

SHIFTING SAND AND SHIFTING JURISDICTION: SEA LEVEL CHANGE AND ITS IMPLICATIONS FOR MARITIME SOVEREIGNTY IN SOUTHERN AFRICA

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Introduction

The *Eduard Bohlen* is a ship that was wrecked off the coast of Namibia in 1909. Today, the wreck — unhindered by human interference — lies about half a kilometre inland, along with numerous other documented wreckages found several hundred metres inland along stretches of the Skeleton Coast.¹ On the east coast of the subcontinent, in the Maputo Bay of Mozambique, the Portuguese colonial administration installed artillery on the Xefina Grande Island during the Second World War. The artillery was placed 600 metres from the shoreline at the time. Today, it is reported that the cannons are almost submerged beneath the sea.² Along the coast adjacent to the capital city Maputo, an access road to the Costa do Sol beach was constructed in 1957 at a minimum distance of 20 metres and a maximum of 65 metres from the shoreline — with protection offered by a seawall and *Eucalyptus* trees. In a recent survey, it was documented in many places the shoreline lies over the road.³

These accounts are examples which demonstrate the trend of change in sea level in Southern Africa. Due to climate change, there appears to have been a rise in the sea level off the coast of Mozambique with the result the shoreline has eroded. The inland position of stationary wrecks off the coast of Namibia gives rise to the opinion that the sea has retreated from the shoreline in certain places.

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¹ T Hutson 'Fears of sea level rise in Maputo Bay' *Maritime News* (26 June 2014), available at http://ports.co.za/news/news_2014_06_25_01.php?five (accessed 26 June 2016).

² Ibid.

³ J Ruby, S Canhangana & O Cossa *Assessment of the impacts of climate changes to sea level rise at Costa do Sol Beach in Maputo — Mozambique* (2008) para 3.2.

A necessary inference from changing sea levels due to climate change or other factors is that coastlines may shift or submerge. These changes are not permanent and depend on various factors.⁴ In a report prepared by the World Bank it was noted, despite the increased awareness of the security aspect of global warming and the adverse impacts of climate change generally, there has been little engagement with the implications of climate change on the rights of coastal states and low-lying areas.⁵ The report considers how low-lying areas are extremely vulnerable to even small changes in sea level, as is evident in parts of the coastline of Mozambique, which is highly sensitive to coastal erosion that could have been caused by a rise in sea level.⁶ Considering that two-thirds of Mozambique's population live along the coast and depend on the available resources in these areas to sustain their livelihoods,⁷ such sea level change continues to be of concern.

This article is based on the premise that climate change contributes to sea level change. In a report prepared by the Intergovernmental Panel on Climate Change it is recorded that '[s]ea level rise due to thermal expansion as the oceans warm, together with meltwater from glaciers, icecaps, and ice sheets of Greenland and Antarctica, are major factors that contribute to [relative sea level rise] globally'.⁸ It is further reported that these factors have accounted for more than 80 per cent of the global

⁴ See C Schofield 'Holding back the waves? Sea level rise and maritime claims' in OC Ruppel, C Roschmann & K Ruppel-Schlichting (eds) *Climate Change: International Law and Global Governance: Legal Responses and Global Responsibility* (2013) vol 1 595. Schofield notes: 'It has also been recognised that sea-level rise is a phenomenon that exhibits marked spatial and temporal variability. The diverse range of factors that can influence sea levels across a range of scales tends to lead to significant uncertainties over measurements and the causes of sea-level changes.'

⁵ C Di Leva & S Morita 'Maritime rights of coastal states and climate change: Should states adapt to submerged boundaries?' (Law and Development Working Paper Series No 5) *The World Bank* 7, available at http://siteresources.worldbank.org/INTLAWJUSTICE/Resources/L&D_number5.pdf (accessed 16 September 2014).

⁶ See Ruby, Canhanga & Cossa (note 3 above). In the study during 2000 to 2008, the average resection rate at Costa do Sol beach varied between 1,06 and 5,34 m/year, with an average of 42,75 m observed during the indicated period. See, also, Di Leva & Morita (note 5 above) 8.

⁷ Ruby, Canhanga & Cossa (note 3 above) para 1.1.

⁸ PP Wong et al 'Coastal systems and low-lying areas' in CB Field et al (eds) *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (2014) 367, available at: http://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap5_FINAL.pdf (accessed 30 January 2016).

mean sea level rise between 1993 and 2010.⁹ This article, however, departs from any examination of scientific studies on the causes of climate change, its relationship to sea level rise or recession and the environmental impact on human settlement and the topography along the coastline.¹⁰

Under the United Nations Convention on the Law of the Sea 1982 (UNCLOS), littoral states are vested with jurisdiction and sovereignty over an adjacent portion of the sea. The sovereignty of the littoral state is divided into various zones over, on, and under the sea that have a specific form of jurisdiction which vests in the coastal state. It is significant to note that the breadth and extent of these zones are measured with reference to a *baseline* along the coast. With specific reference to Southern Africa this article considers the legal nature of the baseline and how changing sea levels impact the position of the baseline and thereby alter the extent and breadth of the maritime zones vested in the littoral state. The article explores the possibilities of adapting the extant legal regime to account for sea level change on baselines and consequent maritime sovereignty.

Maritime zones, the baseline and the low-water mark

Nandan, erstwhile Special Representative of the Secretary-General for the Law of the Sea in the United Nations, commented on how the role of the world's oceans has rapidly evolved and now far exceeds the traditional uses of marine spaces, which for centuries focused mainly on fisheries, transportation and communications.¹¹ He notes that the new law of the sea increasingly has become a law of appropriation — the assertion of national claims to large portions of the Earth's surface covered by the oceans.¹² This assertion is based, according to Stoutenburg, on the notion that it is the possession of coastal land which gives the coastal state rights over the waters off the coast; in other words, the 'land dominates the sea'.¹³

⁹ Id 368.

¹⁰ See AK Theron & M Rossouw *Analysis of potential coastal zone climate change impacts and possible response options in the southern African region* (2007), available at http://www.csir.co.za/nre/coupled_land_water_and_marine_ecosystems/pdfs/CPO-0029_standard.pdf (accessed 18 April 2016) — where it is noted that sea level rise also impacts and interacts with changing storm intensities and wind fields, to produce sea conditions that overwhelm existing infrastructure.

¹¹ Office for Ocean Affairs and the Law of the Sea (UNDOALOS) *Baselines: An examination of the relevant provisions of the United Nations Convention on the Law of the Sea* (1989) vii.

¹² Ibid.

¹³ JG Stoutenburg 'Implementing a new regime of stable maritime zones to ensure

A key achievement of UNCLOS — a treaty developed over a lengthy period spanning over a decade — was the agreement on spatial limits to national claims to maritime jurisdiction and sovereignty. In this regard UNCLOS vested jurisdiction on a littoral state in different maritime zones, including the continental shelf and the high seas. The maritime zones consist of: (i) the territorial sea,¹⁴ wherein every state has the right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles measured from the baseline;¹⁵ (ii) the contiguous zone¹⁶ which may not exceed 24 nautical miles from the baseline from which the breadth of the territorial sea is measured¹⁷ and (iii) the exclusive economic zone (EEZ)¹⁸ which shall not extend beyond 200 nautical miles from the baseline from which the breadth of the territorial sea is measured. These maritime zones, considered collectively, cover a considerable area. Schofield comments, if every coastal state claimed the maximum 200 nautical miles EEZ, this would amount approximately to 41 per cent of the area of the oceans or 29 per cent of the Earth's surface, and thus is approximately equivalent to the land territory on the surface of the Earth.¹⁹ What is common to the maritime zones is that the breadth and limits are measured from the baseline, which, accordingly, has enhanced the critical importance of the baseline.

Turning now to the concept of the baseline itself, defining the boundary between the land and the sea remains a challenging proposition. Schofield puts the issue in the form of a deceptively straightforward question: 'where does the land end and the sea begin?'²⁰ Vrancken

the (economic) survival of small island states threatened by sea-level rise' (2011) 26 *International Journal of Marine and Coastal Law* 263 273. See, also, the *North Sea Continental Shelf Cases (Federal Republic of Germany v Denmark; Federal Republic of Germany v Netherlands)* (Judgment) (1969) ICJ Rep para 96.

¹⁴ In terms of art 2 of UNCLOS, the sovereignty of a coastal state extends beyond its land territory and internal waters to an adjacent belt of sea described as the territorial sea. The sovereignty extends to the airspace over the territorial sea, as well as to its bed and subsoil. Ships of all states enjoy a right of innocent passage through the territorial sea in terms of art 17.

¹⁵ Art 3 of UNCLOS.

¹⁶ In terms of art 33 of UNCLOS, in this zone the coastal state may exercise the control necessary to prevent infringement of its customs, fiscal, immigration or other sanitary laws and regulations, within its territory or territorial sea.

¹⁷ Art 33 of UNCLOS.

¹⁸ In terms of art 56 of UNCLOS, in this zone, the coastal state has sovereign rights, inter alia, for the purpose of exploring and exploiting, conserving and managing the natural resources — whether living or non-living — of the waters superjacent to the seabed and of the seabed and its subsoil. Also measured from the baseline is the continental shelf. See art 76 of UNCLOS.

¹⁹ Schofield (note 4 above) 605.

²⁰ C Schofield 'Departures from the coast: Trends in the application of territorial sea

notes how the actual intersection between the land and sea constantly moves due to waves and tides.²¹ This is a cyclical change and, coupled with more gradual changes which cause a change in the location and configuration of the coast and deposition and accretion of material along the coast, can cause the coastline to shift seawards and then landwards as a result of erosion.²² Vrancken further notes

[t]his state of affairs runs counter to the law's requirements of certainty and predictability, as well as the need to define the legal status of the areas affected by those constant changes. For those reasons, fixed lines have been drawn for hydrographical and legal purposes.²³

The courses of coastlines around the world are diverse and range in complexity. As a result, UNCLOS makes provision for different types of baselines that are broadly categorised into: (i) normal baselines, (ii) straight baselines²⁴ and (iii) baselines of a special local application.²⁵ States therefore have multiple options with respect to a choice of baselines, based on the configuration of its coastline. The normal baseline is described in article 5 of UNCLOS:

Except where otherwise provided in this Convention, the normal baseline for measuring the breadth of the territorial sea is the low-water line along the coast as marked on large-scale charts officially recognised by the coastal state.

From this provision two defining terms are crucial: the low-water mark and the large-scale charts officially recognised by the coastal state.²⁶

baselines under the Law of the Sea Convention' (2012) 27 *International Journal of Marine and Coastal Law* 723 724.

²¹ P Vrancken *South Africa and the Law of the Sea* (2011) 83.

²² Schofield (note 4 above) 597.

²³ Vrancken (note 21 above) 83.

²⁴ Straight baselines may be substituted for the normal baseline along sections of the coast which meet the conditions laid down in art 7 of UNCLOS. In this regard, art 7(1) of UNCLOS states that: '[i]n localities where the coastline is deeply indented and cut into, or if there is a fringe of islands along the coast in its immediate vicinity, the method of straight baselines joining appropriate points may be employed in drawing the baseline from which the breadth of the territorial sea is measured.'

²⁵ These baselines deal with the delimitation of the territorial sea in the vicinity of the mouths of rivers, bays, ports and roadsteads. See arts 9–12 of UNCLOS.

²⁶ In *Forty-nine casks of brandy* (1836) 3 *Hagg Adm* 257 at 275, Sir Nicholl defined the 'coast' as 'not the sea but the land which bounds the sea; it is the limit of land jurisdiction and of parishes and manors – bordering on the sea – which are part of the land country'. DP O'Connell *The International Law of the Sea* (1982) notes that 'this limit, however, and its character, varies according to the state of the tide: when the tide is out, it is land as far as the low-water mark; between the

UNCLOS itself does not define the 'low-water mark', but it is referred to in hydrographic terms as 'the intersection of the plane of low water with the shore. The line along a coast or beach, to which the sea recedes at low water.'²⁷ O'Connell notes that defining the low-water mark for legal purposes has been a question for several centuries and there have been several criteria used by cartographers for determining it.²⁸ There are different tidal levels used for hydrographical purposes.²⁹ Schofield summarises the general state practice in the following terms

The level of the low-water line forming the normal baseline is dependent on the choice of vertical datum, that is, the level of reference for the measurement of depths and elevations. In this context, many States have tended to opt for a particularly conservative vertical datum, such as *lowest astronomical tide* (LAT) and thus low normal baselines'.³⁰

Given the different possibilities of tidal datum and its unpredictability,³¹ O'Connell notes that the low-water line is adopted by each state and cautions that in some parts of the world the tide advances and retreats many miles, and the differences in the low-water marks between which choice may freely be made can be quite considerable.³² The result is that there is no uniformity of judicial doctrine on this aspect.

The term 'large-scale' has been described as a scale of 1:200 000 or higher,³³ and a 'chart' means a nautical chart intended for use by mariners as an aid to navigation. UNCLOS is silent on whether or how often

high- and low-water marks it is treated as *divisum imperium*' (171).

²⁷ UNDOALOS (note 11 above) 58, where the following observation is made: '... low-waterline along the coast is a fact irrespective of its representation on the charts. The territorial sea exists even if no particular water-line has been selected or if no charts have been officially recognised, however, for enforcement of regulations, it is necessary to identify the location of the outer limit of the territorial sea, for which charts marking the low-water line are required' (3).

²⁸ O'Connell (note 26 above) 179, 172.

²⁹ See O'Connell (note 26 above) 173 for a full list.

³⁰ Schofield (note 20 above) 724–725. He discusses how the use of the LAT 'has the advantage of advancing the low-water line further "down the beach", as it were, thereby expanding and maximizing the coastal State's land territory and simultaneously potentially enhancing the scope of its claims to maritime jurisdiction by advancing the starting point for measuring maritime claims.' See, also, O'Connell (note 26 above) 171–183.

³¹ O'Connell (note 26 above) 175 cites D Clark *Plane and Geodetic Surveying for Engineers* (1972) 522, who points out, for example, that in shallow waters the gradients of tidal stream can be greatly accentuated.

³² O'Connell (note 26 above) 177.

³³ Vrancken (note 21 above) 84. The scale of a chart is an expression of the relationship between a distance measured on the Earth's surface and the length that represents it on the chart. See UNDOALOS (note 11 above) 5.

the charts must be revised or on the required technical specifications of the nautical chart.³⁴ Only nautical charts show all relevant features such as low-water lines, low-tide elevations, and drying reefs.³⁵ The term 'normal' implies that this baseline is a default position, from which certain variations along the coastline, described below, would justify a deviating baseline.

Where the coastline is deeply indented and cut into or if there is a fringe of islands along the coast in its immediate vicinity article 7 of UNCLOS provides that a method of *straight baselines* adjoining appropriate points may be employed in drawing the baseline.³⁶ The 'appropriate point' – in terms of article 7(2) – may be selected along the furthest seaward extent of the low-water line. What is noteworthy about the provision is that it goes on to state, notwithstanding the subsequent regression of the low-water line, the straight baselines shall remain effective until changed by the coastal state in accordance with UNCLOS. In terms of a special local application, UNCLOS provides for a delimitation of the territorial sea in the vicinity of the mouths of rivers,³⁷ bays,³⁸ ports³⁹ and roadsteads.⁴⁰ The International Court of Justice in *Qatar v Bahrain*⁴¹ observed that

'... the method of straight baselines, which is an exception to the normal rules for the determination of baselines, may only be applied if a number of conditions are met. This method must be applied restrictively. Such conditions are primarily that either the coastline is deeply indented

³⁴ See Schofield (note 4 above) 603.

³⁵ UNDOALOS (note 11 above) 1.

³⁶ See art 7(1) of UNCLOS. Further detail on the method of drawing a straight baseline is set out in art 7(2)–(6) of UNCLOS. Prior to the adoption of UNCLOS, the International Court of Justice, in *Anglo Norwegian Fisheries* (Pleadings vol 1) (1951) ICJ Rep 242, vindicated the use of straight baselines for describing the territorial sea, where the coastline, as in the instance of Norway, is complex (cited in O'Connell (note 26 above) 199–200).

³⁷ Art 9 of UNCLOS provides that if a river flows directly into the sea, the baseline shall be a straight line across the mouth of the river between points of the low-water line of its banks.

³⁸ Art 10 of UNCLOS defines the concept of a bay and provides for circumstances where the baseline in the vicinity of a bay could be marked by a straight baseline and where the baseline would be marked using the low-water mark.

³⁹ Art 11 of UNCLOS provides that the outermost permanent harbour works, which form an integral part of the harbour system, are regarded as forming part of the coast.

⁴⁰ See art 12 of UNCLOS.

⁴¹ *Maritime Delimitation and Territorial Questions between Qatar and Bahrain* (Merits, Judgment) (2001) ICJ Rep 40.

and cut into, or that there is a fringe of islands along the coast in its immediate vicinity.’⁴²

Notwithstanding this restrictive approach, Schofield comments that expansive claims to straight baselines have been a dominant theme in the past three decades and he attributes this to a lack of objective tests within article 7 of UNCLOS.⁴³

Given that these baselines are determined by the coastal state concerned, UNCLOS provided an article which sets out how states must give due publicity to their baselines. Article 16 states that the baselines — other than the normal baseline⁴⁴ — shall be shown on charts of a scale or scales adequate for ascertaining their position. Alternatively, a list of geographical co-ordinates of points specifying the geodetic datum may be substituted. The article goes on to provide that the coastal state shall give due publicity to such charts or lists of geographical co-ordinates and shall deposit a copy of each such chart or list with the Secretary-General of the United Nations.⁴⁵

On 27 October 1995 a chart under the superintendence of the Hydrographer of the South African Navy was published.⁴⁶ The sheet contained five charts showing South Africa’s claim to the straight baselines, internal waters, territorial seas, contiguous zone, exclusive economic zone and continental margin beyond 200 nautical miles. The normal baselines are not plotted on this chart. South Africa has drawn six groups of straight baselines along about 540 nautical miles of its southern coast from Cape Deseada north of Cape Town to Cape Padrone

⁴² Id 67 para 212.

⁴³ Schofield (note 20 above) 727. See also A Khadem ‘Protecting maritime zones from the effects of sea level rise’ (1998) 6 *IBRU Boundary and Security Bulletin* 76.

⁴⁴ In other words, those baselines determined in terms of arts 7, 9 and 10 of UNCLOS and the lines of delimitation drawn in accordance with arts 12 and 15 of UNCLOS.

⁴⁵ Notwithstanding the peremptory nature of this subsection not all states have submitted charts in accordance with the UNCLOS. A report by the United Nations Division for Ocean Affairs and the Law of the Sea, dated 8 April 2016, reveals that South Africa has not yet deposited charts plotting their straight baselines. See <http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/depositpublicity.htm> (accessed 28 April 2016).

⁴⁶ The chart bears the Hydrographic Office chart identification number SAN MZ-1. For a detailed hydrographical analysis of this chart, see V Prescott ‘Publication of a chart showing the limits of South Africa’s maritime claims’ (1999) 14 *International Journal of Marine and Coastal Law* 557. A further chart, the SAN FP21, published by the South African Navy, also depicts South Africa’s maritime zones. However, it is on a much smaller scale of 1:2 450 000, and is used as a fishing reference grid and not for navigation.

east of Port Elizabeth.⁴⁷ The geographical co-ordinates of these straight baselines were attached as Schedule 2 to the Maritime Zones Act 15 of 1994. In 2004, the Ministry of Transport amended the Schedule with substituted co-ordinates.⁴⁸ This amendment had the effect of pushing the eastern frontier of the straight-baseline system from Cape Padrone to Cannon Rocks.⁴⁹

The implications

Having now established the nature of the maritime zones above, the extent of the sovereignty of the coastal state over each zone and the direct relationship between the breadth and extent of each zone in relation to the baseline, the proposition following becomes quite apparent when considered against the dynamic features of a coastline affected by sea level change, erosion and accretion. Through such sea level changes the actual location of the low-water line changes. The direct implication of this change is that the normal baseline would change or 'ambulate' with the changing or shifting low-water line.⁵⁰

As indicated above, the outer limit of the different maritime zones is dependent on the baselines in that it is determined by a 'line every point of which is at a distance from the nearest point of the baseline equal to the breadth of the maritime zone'.⁵¹ Therefore, as the low-water line changes the normal baselines correspondingly ambulate, as do each of the maritime zones measured from it.⁵²

This ambulatory baseline results in an anomaly which affects the sovereignty of a state over its maritime zones. A rising sea level would

⁴⁷ Ibid. Prescott, however, notes at 559 that when these straight baselines are measured against a reasonably strict interpretation of the rules contained in art 7 of UNCLOS it is obvious that they contravene those rules. He notes that only a short section of this coast, between Cape Columbine and North Head, is deeply indented to an extent that might justify the use of straight baselines. He finds, in any event, these straight baselines have drawn little unfavourable attention because South Africa requires laden tankers to maintain a minimum distance of 25 nautical miles from its southern coast between Cape Town and Port Elizabeth (560).

⁴⁸ GN R. 543 in GG 26301 of 30 April 2004.

⁴⁹ See Vrancken (note 21 above) 85.

⁵⁰ The normal baseline is the most common type of baseline in the world, but other types of straight baselines are also potentially threatened by sea level changes because such baselines need anchoring to the coast as represented by the low-water line at appropriate points. See art 7 of UNCLOS and Schofield (note 4 above) 597.

⁵¹ See art 4 of UNCLOS, and Stoutenburg (note 13 above) 267–268.

⁵² These questions were formulated in Di Leva & Morita (note 5 above) 18.

cause the low-water line to retreat inland.⁵³ The consequence of this is an inundation of land territory by the sea and a corresponding diminution of a state's claim to its maritime zones.⁵⁴ For example, if over a period of time the baseline shifts a nautical mile inland due to a rising sea level, the maritime zones would correspondingly shift a nautical mile landward and thus a state would lose a nautical mile of a claim to that particular zone and rights to any maritime resources. Conversely, a receding sea level, as appears to be the case in parts of the coastline of Namibia described above, would cause the low-water line to shift seaward and, following the example above, if over a period of time the low-water mark shifted one nautical mile seaward, then the coastal state would gain a corresponding nautical mile of the applicable maritime zones.

Against this anomaly certain questions arise, such as: (i) is it possible for maritime boundaries to ambulate, (ii) whether a state's right to explore offshore resources would be affected and (iii) what is the status of the resources currently within international waters.⁵⁵

Features of the Southern African coastline and waters

These issues find an application when considered against the features of the Southern African waters and coastline. Firstly, Theron and Rossouw note that in excess of 80 per cent of the Southern African coastline comprises sandy shores susceptible to large variability and erosion.⁵⁶ They highlight that in South Africa the most vulnerable coastal areas are: Northern False Bay, Table Bay, the Saldanha Bay area, the South Cape coast, Mossel Bay to Nature's Valley, Port Elizabeth, and developed areas of the KwaZulu-Natal coast.⁵⁷ In another report by the South African Environmental Observation Network, Goschen records that analyses of about 50 years of data show that the sea level of the West Coast of South Africa is rising by about 1,87mm/yr, the South Coast by approximately 1,47mm/yr, and the East Coast by about 2,74mm/yr.⁵⁸

A unique South African case study relates to baselines arising at the mouth of the Orange (Gariep) River. Article 9 of UNCLOS stipulates

⁵³ Schofield (note 20 above) 725.

⁵⁴ Ibid.

⁵⁵ Di Leva & Morita (note 5 above) 11.

⁵⁶ Theron & Rossouw (note 10 above).

⁵⁷ Ibid.

⁵⁸ W Goschen 'Coping with sea level rise and storm surges' *South African Environmental Observation Network* (2011), available at <http://www.saeon.ac.za/enewsletter/archives/2011/april2011/doc08> (accessed 18 April 2016). They also explain that the land mass off Southern Africa appears to be tilting along an approximately north/south axis — with the east coast rising faster than the west coast.

that 'if a river flows directly into the sea, the baseline shall be a straight line across the mouth of the river between points on the low-water line of its banks'. Here, the river forms an international boundary between Namibia and South Africa and egresses into the Atlantic Ocean in a confluence of about two miles in width. Tanaka views the act of drawing baselines as being unilateral⁵⁹ and finds that it is debatable whether a coastal state can unilaterally draw a straight line across the mouth of the river from or to a base point located in another coastal state without the agreement of that state.⁶⁰ Should climatic conditions foster sea level rise, consequently altering the low-water mark and thus the baseline, this would accentuate an existing dispute between the two riparian states. South Africa contends that the boundary is on the Namibian bank at the high-water mark as was delineated by the colonial powers, Britain and Germany, under the Helgoland-Zanzibar Treaty of 1890.⁶¹ Namibia, on the other hand, contends that the state's southern boundary shall extend up to the middle of the river.⁶² Furthermore, in the scenario cited above, where sea levels receded along certain parts of Namibia's Skeleton Coast, the low-water mark will ambulate with a corresponding change in the baseline, resulting in an increase in Namibia's maritime zones — the extent of the change being the difference between the old and new baseline readings. An increase in Namibia's territorial sea would mean that ships traversing this extended realm, which hitherto was regarded as the Namibian EEZ, no longer enjoy freedom of navigation in the erstwhile EEZ, but would have to comply with the rules of innocent passage in traversing the territorial sea as contained in UNCLOS.⁶³ The littoral state can now license industry to operate right up to the 'new' boundary line and can enforce its fisheries legislation in this area of the EEZ created by the extension of the boundary.⁶⁴

On the East Coast of the subcontinent, Theron and Rossouw record that by 2100 Mozambique will lose 1,3 per cent of its dry land area due to a sea level rise, potentially making it the fifth most vulnerable country

⁵⁹ Y Tanaka *The International Law of the Sea* (2015) 62.

⁶⁰ Ibid. See, also, Di Leva & Morita (note 5 above) 16.

⁶¹ See M Kamundu *The Orange River Boundary Dispute between Namibia and South Africa: Territorial and Legal Position* (unpublished LLB dissertation, University of Namibia 2011) 1, 5.

⁶² See §1(4) of the Constitution of Namibia, 1990. See, also, Kumundu (note 61 above) 4, 5, who observes that a geographical feature of the river is its temporary watermark.

⁶³ See arts 17–19 of UNCLOS.

⁶⁴ See: EB Jamine *Maritime boundaries delimitation, management and dispute resolution: Delimitation of the Mozambique maritime boundaries with neighbouring states (including the extended continental shelf) and the management of ocean issues* (2007) 96.

worldwide to sea level rise.⁶⁵ A report prepared by the Mozambique National Institute of Hydrography and Navigation shows that the sea level will rise in the Maputo region by 0,2 m by the year 2034, 0,5 m by 2073 and 0,8 m by 2114.⁶⁶ The corollary to the consequences described in the Namibian scenario above would arise from a baseline ambulating landward along the Mozambican coast.

Staying in the Mozambique Channel, there is a longstanding delimitation dispute between Madagascar and France over the islands Bassas da India, Europa, and Juan de Nova in the Scattered Islands (Iles Esparses) Archipelago and the Glorioso Islands. Jamine records that although Madagascar gained independence from France in 1960, France retained control over a number of small island territories in the Mozambique Channel.⁶⁷ Madagascar claims sovereignty over Europa Island, Gloriso Islands and Juan de Nova Island on the grounds of historic title and geographic proximity; France bases its claim on first discovery and its history of occupation and administration.⁶⁸ Each state believes that a claim to sovereignty over the islands would enable it to claim the maritime zones referred to in UNCLOS, such as: a territorial sea, contiguous zone, and exclusive economic zone.⁶⁹ France claims around 360 000 km² as an exclusive economic zone around the islands in question in the Scattered Islands Archipelago.⁷⁰ The ability to claim these zones depends on its status as an island. Article 121 of UNCLOS provides that: 'an island is a naturally formed area of land, surrounded by water, *which is above water at high tide*' (emphasis added). Islands like Europa Island are particularly vulnerable to sea level rise.⁷¹ Should sea level rise result in the island being submerged at high tide it would lead to its reclassification as an island, thereby nullifying a state's claim

⁶⁵ Theron & Rossouw (note 10 above).

⁶⁶ Ruby, Canhanga & Cossa (note 3 above), Executive Summary. It is worth noting that the report contains a delimitation because the quality of the Mozambique sea level data is poor due to gaps in the records, making it inadequate for sea level trend estimates.

⁶⁷ Jamine (note 64 above) 28.

⁶⁸ Id 28–29.

⁶⁹ Id 29.

⁷⁰ D Rumley, S Chaturvedi & MT Yasin (eds) *The Security of Sea Lanes of Communication in the Indian Ocean Region* (2016) 81.

⁷¹ Jamine (note 64 above) 39, with regard to Bassas da India, points out: 'there is some doubt whether Bassas da India is an island, a rock or a low tide elevation' and suggests that it is a low-tide elevation (art 13 of UNCLOS). He comments further, at 39, on the consequence of this status, namely that according to art 13(2) of UNCLOS, any low-tide elevation that is wholly situated at a distance exceeding the territorial sea from the mainland or an island has no territorial sea of its own.

to full maritime zones. Alternatively, it would be classified as a formation which vests restricted maritime claims, such as a rock⁷² or a low-tide elevation.⁷³

The lacunae

The preceding discussion has shown that the current legal regime, which sets out maritime limits relying on baselines that ambulate with sea level change, is inherently unstable. There is no explicit provision in UNCLOS that the baselines ambulate with the changing sea level, since climate change and sea level rise were not thought of at the time the treaty was being negotiated.⁷⁴ The drafters generally did not anticipate that sea level change would beget radical shifts in normal baselines.⁷⁵ Neither does UNCLOS specify the steps that are required to change baselines.⁷⁶

At a foreign domestic level the United States of America, which is not a party to UNCLOS, holds the view that their normal baselines are ambulatory and subject to changes as the coastline accretes and erodes.⁷⁷ This approach was confirmed by the US Supreme Court in *United States v Alaska*,⁷⁸ where it was held that 'the shifts in a low-water line along the shore ... could lead to a shift in the baseline for measuring a maritime zone, for international purposes' and that the 'State's entitlement to submerged lands beneath the territorial sea would change'.⁷⁹ However this foreign domestic view does not alter the existing international legal regime.

Although sea level rise has become a popular topic amongst international law writers today, it was not so topical a few years ago: Di Leva and Morita, writing in 2009, commented, 'despite increased attention to the security aspect of global warming and the adverse impacts of climate change generally, there has been little discussion of

⁷² See art 121(3) of UNCLOS.

⁷³ See art 12 of UNCLOS.

⁷⁴ Stoutenburg (note 13 above) 269; Di Leva & Morita (note 5 above) 17; Schofield (note 20 above) 726.

⁷⁵ C Schofield 'Against a rising tide: Ambulatory baselines and shifting maritime limits in the face of sea level rise' (paper presented at *Proceedings of International Symposium on Islands and Oceans*, Tokyo, 22–23 January 2009) 77.

⁷⁶ Di Leva & Morita (note 5 above) 19.

⁷⁷ See National Oceanic and Atmospheric Administration 'Maritime zones and boundaries', available at http://www.gc.noaa.gov/gcil_maritime.html (accessed 22 April 2016).

⁷⁸ 521 US 1, 31 (1997).

⁷⁹ *Ibid.*

the implications of climate change on the rights of coastal states and low-lying areas'.⁸⁰

Ensuing measures

At this stage, two propositions⁸¹ and their merits are now set out in order to address the *lacunae* identified above.

The first proposition and most common-sense solution according to Stoutenburg would be to protect the coastal features from which these baselines are measured through the construction of seawalls and other similar defence structures.⁸² Schofield cautions that these artificial measures are likely to be prohibitively expensive and generally unrealistic in light of the sheer scale of the challenge.⁸³ This will likely be the case for the Mozambican coastline.

The second proposition is the stabilisation of maritime zones. In simpler terms, agreed maritime boundaries are fixed in terms of location even if the baselines upon which they are constructed have ambulated.⁸⁴ It is important to note that there are no provisions that potentially fix or freeze the outer boundary of the EEZ, the contiguous zone, or the territorial sea.⁸⁵ Indeed, Di Leva and Morita's research has shown that scholars have considered the legal and physical boundary of these maritime zones to be ambulatory.⁸⁶ That said, the drafters of the Convention were not averse to the permanent fixing of certain baselines and boundaries.⁸⁷ Di Leva and Morita, in looking at the records of the original drafters of the UNCLOS, seem to suggest that they recognised the possibility that a mean low-water mark may change or that the mark charted on a map may not always be accurate.⁸⁸ In the UN Office for Ocean Affairs and the Law of the Sea commentary on baselines some instances are recorded reflecting an awareness of unstable baselines which would justify a departure from the normal baseline. An example was provided of the Ganges/Brahmaputra Delta, which is inundated with tidal waters during monsoons and storms which could create an

⁸⁰ Di Leva & Morita (note 5 above) 7.

⁸¹ Further propositions are set out, generally, in Stoutenburg (note 13 above) 276–287.

⁸² Stoutenburg (note 13 above) 277.

⁸³ Schofield (note 75 above) 76; Stoutenburg (note 13 above) 277–278.

⁸⁴ Schofield (note 4 above) 607.

⁸⁵ Di Leva & Morita (note 5 above) 18.

⁸⁶ *Ibid.*

⁸⁷ Schofield (note 75 above) 77.

⁸⁸ Di Leva & Morita (note 5 above) 19, citing one of the discussions of the ILC's Fourth Session (170th and 171st meetings) focused on art 5, para 3 of the draft provision.

unstable coastline and justify the application of straight baselines.⁸⁹ Another example given is where the natural low-water line of the land is permanently covered by ice and its location cannot be determined. In such a case it was suggested that the ice cap should be substituted for the low-water line and since this too is changing it has been suggested further that the location should be determined from the most recent survey or it should be a mean position determined over a period of time.⁹⁰

The method of stabilising the maritime zones would be either to fix or freeze the position of the normal baseline or the outer limits of the maritime zones. The rationale for fixing the baselines of maritime limits has been described as aimed at preserving existing rights and national authority of coastal states over their maritime zones and natural resources to which they are entitled.⁹¹ This theory, by analogy, could find a basis in the *uti possidetis* doctrine⁹² to protect the territorial integrity of a state and preserve the *status quo*.

The key to legally fixing the maritime zones lies in officially recognised nautical charts of the coastal state. Unlike boundaries on *terra firma* which have physical markers in the form of fences or walls, maritime boundaries are plotted only symbolically on official nautical charts. Stoutenburg recognises, in practice, baselines once established and plotted on charts remain in place until the coastal state decides to redraft or revisit the charts even if the low-water line has moved.⁹³ States can unilaterally declare and describe their baselines and maritime zones and deposit with the Secretary-General of the United Nations an official chart depicting all relevant information, including geodetic data permanently describing baselines and outer limits of maritime zones.⁹⁴ This process would be analogous to the deposition of straight line and archipelagic baselines.⁹⁵ Schofield comments, once declared on an official nautical chart, the normal baselines can remain at the same location until

⁸⁹ UNDOALOS (note 11 above) 24.

⁹⁰ *Id* 5.

⁹¹ Schofield (note 4 above) 609.

⁹² The doctrine is well documented. See, e.g. MN Shaw *International Law* 5 ed (2003) 429–430. MN Shaw 'The heritage of states: The principle of *uti possidetis juris* today' (1996) 67 *British Yearbook of International Law* 75–76, notes that '[t]he principle of *uti possidetis juris* developed as an attempt to obviate territorial disputes by fixing the territorial heritage of new States at the moment of independence and converting existing lines into internationally recognized borders, and can thus be seen as a specific legal package, anchored in space and time, with crucial legitimating functions'.

⁹³ Stoutenburg (note 13 above) 279.

⁹⁴ *Id* 290.

⁹⁵ See arts 16(2) and 47(9) of UNCLOS, and Schofield (note 4 above) 608.

the map is revisited.⁹⁶ It must, however, be noted that the plotting of baselines and the limits of maritime zones is not the *raison d'être* of the publication of official nautical charts. Schofield comments further that they are also used for navigation and, accordingly, need to be revisited regularly through surveys to show the most updated coastal environment and important objects, especially those hazardous to navigation.⁹⁷ The baselines and limits of the maritime zones would be fixed in these subsequent reissues of nautical charts.

Stoutenburg points out that a jurisdictional anomaly would occur if the baselines and outer limits of the maritime zones were stabilised. The author explains this anomaly with the following example: the extent of seaward maritime zones would remain constant but the coastal state's internal waters would be enlarged as more of its territory became inundated on the landward side of the baseline.⁹⁸ In other words, as the coastline would regress due to rising sea levels these waters would fall on the landward side of the fixed baseline effectively changing its juridical nature to those of internal waters. Furthermore, the juridical change of the waters from territorial seas to internal waters could be seen as entailing an unjustified encroachment on other states' right of innocent passage.⁹⁹ A coastal state has full sovereignty over its internal waters and, at will, can exclude foreign ships from traversing these waters.¹⁰⁰ It is submitted that these fixed baselines should be regarded as an artificial baseline in a manner similar to straight baselines. The issue of the encroachment of the rights of innocent passage could be remedied by extending the principle contained in article 8(2) of UNCLOS, which provides

Where the establishment of a straight baseline ... has the effect of enclosing as internal waters areas which had not previously been considered as such, a right of innocent passage as provided in this Convention shall exist in those waters.

Concluding remarks

During the United Nations Conferences on the Law of the Sea that lead to the adoption of UNCLOS in the late twentieth century the preoccupation of the drafters was to balance the freedom of the seas

⁹⁶ Schofield (note 4 above) 608.

⁹⁷ *Id* 604.

⁹⁸ Stoutenburg (note 13 above) 275.

⁹⁹ See arts 17–19 of UNCLOS dealing with innocent passage, and Stoutenburg (note 13 above) 275.

¹⁰⁰ *Ibid*.

and preserve them for the common heritage of humanity against those states wishing to appropriate maritime realms to an increasing extent. The law of the sea, as Nandan cited above points out, had become a law of appropriation. In the issue at hand, it is the ocean which is now appropriating portions of the land due to its rising level. This turn of events, which was not anticipated on a global scale at the time of UNCLOS, has left a *lacuna* in its provisions which deal with baselines that directly impact the breadths of a coastal state's maritime zones and the rights, duties and privileges which follow.

This article canvasses the implications of this apparent *lacuna* and considers its application to occurrences and disputes off the Southern African coastline. A tenable suggestion advanced in light of this gap would be the adoption of a regime of stable or fixed baselines and outer limits of maritime zones — analogous to the regime of straight baselines under UNCLOS. Practically, these will be fixed by permanent plotting on official nautical charts.

Although states have some autonomy in the determination of their baselines in accordance with the UNCLOS provisions, Stoutenburg suggests creating an institutional mechanism through which they could make submissions regarding their baselines and outer maritime limits, namely a UN Commission on Baselines and Maritime Limits.¹⁰¹ It is suggested that this Commission should work closely with the African Union Border Programme (AUBP)¹⁰² to gain a greater insight into African perspectives, both in terms of political context as well as the unique hydrographic features of the region.¹⁰³ The Commission could assist states in capacity development and issues such as whether the state's entire normal baseline should be fixed or only portions which are vulnerable to sea level rise.

Di Leva and Morita find that it is an appropriate precautionary measure to have territorial survey records up-to-date in order to determine where current boundaries lie and to where they may shift.¹⁰⁴ Deposited charts have been closely analysed by courts and arbiters in territorial and maritime boundary disputes.¹⁰⁵ The United Nations Office

¹⁰¹ Stoutenburg (note 13 above) 293.

¹⁰² See generally <http://aubis.peaceau.org/en/> (accessed 15 June 2016).

¹⁰³ See for example: AUBP *Creation and operation of boundary commissions in Africa* (2014), available at <http://www.peaceau.org/uploads/au-3-en-2013-en-creation-a-operation.pdf> (accessed 15 June 2016); AUBP *Delimitation and demarcation of boundaries in Africa* (2014), available at <http://www.peaceau.org/uploads/au2013-en-delim-a-demar-of-bound-gen-iss-a-studies-elec2.pdf> (accessed 15 June 2016).

¹⁰⁴ Di Leva & Morita (note 5 above) 27.

¹⁰⁵ *Ibid.*

for Ocean Affairs and the Law of the Sea cautions that the cost would be considerable of surveying offshore areas for a new chart datum and preparing and publishing new charts.¹⁰⁶

Developing countries in Southern Africa and other parts of the world would find it challenging to secure the financial resources and appropriate hydrographical surveying skills to produce adequate or revised nautical charts.¹⁰⁷ Developing countries may be at a further disadvantage if they have only limited access to historical records or lack the capacity to address complicated historical and geographic approaches to boundary claims.¹⁰⁸ Sea level change is a gradual process and, in the interim, South Africa and her neighbours ought to continue investing in capacity to assess and survey the coastline and maintain a competent system of survey and chart publications. In South Africa, the role of the South African Navy Hydrographic Office, established in 1955, in terms of the survey and publication of official nautical charts is critical in the preservation of the country's sovereignty and rights over its maritime zones.

¹⁰⁶ UNDOALOS (note 11 above) 3.

¹⁰⁷ Stoutenburg (note 13 above) 292.

¹⁰⁸ Di Leva & Morita (note 5 above) 32.