation is subject to a number of international obligations incumbent upon coastal States, including in relation to the protection and preservation of the environment and to the conservation and sustainable use of marine genetic resources. Significantly, such regulation may also be impacted by access and benefit-sharing mechanisms established pursuant to the CBD;
- All States enjoy free-access to marine genetic resources located seaward of other States’ EEZs and continental shelf. They have jurisdiction to allow, prohibit, and regulate marine bioprospecting activities conducted by their nationals and/or vessels flying their flags;
- Free-access is subject to a number of international obligations incumbent upon coastal States, including in relation to the protection and preservation of the environment and

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<sup>[47]</sup> Warner notes, with reason, that Article 118 is rather ill-fitted to address marine genetic resources issues, supra note 3, at 229.

to the conservation and sustainable use of marine genetic resources. Significantly, such free-access is also subject to the duty of States to cooperate for the conservation of marine genetic resources.

## 5.2 The way forward

Marine bioprospecting in areas within national jurisdiction has been the subject of comparatively little direct interest among the scholars and in State discourse. The topic comes up mostly in wider discussions about the status of genetic resources under national jurisdiction, and in relation to ABS mechanisms.

Commentators, however, have voiced concerns about alleged loopholes in the regulation of marine bioprospecting, especially in areas beyond national jurisdiction.<sup>[48]</sup> Although the current legal regime may not be as inconsistent as some suggest, it is true that the responsibility for conservation and sustainable use of marine genetic resources in areas beyond national jurisdictions currently lies with individual States, with few tools available for actual international supervision. Since, in practice only public and private institutions from a limited number of wealthier States possess the technology for deep-sea bioprospecting, the current regime effectively entrusts much of marine genetic resources to a few States. That reality raises serious questions regarding conservation and sustainable use, but also regarding how benefits deriving from the commercial use of such resources can be shared in the interest of mankind.<sup>[49]</sup>

States and commentators alike have put forward a number of proposals to improve the current regime as it relates to areas beyond national jurisdiction. Several proposals recur and may be summarized under three main headings for the brief purposes of this paper.<sup>[50]</sup>

*First*, a number of States, mostly from the North, have expressed their happiness with the current regime and have argued for the *status quo*.<sup>[51]</sup> They see free-access together with appropriate intellectual property rights as a means to foster competition and encourage private and public institutions in actively engaging in marine bioprospecting and thus revealing the full potential of marine genetic resources.<sup>[52]</sup>

*Second*, other, States, mostly from the South, insist that Part XI of UNCLOS applies to marine genetic resources in the Area.<sup>[53]</sup> Although most commentators are not convinced, many agree that marine genetic resources *should* be subjected to Part XI and declared to be part and parcel of the common heritage of mankind, and that the mandate of the International Seabed Authority could be expanded to cover marine bioprospecting.<sup>[54]</sup>

In order to break the deadlock, a number of States have advocated a *third* approach, which avoids the principled issue of marine genetic resources status and focuses on practical issues of immediate concern.<sup>[55]</sup> Those issues include 1) the promotion of marine scientific research

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<sup>[48]</sup> See e.g. Warner, *supra* note 3 at 21.

<sup>[49]</sup> See E. Canal-Forgues, 'Les ressources génétiques des grands fonds marins ne relevant d'aucune juridiction nationale', *Annuaire du droit de la mer* 2005, 99, at 103.

<sup>[50]</sup> Discussions about a potential new regime for marine genetic resources in areas beyond national jurisdiction have been ongoing for more than a decade, although with little success so far – see the summary in Warner, *supra* note 3, at 224-225.

<sup>[51]</sup> See the latest expression of such views as reported in Letter dated 16 March 2010 from the Co-Chairpersons of the Ad Hoc Open-ended Working Group to the President of the General Assembly, UN Doc. No. A/65/68, at para. 75.

<sup>[52]</sup> See E. Canal-Forgues, 'Les ressources génétiques des grands fonds marins ne relevant d'aucune juridiction nationale', *Annuaire du droit de la mer* 2005, 99, at 102.

<sup>[53]</sup> See *supra* note 51.

<sup>[54]</sup> See e.g. the discussion by Warner, *supra* note 3, at 225-226.

<sup>[55]</sup> See also the intriguing approach developed by Warner, *supra* note 3, at 230-231.

in connection with marine genetic resources in areas beyond national jurisdiction, 2) environmental impact assessments of marine bioprospecting activities, 3) practical options for benefit-sharing, if any, and 4) the possibility of protected areas for marine genetic resources.<sup>[56]</sup> Some commentators also stress that any new regime should retain a global ecosystem approach consistent with the CBD and should, as far as possible, lay ground for a comprehensive regime covering not only marine bioprospecting but also other legitimate uses of the high seas.<sup>[57]</sup>

The last meeting of the Ad Hoc Open-ended Informal Working Group regarding the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction has made little progress, with most States maintaining and restating their positions.<sup>[58]</sup> It remains to be seen whether any progress can be made on at occasion. The outcome of the current ABS negotiations regarding genetic resources under national jurisdiction in the context of the CBD (if any) may play a significant role in that, by inspiring States to (or dissuading them from) making further progress on international cooperation with respect to deep-sea genetic resources in the high seas.

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<sup>[56]</sup> See Letter dated 16 March 2010 from the Co-Chairpersons of the Ad Hoc Open-ended Working Group to the President of the General Assembly, UN Doc. No. A/65/68, at para. 73. See also the proposals made by E. Canal-Forgues, in 'Les ressources génétiques des grands fonds marins ne relevant d'aucune juridiction nationale', *Annuaire du droit de la mer* 2005, 99, at 109, including the extension of the CBD's scope to areas beyond national jurisdictions. See also Leary, *supra* note 2 at 155-156.

<sup>[57]</sup> See Leary, *supra* note 2, at 165, citing inter alia deep sea tourism and climate change mitigation techniques.

<sup>[58]</sup> *Ibid.* The Working Group was created by the General Assembly in 2004 – see Resolution adopted by the General Assembly – 59/24 Oceans and the Law of the Sea, UN Doc. A/RES/59/24, at para. 73.