Leiden Journal of International Law (2022), **35**, 379–395
doi:10.1017/S0922156522000061

ORIGINAL ARTICLE

INTERNATIONAL LAW AND PRACTICE: DEBATE

Stability of maritime boundaries and the challenge of geographical change: A reply to Snjólaug Árnadóttir

Massimo Lando*

City University of Hong Kong, School of Law, 6/F Li Dak Sum Yip Yio Chin Academic Building, Tat Chee Avenue, Kowloon Tong, Kowloon, Hong Kong SAR
E-mail: mflando@cityu.edu.hk

Abstract
Geographical phenomena impacting the shape of coastlines may have implications for the stability of maritime boundaries delimited by agreement or judicial process. Sea level rise resulting from human-caused climate change has recently arisen as an additional phenomenon compelling the re-assessment of the stability of maritime boundaries over time. In a recent article published in this Journal, Dr. Snjólaug Árnadóttir has argued that a solution to the challenges of coastline change could be for maritime boundaries to fluctuate following the fluctuation of the baselines on which their course depends. By way of reply to Dr. Árnadóttir's suggestion, this article argues that fluctuating boundaries have no legal basis either in the United Nations Convention on the Law of the Sea or in judicial decisions. Moreover, the delimitation process in three stages, commonly applied by international courts and tribunals since the *Black Sea* judgment, appears to be ill-suited for establishing fluctuating boundaries. There seems to be other solutions to the problem of coastline change, which this article also briefly explores.

Keywords: fundamental change of circumstances; maritime boundaries; maritime delimitation; sea level rise; UNCLOS

1. Consequences of changing coastlines on maritime boundaries

Boundaries across the world change all the time. Land boundaries may shift as a result of territorial acquisitions. Boundaries running along rivers follow the changes in the rivers' course. Maritime boundaries seem to behave differently. Because maritime entitlements depend on sovereignty over land abutting the sea,[1] boundaries dividing overlapping maritime entitlements generated by the coast of neighbouring states owe their existence to territorial sovereignty. If territorial sovereignty ceases to exist, so do maritime entitlements and boundaries. However, aside from their possible disappearance upon the disappearance of territorial sovereignty, maritime boundaries are endowed with a degree of durability that may strike one as unusual. Maritime boundaries are established, whether by treaty or judicial process, based on the coastal geography at the time of delimitation.[2] Climate change has begun to raise questions as to whether maritime boundaries will, or should, continue to exist undisturbed even when coastlines change. Sea level rise caused by climate change is not the only phenomenon that can lead to coastlines changing. Natural erosion and accretion, as well as human activities such as land reclamation, can determine

*The author would like to thank Snjólaug Árnadóttir, Michael Tsimplis, and the Journal's editors for their comments. The usual caveats apply.

[1] *North Sea Continental Shelf (Federal Republic of Germany/Denmark; Federal Republic of Germany/Netherlands)*, Judgment of 20 February 1969, [1969] ICJ Rep. 3, at 51, para. 96.

[2] *Bay of Bengal Maritime Boundary Arbitration (Bangladesh v. India)*, 167 ILR 1 (2017), at 74, para. 212.

© The Author(s), 2022. Published by Cambridge University Press

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

shifts in coastlines. Climate change has simply added a reason by which we can expect coastlines to change in the future.

Changing coastlines can be problematic from the perspective of the international law of the sea. The geographical coastline is closely connected with the legal notions of 'baseline'. Under Article 5 of the United Nations Convention on the Law of the Sea (UNCLOS),[3] 'the normal baseline for measuring the breadth of the territorial sea is the low-water line along the coast'. On this definition, the normal baseline is ambulatory: it changes as the low-water line along the coast changes.[4] Article 7 of UNCLOS allows states to establish straight baselines where 'the coastline is deeply indented and cut into, or if there is a fringe of islands along the coast in its immediate vicinity',[5] but, in doing so, states 'must not depart to any appreciable extent from the general direction of the coast'.[6] Where states decide to establish straight baselines, they must do so by reference to geographical coastlines. As the latter change, so should the former.[7] Upon establishing their baselines, whether normal or straight, states must publish charts or lists of geographical co-ordinates relating to those baselines.[8] The establishment of baselines is a unilateral act by coastal states. Coastal states establish their baselines, but may subsequently declare that such baselines have changed. The conformity of the states' establishment of baselines with UNCLOS can be subject to review before international judicial organs.[9]

The shape of baselines affects the establishment of the outer limits or maritime zones and the delimitation of maritime boundaries between states. For the territorial sea and Exclusive Economic Zone (EEZ), UNCLOS defines the outer limit by reference to distance from the baselines,[10] while for the continental shelf UNCLOS defines the outer limit by reference to distance from the baselines combined with geomorphological criteria.[11] Article 15 UNCLOS governing territorial sea delimitation specifically refers to 'the median line every point of which is equidistant from the nearest points on the baselines from which the breadth of the territorial seas ... is measured'.[12] Articles 74 and 83 UNCLOS, respectively concerning the delimitation of the EEZ and continental shelf, do not refer to baselines explicitly.[13] Baselines are anyway central to the delimitation exercise, whether states delimit boundaries by agreement or judicial process. If the former, baselines are essential to draw equidistance lines, which are the most common type of boundary established by treaty.[14] If the latter, baselines are essential for international tribunals to identify the relevant coast and relevant area, draw the provisional equidistance line and assess disproportionality, and may be useful also to decide the effect of maritime features.[15]

Because baselines will change as a result of sea level rise, the question arises as to whether outer limits and maritime boundaries should change accordingly. Although the UNCLOS drafters did

---

[3]1982 United Nations Convention on the Law of the Sea, 1833 UNTS 3.

[4]Y. Tanaka, *The International Law of the Sea* (2019), 55.

[5]UNCLOS, Art. 7(1).

[6]UNCLOS, Art. 7(3).

[7]An exception is the situation under Art. 7(2) of UNCLOS, concerning highly unstable coastlines. Under this provision, straight baselines remain valid until the relevant coastal state changes them. Yet, that change, or lack thereof, may be judicially reviewed. See *infra* note 9.

[8]UNCLOS, Art. 16.

[9]In relation to straight baselines, see *Maritime Delimitation and Territorial Questions between Qatar and Bahrain (Qatar v. Bahrain)*, Merits, Judgment of 16 March 2001, [2001] ICJ Rep. 40, at 103–4, paras. 201–14.

[10]UNCLOS, Arts. 3 (territorial sea) and 57 (EEZ).

[11]UNCLOS, Art. 76.

[12]Art. 15 of UNCLOS is regarded to be part of customary international law. See *Qatar v. Bahrain*, *supra* note 9, at 94, para. 176.

[13]For the text of Arts. 74 and 83 of UNCLOS, see Section 2.1 below. Both provisions are considered to be part of customary international law. See *Territorial and Maritime Dispute (Nicaragua v. Colombia)*, Merits, Judgment of 19 November 2012, [2012] ICJ Rep. 624, at 674, para. 139.

[14]M. Lando, *Maritime Delimitation as a Judicial Process* (2019), 334–56 (Appendix 2).

[15]On the process of maritime delimitation see Section 3.1 below.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

not appear adequately to appreciate the implications of climate change,[16] UNCLOS provisions allow states unilaterally to adjust the outer limits of their maritime zones as baselines change. To the contrary, the UNCLOS drafters' assumption underlying provisions on maritime delimitation was that boundaries would remain stable over time. Nothing in UNCLOS indicates that maritime boundaries are subject to change because of shifts in baselines. Moreover, the *pacta sunt servanda* and *res judicata* principles, respectively applicable to treaties and judicial decisions, are subject to limited exceptions,[17] thus ensuring the stability of maritime boundaries.

In 2012, the International Law Association (ILA) formed a committee on International Law and Sea Level Rise. The committee, the work of which is on-going, has a two-part mandate: 'to study the possible impacts of sea level rise and the implications under international law of the partial and complete inundation of state territory';[18] and 'to develop proposals for the progressive development of international law in relation to the possible loss of all or of parts of state territory and maritime zones due to sea level rise'.[19] The committee's work covers issues relating to maritime boundaries, which, so far, have primarily concerned the *lex lata* more than the *lex ferenda*.[20]

In a recent article published in this Journal, Dr. Snjólaug Árnadóttir examined the 'possibility and desirability of establishing maritime boundaries that fluctuate in accordance with ambulatory baselines or other criteria forming the essential basis of the boundary'.[21] She considered whether maritime boundaries can be fluctuating by operation or law, agreement and judicial decisions.[22] Subsequently, she discussed the feasibility of establishing fluctuating boundaries, resolving that such 'boundaries are one option that may ensure a just outcome by prioritizing legal stability over geographic stability where unforeseeable environmental changes are anticipated'.[23] Dr. Árnadóttir concluded that fluctuating boundaries:

> may never be ideal but they represent a viable alternative to meet the challenges of environmental instability. Provisional lines delimiting the territorial sea fluctuate with changing coastlines unless and until otherwise agreed, states can establish fluctuating boundaries on the basis of bilateral agreements and they can result from judicial decisions.[24]

In Dr. Árnadóttir's words, 'fluctuating boundaries may be the only delimitation method capable of incorporating consideration for unforeseeable changes to relevant coastal geography and bridging the gap between a stable maritime boundary and a fluctuating land boundary terminus'.[25]

This article explores the opposite view. Fluctuating maritime boundaries could be an alternative to stable boundaries where geomorphological phenomena related or unrelated to climate change

[16]D. R. Rothwell and T. Stephens, *The International Law of the Sea* (2016), 43. See also A. Boyle, 'Climate Change, Ocean Governance and UNCLOS', in J. Barrett and R. Barnes (eds.), *Law of the Sea – UNCLOS as a Living Treaty* (2016), 211. The first assessment report of the Intergovernmental Panel on Climate Change was published in 1990, eight years after the adoption of UNCLOS.

[17]On the exceptions to *pacta sunt servanda*, see Arts. 42–72 of the 1969 Vienna Convention on the Law of Treaties, 1155 UNTS 331('VCLT'). Judicial decisions can be re-opened only by filing an application for revision, such as under Art. 61 of the Statute of the International Court of Justice and Arts. 127–128 of the Rules of Procedure of the International Tribunal for the Law of the Sea.

[18]International Law Association, *Report of the Committee on International Law and Sea Level Rise* (2018), at 1.

[19]Ibid.

[20]See Section 3.2 below.

[21]S. Árnadóttir, 'Fluctuating Boundaries in a Changing Marine Environment', (2021) 34 LJIL 471.

[22]Ibid., at 473–82.

[23]Ibid., at 482–5.

[24]Ibid., at 485.

[25]Ibid.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

result in coastline changing.[26] While agreeing that fluctuating boundaries are not ideal in practice, this article argues, first, that UNCLOS and judicial decisions provide no convincing legal basis for delimiting fluctuating boundaries, and, second, that fluctuating boundaries are complicated to delimit and even more complicated to manage once delimited. Section 2 focuses on showing that there is no legal basis in positive international law for delimiting fluctuating boundaries. Section 3 discusses the difficulties in establishing and managing fluctuating boundaries. Section 4 considers alternatives to fluctuating boundaries by which, in the future, states may take stock of the impact of sea level rise on maritime boundaries. Section 5 concludes.

2. Legal basis of fluctuating boundaries

Nothing prevents states from agreeing to establish fluctuating boundaries by treaty. However, there is no legal basis for maritime boundaries to fluctuate by operation of the relevant UNCLOS provisions (Section 2.1) or as a result of judicial decisions (Section 2.2).

2.1 UNCLOS

The legal basis for boundaries fluctuating by operation of law is distinct depending on whether one considers, on one hand, boundaries in the territorial sea and, on the other hand, boundaries in the EEZ and continental shelf.

Articles 74 UNCLOS states that:

> [t]he delimitation of the [EEZ] between States with opposite or adjacent coasts shall be effected by agreement on the basis of international law, as referred to in Article 38 of the Statute of the International Court of Justice, in order to achieve an equitable solution.

Article 83 UNCLOS is identical, save for referring to the continental shelf instead of the EEZ. Owing to their vagueness, these two provisions seem to give no indication of a possible legal basis for EEZ and continental shelf boundaries to fluctuate by operation of law.[27] The position under Articles 74 and 83 seems to be that a boundary ought to be equitable at the time when the relevant states reach the agreement to delimit that boundary.

The situation may be different in relation to the territorial sea. With respect to territorial sea delimitation, Article 15 UNCLOS states that:

> [w]here the coasts of two States are opposite or adjacent to each other, neither of the two States is entitled, failing agreement between them to the contrary, to extend its territorial sea beyond the median line every point of which is equidistant from the nearest points on the baselines from which the breadth of the territorial seas of each of the two States is measured.

According to Dr. Árnadóttir, this provision 'establishes a bilateral limit to the territorial sea and explains "how States must act failing an agreement on delimitation"',[28] from which it would follow that 'an equidistance line can function as a provisional arrangement until either state initiates the delimitation of a more definitive boundary'.[29] This equidistance line 'would assumedly fluctuate in accordance with ambulatory baselines to continuously reflect relevant coastlines, unless and until

[26]As Dr. Árnadóttir wrote, land boundaries running along rivers, whether along the thalweg or elsewhere, shift as a result of river changes. See ibid., at 476. In any case, land boundaries are essentially distinct from maritime boundaries, which justifies not discussing the former in an article focused on the latter.

[27]Ibid., at 475.

[28]Ibid., at 474.

[29]Ibid.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

otherwise agreed'.[30] These remarks appear to convey that Article 15 UNCLOS establishes median lines as provisional boundary arrangements in the territorial sea, which coastal states can change only by agreement to the contrary. These provisional boundary arrangements could be understood as de facto provisional territorial sea boundaries.

Article 15 UNCLOS does not expressly state that territorial sea boundaries exist irrespective of agreement between the relevant states. All that Article 15 explicitly does is defining the scope *ratione loci* of the rights and duties of states in the territorial sea: if a coastal state has concluded no agreement with its neighbouring states delimiting the territorial sea, it enjoys none of the rights that coastal states have in the territorial sea, and other states owe it none of the duties that flag states have in the territorial sea, beyond the median line between that state's coast and the coast of its neighbouring states. Article 15 does not govern the relationship only between the states whose coasts generate maritime entitlements overlapping in the territorial sea, but also between those states and other states whose main interest is ensuring that ships flying their flag can enjoy innocent passage through undelimited territorial sea entitlements. Article 15 does not establish median lines as provisional territorial sea boundaries, which can be changed only by agreement of the coastal states concerned. Stating that Article 15 creates 'a provisional arrangement' in the form of a median line seems to force the meaning of its text.

This understanding finds support in the absence, in Article 15, of a provision comparable to Articles 74(3) and 83(3) of UNCLOS.[31] Articles 74(3) and 83(3) state that, pending agreement on the delimitation of the EEZ or continental shelf, 'the States concerned . . . shall make every effort to enter into provisional arrangements of a practical nature and, during this transitional period, not to jeopardize or hamper the reaching of the final agreement'. Discussing Article 83(3), the Special Chamber of the International Tribunal for the Law of the Sea (ITLOS) in *Ghana/Côte d'Ivoire* stated that it includes an obligation 'designed to promote interim regimes of a practical nature pending delimitation'.[32] According to the Special Chamber, the text of this provision 'clearly indicates that it does not amount to an obligation to reach an agreement on provisional arrangements'.[33] Because UNCLOS provides expressly for provisional arrangements in relation to the EEZ and continental shelf, it seems odd to suggest that similar arrangements exist in relation to the territorial sea despite the lack of a clear provision to that effect.[34] Furthermore, the suggested automaticity of provisional arrangements under Article 15 UNCLOS seems inconsistent with the character of the territorial sea as a maritime zone under the coastal states' sovereignty.[35] With respect to the EEZ and continental shelf, where coastal states only exercise sovereign rights and jurisdiction,[36] UNCLOS imposes no obligation to reach agreements on provisional arrangements. The inexistence of such an obligation in relation to maritime zones over which states do not have sovereignty suggests the lack of automatic provisional arrangements in relation to the only maritime zones over which states exercise sovereignty.

The UNCLOS drafting history also suggests that Article 15 does not provide for the automatic establishment of territorial sea boundaries unless and until coastal states reach an agreement to delimit those boundaries. Article 15 UNCLOS is based on Article 12 of the 1958 Convention on

[30]Ibid.

[31]The absence of such a provision was noted in the *Virginia Commentary*. See Nordquist et al. (eds.), *United Nations Convention on the Law of the Sea 1982, A Commentary – Volume II* (1993), 143. Arts. 74(3) and 83(3) UNCLOS are part of the context of Art. 15 for the purposes of interpretation pursuant to Art. 31 VCLT.

[32]*Dsipute concerning Delimitation of the Maritime Boundary in the Atlantic Ocean (Ghana/Côte d'Ivoire)*, Judgment of 23 September 2017, [2017] ITLOS Rep. 4, at 166–7, para. 627.

[33]Ibid.

[34]Even if UNCLOS was drafted by different negotiating groups, the core procedures of the Third UN Conference on the Law of the Sea included the 'single text approach' and the approval of proposals by consensus. These procedures emphasize the character of UNCLOS as a unified treaty, even if specific parts of it may have been drafted by separate negotiating groups. See Tanaka, *supra* note 4, at 34–6; J. Evensen, 'Working Methods and Procedures in the Third United Nations Conference on the Law of the Sea', (1986) 199 *Recueil des Cours* 415.

[35]UNCLOS, Art. 2.

[36]UNCLOS, Arts. 56, 77.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

the Territorial Sea and Contiguous Zone,[37] which, in turn, is based on Articles 12 and 14 of the 1956 Draft Articles concerning the law of the sea prepared by the International Law Commission (ILC).[38] The interpretation of Article 15 UNCLOS should be informed by an understanding of its 1956 and 1958 predecessors.

The 1956 Draft Articles distinguished territorial sea delimitation between opposite coasts (Draft Article 12) and between adjacent coasts (Draft Article 14), but the ILC had envisaged the median line to be the delimitation method in both scenarios unless special circumstances justified a departure from it.[39] The ILC's commentary to Draft Article 12 recognized that departures from the median line on account of special circumstances would have been frequent, adding that it had seemed anyway advisable 'to adopt, as a general rule, the system of the median line as a basis for delimitation'.[40]

The explanation that the median line was a mere 'basis for delimitation' falls short of suggesting that the ILC had conceived Draft Article 12 as automatically creating a provisional boundary. The ILC appears to have written Draft Article 12 either as a guideline for negotiating states, or as a rule to be applied by international tribunals. The ILC also stated that there would have been frequent departures from the median line on account of special circumstances.[41] The very presence of special circumstances may complicate, and even prevent, reaching an agreement on territorial sea delimitation. If the rule governing territorial sea delimitation provided for the automatic creation of provisional median-line boundaries, the complexity of a case due to special circumstances could result in the effective permanence of a provisional median-line boundary. This mechanism would contradict the rationale justifying the introduction of the notion of special circumstances: although special circumstances warrant departing from median-line boundaries, the complexity determined by special circumstances could prevent states from reaching agreements delimiting territorial sea boundaries departing from the median line, which therefore would result in permanent median-line boundaries.

It is not entirely convincing to understand Article 15 UNCLOS as automatically establishing median-line boundaries unless and until the relevant states agree to the contrary. Consequently, one cannot consider that changes in the baselines determine the automatic fluctuation of territorial sea boundaries. UNCLOS does not provide a convincing legal basis for boundaries fluctuating by operation of law, either in the territorial sea, or in the EEZ and continental shelf.

2.2 Judicial decisions

As maritime boundaries do not fluctuate by operation of law, the question becomes whether they can fluctuate as a result of judicial decisions. At first glance, the answer to this question is in the

[37] 1958 Convention on the Territorial Sea and Contiguous Zone, 516 UNTS 206. See *Territorial and Maritime Dispute between Nicaragua and Honduras in the Caribbean Sea (Nicaragua v. Honduras)*, Judgment of 8 October 2007, [2007] ICJ Rep. 659, at 744, para. 280. See also M. Lando, 'Judicial Uncertainties concerning Territorial Sea Delimitation under Article 15 of the United Nations Convention on the Law of the Sea', (2017) 66 *International and Comparative Law Quarterly* 589, at 599.

[38] 'Commentary to the Articles concerning the Law of the Sea', 1956 YILC, Vol. II, at 271–2.

[39] Art. 12(1) of the 1956 Draft Articles stated that '[t]he boundary of the territorial sea between two States, the coasts of which are opposite each other at a distance less than the extent of the belts of territorial sea adjacent to the two coasts, shall be fixed by agreement between those States. Failing such agreement and unless another boundary line is justified by special circumstances, the boundary is the median line every point of which is equidistant from the nearest points on the baselines from which the breadths of the territorial seas of the two States are measured'. Under Art. 14(1) of the 1956 Draft Articles, '[t]he boundary of the territorial sea between two adjacent States shall be determined by agreement between them. In the absence of such agreement, and unless another boundary line is justified by special circumstances, the boundary is drawn by application of the principle of equidistance from the nearest points on the baseline from which the breadth of the territorial sea of each country is measured'.

[40] Commentary, *supra* note 38, at 271.

[41] Special circumstances include the presence of islands or navigational channels in the delimitation area. See Lando, *supra* note 37, at 591.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

affirmative. No rule of international law expressly prevents international tribunals from delimiting fluctuating maritime boundaries. Presumably, international tribunals could delimit fluctuating boundaries, provided that states have agreed to request them to do so, for example by special agreement. On closer analysis, this question raises an additional issue, namely whether there is judicial authority for the delimitation of fluctuating boundaries.

Dr. Árnadóttir wrote that two decisions of the International Court of Justice (ICJ or Court) are exceptions to the result of maritime delimitation being a stable boundary.[42] In its 2007 judgment in *Nicaragua* v. *Honduras*, the Court would have 'established a fluctuating boundary for the first segment of the boundary, from the land boundary terminus and seaward',[43] meaning that 'the first segment was left to fluctuate unless and until otherwise agreed by the parties'.[44] *Nicaragua* v. *Honduras* was a case in which a most prominent feature was high coastal instability at the mouth of the Rio Coco,[45] a river constituting the eastern half of the land boundary between Nicaragua and Honduras. The Rio Coco empties into the Caribbean Sea forming a markedly convex coastal protrusion resulting from continued sediment accretion, known as Cabo Gracias a Dios.

Because of coastal instability around Cabo Gracias a Dios, both parties requested the Court to identify a fixed point out to sea, instead of their land boundary terminus on Cabo Gracias a Dios, from which a stable boundary would depart.[46] Honduras requested that fixed point to be 3 nautical miles (nm) out to sea and also provided its geographical co-ordinates.[47] Nicaragua requested 'a starting-point located at the current mouth of the River Coco',[48] adding that 'this starting-point, wherever it may be located on any given day, would then be connected by a straight-line single maritime boundary to the start of its proposed bisector line'.[49] Nicaragua's was the only solution that would have resulted in a fluctuating boundary. The Court found that 'Nicaragua's proposal ... is problematic in certain respects and its initial suggestion to start the line some distance out to sea appears a more judicious solution'.[50] The Court also stated that '[t]he Parties are to agree on a line which links the end of the land boundary as fixed by the 1906 Award and the point of departure of the maritime delimitation in accordance with this Judgment'.[51]

The ICJ expressly opted for starting the maritime boundary at a fixed, not ambulatory, point out to sea. Furthermore, there is no indication that the Court, by directing the parties to agree on a line connecting the fixed starting point to their land boundary terminus, had envisaged that this line would be a fluctuating one. The Court specified that this line had to connect the fixed starting point to 'the end of the land boundary as fixed by the 1906 Award' of the King of Spain,[52] which was also a fixed point, having the geographical co-ordinates identified by a Mixed Commission in 1962.[53] The ICJ itself had used that point both 'as the point where the Parties' coastal fronts meet',[54] and as the point from which 3 nm would be measured to identify the starting point of the boundary out to sea.[55] The only way for *Nicaragua* v. *Honduras* to result in a fluctuating boundary is if one accepts that the line connecting the fixed starting point out to sea is established by operation of law under Article 15 UNCLOS. However, maritime boundaries do not fluctuate by

[42]Árnadóttir, *supra* note 21, at 479–80.
[43]Ibid., at 479.
[44]Ibid., at 480.
[45]*Nicaragua v. Honduras*, *supra* note 37, at 672–3, paras. 31–2.
[46]Ibid., at 755, para. 307.
[47]Ibid., at 755, para. 308.
[48]Ibid., at 755, para. 309.
[49]Ibid.
[50]Ibid., at 756, para. 311.
[51]Ibid.
[52]*The Border Dispute between Honduras and Nicaragua (Honduras v. Nicaragua)*, Award of 23 December 1906, XI RIAA 101.
[53]*Nicaragua v. Honduras*, *supra* note 37, at 677, para. 47.
[54]Ibid., at 748, para. 294.
[55]Ibid., at 756, para. 311.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

operation of law.[56] *Nicaragua* v. *Honduras* is no authority for the establishment of fluctuating boundaries by judicial process.

Costa Rica v. *Nicaragua* raised issues similar to those in *Nicaragua* v. *Honduras*. The land boundary terminus was located at the mouth of the San Juan River. Coastal instability at the land boundary terminus meant that it was difficult to identify a stable starting point for the maritime boundary.[57] Both parties had requested the Court to identify a starting point on land: for Costa Rica, that point was the one on its coast that was closest to the mouth of the San Juan River, as identified by the Court-appointed expert;[58] for Nicaragua, that point was the land boundary terminus as it existed on 15 April 1858, when the two parties had concluded the Treaty of Limits demarcating their land boundary, even if that point was submerged by the sea.[59] It was the Court who asked the parties to indicate, in their oral submissions, their views on a starting point out to sea.[60] Costa Rica stated that a starting point out to sea could have been a viable alternative, in which case the Court should have connected that point to the mouth of the San Juan River by a mobile segment.[61] Nicaragua stated that 'the "hinge" solution is practicable',[62] and that 'the line connecting the fixed point at sea with the actual land territory could be mobile, moving with natural changes in the coastline'.[63] The Court decided that:

> the great instability of the coastline in the area of the mouth of the San Juan River ... prevents the identification on the sandspit of a fixed point that would be suitable as the starting-point of the maritime delimitation. It is preferable to select a fixed point at sea and connect it to the starting-point on the coast by a mobile line.[64]

The Court thus fixed a starting point along the median line, between the baselines of both states, located at 2 nm from the land boundary terminus.[65]

The decision in *Costa Rica* v. *Nicaragua* should be understood in the context of the parties' replies to the Court's question on the appropriateness of a starting point out to sea. Crucially, both states replied that a starting point out to sea, connected to solid land by a mobile line, was a viable option. In reaching its decision on this point, the Court could build on the parties' agreement, different from *Nicaragua* v. *Honduras*. Conceivably, if the parties had not agreed on the viability of a mobile segment, the Court might have only identified a starting point out to sea, without connecting that point to solid land with a mobile segment, as it had already done in *Nicaragua* v. *Honduras*. The ICJ's judgment in *Costa Rica* v. *Nicaragua* does not seem to be authority for the delimitation of fluctuating boundaries, but for the narrower proposition that the Court may establish such boundaries when the parties agree to it.

To date, there has been no judicial decision on maritime delimitation establishing fluctuating maritime boundaries. The decisions relating to fluctuating boundaries, *Nicaragua* v. *Honduras* and *Costa Rica* v. *Nicaragua*, were much narrower in their rationale than would be necessary in order to conclude that there is judicial authority for establishing boundaries that change with changes in the coastlines. Anyway, there could be room for international tribunals to delimit

[56] Section 2.1 above.

[57] *Maritime Delimitation in the Caribbean Sea and the Pacific Ocean (Costa Rica v. Nicaragua); Land Boundary in the Northern Part of Isla Portillos (Costa Rica v. Nicaragua)*, Judgment of 2 February 2018, [2018] ICJ Rep. 139, at 171–3, paras. 80–5.

[58] Ibid., at 171, para. 80, and at 178, para. 104.

[59] Ibid., at 171, para. 81. For the Treaty of Limits see Consolidated Treaty Series, vol. 118, at 439.

[60] *Costa Rica v. Nicaragua*, *supra* note 57, at 171, para. 82.

[61] Ibid., at 171, para. 83.

[62] Ibid., at 173, para. 84.

[63] Ibid.

[64] Ibid., at 173, para. 86.

[65] Ibid.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

wholly or partly fluctuating boundaries in the future. Whether they will do so seems to depend, to a great extent, on the arguments of the parties to the relevant disputes. The ICJ accepted to delimit a fluctuating boundary where the parties had agreed, but was reluctant to do so where the parties held opposing views on the matter. The lack of express support for delimiting fluctuating boundaries in the judges' individual opinions suggests that the ICJ is unlikely to delimit anything other than stable maritime boundaries, at least for the foreseeable future.

3. Fluctuating boundaries in practice

Beyond the lack of legal basis for their delimitation, fluctuating maritime boundaries are complex to establish by way of judicial process (Section 3.1) and, once established, are difficult to manage (Section 3.2). These problems suggest that fluctuating boundaries are not the practical solution to changing coastlines that one may think they are.

3.1 Delimiting fluctuating boundaries by judicial process

In the exercise of their treaty-making autonomy, states may agree to delimit fluctuating boundaries. Because boundary negotiations are confidential, the methodologies that states employ to delimit boundaries, fluctuating or not, are rarely in the public domain.[66] Conversely, the international tribunals' methodologies for delimiting maritime boundaries are well known.

The methodology for territorial sea delimitation is in two stages: first, international tribunals establish a provisional equidistance line by reference to base points located on the relevant coast of the states concerned; second, international tribunals may adjust that provisional line on account of special circumstances.[67] With respect to the delimitation of the EEZ and continental shelf, the judicial methodology involves three stages: first, international tribunals establish a provisional equidistance line, similar to delimitation in the territorial sea while including the identification of the relevant coast and relevant area;[68] second, international tribunals may adjust that line in the light of relevant circumstances;[69] third, international tribunals assess the equitableness of the boundary by reference to the inexistence of gross disproportionality between the length of the states' relevant coasts and the maritime areas found to appertain to each state.[70] International tribunals delimit boundaries in the territorial sea, EEZ and continental shelf on the basis of the geographical conditions at the time of delimitation.[71]

There appear to be two ways for international tribunals to delimit fluctuating boundaries. First, when implementing the delimitation methodology international tribunals may take into account that coastlines will change in the future. This approach would require abandoning the position

[66]Lando, *supra* note 14, at 308–10.

[67]*Qatar v. Bahrain*, *supra* note 9, at 94, para. 176.

[68]The methodology for territorial sea delimitation requires no identification of the relevant coast and relevant area. On the identification of the relevant coast and the relevant area see Lando, *supra* note 14, at 34–101; Y. Ishii, 'Relevant Coasts and Relevant Area in the Maritime Delimitation of the EEZ and Continental Shelf', (2020) 51 *Ocean Development and International Law* 307; A. G. Oude Elferink, 'Relevant Coasts and Relevant Area: The Difficulty of Developing General Concepts in a Case-Specific Context', in A. G. Oude Elferink, T. Henriksen and S. Veierud Busch (eds.), *Maritime Boundary Delimitation: The Case Law – Is it Consistent and Predictable?* (2018), 173.

[69]Relevant circumstances in EEZ and continental shelf delimitation are broadly similar to special circumstances in territorial sea delimitation. See M. Evans, 'Relevant Circumstances', in Oude Elferink, Henriksen and Veierud Busch, ibid., at 223–8.

[70]*Maritime Delimitation in the Black Sea (Romania v. Ukraine)*, Judgment of 3 February 2009, [2009] ICJ Rep. 61, at 101–3, paras. 115–22. See also *Dispute concerning Delimitation of the Maritime Boundary in the Bay of Bengal (Bangladesh/Myanmar)*, Judgment of 14 March 2012, [2012] ITLOS Rep. 4, at 67–8, para. 240. On the EEZ and continental shelf delimitation process in general see Y. Tanaka, *Predictability and Flexibility in the Law of Maritime Delimitation* (2019); S. Fietta and R. Cleverly, *A Practitioner's Guide to Maritime Boundary Delimitation* (2016); T. Cottier, *Equitable Principles of Maritime Boundary Delimitation* (2015).

[71]*Bangladesh v. India*, *supra* note 2, at 74, para. 212.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

that maritime boundaries are established on the basis of the geographical conditions at the time of the delimitation. Second, international tribunals may delimit maritime boundaries as they have done until now and leave it to states to update such boundaries in the future, if and when geographical changes justify it. This approach would be consistent with the position that maritime boundaries are established on the basis of the geographical conditions at the time of the delimitation.[72] The first way would require international tribunals to adjust how they implement the delimitation methodology. Issues arising in the adjustment process would affect all stages of the delimitation methodology, discussed in turn, and would likely require impracticable solutions.

Accounting for shifting coastlines would complicate identifying the relevant coast. International tribunals identify the relevant coast either along the low-water line,[73] or by approximating the coast by means of straight lines.[74] Taking into account shifting coastlines in the former approach would require international tribunals to consider what coastlines will look like in the future. There is no indication as to the appropriate future timespan to be considered. The longer the relevant timespan, the more the coast will likely change, the more different will the relevant coast be with respect to the one at the time of delimitation, whether because of erosion or accretion. Another time-related issue would concern the intervals at which international tribunals would have to 'freeze' the future picture of the coastline to assess its changes with respect to earlier times. Assessing the coast at weekly intervals, for instance, is likely too minute and time-consuming an exercise, but to assess the coast at intervals of years, or even decades, risks resulting in a distorted understanding of how changes in the coastline have actually taken place.

Furthermore, assessing how coastlines might shift in the future raises evidentiary questions. Coastlines can change not only by natural phenomena, but also owing to human interference; for example, engineering works to protect ports located near a river mouth could affect the supply of sediments brought downstream by that river. The variety of factors capable of determining changes in the shape of coastlines complicates assessing how such changes are likely to take place. In turn, this assessment raises questions concerning both the type of evidence capable of showing the coastline's evolution and the method for international tribunals to assess this evidence. Expert evidence appears to be most suited to addressing scientific matters such as changes in coastal morphology. However, scholars have shown that presenting expert evidence can have shortcomings, including the international tribunals' limited expertise in assessing it.[75] In relation to climate change, a lot may depend on whether mitigation measures will be implemented and prove successful. Moreover, the processes by which ice sheets melt are not linear and not entirely understood within the scientific community.[76]

Approximating the relevant coast by means of straight lines might avoid the full extent of the problems arising where the relevant coast is identified along the low-water line. Relevant coasts approximated by straight lines can remain a representation of the coast for longer than relevant coasts identified along the low-water line: changes in the coastal geography may entail significant changes in the shape and length of the low-water line, but they may not be sufficiently extensive to justify adjustments to straight lines representing the relevant coast. Approximating the relevant

[72]This second way to delimit fluctuating boundaries is discussed in Section 3.2 below. A third question which could arise is whether geographical changes could be the basis for states to argue that maritime boundaries previously established by judicial process could be re-delimited. This question is linked to the principle of *res judicata*, the detailed treatment of which is beyond the scope of this article.

[73]For example, see *Nicaragua v. Colombia*, *supra* note 13, at 678, para. 145, and at 679–80, paras. 150–4.

[74]For example, see *Bangladesh/Myanmar*, *supra* note 70, at 58–9, paras. 200–5.

[75]L. Lima, 'The Evidential Weight of Experts before the ICJ: Reflections on the *Whaling in the Antarctic* Case', (2015) 6 JIDS 621; I. Van Damme, 'The Assessment of Expert Evidence in International Adjudication', (2018) 9 JIDS 401; K. Cook, 'Judging "Best Available Science": Emerging Issues and the Role of Experts', (2018) 9 JIDS 388.

[76]For example, see Naughten et al., 'Two-timescale Response of a Large Antarctic Ice Shelf to Climate Change', (2021) 12 *Nature Communications* 1991; A. A. Robel, H. Seroussi and G. H. Roe, 'Marine Ice Sheet Instability amplifies and skews Uncertainty in Projections of future Sea-level Rise', (2019) 116 *Proceedings of the National Academy of Sciences* 14887.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

coast by straight lines could be a safer option for international tribunals willing to take stock of the coastline's potential for future change. Nonetheless, the questions arising in respect of identifying a changing relevant coast along the low-water line would still persist, to some degree, where the relevant coast were approximated using straight lines. Moreover, the approximation approach is problematic in its own right, primarily because it does not result in an accurate depiction of the coast generating the maritime entitlements to be delimited.[77] A solution could be to use straight baselines to approximate the relevant coast.[78] Anyway, this solution would carry the same problems connected with identifying the relevant coast along a changing coastline, given the close relationship between straight baselines and the direction of the coast under Article 7(3) UNCLOS.

Identifying the relevant area would be similarly difficult. Similar problems would arise as would with regard to relevant coast identification, because the landward limit of the relevant area is the relevant coast. Additional problems would follow from the need to determine the limits of the relevant area out to sea.[79] The outer limit of the relevant area may coincide with the outer limit of the EEZ or continental shelf, which depends on the baseline. Otherwise, the limits of the relevant area may be identified by reference to existing boundaries, but the question would be whether such boundaries would be stable over time or, similar to the relevant coast, also fluctuate. If existing boundaries fluctuated, international tribunals would have to assess not only the potential shifts in the relevant coast, but also the potential shifts in boundaries established with, or only between, third states not before them. A consequence of delimiting fluctuating boundaries would be to promote uncertainty in identifying the relevant coast and the relevant area.

Drawing a provisional equidistance line, both in the territorial sea and beyond, depends on the identification of suitable base points. It seems established that base points must be located on solid land, which excludes low-tide elevations.[80] Nevertheless, what is solid land today may not be solid land anymore in the future. The maritime feature of New Moore/South Talpatty in *Bangladesh* v. *India* and the land boundary terminus identified by General Alexander in *Costa Rica* v. *Nicaragua* are examples from recent cases. If international tribunals drew provisional equidistance lines using base points that will exist into the future, they may have to look for such base points far inland. This approach appears unsatisfactory, as it would result in delimiting maritime boundaries with complete disregard for the geographical circumstances at the time of delimitation. Alternatively, international tribunals could draw multiple provisional equidistance lines, each representing what an equidistance line would look like at a given point in time in the future. In doing so, international tribunals would use distinct base points for each line, depending on which would be expected to exist at the relevant future time. It is not unheard for international tribunals to draw more than one provisional equidistance line in the same case. In *Qatar* v. *Bahrain*, the ICJ drew two such lines, depending on whether base points were placed on certain maritime features.[81] However, one thing is to draw two provisional equidistance lines, while drawing several more is quite another. The more provisional equidistance lines an international tribunal were to draw, the more would it be possible for it to determine the boundary with greater precision. Questions of proof arising in respect of the relevant coast and relevant area would arise also in respect of drawing a provisional equidistance line.

Difficulties resulting from the uncertain identification of the relevant coast would also impact the assessment of certain special or relevant circumstances, at the second stage of the delimitation methodologies. Among the circumstances states most frequently invoke to justify adjustments to a provisional equidistance line, one finds marked disparity in the length of the coasts of the states

[77]Lando, *supra* note 14, at 48–56.
[78]Ibid., at 52–6.
[79]On the limits of the relevant area see Lando, ibid., at 81–98; Ishii, *supra* note 68, at 321–4.
[80]*Bangladesh v. India*, *supra* note 2, at 86, paras. 260–1.
[81]*Qatar v. Bahrain*, *supra* note 9, at 104, para. 216.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

concerned.[82] If this disparity is sufficiently marked at the time of delimitation to warrant adjusting the provisional equidistance line, it should also be sufficiently marked at a future time. Nonetheless, the accuracy of this statement depends on the degree of coastal length disparity at the time of delimitation. In cases such as *Nicaragua* v. *Colombia*, in which the coasts of the two states stood in a 8.2:1 ratio,[83] one might confidently expect that, all other circumstances being identical, coastal length disparities will remain sufficiently marked to justify adjusting the provisional equidistance lines for an appreciable duration of time in the future. One could not make the same confident assessment in a case such as *Bangladesh/Myanmar*, in which the coastal length ratio was 1:1.42 and the delta of the Ganges, along which ran most of the coast of Bangladesh, was known to change relatively rapidly.[84]

The uncertainty stemming from the identification of the relevant area makes it problematic to assess disproportionality, at the third stage of the process for delimiting the EEZ and continental shelf.[85] Disproportionality can be criticized for being 'much ado about nothing', because it has never led to adjusting boundaries which emerged from the first two stages of the delimitation methodology.[86] Further criticism centres on the discretionary character of the disproportionality assessment.[87] The reasons of disproportionality's critics mainly focus on the indeterminacy of the standard and its limited impact on maritime delimitation by judicial process. Seeking to delimit maritime boundaries by taking into account future changes in coastal geography would likely dilute both the disproportionality standard, and its effects in the delimitation methodology. This problem is additional to the ones, already noted in relation to the previous stages of the methodology, of uncertainty and proof.

The current judicial process of maritime delimitation is ill-suited to being applied in the context of evolving coastlines. This view does not necessarily entail that maritime delimitation should never take place in such a context. Yet, it does entail delimiting maritime boundaries while taking into account changing coastlines requires, at least, considering seriously whether the established delimitation methodology can be applied meaningfully at all.

3.2 Updating fluctuating boundaries

The alternative to international tribunals delimiting maritime boundaries while taking into account future changes in the coastlines, states could take on the task of updating such boundaries after international tribunals have delimited them on the basis of the geographical conditions at the time of delimitation. This updating exercise, which would likely take place decades after the relevant judicial decisions, is an operation extending to maritime boundaries delimited by treaty.

Updating maritime boundaries is nothing short of delimiting an entirely new boundary. In the updating process, states would remain bound by the earlier judicial decision or treaty establishing the boundary to be updated, pursuant to the principles of *res judicata* and *pacta sunt servanda*. It would be only when the states concerned have reached an agreement on the updated boundary that they would not be obligated to comply with the earlier judicial decision or observe the earlier treaty.[88] This legal framework may create imbalance in the negotiating power of the relevant states. Once coastlines change, an original maritime boundary will likely become more

[82] Lando, *supra* note 14, at 173–8.

[83] *Nicaragua v. Colombia*, *supra* note 13, at 702, para. 211.

[84] *Bangladesh/Myanmar*, *supra* note 70, at 126, para. 498.

[85] On disproportionality see Y. Tanaka, 'The Disproportionality Test in the Law of Maritime Delimitation', in Oude Elferink, Henriksen and Veierud Busch, *supra* note 68, at 291.

[86] M. Evans, 'Maritime Boundary Delimitation: Where Do We Go From Here?', in D. Freestone, R. Barnes and D. Ong (eds.), *Law of the Sea: Progress and Prospects* (2006), 137, at 156.

[87] M. Evans, 'Maritime Boundary Delimitation: Whatever Next?', in J. Barrett and R. Barnes (eds.), *Law of the Sea: UNCLOS as a Living Treaty* (2016), 41, at 70.

[88] VCLT, Art. 59. See also H. Thirlway, *The International Court of Justice* (2016), 135–6.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

advantageous for one of the two relevant states, to the detriment of the other state. Cognisant of its acquired advantage, the former state could simply refuse to negotiate an updated boundary. Against this position, there seems to be little in the way of legal remedies.

Dr. Árnadóttir appears to suggest, on the basis of the ICJ's judgment in *Aegean Sea Continental Shelf*,[89] that maritime boundary treaties could be terminated on the basis of a fundamental change of circumstances, under Article 62 VCLT.[90] While territorial sea and continental shelf boundaries would fall within the exception to the application of this rule,[91] the same could not be said for EEZ and all-purpose boundaries.[92] The problem of this view is that it builds upon a formalistic distinction between boundaries in different maritime zones. It is true that, because coastal states exercise sovereignty in their territorial sea, territorial sea boundaries are theoretically identical to land boundaries, in relation to which Article 62 VCLT had been conceived. In practice, territorial sea boundaries are no different from boundaries in any other maritime zone.

Accepting that states cannot terminate treaties establishing territorial sea and continental shelf boundaries pursuant to Article 62 VCLT, while could do so in respect of treaties establishing EEZ and all-purpose boundaries, would complicate the relevant states' exercise or rights and duties in the maritime zones concerned. Treaty-made territorial sea and continental shelf boundaries would become immutable, allowing states only to update EEZ or all-purpose boundaries. There are two problems with this situation. First, the EEZ conceivably incorporates the continental shelf upon being declared by a coastal state.[93] States willing to update continental shelf boundaries thus could find a legal justification for invoking the termination of earlier treaties delimiting such boundaries simply by declaring EEZs. Second, there are numerous treaties still in force specifying that they delimit boundaries in the continental shelf, with or without also delimiting boundaries in the water column.[94] On Dr. Árnadóttir's line of argument, one should understand such treaties to establish continental shelf boundaries distinct from water column boundaries. The states parties to these treaties could only delimit, or update, water column boundaries on the basis of the future coastal geography. This exercise in delimiting or updating could result in water column boundaries which follow a course different from continental shelf boundaries. The fact that such boundaries have been delimited only on three occasions to date[95] indicates the states' aversion to such arrangements, presumably owing to their difficult workability.[96]

[89] *Aegean Sea Continental Shelf (Greece v. Turkey)*, Judgment of 19 December 1978, [1978] ICJ Rep. 3, at 35–6, para. 85.

[90] Under Art. 62(1) VCLT, '[a] fundamental change of circumstances which has occurred with regard to those existing at the time of the conclusion of a treaty, and which was not foreseen by the parties, may not be invoked as a ground for terminating or withdrawing from the treaty unless: (a) the existence of those circumstances constituted an essential basis of the consent of the parties to be bound by the treaty; and (b) the effect of the change is radically to transform the extent of obligations still to be performed under the treaty'. The ICJ had found Art. 62 VCLT to reflect customary international law. See *Gabčikovo-Nagymaros Project (Hungary/Slovakia)*, Judgment of 25 September 1997, [1997] ICJ Rep. 7, at 38, para. 46.

[91] Under Art. 62(2) of VCLT, '[a] fundamental change of circumstances may not be invoked as a ground for terminating or withdrawing from a treaty: (a) if the treaty establishes a boundary; or (b) if the fundamental change is the result of a breach by the party invoking it either of an obligation under the treaty or of any other international obligation owed to any other party to the treaty'.

[92] Árnadóttir, *supra* note 21, at 483. See also S. Árnadóttir, 'Termination of Maritime Boundaries Due to a Fundamental Change of Circumstances', (2016) 32 *Utrecht Journal of International and European Law* 94, at 105–6.

[93] Lando, *supra* note 14, at 109–21.

[94] Ibid., at 116–21.

[95] 1971 Treaty between Australia and Indonesia Establishing Certain Seabed Boundaries, 974 UNTS 308; 1972 Treaty between Australian and Indonesia Establishing Certain Seabed Boundaries in the Area of the Timor and Arafura Seas, Supplementary to the Agreement of 18 May 1971, 974 UNTS 320; 1978 Treaty between Australia and Papua New Guinea concerning Sovereignty and Maritime Boundaries in the Torres Strait, 1429 UNTS 207; 1997 Treaty between Australia and Indonesia Establishing an Exclusive Economic Zone Boundary and Certain Seabed Boundaries, 36 ILM 1053 (1997).

[96] The ILA's committee on International Law and Sea Level Rise has also emphasized problems of legal certainty in its discussions concerning fundamental change of circumstances as a reason to terminate maritime boundary agreements. The committee proposed that, 'on the grounds of legal certainty and stability, the impacts of sea level rise on maritime boundaries, whether contemplated or not by the parties at the time of the negotiation of the maritime boundary, should not be regarded as a fundamental change of circumstances'. See Report, *supra* note 18, at 23.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

The additional issue is that fundamental change of circumstances is not a ground for updating boundaries established by judicial decision. The only legal basis to achieve that result is to file an application for revision, in accordance with Article 61 of the ICJ's Statute or Articles 127–128 of ITLOS' Rules of Procedure. An application for revision can only be filed before the lapse of ten years from the date of the relevant judgment. Ten years appear unlikely to be a sufficiently long time period for coastlines to change in such a manner that would justify updating maritime boundaries. Future changes in the coastline also could not justify applications for revision anyway, because a 'fact' on the basis of which revision proceedings can start is one that already existed before the date of the judgment to be revised.[97]

Assuming that states are willing to update a previously-established maritime boundary because of changed coastlines, the same issues may arise that already arise in relation to the delimitation of present-day boundaries. Such issues may include agreeing on the delimitation method, selecting base points and assessing resource-related factors. The suggestion that '[s]tates are usually in good positions to monitor fluctuations of their coastlines and they can adjust boundaries accordingly'[98] assumes that these issues would present no obstacles to future delimitations. There are numerous examples of maritime boundary negotiations which are protracted for decades because of the states' inability to agree on such issues. For example, the negotiations between Bangladesh and Myanmar continued from 1974 to 2010, without resulting in a treaty.[99] There is no telling that similar cases would not take place also in future boundary negotiations, even if such negotiations were to build upon maritime boundaries already delimited by judicial process or treaty decades earlier.

Base point selection could be the most contentious problem in updating existing boundaries. Whether coastlines receded or advanced, base points used by international tribunals or states to delimit maritime boundaries would disappear as a result of erosion or accretion. In the accretion scenario, base points that used to be situated along the coast would be found inland; for this reason, they could not be seen as suitable base points anymore. Erosion is the more likely phenomenon, given the scientific predictions concerning sea level rise. Receding coastlines would mean that base points that used to be located on solid land would become submerged and thus rendered entirely unsuitable as base points for maritime delimitation. This likely future situation would cause limited problems for the unilateral establishment by states of the outer limits of their maritime zones, but states may not delimit maritime boundaries unilaterally. Selecting base points along the changed coastline is a matter for the relevant states' subjective appreciation and on which they must reach an agreement,[100] but judicial delimitation cases show that states can hardly ever agree on base point selection. International tribunals may have selected base points at an earlier point in time, but the very need for updating boundaries shows that such base points are now unsuitable to construct an equidistance line. Therefore, the international tribunals' selection of base points is no guarantee that states will have an easier task in selecting their own updated base points years on.

4. Alternatives

Fluctuating boundaries lack a convincing legal basis in positive international law, whether they may fluctuate by operation of law,[101] or be delimited by international tribunals.[102] Delimiting

[97] *Application for Revision of the Judgment of 11 July 1996 in the Case concerning* Application of the Convention on the Prevention and Punishment of the Crime of Genocide (Bosnia and Herzegovina v. Yugoslavia), Preliminary Objections *(Yugoslavia v. Bosnia and Herzegovina)*, Judgment of 3 February 2003, [2003] ICJ Rep. 7, at 30, para. 67.

[98] Árnadóttir, *supra* note 21, at 485.

[99] *Bangladesh/Myanmar*, *supra* note 70, at 21, paras. 36–9.

[100] C. G. Lathrop, 'The Provisional Equidistance Line: Charting a Course between Objectivity and Subjectivity?', in Oude Elferink, Henriksen and Veierud Busch, *supra* note 68, at 211.

[101] See Section 2.1 above.

[102] See Section 2.2 above.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

fluctuating boundaries by judicial process would be too complex an exercise, because international tribunals would have to grapple with questions which appear ill-suited to be answered in the context of the established methodologies for delimiting territorial sea, EEZ and continental shelf boundaries.[103] The potential scenario in which states are left to update boundaries previously delimited by judicial process also raises problematic questions.[104] Currently, international law lacks the instruments to make fluctuating boundaries a realistic possibility.

The question is whether there are other delimitation methodologies that international tribunals have already used in past cases which would allow one to establish fluctuating boundaries. Beyond the two- and three-stage delimitation methodologies, which heavily rely on equidistance, international tribunals have delimited maritime boundaries, or part thereof, by way of angle-bisector lines.[105] The ICJ used the angle-bisector method in *Nicaragua v. Honduras* apparently because the coastal geography presented was highly unstable around Cabo Gracias a Dios.[106] However, it appears more persuasive to read the reason for the ICJ's decision in *Nicaragua* v. *Honduras* to concern the sharp convexity of the parties' coast, with coastal instability being an additional reason for drawing an angle-bisector boundary.[107] *Nicaragua* v. *Honduras* should not be read as authority for using angle-bisector lines where coastal instability makes delimiting equidistance lines difficult. Moreover, the angle-bisector method also relies on the geography as it exists at the time of delimitation, because the angle to be bisected by the boundary-to-be is defined by two lines approximating the direction of the relevant states' coast when the boundary is delimited. More problematically for fluctuating boundaries, the ICJ has once delimited an angle-bisector boundary also on the basis of the coastal geography existing years before the delimitation. In *Nicaragua* v. *Honduras*, the Court used the land boundary terminus identified by a Mixed Commission in 1962, 45 years before the ICJ's judgment, as the point where the lines approximating the direction of the parties' coasts met.[108]

The other method for maritime delimitation would require international tribunals to take a case-specific approach, establishing maritime boundaries on the basis of equitable principles and taking into account all relevant circumstances.[109] This case-specific approach would be problematic. First, it would entail international tribunals reverting back to the earliest jurisprudence on maritime delimitation, which was much criticized for lacking a sufficiently stringent methodology ensuring that delimitation would have an appreciable degree of predictability.[110] Second, the question would remain open as to how international tribunals could integrate considerations on future changes of the coastline into the reasoning of their decisions. The problem is that there appears to be no legal basis for international tribunals to delimit fluctuating boundaries, unless the states concerned made an express request to that effect in a special agreement. This second question is also connected with issues similar to those already considered in relation to delimiting boundaries under the two- or three-stage methodology, such as issues of evidence.[111]

In current positive international law, solutions addressing the impact of changing coastlines on maritime boundaries should not be sought in UNCLOS or the judicial delimitation methodology.

[103]See Section 3.1 above.

[104]See Section 3.2 above.

[105]*Nicaragua v. Honduras*, *supra* note 37, at 746–9, paras. 286–98; *Delimitation of the Maritime Boundary between Guinea and Guinea-Bissau (Guinea/Guinea-Bissau)*, Award of 14 February 1985, XIX RIAA 149, at 189–90, paras. 108–11; *Continental Shelf (Tunisia/Libyan Arab Jamahiriya)*, Judgment of 24 February 1982, [1982] ICJ Rep. 18, at 89, para. 129; *Delimitation of the Continental Shelf between the United Kingdom and France (France/United Kingdom)*, Award of 30 June 1977, XVIII RIAA 3, at 118, para. 254.

[106]*Nicaragua v. Honduras*, ibid., at 742–3, paras. 277–8.

[107]Lando, *supra* note 14, at 162.

[108]*Nicaragua v. Honduras*, *supra* note 37, at 748, para. 294. See also Lando, ibid., at 163.

[109]*North Sea Continental Shelf*, *supra* note 1.

[110]Lando, *supra* note 14, at 17–20.

[111]See Section 3.1 above.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

International tribunals seem capable of having only a limited impact on how maritime boundaries can or should change as a consequence of sea level rise. For this reason, acting on the implications of sea level rise for maritime boundaries is a task that states should undertake. States can carry out this task either case-by-case or generally. Either way, the key to a solution could be to remove the problem at its root, which is the boundary itself.

Case-by-case solutions providing for the likelihood of coastline change include abandoning maritime delimitation in favour of arrangements that allow greater flexibility while, at the same time, regulating the respective rights and duties of coastal states in the area of their overlapping maritime claims or entitlements. For example, states could agree to create joint development zones, in which they both have rights to explore and exploit natural resources, which may include mechanisms for revenue-sharing and environmental protection.[112] Joint development would avoid most problems relating to maritime boundaries becoming obsolete as a result of changes in coastlines, but would also entail its own issues. Because joint development relies on inter-state co-operation, it requires the states' willingness to conclude mutually beneficial arrangements for the exploration and exploitation of marine natural resources. To date, states have overwhelmingly concluded maritime delimitation treaties over treaties on joint development, which suggests that states prefer clearly dividing the geographical scope of their individual maritime jurisdiction over entering into agreements requiring further co-operation after their entry into force.[113]

Action to address the implications of changing coastlines on a general level would possibly have to be more radical. One approach is to recognize that climate-change-caused sea level rise is a risk which faces humankind, and thus the international community of states, as a whole. Threats to the entire international community may require a communitarian solution. This solution could be to abolish maritime boundaries altogether, whether alongside or separately from abolishing the EEZ and the continental shelf. The need for maritime boundaries arises from the gradual extension of jurisdiction over maritime areas since the beginning of the twentieth century. If the EEZ and continental shelf were to be re-claimed as part of the high seas, the need for maritime boundaries beyond the territorial sea would disappear, and with it all issues fluctuating boundaries would entail. This reclamation by the high seas would also result in a corresponding extension of the Common Heritage of Mankind,[114] the regulation of which under international law is currently the subject of negotiations. The Common Heritage of Mankind could also limit the reckless exploitation of natural resources which has already contributed towards biodiversity collapse.[115] Putting the EEZ and continental shelf under the common responsibility of all states in order to implement strategies to deal with climate change and its effects could seem a sensible idea in principle. Nevertheless, that idea would have to be implemented by states, which are likely reluctant to reduce the extent of maritime areas currently falling within their jurisdiction. If abolishing the EEZ, and its boundaries as a result, is an unlikely event, it appears even more so in respect of the territorial sea and its boundaries. States would be conceivably reluctant to surrender jurisdiction over the belt of sea closest to their coasts, on grounds which one could presume mainly to concern security.

The most realistic solution to take stock of the impact of sea level rise on maritime boundaries seems to be joint development of maritime areas. This solution would build on the established rules on treaty-making and would not entail reducing the geographical scope of the states' rights and duties relating to exploration and exploitation of marine resources. Idealistic solutions appear more difficult to realize, although they may, perhaps, better provide for the long-term management of ocean resources in a time when the reality of climate change is no longer debatable.

[112]On joint developments zones see V. Becker-Weinberg, *Joint Development of Hydrocarbon Deposits in the Law of the Sea* (2014).

[113]For a list of treaties creating joint developments zones see Lando, *supra* note 14, at 355–6 (Appendix 2).

[114]UNCLOS, Art. 136.

[115]K. Mickelson, 'Common Heritage of Mankind as a Limit to Exploitation of the Global Commons', (2019) 30 EJIL 635.

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press

Certain international lawyers have had a lasting impact on shaping how we think about the sea and its resources.[116] Perhaps, the time has come for another shift in perspective.

5. Stability of boundaries between parochialism and community

Under current international law changing coastlines do not result in changing maritime boundaries. UNCLOS does not provide a convincing legal basis to state that maritime boundaries change automatically, as coastlines change. No international judicial decision can be read as authority for the delimitation of fluctuating boundaries by judicial process. In addition, the actual process of establishing maritime boundaries by judicial process does not provide a workable framework within which international tribunals may take into account the impact of shifting coastlines on maritime boundaries. If states were left to update previously-delimited maritime boundaries, they would face both legal problems connected with the principles of *res judicata* and *pacta sunt servanda*, and practical problems resulting from challenges that updating negotiations would conceivably entail.

Fluctuating boundaries are not a reality in positive international law. If they were, or were to become, a reality, they could be a solution to the problems created by the obsolescence of maritime boundaries owing to coastline change. At the same time, fluctuating boundaries are likely to be fertile ground for a new type of maritime disputes to arise: disputes concerning the location of a fluctuating boundary at a given point in time. Such disputes could result from incidents at sea, such as enforcement overreach by coastal states; states parties to such disputes would have to premise their claims on the exact course of a fluctuating boundary at the relevant time. Fluctuating boundaries appear to be a method to prevent disputes, which have not yet arisen, concerning the obsolescence of maritime boundaries due to changes in the coastline; at the same time, fluctuating boundaries ensure that disputes concerning the lawfulness of state activities at sea, which have already come before international tribunals,[117] would increase in frequency.

Certain solutions to the challenges of sea level rise for maritime boundaries may already be available, such as the states' decision to opt for joint development instead of delimitation. More radical solutions aiming at the abolition of maritime boundaries by re-incorporating the EEZ and continental shelf into the high seas appear difficult to realize, although they could address the challenges of sea level rise at their root. The question as to what to do with boundaries made obsolete by changing coastlines can have different answers. Fluctuating boundaries provide one of these answers, but an answer that struggles to fit in the current legal framework of maritime delimitation.

[116] S. Ranganathan, 'Global Commons', (2016) 27 EJIL 693; S. Ranganathan, 'Ocean Floor Grab: International Law and the Making of an Extractive Imaginary', (2019) 30 EJIL 573.

[117] For example, see *M/V "Saiga" (No. 2) (Saint Vincent and the Grenadines v. Guinea)*, Judgment of 1 July 1999, [1999] ITLOS Rep. 10; *M/V "Virginia G" (Panama/Guinea-Bissau)*, Judgment of 14 April 2014, [2014] ITLOS Rep. 4; *M/V "Norstar" (Panama v. Italy)*, Judgment of 10 April 2019, [2018–2019] ITLOS Rep. 10.

Cite this article: Lando M (2022). Stability of maritime boundaries and the challenge of geographical change: A reply to Snjólaug Árnadóttir. *Leiden Journal of International Law* **35**, 379–395. https://doi.org/10.1017/S0922156522000061

https://doi.org/10.1017/S0922156522000061 Published online by Cambridge University Press