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Against a rising tide: ambulatory baselines and shifting maritime limits in the face of sea level rise

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Abstract

This paper addresses a critical issue for many coastal States: rising global sea levels. While the causes of climate change still excite controversy and debate, it is now widely accepted that significant sea level rise is taking place and that this trend appears likely to accelerate in the future. This phenomenon raises a number of important challenges for coastal and island States. Among these threats is the likely impact of rising sea levels on national claims to maritime jurisdiction. Significant changes to coastlines and therefore baselines and the potential submergence of key basepoints may potentially lead to the loss of broad national claims to maritime jurisdiction. The loss of significant areas, even all, of the maritime jurisdictional zones claimed by certain coastal States is likely to have profound economic consequences as jurisdictional rights over the valuable resources within these maritime spaces would also necessarily be lost. Certain generally low-lying Pacific Island States, notably Kiribati, Marshall Islands and Tuvalu, which also have geographically restricted territorial extents, appear to be especially vulnerable to these threats. Some of the options to address these potentially dire threats are then briefly addressed.

Keywords

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Against a Rising Tide:

Ambulatory Baselines and Shifting Maritime Limits in the Face of Sea Level Rise

Clive Schofield

Introduction

This paper addresses a critical issue for many coastal States: rising global sea levels. While the causes of climate change still excite controversy and debate, it is now widely accepted that significant sea level rise is taking place and that this trend appears likely to accelerate in the future. This phenomenon raises a number of important challenges for coastal and island States. Among these threats is the likely impact of rising sea levels on national claims to maritime jurisdiction. Significant changes to coastlines and therefore baselines and the potential submergence of key basepoints may potentially lead to the loss of broad national claims to maritime jurisdiction. The loss of significant areas, even all, of the maritime jurisdictional zones claimed by certain coastal States is likely to have profound economic consequences as jurisdictional rights over the valuable resources within these maritime spaces would also necessarily be lost. Certain generally low-lying Pacific Island States, notably Kiribati, Marshall Islands and Tuvalu, which also have geographically restricted territorial extents, appear to be especially vulnerable to these threats. Some of the options to address these potentially dire threats are then briefly addressed.

Rising Tides – the Threat of Global Sea Level Rise

There is mounting evidence that not only is the global sea level rising, but that the rate at which it is doing so is accelerating.¹ While debates continue as to the causes of this phenomenon (and are beyond the scope of this paper), many commentators link the rise in the world's ocean to anthropogenically-induced global climate change.²

The major potential sources of significant sea level rise are from the thermal expansion of the oceans and the disintegration of land-based ice sheets. The first of these, the so-called 'steric effect', occurs as a consequence of the increasing atmospheric temperatures associated with global warming. As air temperatures rise so, gradually and incrementally, the oceans also warm. As they warm, surface waters expand and this in turn translates to a rise in sea level rise.

With regard to the loss of land-based ice – the melting of glaciers and potential destabilisation and disintegration of major ice sheets such as those in Greenland and Antarctica – while it would in all probability take a considerable time for major

¹ See, for example, Church, J. A., and White, N. J. (2006) "A 20th century acceleration in global sea-level rise", *Geophysical Research Letters*, 33, L01602, doi:10.1029/2005GL024826, 2006.

² Although the evidence for global warming appears to be compelling, some scientists and commentators point to long term cyclical processes rather than anthropogenically inspired causes to explain this phenomenon. With regard to the Arctic see, for example, See "NASA sees Arctic Ocean circulation do an about-face", available at <www.physorg.com/news114189626.html>.

bodies of ice to disintegrate, collapse and melt, the consequences in terms of sea level rise were they to do so are dire. The disintegration of major ice sheets has been described as “the greatest threat of climate change to human beings” with the potential to result in sea level rise well in excess of one metre by the end of the present century, with sea level potentially rising by around that figure every two decades.³ In this context it is worth noting that there are strong signs of increased melting on the Greenland ice sheet and that there is enough water locked in the Greenland ice sheet alone to equate to sea level rise of the order of six metres were it to collapse and melt completely.⁴

For its part the United Nations Intergovernmental Panel on Climate Change (IPCC), in its most recent report, dating from 2007, estimated the range of sea-level rise at between 0.38 to 0.59 metres.⁵ The key reason for the IPCC’s relatively moderate predictions, which includes a mid-range prediction of sea level rise of the order of 40 centimetres, is that the IPCC’s methodology does not take into account the potential disintegration of the major ice sheets mentioned above, largely due to the considerable uncertainties that exist in respect of how swiftly such events might take place. This has led to the IPCC’s predictions being criticised as being “remarkably conservative” and the victim of reaching “lowest common-denominator conclusions.”⁶

Whilst there is mounting evidence that sea level rise is a very real concern and that the rate of sea level rise is accelerating, it is important to acknowledge that considerable uncertainties remain and that sceptical voices exist that view the predictions of sea level rise outlined above as improbable.⁷ Nonetheless, even the relatively modest sea level rise envisaged by the IPCC would have significant consequences and pose major challenges for coastal States, most notably those that are low-lying such as Bangladesh and those composed of low-lying islands such as Kiribati and Tuvalu in the Pacific Ocean and the Maldives in the Indian Ocean.

Baselines and the Limits of Claims to Maritime Jurisdiction

The interface between the land and sea for maritime jurisdictional purposes are a coastal State’s baselines. Such baselines are of fundamental importance to coastal State claims to maritime jurisdiction as they provide the starting point from which these claimed zones are measured. While often termed “territorial sea baselines”, such baselines are fundamental to claims not only to the territorial sea, but all other maritime zones – the contiguous zone, exclusive economic zone (EEZ) and continental shelf are all measured from relevant baselines (see Figure 1).

³ Hansen, J. (2006) “The Threat to the Planet”, *The New York Review of Books* (13 July).

⁴ *Ibid.* Hansen notes that the area of Greenland subject to melting in summer has increased by in excess of 50 per cent in the last 25 years, that the volume of icebergs being discharged from Greenland has doubled in the last ten years and that the annual number of “icequakes” caused by major shifts by parts of the ice sheet (a sign of destabilisation) doubled in the 1990s and redoubled by 2005.

⁵ See, the IPCC’s Fourth Assessment Report (AR4), available at, <<http://www.ipcc.ch/#>>.

⁶ McKibben, W. (2007) “Warning on Warming”, *The New York Review of Books* (15 March).

⁷ See, for example, Morner, N.-A. (2007) *The Greatest Lie Ever Told*, (printed and distributed by the author).

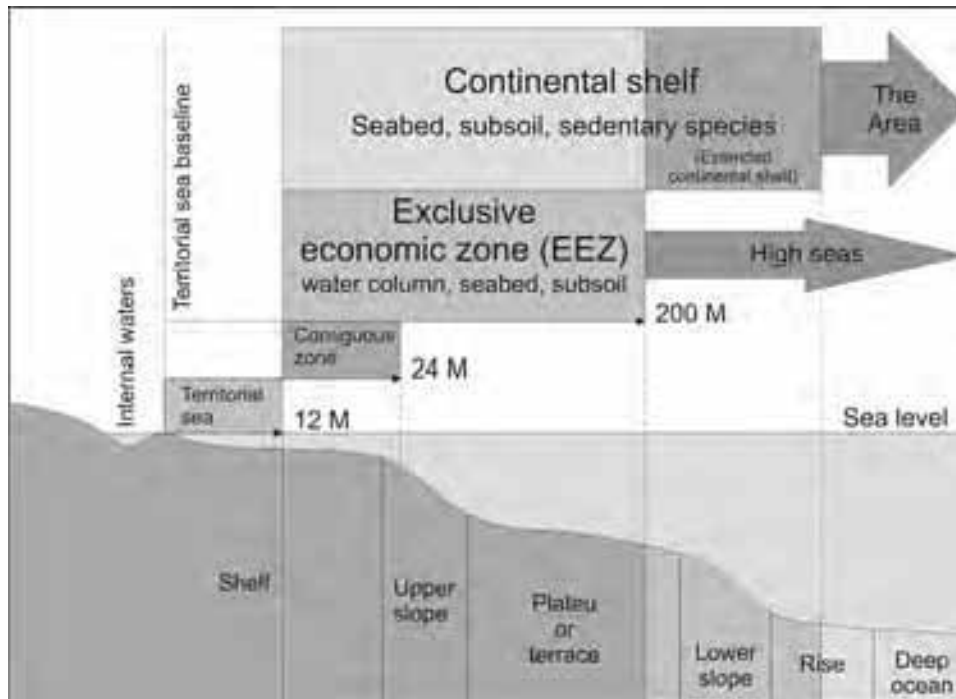


Figure 1 Baselines and Claims to Maritime Jurisdiction

The location of a State's baselines is therefore directly linked to defining the limits of its zones of maritime jurisdiction, as it is essential to determine the points from which the specified breadths of such zones are measured.⁸ Baselines are also important because, just as baselines provide the starting line for the measurement of maritime zones offshore, equally they also represent the outer limit of a State's land territory⁹ or internal waters landward of the baseline.¹⁰ Baselines are also frequently crucial to the delimitation of maritime boundaries. This is the case because baselines have a direct bearing on the construction of an accurate equidistance or median line and the majority of maritime boundaries concluded to date have been based on equidistance. Equidistance lines are commonly constructed at least as a means of assessing a maritime boundary situation or as the starting point for discussions in the context of maritime boundary negotiations and such lines have also frequently been adopted as the basis for the final delimitation line.

Normal Baselines

The international law rules concerning baselines, maritime claims and the delimitation of maritime boundaries are largely codified in the United Nations Convention on the Law of the Sea (LOSC) of 1982,¹¹ and its predecessors, notably the Conventions of

⁸ This issue is somewhat more complex when claims to 'extended' or 'outer' continental shelf rights are under consideration. Nonetheless, distance measurements from baselines, especially the 200 and 350 nautical miles limits are crucial to the determination of the limits of these claimed sovereign rights.

⁹ Where the low-water line, normal, baselines are used.

¹⁰ Where straight baselines and closing lines are applied.

¹¹ United Nations, *United Nations Conventions on the Law of the Sea*, U.N. Sales No.E.97.V.10 (1983). See 1833 UNTS 3, entered into force 16 Nov. 1994, available at http://www.un.org/Depts/los/convention_agreements/convention_overview_convention.htm

1958.¹² Under usual circumstances and in the absence of other claims, a coastal State will have “normal” baselines. The rule in accordance with Article 5 of LOSC, is that the coastal State will possess “normal” baselines, which coincide with “the low-water line along the coast as marked on large-scale charts officially recognized by the coastal State.”¹³ Normal baselines represent the predominant type of baseline worldwide and, in effect, represent a state’s ‘default’ baselines. The vast majority of baselines worldwide consist of normal baselines.¹⁴

The key issue in this regard is which of many possible low-water lines to use as the normal baseline. The low-water line is dependent on the choice of vertical datum. That is, the level of reference for vertical measurements such as depths and heights of tide. A source of uncertainty associated with Article 5 of LOSC is that it does not specify a particular vertical datum and thus low-water line to be used. Consequently, there is no ‘wrong’ answer and the choice is left up to the coastal State.¹⁵

Most coastal States and charting authorities have selected particularly low vertical datums, such as lowest astronomical tide (LAT), as their preferred chart datum. The key reason why such low vertical datums are favoured relates to the primary purpose of nautical charts – to act as an aid to navigation. The advantage of a low vertical datum in this context is that this will necessarily mean that any potential hazards to navigation are shown on the chart – something that is clearly advantageous from the mariner’s perspective.

Charts are, however, also used in the law of the sea context and, in particular as a means of showing the normal baseline from which maritime jurisdictional claims are measured. This can prove advantageous to coastal States as the lower the low-water line selected, the further seaward the normal baseline will lie. As this serves to advance the starting point for maritime claims offshore ‘further down the beach’, as well as increasing the area designated as ‘land’ or internal waters landward of the baseline, choice of a particularly low low water line will tend to maximise maritime (and terrestrial) claims. The impact of selecting a lower vertical datum on the extent of maritime claims tends to be limited, however, unless there is a significant tidal range or the coastline in question shelves particularly gently. Where the gradient on a coastline is especially shallow, however, minor changes in the choice of vertical

¹² Of the four conventions that were concluded following the first United Nations Conference on the Law of the Sea (UNCLOS I), held in Geneva in 1958, the Convention on the Territorial Sea and Contiguous Zone is of direct relevance to baselines. See, Convention on the Territorial Sea and Contiguous Zone, opened for signature 29 April 1958, 516 UNTS 205 (entered into force 10 September 1964) (hereinafter “1958 Convention”). This represents a near verbatim repetition of Article 3 of the 1958 Convention on the Territorial Sea and Contiguous Zone.

¹⁴ See, Prescott and Schofield, 2005: 94-97.

¹⁵ See, Carleton, C.M. and Schofield, C.H. (2001) *Developments in the Technical Determination of Maritime Space: Charts, Datums, Baselines, Maritime Zones and Limits*, Maritime Briefing, Vol.3, no.3, (Durham: International Boundaries Research Unit): 21-25. Having made that observation, it is nonetheless the case that the International Hydrographic Organization (IHO) favours use of lowest astronomical tide as the vertical datum for the construction of modern nautical charting. See, International Hydrographic Organization (with the International Oceanographic Commission and the International Association of Geodesy) (2006) *A Manual on Technical Aspects of the United Nations Convention on the Law of the Sea, 1982*, Special Publication no.51, 4th edition, (Monaco: International Hydrographic Bureau) (hereafter TALOS Manual, 2006).

datum may result in dramatic horizontal shifts in the location of the low water line, especially where this impacts on the status of low-tide elevations, and this can have significant ‘knock-on’ impacts in terms of the limits of maritime claims.

Ambulatory Baselines

Choice of a particularly low vertical datum may, however, have negative implications in the case of unstable coasts and also in an era of sea level rise. By virtue their especially low-lying nature the low water normal baselines on which coastal States rely to measure their claims to maritime jurisdiction are potentially unstable and likely to be especially susceptible to inundation as sea level rises.

The traditional and generally accepted linkage between ambulatory normal low-water baselines and the limits of maritime zones of jurisdiction dictates that as normal baselines change, so the limits of the maritime jurisdictional zones measured from these baselines will correspondingly shift.¹⁶ Thus, as normal baselines recede as a consequence of sea level rise, so the maritime zones measured from them will also retreat leading to potentially significant diminution in the scope of the coastal State’s maritime claims.

This is by no means a new phenomenon or problem. It has long been recognised that coastlines are dynamic, so normal baselines can change significantly over time or “ambulate” and this necessarily has an impact on the generation of the outer limits of claims to maritime jurisdiction.¹⁷ In this context it is, however, important to note that not all of a coastal State’s baseline contributes towards the construction of the outer limits of its maritime claims. Maritime limits are commonly constructed through the ‘envelope of arcs’ method.¹⁸ Consequently, only certain basepoints along the normal baseline will be relevant to the limits of the relevant maritime zone with the length of the arcs from the contributing basepoints being determined by the breadth of the maritime zone for which the outer limit is being constructed.¹⁹ This has potential implications for the preservation of particular, critical basepoints.

Ephemeral Islands?

Sea level rise also has the potential to threaten the insular status of certain features, that is whether a particular feature can be properly regarded as an island, a low-tide elevation, or a fully submerged part of the sea floor. This, in turn, can have significant

¹⁶ This view can be reached through negative implication. As UNCLOS provides for certain maritime limits to be fixed, notably in respect of the presence of deltas and other natural conditions (UNCLOS, Article 7(2), see below) and in relation to the outer limit of the continental shelf beyond the 200 nautical mile limit (UNCLOS, Article 76(8)), the implication is that other maritime limits are *not* fixed. See, for example, Caron, D.D. “Climate Change, Sea Level Rise and the Coming Uncertainty in Oceanic Boundaries”, in S.-Y. Hong and J.M. Van Dyke (eds) *Maritime Boundary Disputes, Settlement Processes, and the Law of the Sea*, Publications on Ocean Development, Volume 65 (The Hague: Martinus Nijhoff).

¹⁷ Reed, M.W. (2000) *Shore and sea boundaries: the development of international maritime boundary principles through United States practice*, (Washington D.C.: US Department of Commerce): 185; Prescott and Schofield, 2005: 100-101.

¹⁸ Carleton and Schofield, 2001: 62.

¹⁹ A maximum of 12 nautical miles for the territorial sea, 24 nautical miles for the contiguous zone and 200 nautical miles for the exclusive economic zone (EEZ). However, while the EEZ extends out to 200 nautical mile from relevant baselines, it is actually usually only 188 nautical miles in breadth because the EEZ only begins at the limit of the territorial sea which is commonly 12 nautical miles.

implications in terms of the capacity of a particular feature to generate extensive maritime claims to jurisdiction. For example, while an island may, in accordance with LOSC Article 121(2), generate a full suite of maritime zones in an identical fashion to mainland coasts, Article 121(3) states that “Rocks which cannot sustain human habitation or an economic life of their own shall have no exclusive economic zone or continental shelf.” This distinction between islands and rocks has enormous implications in terms of potential maritime claims. If an island had no maritime neighbours within 400nm, it could generate 125,664 sq.nm (431,014km²) of territorial sea, EEZ and continental shelf rights. In stark contrast, if deemed a mere “rock” incapable of generating EEZ and continental shelf rights, a territorial sea of 452 sq. nautical miles (1,550km²) could be claimed.

With regard to low-tide elevations, as provided by LOSC, Article 13, these may be used as a territorial sea basepoint, but only if they fall wholly or partially within the breadth of the territorial sea measured from the normal baseline of a State’s mainland or island coasts. A low-tide elevation’s value for maritime jurisdictional claims is therefore geographically restricted to coastal locations.²⁰ With respect to the ambulatory nature of normal baselines and the maritime jurisdictional limits measured from them it can be observed that low-tide elevations are often key culprits. This is because low-tide elevations, by virtue of their near low-tide level status and the fact that they are often composed of soft depositional material which may readily change over time, tend to appear on one survey but not the next, resulting in revisions in the related charts and thus in maritime jurisdictional limits associated with them.

Implications

Opting for a very low vertical datum and thus low water line inevitably means that often ephemeral features, such as low-tide elevations, are used as critical basepoints for the generation of claims to maritime jurisdiction. The loss of critical basepoints/islands, or the reclassification of an isolated feature from being an “island” capable of generating EEZ and continental shelf claims to a mere “rock” incapable of doing so or even to a low-tide elevation with even more restricted capacity to generate maritime claims or a sub-surface feature with no such capacity can have an enormous impact on the scope of claims to maritime jurisdiction. For example, the United Kingdom’s ‘roll-back’ of its maritime claims to the northwest of Scotland as a result of reclassifying Rockall as a “rock” in line with Article 121(3) resulted in a loss to the UK of around 60,000 square nautical miles of previously claimed fishery zone.²¹

It is also the case that such features may be important in terms of the delimitation of maritime boundaries where maritime claims overlap. For example, in the course of the negotiation of the maritime boundary between Belgium and the United Kingdom, the United Kingdom was forced to abandon one of its key basepoints, a drying bank called the Shipwash, when a new hydrographic survey revealed that the feature had eroded to the extent that it no longer dried and could no longer be regarded as a low-

²⁰ See, Carleton and Schofield, 2001: 38 and Prescott and Schofield, 2005: 107-108.

²¹ Rockall itself now merely generates a 12nm territorial sea claim as evidence of its “vestigial insular status in international law.” See, Symmons, C.R. (1998) “Ireland and the Rockall dispute: an analysis of recent developments”, *Boundary and Security Bulletin*, Vol.6, no.1 (Spring): 78-93.

tide elevation.²² It has, however, been long established that international maritime boundaries, once agreed, are not subject to change except through agreement among the parties concerned.

Furthermore, it is the case that where maritime limits are potentially constantly in flux because of shifts in the location of the normal baseline, and this raises implications in terms of maritime enforcement if maritime jurisdictional limits are similarly always changing. Recent Dutch experience in relation to fisheries enforcement off the Zeeland Banks as a consequence of the disappearance and reappearance of certain low-tide elevations provides an excellent example of the potential problems involved.²³ From the point of view of enforcement agencies, clarity, stability and certainty in respect of maritime jurisdictional limits is highly desirable and the ambulatory nature of such limits is unwelcome as it has the potential to undermine confidence in those limits and cause confusion. Overall, the fact that baselines and thus maritime limits are capable of shifting has the potential to result in jurisdictional uncertainty, disputes and conflict.

Concluding Thoughts: Options to Counter the Threat of Sea Level Rise

So what is to be done in the face of these threats to critical basepoints and related zones of maritime jurisdiction, the marine resource within which are often crucial to the economic well being of small island State? Doing nothing and letting coastlines and normal baselines find their natural equilibrium is one 'option', but is certainly unattractive, especially from the perspective of small island States with severely restricted territorial extents and thus little scope for coastlines to retreat. An alternative option with a long pedigree in the context of unstable coasts is an interventionist policy designed to protect the coastline from erosion through the construction of sea defences. Such measures to physically protect the coast from sea level rise are, however, likely to prove prohibitively expensive and generally unrealistic in light of the sheer scale of the challenge. Exceptions may, however, be made in exceptional circumstances for critical basepoints.²⁴

²² Carleton, C.M. and Schofield, C.H. (2002) *Developments in the Technical Determination of Maritime Space: Delimitation, Dispute Resolution, Geographical Information Systems and the Role of the Technical Expert*, Maritime Briefing, Vol.3, no.4 (Durham: International Boundaries Research Unit): 59-61.

²³ Award of the economic police court in the case against Marijs, gebroeders H. en B., V.O.F., of 29 June 2007 cited in Dorst, L. and Elema, I. (2008) "The Effects of Changing Baselines on the Limits of the Netherlands in the North Sea", paper presented on 17 October 2008 at the Advisory Board on the Law of the Sea (ABLOS) Conference on Difficulties in Implementing the Provisions of UNCLOS, 15-17 October 2008, Monaco, at p.6. Available at, <http://www.gmat.unsw.edu.au/ablos/ABLOS08Folder/ablos08_papers.htm>.

²⁴ Japan's construction of sea defences around Okinotorishima at a cost in excess of US\$200 million providing an excellent example of this practice. On Okinotorishima see, for example, J. Brown, A. Colling, D. Park, J. Phillips, D. Rotehery, and J. Wright, *Case Studies in Oceanography and Marine Affairs*, (Oxford: Pergamon Press, 1991): 84-85. Prescott and Schofield, 2005: 84-85; A.L. Silverstein, "Okinotorishima: Artificial Preservation of a Speck of Sovereignty", *Brooklyn Journal of International Law*, 1990, Vol. XVI, 2: 409-431; Y.H. Song, "Okinotorishima: A "Rock" or an "Island"? Recent Maritime Boundary Controversy between Japan and Taiwan/China, pp.145-176 in S.-Y. Hong and J.M. Van Dyke (eds) *Maritime Boundary Disputes, Settlement Processes, and the Law of the Sea*, Publications on Ocean Development, Volume 65 (The Hague: Martinus Nijhoff, 2009); and, J. Van Dyke, "Speck in the Ocean Meets Law of the Sea", letter to the editor, *New York Times* 21 January

Rather than attempting stabilise and protect coastlines and normal baselines by intervening physically – something that may well prove unrealistic in the context of significant sea level rise – a number of legal measures may provide for the retention of existing maritime jurisdictional claims. While it is recognised that such approaches will not resolve the central problem of the inundation of vulnerable low-lying areas, they are not without merit.

At the Third United Nations Conference on the Law of the Sea it was generally not anticipated that sea level rise would engender such radical shifts in normal baselines and changes in insular status. Consequently, LOSC does not necessarily provide mechanisms to deal with these novel problems. The drafters of the Conventions were not averse to the permanent fixing of certain baselines and boundaries.²⁵ The goal of retaining existing maritime claims could be achieved by fixing the normal baseline or the limits of the maritime jurisdictional claims of coastal States. Regarding the former option it should be emphasised that normal baselines are dependent on choice of chart – a choice that is left up to the coastal State. The coastal State is therefore at liberty to choose a chart advantageous to it although over time tensions would inevitably arise between charts chosen by the coastal State for maritime jurisdictional purposes and (increasingly) reality. The latter option would essentially see the limits of maritime claims decoupled from ambulatory normal baselines.

Ultimately, therefore, there may be a need for a new rule and regime providing for the fixing of normal baselines. This might develop through State practice, with coastal States choosing particular charts for maritime jurisdictional purposes as outlined above or simply declaring the location of the limits of their maritime claims. Alternatively, the institution of such a departure from the traditionally accepted norm may call for multilateral negotiations as explored in Professor Hayashi's paper.

1988, available at
<<http://query.nytimes.com/gst/fullpage.html?res=940DE3D9163DF932A15752C0A96E948260&sec=&spon=#>>.

²⁵ For example, LOSC, Article 7(2) provides that: "Where because of the presence of a delta and other natural conditions the coastline is highly unstable, the appropriate points may be selected along the furthest seaward extent of the low-water line and, notwithstanding subsequent regression of the low-water line, the straight baselines shall remain effective until changed by the coastal State in accordance with this Convention." Similarly, the outer limits of the continental shelf may be "final and binding" in accordance with LOSC, Article 76(8).