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The Anthropocene and the international law of the sea

By Davor Vidas*

Director, Marine Affairs and Law of the Sea Programme, Senior Research Fellow, The Fridtjof Nansen Institute, PO Box 326, 1326 Lysaker, Norway

The current law of the sea provides a framework for various specific issues, but is incapable of responding adequately to the overall challenges facing humankind, now conceivably already living in the Anthropocene. The linkages between the development of the law of the sea and the current process towards formal recognition of an Anthropocene epoch are twofold. First, there is a linkage of origin. The ideological foundations of the law of the sea facilitated the emergence of forces that were to lead to the Industrial Revolution and, eventually, to levels of development entailing ever-greater human impacts on the Earth System. Second, there are linkages in interaction. Geological information has prompted key developments in the law of the sea since the introduction of the continental shelf concept in the mid-twentieth century. With the formalization of the Anthropocene epoch, geology might again act as a trigger for new developments needed in the law of the sea. This article explores those two aspects of linkages and examines prospects for further development of the law of the sea framework, through concepts such as the responsibility for the seas as well as those related to new approaches to global sustainability such as the 'planetary boundaries'.

Keywords: law of the sea; Anthropocene; continental shelf; freedom of the seas; responsibility for the seas; planetary boundaries

1. Introduction

The foundations of today's law of the sea are basically the product of often-antagonistic struggles among and between dominant human forces. These forces have produced impressive technological capabilities and made possible the modern way of life in industrialized societies, but ultimately they also seem to threaten the stable Holocene state—possibly already bringing about our entry into a new epoch, the Anthropocene. Formal recognition of the Anthropocene as a new unit in the geological history of the planet could raise awareness, highlighting the magnitude of human impact on the Earth System, as indicated by geological evidence (see further [1]).

Today's legal order for the oceans provides a legal framework for various specific issues, but it is incapable of responding adequately to the overall challenges facing humankind, now conceivably already living in the Anthropocene (see further [2]). Increasingly, we will need an order for the oceans that can respond to that newly

*davor.vidas@fni.no

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created (or newly understood) reality. In turn, the future development of the law of the sea might be seen as potentially related to the recent initiative for scientific evaluation and formal ratification of the Anthropocene as the most recent unit in the Geological Time Scale of the Earth (see [3]). The linkages between the development of the law of the sea and the current process towards formal recognition of an Anthropocene epoch (or age?) may thus be seen as twofold.

First, there is a linkage of *origin*. The ideological foundations of the current law of the sea, especially as found in Hugo Grotius' *Mare Liberum* (1609), involve 'deep-time' origins for the later processes that have ultimately brought about the Anthropocene. The ideology expounded in *Mare Liberum* facilitated the emergence of forces that were, by the first half of the nineteenth century, to lead to the Industrial Revolution and eventually, in the course of the twentieth century, to levels of development entailing ever-greater human impacts on the Earth System.

Second, there may be a renewed linkage in *interaction*. Geological information has prompted key developments in the law of the sea since the introduction of the continental shelf as a political concept and, soon thereafter, as a concept of international law in the mid-twentieth century. With the formalization of the Anthropocene epoch, geology might again, in the early twenty-first century, act as a trigger for new developments needed in the law-of-the-sea framework. Work towards a decision of the International Commission on Stratigraphy and the International Union of Geological Sciences—on the definition and status of the Anthropocene as a possible new formal division of the Geological Time Scale—is currently in progress. However, the very fact that an initiative has been taken towards that end may indicate that research in geology, and information based on it, could once again provide an impetus for important new directions in the development of the law of the sea.

The present contribution begins by exploring (in §§2 and 3) those two aspects of linkages between the Anthropocene and the law of the sea. Section 4 follows by noting some deficiencies in the current law of the sea framework, and examining prospects for its further development in response to the concept of the Anthropocene.

2. 'Deep time' ideological foundations of the law of the sea: from *Mare Liberum* to the Anthropocene

(*a*) *Laying the foundations: 'Freedom of the Seas'*

Four centuries ago, in the spring of 1609, a tiny, 66-page volume was published; it was titled *Mare Liberum* ('The Freedom of the Seas' or 'The Free Sea'; see further: Scott [4]; Armitage [5]; Feenstra [6]). The book was the work of a young Dutch scholar, Hugo Grotius. It has been observed that 'few works of such brevity have caused arguments of such global extent and striking longevity as Hugo Grotius's *Mare Liberum*' [7]. Yet, the freedom of the seas was not presented in that book as an 'ideal' in its own right. In fact, Grotius was highly pragmatic. The lengthy sub-title of *Mare Liberum*—'The Right Which Belongs to the Dutch to Take Part in the East Indian Trade'—explains much more about the background for the book. It was related to the Dutch capture of a wealthy Portuguese carrack, the *Santa Catarina*, that occurred in the Straits of Singapore in February 1603.

There is, however, in *Mare Liberum* no explicit mention of that particular event of 'privateering' at sea. While the incident as such belongs to history (in which it was by no means unique), the chain of consequences flowing from it is still alive and relevant.

When the prize of the captured vessel with its cargo was auctioned in Amsterdam in the autumn of 1604, the gross proceeds amounted to around 3.35 million Dutch guilders—an amount equivalent to almost the annual revenues of the English government at that time, and more than double the capital of the English East India Company (see further [7–9]). That was to the great benefit of the United Dutch East India Company (in Dutch: *Vereenighde Oostindische Compagnie*, VOC), under whose authority *Santa Catarina* was captured. The Holland and Zeeland overseas trading companies, including the United Amsterdam Company, had merged in March 1602 to form the VOC, which enjoyed a government-sanctioned monopoly of Dutch overseas trade with the East Indies.

The legal aspects of the case were soon settled by a verdict of the Amsterdam Admiralty Court, to the satisfaction of the VOC directors (see documents in [10]). Their concern, however, was a wider legitimization of such conduct, domestically but especially internationally, given the geopolitical developments of the time and the complex relations prevailing between England, France, Spain and Portugal—in which Dutch overseas trade had both economic and political aspects (see further [11,12]).

Grotius, a young (then only 21) solicitor in The Hague—but already the official historiographer for the States of Holland—was approached in September 1604 and was asked to write an apology for the VOC. This was intended as a brief pamphlet related to documents on the 'cruel, treasonous and hostile procedures of the Portuguese in the East Indies', to be completed in a short time [13]. However, the result was a somewhat more lengthy manuscript (around 700 pages), which took him considerable time to prepare, probably until the later part of 1606—and was not published upon completion. Political agendas of the time, in which the interests of the VOC were embedded, seem to have prevented publication of the manuscript then. (The complete manuscript was not published during the lifetime of Grotius; the unpublished manuscript was found some 250 years later and was issued only then.)

Political events took a new course in 1608, in the context of negotiations that later resulted in the Twelve Years' Truce (1609–1621) between Spain and The Netherlands. The VOC directors feared losing out in the diplomatic negotiations between Spain and the United Provinces, leading to the truce. In November 1608, the VOC directors wrote to Grotius, emphasizing the importance for the company of 'the right of navigation … over the whole wide world—thoroughly examined and adduced with rational as well as legal arguments', in order to 'persuade both our government and neighbouring princes to staunchly defend our, as well as the nation's, rights' (see document in [10], pp. 555–556). The letter also referred to 'already prepared all the material on this topic' by Grotius, requested him to 'assist the Company with [his] labours', and asked him to 'be prompt' (see document in [10], pp. 555–556). Several months later, in the spring of 1609, *Mare Liberum* was issued by the Dutch publisher Elzevier at Leiden. The book was published anonymously, with the identity of the author disclosed only several years later.

Mare Liberum is often referred to as the source of the 'principle of the freedom of the seas'—and sometimes even as the early foundation of the law of the sea. In fact, although *Mare Liberum* was a key thesis in the development of the law of the sea, both the law of the sea and the idea of the sea as free for all are much older. And indeed, shortly preceeding Grotius's theories, Queen Elizabeth I of England defended Drake's 'adventures' across the ocean in 1580 by invoking, precisely, the freedom of the seas. However, Grotius's ideology, presented in *Mare Liberum*, proved so long-lived owing to its core pragmatic purpose—a purpose that also was useful in lending support to pragmatism of a later time. That ideology was successful since, over time, it obtained a force to carry it out, and media to spread it. And the media (of all sorts) know well that controlling perceptions is the ultimate power. An 'ideal of freedom' was born—and it came to govern the global maritime relations of a later time.

(*b*) *Driving forces that shaped the law of the sea*

In the beginning, however, the thesis advocated in *Mare Liberum*—that the seas are free for all, in particular for navigation as well as fisheries—lacked sufficiently strong carrying force. Those defending the territorial appropriation of the seas prevailed at first. Among them, the famous thesis by John Selden, *Mare Clausum,* published in 1635, long dominated the law of the sea. With the onset of the nineteenth century, such territorial forces, becoming less practical than the functional ones, temporarily retreated. (They were to return later, in the aftermath of the Second World War, with new and rather creative concepts that enabled the enormous spread of only some segments of sovereignty, related to technological developments and economic prospects of the time—and aiming to secure future ones, as further discussed in §3*a*, below; see also [14].)

Reduced to a minimalist approach, the law of the sea has over the centuries developed as an exponent of two main driving forces. One driving force has been that of territorial appropriation of the seas. This has taken many forms and resulted in different outcomes through history. In some cases, as in the early thirteenth century, it consisted of claims to ownership over the entire seas. The defeat of the Byzantine empire in 1204 (i.e. the fall of Constantinople during the Fourth Crusade) changed the constellation of power in the region. Venice, mainly in order to control shipping (trade) routes, openly claimed (and in periods enforced) dominion over the entire Adriatic Sea—although possessing only a part of the Adriatic coast [15]. Thereafter, Genoa claimed dominion over the Ligurian Sea. Claims by Scandinavian countries were another prominent example: Denmark asserted its authority in the Baltic Sea, by controlling the Sound and the Belts; and Norway (later Denmark) over vast northern marine areas. Though to varying degrees, those countries claimed the right to exclude others from the uses of the seas, such as fishing and, to a certain extent, navigation [16]. These instances, however, typically related to semi-enclosed seas around the European mainland, and not to the open oceans. Gradually, with increasing shipping capabilities and the overseas discoveries of the fifteenth century, areas of interest came to comprise the great oceans as well.

At the end of the fifteenth century, immediately after the discoveries made by Columbus and the claims of Portugal thereto, Pope Alexander VI (a native of Xàtiva, Kingdom of Valencia) issued in 1493 the bull *Inter Caetera*, affecting the division of interest spheres of the 'New World' between Spain and Portugal. Following this, the two countries in 1494 agreed on 'delimitation' in the Treaty of Tordesillas, and agreed also that 'no ships shall be despatched ... for the purpose of discovering and seeking any mainlands or islands, or for the purpose of trade' by the two countries on the different sides of the agreed boundary.

The driving force of territorial appropriation of the seas later resulted in different outcomes. In some periods, those outcomes (depending on the convenience of the leading powers) were reduced to a narrow belt of the sea near the coast. In the post-Second World War period, however, the territorial driving force returned in the form of claims—rapidly legalized—for only segments of sovereignty: sovereign rights and jurisdiction. These related to fisheries resources in vast areas of water column (1945: US Presidential Proclamation No. 2668); and also resources (yet to be) found in submarine extensions of entire continents, soon considered to be a 'natural prolongation' of land territory of individual coastal states 'into and under the sea' and thus, legally, 'in short ... an inherent right' of those states (1969: North Sea Continental Shelf Judgment, International Court of Justice Reports), even though their shores might lie several hundred nautical miles away (see further in §3*a*, below).

The other driving force was that of economic profit by functional as opposed to territorial access; and of securing strategic gains of naval powers in distant sea areas. Both were promoted by the concept of the 'freedom of the seas'. A notion with excellent 'marketing' potential, it gradually offered an ideological platform for securing unimpeded international trade for both established and emerging maritime powers, with the dual main goals of maximizing profits for their economies and increasing strategic dominance over new territories. That driving force has taken various appearances, associated with such maritime activities as navigation, fishing, naval uses and others. As with the territorial drive, the goal of this driving force has also been to legitimize itself by establishing a sound legal basis.

In its broad meaning beyond international trade and finance, globalization can be understood as the 'widening, deepening and speeding up of worldwide interconnectedness in all aspects' ([17], p. 28). It might seem tempting to claim that the step from *Mare Liberum* to globalization seems a very short one. One could also argue that the former opens the way to the latter—and, on the level of ideology and theory, that may be so. But there has been, for centuries, a major gap in between: the facts. Owing to the technology available, human impacts on the sea and its resources were limited; and humans were also limited in number, since the global population in the early seventeenth century was around 500 million—some 14 times less than today.

However, the ideology of *Mare Liberum*, launched in the early seventeenth century, did facilitate the development of the forces that, by the first half of the nineteenth century, were to lead to the Industrial Revolution and eventually, in the course of the twentieth century, to the levels of development that have resulted in ever-greater human impacts on the Earth System. The key turning point in that process occurred in the early nineteenth century when, as summarized by

Anand ([18], p. 76), 'Great Britain, as the greatest naval and industrial power, became the strongest champion of freedom of the seas and its police officer. Grotius, a false prophet for 200 years, was proclaimed as a great hero, and his arguments, illogical in several respects, came to be chanted as holy mantras'.

The Industrial Revolution was already in its main phase. The mid-twentieth century brought, however, new forces and new needs.

3. Contemporary law of the sea and the role of geology in its development

(*a*) *Geology and the law of the sea after the Second World War*

The end of the Second World War in 1945 was also the time when the last 'tectonic change' in the law of the sea began. Geological information has played a crucial role in setting the direction in which the law of the sea developed since the mid-twentieth century. The main development of the law of the sea drew on a geological basis: on the continental shelf as a submarine prolongation of the state land territory, with its mineral (primarily fossil) resources belonging to the same pool as those found on the land that forms part of the same continental mass. Moreover, key developments were prompted with respect to the control of fish resources (see further [19]).

Out of the Second World War came also various new technologies—many of which represented new applications for fossil fuels—and a commitment by governments (at least in some of the industrially advanced countries) to subsidize research and development [20]. Only months after the conclusion of the Second World War, the USA initiated articulation of the continental shelf as a concept of international law. The USA then also prompted new directions regarding the coastal state regulation of fisheries in (then) the high seas areas (see 1945: US Presidential Proclamation No. 2668).

Today we see the final outcomes. The most prominent among these is the current process of determination of outer limits of the continental shelf beyond 200 nautical miles, facilitated by the work of the Commission on the Limits of the Continental Shelf, which is composed of experts in geology as well as in some other disciplines (the Commission consists of 21 members, who are experts in the field of geology, geophysics or hydrography). This, now 65 years old, 'cooperation' between international law and geology has had a clearly defined purpose: extending the sovereign rights of some coastal states to new, distant borders under the sea, related to the exploitation of (primarily) oil and gas from vast submarine areas. In a decades-long development, these external boundaries of the sovereign rights of coastal states have been gradually heading towards the outermost extent of the continental margin, in some places hundreds of miles away from the land territory. Geological information has been presented through political claims and formulated in a legal language. As a result, today, the continental shelf of a coastal state may comprise submarine areas to the outer edge of the continental margin, though not exceeding 350 nautical miles from the baselines (notwithstanding provisions on submarine ridges). However, this does not apply to submarine elevations that are natural components of the continental margin, such as its plateaux, rises, caps, banks and spurs.

There were several milestones in that process. In September 1945, by a unilateral act issued by President Harry Truman, the USA proclaimed a new policy with respect to the natural resources of the submarine areas beyond the territorial sea (on the breadth of which there was then no general agreement). These resources were previously not within the bounds of national jurisdiction. Stating awareness of the 'world-wide need for new sources of petroleum and other minerals' and the opinion of 'competent experts ... that such resources underlie many parts of the continental shelf off the coast', while with 'modern technology progress their utilization is already practicable', the USA held it as 'reasonable and just' that a 'contiguous nation' should exercise jurisdiction over the natural resources of the continental shelf (1945: US Presidential Proclamation No. 2667). The background had to do with geology ('since these resources frequently form a seaward extension of a pool or deposit lying within the territory'), the justification with both geology and geography ('since the continental shelf may be regarded as an extension of the land-mass of the coastal nation and thus naturally appurtenant to it'), and the wider reasoning involved geostrategic aspects ('since self-protection compels').

The continental shelf is a geological feature common to all continents, though with differences in configuration. Similar unilateral acts by many coastal states worldwide quickly followed Truman's proclamation, and very soon this new concept—justifying a major extension of coastal state rights—became part of international law.

The geological notion of a continental shelf gave rise to the 'legal' continental shelf. However, while the concept of a legal continental shelf relied on the unity of the continental mass on land and its continental shelf under the sea, the temptation of resources—oil and gas in particular—took the concept to quite different areas, ultimately far beyond the (geological) continental shelf, all the way to the edge of the continental margin and even beyond it. At first, though, that was only a theoretical option, opened by a legal provision.

When, in 1958, the Convention on the Continental Shelf (*United Nations Treaty Series*, vol. 499) was adopted at the First United Nations Conference on the Law of the Sea held in Geneva, the outer limit of the continental shelf was not defined with direct reliance on geology. Instead, Article 1 of the Continental Shelf Convention contained a double criterion for defining the outer limit of the continental shelf: (i) to a depth of 200 metres, or, (ii) beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources. As observed by Andrassy ([21], p. 71): 'the geological feature itself has not been used for fixing boundaries despite the fact that early claims were justified in terms of the scientific concept, and the claimed areas, like the geological feature, were called continental shelf'.

It was the prospects of exploitation of (oil and gas) resources that constituted the main reason behind the concept. From that perspective, the criterion of 'exploitability' seems a logical alternative for determining the outer limit under the 1958 Continental Shelf Convention. That criterion, however, opened the door wide for various interpretations as to its exact meaning (technology aspects, ability to undertake exploitation, feasibility and so on). At any rate, the criterion made the outer limit of the continental shelf subject to unforeseeable changes. It was, in fact, dependent on the development of maritime exploitation technology, opening prospects for those who were industrially developed and geographically

favourably situated. With the legal concept no longer limited to the geological continental shelf, it became conceivable that the criterion of 'exploitability' might lead to constantly expanding claims and, in theory (depending on technology and economic feasibility), to the apportionment of the entire ocean floor. However, most of the delegates at the 1958 Geneva Conference apparently did not believe that technological advances could in any near future enable the oil industry to develop structures that would permit drilling at depths of 200 metres [21].

The Continental Shelf Convention entered into force in 1964. A major political challenge followed only 3 years later. On 1 November 1967, Ambassador Arvid Pardo of Malta delivered a famous speech in the UN General Assembly (1967: UN docs. A/C.1/PV. 1515 and 1516), arguing for the establishment of an international regime for the seabed beyond the limits of 'clearly' and 'reasonably' defined national jurisdiction, and for the use of the resources thereof in the interests of mankind, with particular regard to the needs of poor countries. Citing, as his point of entry, the criticism by one US Congressman who argued that 'there is no rush' (UN doc. A/C.1/PV. 1515, para. 4), Pardo in turn referred to various arguments and information, *inter alia* that:

— 'rapidly developing technology makes possible the exploration, occupation and exploitation of the world's sea-beds and much of its ocean floor' (para. 6);
— 'about 20 per cent of the surface of the Pacific Ocean floor is covered by manganese nodules ... [which] ... conservatively to calculate the reserves of metals ... contain 43 billion tonnes of *aluminium* equivalent to reserves for 20 000 years at the 1960 world rate of consumption as compared with known land reserves for 100 years; 358 billion tonnes of *manganese* equivalent to reserves for 400 000 years as compared with known land reserves of only 100 years; 7.9 billion tonnes of *copper* equivalent to reserves for 6000 years as compared with only 40 years for land; 14.7 billion tonnes of *nickel* equivalent to reserves for 150 000 years as compared with 100 years on land; 5.2 billion tonnes of *cobalt* equivalent to reserves for 200 000 years as compared with land reserves for 40 years only... (etc.)' (para. 26; emphasis added);
— 'if the mineral resources lying on the ocean floor are vast, equally vast are those lying below the floor's surface' (para. 35);
— 'semi-submersible drilling rigs in operation today are capable of drilling in water in depths up to 350 metres.... Self-propelled, ocean-going oil-drilling rigs currently advertised in technical journals can anchor in water 180 metres deep and drill 6500 metres under the ocean floor.... Methods of transportation to the coast of offshore oil are also being improved' (para. 38);
— 'the exploitation of the continental shelf over the past 20 years was a gradual process; we must look to its intensification and to the rapid extension of national appropriation and exploitation far beyond the shelf in the next few years' (para. 39);
— 'unfortunately, the present juridical framework clearly encourages, subject to certain limitations, the appropriation for national purposes of the sea-bed beyond the geophysical continental shelf' (para. 56);

— 'the sea-bed and the ocean floor constitute nearly three-quarters of the land area of the Earth. Current international law encourages the appropriation of this vast area by those who have the technical competence to exploit it' (paras 89 and 90).

Arguing for the objectives of this 1967 initiative, Malta (and the countries supporting it) in fact called for a new reconciliation of geology and law with economy, now seen in the light of the 'New International Economic Order' as the ideological basis for a method of redistributing the benefits from resource exploitation between industrially developed and developing nations. Ultimately, this, coupled with developments related to the control over fisheries and the strategic naval considerations, led to a major development of the law of the sea during the last third of the twentieth century, and resulted in the law-of-the-sea framework that is still in force today: the United Nations Convention on the Law of the Sea.

(*b*) *The 1982 UN Convention on the Law of the Sea: written rules for the changing world*

The United Nations Convention on the Law of the Sea (*United Nations Treaty Series*, vol. 1833) was negotiated at a major multi-lateral diplomatic conference: the Third United Nations Conference on the Law of the Sea (UNCLOS III), held from 1973 to 1982. The Convention was opened for signature at Montego Bay, Jamaica, on 10 December 1982; it soon attracted altogether 159 signatures, but not many ratifications. It thus took 12 years for the Convention to enter into force, on 16 November 1994. In years to follow, however, the Convention did secure an almost universal participation, with 161 parties to the Convention so far: 160 states and the European Union (as of 1 November 2010). This broad participation was facilitated by the adoption, on 28 July 1994, of the Agreement relating to the Implementation of Part XI of the Convention, on the international seabed area (*United Nations Treaty Series*, vol. 2167).

This aspect of the Convention is related to the origin of the initiative for UNCLOS III, and can be traced back to the 1967 UN General Assembly discussion of the concept of the common heritage of mankind and the seabed beyond the limits of national jurisdiction (as outlined in §3*a*, above). However, when UNCLOS III eventually began in 1973, it started from a far broader platform: consciousness that the problems of ocean space are closely related and need to be considered as a whole.

The result was the Convention on the Law of the Sea, consisting of 320 articles and nine annexes, containing both codification of customary norms and progressive development of international law. Included are rules on various maritime zones and areas: territorial sea, contiguous zone, straits used for international navigation, archipelagic waters, exclusive economic zone, continental shelf, high seas and the international seabed area. The Convention also devotes special parts to enclosed/semi-enclosed seas, and the rights of land-locked states. Protection of the marine environment, scientific research, technology transfer and settlement of disputes are all addressed. New institutions

and bodies are established under the Convention: the International Seabed Authority, the International Tribunal for the Law of the Sea and the Commission on the Limits of the Continental Shelf. Meetings of States Parties to the Convention have been held annually since 1994, while the UN Secretary-General has reported annually, since 1984, to the General Assembly on key law of the sea developments.

It has been declared and reiterated since its adoption that 'the Convention sets out the legal framework within which all activities in the oceans and seas must be carried out' and that 'its integrity needs to be maintained' (2008: United Nations General Assembly resolution 63/111, 'Oceans and the Law of the Sea'). Owing to its features, the Law of the Sea Convention is often referred to as the 'Charter of the Oceans', a framework treaty that governs all major issues of the entire ocean space (see further [22]). Despite some initial difficulties, today, over one-quarter of a century later, the Convention is in force and is generally considered to reflect international law [23].

Since the Convention on the Law of the Sea is an international treaty, its main purpose is to regulate relations among states. Their number, influence and pattern of relations have changed somewhat from the initiation of UNCLOS III to the present day. However, in the same time span, a dramatic change has occurred in the number and distribution of those whom, ultimately, any regulation should 'serve'. From the standpoint of international law, those are people divided into states of which they are nationals, and within which they are legal subjects. From some other possible perspectives, the reference is to all humankind joined by the circumstance of living on the same Earth and using the seas—all that in a great 'life-environment system' of which we are an integral part; or, as more precisely defined by Lovelock ([24], p. 100), 'a system made from the living organisms of the Earth, and from their material environment, the two parts being tightly coupled and indivisible'.

It took 43 years from the initiative for a new oceans regime in 1967 (when Arvid Pardo gave his speech at the UN General Assembly) to the current status of the Law of the Sea Convention with its almost-universal participation in 2010. The ideas, proposals, perceptions, interests and rules that converged in the second half of the 1960s were shaped as the provisions of the Convention in the course of the 1970s, formalized in the 1980s, further adjusted in the 1990s and brought to today's state of broad participation and implementation in the course of the first decade of the 2000s. Major changes and developments of unprecedented proportions have occurred in that same 43 year period from 1967 to 2010; moreover, world population has doubled, from around 3.5 billion to almost 7 billion people.

Yet, we do have today the Convention on the Law of the Sea, containing 'the legal framework within which all activities in the oceans and seas must be carried out' and the integrity of which 'needs to be maintained' (2009: UN Secretary-General, *Message on World Oceans Day*, 8 June 2009). At the same time, the pace of change all around us is tremendous: population trends, technology development, scientific achievements—and the resultant uses of, and impacts on, the seas and oceans. The 1982 Law of the Sea Convention is a written law, an international treaty—perhaps flexible and adjustable as a framework for future regulation, but also deeply rooted in past developments.

4. The Anthropocene: awakening the need for new developments in the law of the sea?

(*a*) *From ideology and legal rules to scientific findings and facts*

Our present-day picture of the law of the sea regulation has received its frame. Somewhere at its lower end, we may see the 1603 incident of the *Santa Catarina*—a symbol of the law of the sea of that time, and a trigger for its further development. (And somewhere in the background are political agendas and commercial interests, such as by England's Queen Elizabeth I, the East India Company established in 1600 and the United Dutch East India Company, VOC, established in 1602.) At the upper end of our frame, building on four centuries of development, we find the current, almost-universal application of the law of the sea regime as contained in the 1982 UN Convention on the Law of the Sea. (And somewhere in the background are the major powers of our days, as well as an array of national and multi-national companies.)

Yet, there may be something of crucial importance arising in our times, above and beyond the confines of that finally consolidated frame—the 'integrity' of which, according to various recent documents, 'needs to be maintained'. Four centuries ago, the incident involving *Santa Catarina* (actually, the wealth it carried, as later auctioned in Amsterdam) triggered major developments, including a shift in the flow of maritime trade [9]. *Mare Liberum*, itself a product of that 1603 event, advocated a powerful and vital ideology for many events and developments to follow. That was the ideology of one emerging driving force against the other: the (then nascent) freedom of the seas versus (then more developed) sovereignty of the sea [16].

Today, we stand at the threshold of an emerging consciousness of the truly historic change in the relationship between humankind and the rest of the Earth System. At the end of the first decade of the Third Millennium, a process for a new geological time unit—the Anthropocene—to be formally acknowledged has been initiated. That scientific-based awakening of our consciousness is a development of magnitude—and one that relates not only to a few individuals, but to us all. If any 'new ideology' is now needed, it is certainly not an antagonistic one, but an ideology of a joint effort towards our common goal.

Four decades ago, when UNCLOS III was in the initiation phase, an image was taken from a perspective quite the reverse of that of Galileo Galilei in 1609, when he used the telescope to be the first to observe the surface of the Moon. A photograph of *Earthrise*, published in 1969, with the lunar horizon in the foreground and our blue–green planet 240 000 miles away, was taken from Apollo 8 on 24 December 1968—by humans in orbit on the far side of the Moon. That photograph was not a scheduled part of the Apollo 8 mission, but rather a spontaneous consequence of suddenly awakening human consciousness, faced with an entirely new yet essential perspective. That the Earth is, in fact, an Ocean—but also that the Earth is a planet of life surrounded by desolate space and lifeless objects—is perhaps easier to realize when we see it from space.

Notwithstanding the imminent goals of securing states' sovereign rights and naval primacy, as well as accumulating economic profits for industry and trade forces, we must never lose sight of the ultimate purpose of any regulation

concerning the law of the sea in our times. It now must be led by a consciousness of a basic fact: that the seas are vital for life on Earth. The Anthropocene epoch should stand as a constant reminder of that purpose.

This is not meant as a lament for yet another idealism, so much as a plea for a new pragmatism. In the time of Grotius, a new ideology—a 'principle'—was born out of the pragmatic need to defend participation in the pursuit of economic profit for those who possessed the means (ships) but not the 'legal entitlement' based on territorial appropriation (since others had been first out). Grotius's objective was not the 'freedom of the seas' as such. That was only an image of the ideology he developed. That image was to become widespread, possibly also due to the main title of his book: *Mare Liberum*—'the freedom of the seas' (according to the first published English translation of 1916). However, this perception of freedom, while widely adopted and persistently referred to, was never the essence of the thesis that Grotius actually advocated. The essence of his book and its main purpose was quite down to earth: to provide arguments for securing rights of unimpeded access to international trade (in a broader geopolitical context, for his country, more directly for one specific company: VOC). This clearly pragmatic purpose, evident throughout all of the 66-odd pages of *Mare Liberum*—the sea seen through trade—is still topical today, 400 years later.

Several centuries after Grotius, in the aftermath of the Second World War, pragmatism took us *under* the seas, eventually to submarine oil and gas fields all the way to the edges of the continental margins, hundreds of miles away from the shore. Jurists have argued 'inherent rights' for those lucky ones with sovereignty directly on the shores of fortune. The others are left to divide what may be found beyond—if and when it becomes economically feasible for them to reach those resources.

Now that such arrangements have been made, and sealed in the form of 161 ratifications and accessions to the 1982 UN Convention on the Law of the Sea so far, constituting a legal–political equilibrium being achieved on (and under) the seas, a question arises: Do we have a definite, and indeed adequate, response to the challenges of our own deeds? An adequate response to the consequences that the Anthropocene epoch is about to bring? No, we do not. Do we need a response that will be, in a real and pragmatic sense, to the 'common benefit of humankind'? Yes, we do.

Indeed, there are not many who would want or attempt to bury international trade. Thus, the sub-title of Grotius's book has survived 400 years almost intact, while the main title, *Mare Liberum*, has been undergoing constant and, since the mid-twentieth century, increasingly progressive revision—the last major one undertaken at UNCLOS III.

However, the important difference from Grotius's times relates to scientific findings and facts—findings that clearly demonstrate why the key factual basis on which the ideology of *Mare Liberum* was founded can no longer retain its validity. And, just as in the time of Grotius, it is not about validity as such: it is about ultimate purpose.

Possibly more alarming scientific evidence about the state of the oceans and marine resources has been acquired in less than the three decades that have passed since the adoption of the Convention on the Law of the Sea than in the rest of the four centuries since the publication of *Mare Liberum*. Today, we must face the Grotius of 1609—and the Law of the Sea Convention of 1982—with

the facts and scientific findings of the early twenty-first century. It has become even more important to look at our historical experience through the prism of future perspectives, based on the technological and scientific capabilities we have already achieved.

From today's perspective, it may be the closing notion, and not the title, of *Mare Liberum* that is of prime interest. While its slogan of the 'freedom of the seas', as contained in the title, was revealed in the sub-title and the rest of the book as an unabashedly pragmatic defence of the demand for a share in the profitable overseas trade and the wider geopolitical restructuring of the European overseas involvement, the book concludes by referring to the 'common benefit of humankind'. The main point here is not what Grotius's motives might have been for ending the book that way, in the early 1600s. The use of that concept as the closing one becomes far more important from the perspective of today, when the factual circumstances have changed so thoroughly.

The final clause in the text of *Mare Liberum*—highlighted by the phrase the 'common benefit of humankind'—sets forth a concept that only in our times may take on its full pragmatic content. To geologists, the Anthropocene may be understood as the establishment of hard evidence of a major and decisive human impact on the Earth System. But at an anthropocentric level—at the level of our human pragmatism, *our* 'common benefit'—the argument for formally recognizing a new geological epoch can also be understood as a trigger. Awareness of an Anthropocene epoch currently under formal evaluation may mean that the time has come for human energy to shift its main direction, from being used for the struggles among us—to a struggle *for* us. A new direction for the law of the sea will be needed, to provide a framework for such an ultimate objective.

(*b*) *New approaches needed*

Today, around 90 per cent of global trade uses the sea. Moreover, human nutrition is to an important extent dependent on the protein secured by fisheries. All states in the world are entitled to use the sea; also land-locked states have the right of access to and from the sea and freedom of transit. There are around 150 coastal states in the world, with their various maritime zones of sovereignty and (for most among them) sovereign rights, extending mainly in relation to individual coastal geography and submarine geology. Today, challenging the normative and institutional structures established on these bases would essentially mean challenging international law, which in itself is a relatively recent achievement of human civilization. However, simply continuing along the same path as so far could be comparable to a collective suicidal tendency, be it a conscious choice or merely a matter of following familiar, established routines.

With only a few exceptions, our rules currently regulate human impact on the ocean components of the Earth System depending on the political boundaries of sovereignty and jurisdiction, translated into law. Notwithstanding provisions of a more general nature, this is what is expressed through the various maritime zones and the basic division of jurisdictional competences among coastal states and flag states. However, our primary driving forces behind the objectives of international regulation for the uses of the seas can no longer be justified by territorial versus profit considerations, in which only account is taken of the

human impact on the Earth System. The thrust of our ultimate objectives will have to be shifted, and international regulations crafted so as to enable us to channel and confine the human impact on the Earth System, while also taking account of the territorial sovereignty and sovereign rights considerations as well as legitimate profit demands. We need to enter the transitional period where existing structures are retained, of necessity—as the only means we have to facilitate the shift in our approaches.

A deliberate reversal in the primacy of our objectives is the way forward. The highest banner in that reversal can neither be the call for *Mare Liberum* nor the call for *Mare Clausum*, as bantered back and forth through the past several centuries. Given our technological development and abilities, that would lead us to only one certain future: to *Mare Crisium*, the 'sea of crisis'. The ideal is, thus, as many are well aware, not the *freedom of* the seas —but neither should our aim be to negate it. What really is at stake today is not to either defend or obstruct the freedom of the seas as such. The key point is to defend ourselves against misuses of freedoms—misuses that are led by maximizing individual economic profit and specific geopolitical gains: regardless of the environment, or of the sustainability of marine species, or biodiversity, or impacts on climate.

The need of our time is *responsibility for* the seas. That is a responsibility embodied in concepts that question neither territorial states' extent of sovereignty and sovereign rights nor sustainable maritime trade and industry benefits—instead adding to both one key segment that is fundamentally needed today. That segment relates to enabling us to deal with human impacts on the marine component of the Earth System, and that does not depend primarily on our political boundaries or the driving forces shaping them.

The challenges are grave indeed. We need to come to the regulatory stage at which we start to acknowledge that the territorial dimension (or its absence) is not the primary one that matters, and that in any part of the sea, be it under sovereignty or not, we should be ultimately led by some of the same, shared concerns.

Such approaches might be a prospect on the horizon—yet by no means an easy one to achieve. The issue is not only related to both 'territorial temptation' and the hesitation at confining current economic activities to a 'sustainable profit'. A global approach initially conceived as a uniform one might in fact lead to global inequality, since the level of development is greatly uneven worldwide—and the gap is ever increasing. See, for instance, figures of world population growth and its concentration almost entirely in the world's poorer countries (2009: *World Population Data Sheet*, www.prb.org); ever since consciousness-awakening, over 20 years ago, in *Our Common Future* [25], that gap has widened dramatically. Even on a regional scale, in parts of the world where differences are somewhat less accentuated than elsewhere, linear demands may lead to disproportional results, nurturing inequality. For instance, proportional limitation of fishing vessel capacity, even in some semi-enclosed seas surrounding Europe (such as in parts of the Mediterranean Sea), would reduce certain fishing fleets from their current overcapacity down to sustainable limits, while also preventing other, less developed actors from developing towards reaching such limits. Moreover, the greatest human impacts on the Earth's ecosystems are still made by a numerical minority of the world population; yet, it is precisely that minority who control most of the means for making, or reversing, the impact.

Nevertheless, the goal of channelling and confining the overall human impacts on the Earth System is a joint one: while only some may make those impacts, ultimately we will all feel the consequences of failure. It is not so much a question of whether we need new approaches, but how to ensure international and national coordination of such approaches and their adjustment to asymmetrical situations on both the global and regional scale.

(*c*) *Operative preconditions*

Concepts are not sufficient without means to implement them; approaches need instruments to enable them to materialize. What we have at our disposal today are technological capabilities, scientific findings and media reach, rapidly stretching from local to global—three elements crucial as preconditions for making any such fundamentally new approaches operative and functional. If supported by additional policy and legal bases, these tools could (and should) be used far more widely and more effectively, to control the human impacts on the Earth System. What is becoming increasingly relevant is whether we are able to master our capabilities: to use the technology and science available so as not to turn progress into its own contradiction; and the media, to facilitate awareness of the need for major new efforts.

None of those operative preconditions can be achieved without overcoming an array of obstacles. The situation today is a direct reversal of earlier periods in the development of the law of the sea. When Grotius articulated the principles of *Mare Liberum* in 1609, or when Truman issued the continental shelf proclamation in 1945, the underlying driving forces and interests involved accruing *direct* gains—be these financial, industrial or national geostrategic. When it comes to accepting the 'responsibility for the seas' today as a guiding principle, without an imminent cataclysm in sight, the underlying interests could only be indirect and longer term: to prevent losses, common, as well as specific.

Some scientists are now proposing a new approach to global sustainability, by defining so-called *planetary boundaries* within which they expect that humanity can operate safely [26]. They have identified nine such boundaries and, drawing upon current scientific understanding, have proposed quantifying seven of these. Those seven planetary boundaries relate to: climate change (CO_2 concentration in the atmosphere), ocean acidification, rate of biodiversity loss, stratospheric ozone, biogeochemical nitrogen and phosphorus cycles, global freshwater use and change in land-system use. The two additional planetary boundaries, for which scientists have not yet been able to determine a boundary level, are chemical pollution and atmospheric aerosol loading. Rockström *et al.* [26] argue that transgressing one or more of the boundaries may be harmful or even catastrophic, owing to the risk of crossing thresholds that will trigger nonlinear, abrupt environmental change within continental- to planetary-scale systems. Three of these boundaries have already been overstepped: climate change, rate of biodiversity loss and the nitrogen cycle. Moreover, Rockström *et al.* [26] note that the proposed boundaries are rough, first estimates only, and are surrounded by large uncertainties and knowledge gaps.

Nonetheless, this proposed concept of planetary boundaries may offer an important new perspective for the law of the sea in the face of an Anthropocene epoch, in which it is conceivable that maintaining the type and level of activities

within and beyond our jurisdictional boundaries—including maritime ones—may become conditional upon respecting certain overall, planetary-scale boundaries. Conversely, we will increasingly need to focus on the boundaries of jurisdiction versus boundaries as defined by scientific findings, and not solely or even primarily on the boundaries of one jurisdiction versus the other jurisdiction. That does not imply a call for disregarding the jurisdictional dimension—much more that we need to consider seriously how to place it within the context of rapidly changing circumstances.

This article draws on a more comprehensive study by the author [2]: Responsibility for the seas. In Vidas, D. (ed.) 2010. *Law, technology and science for oceans in globalisation* (Leiden/Boston: Martinus Nijhoff Publishers/Brill), pp. 3–40, to which readers interested in further discussion on the law of the sea issues are referred.

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