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Sea Level Rise and Impacts on Maritime Zones and Limits: The Work of the ILA Committee on International Law and Sea Level Rise[♣]

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Abstract

As the oceans warm and ice melts, the Intergovernmental Panel on Climate Change (IPCC) in its Fifth Assessment Report (AR5) now predicts a global average sea-level rise of up to one meter by 2100. AR5 also emphasizes that sea-level rise will have "a strong regional pattern, with some places experiencing significant deviations of local and regional sea level change from the global mean change." These predictions pose serious and possibly existential threats to the inhabitants of low lying islands and coastal areas, and pose challenges for the international legal system to respond in an orderly and humane way to these novel situations. In 2012, the International Law Association (ILA) established a new Committee to look specifically at these issues. This article looks at the work undertaken by the Committee to date regarding the law of the sea aspects of its mandate and identifies some considerations for its future work.

Keywords: Sea-level rise; IPCC; ILA Committee; maritime boundaries; coastal baselines; fundamental change of circumstances; Anthropocene; progressive development of international law; criteria for statehood.

Introduction

The threat that sea level rise represents to small islands and low lying areas is well known. In Paris in December 2015, the Small Island Developing States (SIDS) were extremely vocal at the 21st Session of the Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC).[1] It was partly as a result of their insistence that the

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[1] Published in UNTS 1771, at 164; reprinted in ILM, 31 (1992) 849; available at: http://unfccc.int/essential_background/convention/items/6036.php

objective of the 2015 Paris Agreement which "aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty" includes in its Article 2 an aspiration to

> "[hold] the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change".[2]

The Intergovernmental Panel on Climate Change (IPCC) in its Fourth Assessment Report (AR4) in 2007 had identified 2°C as the threshold for "dangerous climate change"[3] and this too had been reflected in the wording of the Copenhagen Accord.[4] But it was the SIDS who insisted that a higher aspiration should be contained in the Paris Agreement; the threat of sea-level rise was a major driver for this call, for they are at the front lines. Nevertheless, even if the State Parties to the Paris Agreement are able to keep warming within this lower limit, there is a broad scientific consensus, evident in AR5 and elsewhere in recent scientific literature, that the Earth *is already committed to increases of sea-level for the foreseeable future*, in the course of this and possibly for the next several centuries, notwithstanding any change in limiting or (theoretically) even eliminating altogether greenhouse gas emissions.

The IPCC, whose estimates are generally regarded to be conservative, in its Fifth Assessment Report (AR5) now predicts up to approximately one meter sea-level rise by 2100, with "a strong regional pattern, with some places experiencing significant deviations of local and regional sea level change from the global mean change."[5] Moreover, there is a wide range of differences in the results for the upper bounds of projected sea-level rise, identified in assessments using process-based modelling, on the one hand, and those based on semi-empirical models, on the other – with the latter resulting in upper bounds of up to 2.4 m of global mean sea level rise by 2100.[6]

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[2] Article 2(1)(a) of the Paris Agreement under the UNFCCC, UN Doc. FCCC/CP/2015/L.9/Rev.1., of 12 December 2015; authentic text available at: http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf. The Paris Agreement entered into force on 4 November 2016. As of 25 January 2017, there are 127 Parties.

[3] Available at: https://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

[4] UN Doc. FCCC/CP/2009/11/Add.1. By Decision 2/CP.15 Copenhagen Accord, the Conference of the Parties takes note of the Copenhagen Accord of 18 December 2009.

[5] Climate Change 2013: The Physical Science Basis, 1140, as well as 1180 and 1186, available at http://www.climatechange2013.org/images/report/WG1AR5_ALL_FINAL.pdf. Hereinafter: 'Sea Level Change', *Contribution of WG I to* AR5.

[6] Ibid., at 1179–1186. The semi-empirical approach regards changes in sea level as an integrated response of the entire climate system, reflecting changes in the dynamics and thermodynamics of the atmosphere, ocean and cryosphere – in contrast to process-based approach, which explicitly attributes sea level rise to its individual physical components; ibid, at 1182.

Predictions of sea-level rise in the context of the onset of a new epoch in Earth's history

Sea level rise has been singled out as one of the most obvious manifestations of the radical changes to the Earth's system that *Homo sapiens* has brought. Scientific evidence increasingly indicates that, due to the nature and size of on-going changes, the Earth may already be undergoing a shift from the conditions of the current officially accepted geological time interval, the Holocene, to a new planetary state.[7] The Holocene is the latest, and formally still the current, geological epoch. It comprises the past 11,700 years,[8] which have been marked by an exceptionally long period of relative environmental stability, especially for the last few thousand years.[9] As such, the conditions of the Holocene were a key factor facilitating the development of human civilization and, ultimately, the territorial divisions of the political world as we know it today.

It has been argued that, because of the interaction between the global environmental effects of economic development and increased human population, the Earth system has already left the Holocene and has entered a new epoch: the Anthropocene.[10] So far, the 'Anthropocene' is an unofficial scientific term referring to the human imprint on the Earth system that is already so profound as to have reached geological significance.[11] Since 2009, the Anthropocene hypothesis has been under formal scrutiny within geology. In that year, the Anthropocene Working Group (AWG) was set up within the International Commission on Stratigraphy to examine the stratigraphic basis and the scientific justification for possible formalization of the Anthropocene as the most recent geological time unit.[12] The preliminary findings and interim recommendations of the AWG were presented at the 35th International Geological Congress, in August 2016.

The Holocene has been characterized, especially in its late stage, by the longest period of stability in environmental conditions on Earth since the appearance of *Homo sapiens.* By

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[7] See especially the review by 24 members of the Anthropocene Working Group of the International Commission on Stratigraphy published in journal *Science*: Colin Waters et al, 'The Anthropocene is functionally and stratigraphically distinct from the Holocene', *Science*, 351 (2016) 137.

[8] Mike Walker et al, 'Formal Definition and Dating of the GSSP (Global Stratotype Section and Point) for the Base of the Holocene Using the Greenland NGRIP Ice Core, and Selected Auxiliary Records', *Journal of Quaternary Science*, 24 (2009) 3–17.

[9] The lower boundary for the 'late Holocene' is currently proposed at 4200 years BP; see Mike Walker et al, 'Formal subdivision of the Holocene Series/Epoch', *Journal of Quaternary Science*, 27 (2012), 649–659.

[10] On the onset of the Anthropocene, see: Jan Zalasiewicz et (24) al, 'When did the Anthropocene Begin? A Mid-Twentieth Century Boundary Level is Stratigraphically Optimal', *Quaternary International*, 383 (2015), 196–203. For the origins of the Anthropocene hypothesis, see: Paul Crutzen and Eugene Stoermer, 'The Anthropocene', *Global Change Newsletter*, 41 (2000), 17–18; and Paul Crutzen, 'Geology of Mankind', *Nature*, 415 (2002), 23.

[11] On the possible magnitude of that impact, see also a recent article in journal *Nature*: Andrey Ganopolski et al, 'Critical insolation- CO_2 relation for diagnosing past and future glacial inception', *Nature*, 529 (2016), 200–203 – reporting a modelling study confirming findings that the Earth would already be entering a new glacial interval (an 'ice age') absent human impact on the CO_2 concentration in the atmosphere from the 18th century on, and concluding that the onset of a glacial interval is, due to that impact, postponed by at least 100,000 years.

[12] On the International Commission on Stratigraphy, see at: www.stratigraphy.org. On the Anthropocene Working Group, see at: http://quaternary.stratigraphy.org/workinggroups/anthropocene/.

contrast, the Anthropocene would be characterized by change, uncertainty and instability in the future behaviour of the Earth system.[13] This may have increasing relevance and, over time, important consequences for the organisation of international relations as currently reflected in international law.[14] It has been argued that within the current system of international law, the stability of the late Holocene has played a major role in the development of the political system which has in turn reflected the generally stable natural conditions of the Earth system.[15] Changes in that underlying element of stability contain the potential for new types of tension in relations between states.[16]

One such core aspect relates to the international legal implications of sea-level rise, as it is already projected for this century. The onset of changing Earth system conditions in an Anthropocene epoch may raise question regarding a number of key tenets of international law, since these have evolved during a period of general stability of geographic conditions. These changes may require the re-examination of some currently accepted paradigms of international law.[17]

It is against this background that in 2012, following a recommendation made by the existing Committee on Baselines under the International Law of the Sea[18] to the 75th International Law Association (ILA) Conference in Sofia, the ILA Executive Council established the Committee on International Law and Sea Level Rise.[19] The mandate of this new Committee is to study the possible impacts of sea-level rise and the implications under international law of the partial and complete inundation of state territory, or depopulation thereof, in particular of small island and low-lying states; 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, including the impacts on statehood, nationality, and human rights.[20]

In August 2016, at the 77th Conference of the International Law Association held in Johannesburg, South Africa, the International Law and Sea Level Rise Committee presented

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[13] Jan Zalasiewicz, Paul Crutzen and Will Steffen, 'The Anthropocene', in Felix Gradstein et al. (eds), *The Geologic Time Scale 2012*, Vol. 2 (Amsterdam: Elsevier, 2012), 1033–1040; and Mark Williams et al, 'The Anthropocene Biosphere', *The Anthropocene Review*, 2 (2015),196–219.

[14] Davor Vidas, Jan Zalasiewicz and Mark Williams, 'What is the Anthropocene – and Why Is It Relevant for International Law? *Yearbook of International Environmental Law*, 25 (Oxford University Press, 2015), 3–23.

[15] Davor Vidas et al., 'International Law for the Anthropocene?' *Anthropocene*, 9 (2015), 1–13.

[16] Ibid.

[17] See ibid, for further discussion.

[18]'Baselines under the International Law of the Sea: Committee Report', in: International Law Association, *Report of the Seventy-Fifth Conference held in Sofia, August 2012* (London: ILA, 2012), 385–428, and the Resolution 1/2012 adopted at the 2012 Sofia ILA Conference . See further footnote 72 below.

[19]ILA, *Minutes of the Meeting of the Executive Council* (London, 10 November 2012), at 5. International Law Association, International Law and Sea Level Rise Committee, http://www.ila-hq.org/en/committees/index.cfm/cid/1043

[20] Ibid. See also: Davor Vidas, David Freestone and Jane McAdam, "International Law and Sea Level Rise: The New ILA Committee" *International Law Students' Association (ILSA) Journal of International and Comparative Law* 21 (2015), 397–408.

its Interim Report (hereinafter: Johannesburg Report).[21] This paper draws on some of its key findings.

The IPCC predictions of future sea level rise

At the time of the establishment of the new ILA Committee in 2012, the IPCC had issued four assessment reports, the last of which was published in 2007.[22] The First IPCC Assessment Report (FAR), issued in 1990, laid the groundwork and resulted in important general findings, including recognition that: (a) sea level had risen during the 20th century; (b) the rate of rise had increased compared to the 19th century; (c) ocean thermal expansion and the mass loss from glaciers were the main contributors to the 20th century rise; (d) during the 21st century the rate of rise was projected to be faster than during the 20th century; (e) sea level will not rise uniformly around the world; and (f) sea level would continue to rise well after GHG emissions are reduced. The FAR also concluded, however, that no major dynamic response of the ice sheets was expected during the 21st century, leaving ocean thermal expansion and the melting of glaciers as the main contributors to the 21st century rise. This was, in retrospect, a significant misconception in the context of our current understanding of sea level rise.[23] The Second Assessment Report (SAR) in 1996 contained similar conclusions. However, by 2001, when the Third Assessment Report (TAR) was issued, new models replaced the energy balance climate models that had been previously used by the IPCC.

The 2007, Fourth Assessment Report (AR4) relied on more robust observations of the variations in the rate of global average sea level rise for the 20th century. Moreover, by the time of AR4, the satellite altimeter record was long enough to reveal the complexity of the time-variable spatial distribution of sea level.[24] Nevertheless, three central issues remained in AR4. First, the observed sea-level rise over decades was larger than the sum of individual contributions as estimated using the AR4 methodology. Second, it was not possible to make confident projections about the regional distribution of sea level rise. Third, there was insufficient understanding of the potential contributions from the destabilisation (melting) of ice sheets – and AR4 recognized that existing ice-sheet models were unable to simulate the recent observations of accelerated ice-sheet melting. Indeed, understanding of ice-sheet dynamics was too limited to assess either the likelihood of continued accelerated melting or to provide a reliable estimate or even an upper bound for their future contribution.

[21] Available at http://www.ila-hq.org/en/committees/index.cfm/cid/1043

[22] The brief overview, contained in this and the next two paragraphs, of the previous four IPCC assessment reports, as related to sea-level change, is based on J.A. Church et al., 'Sea Level Change', in: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2013), at 1142. Hereinafter: 'Sea Level Change', *Contribution of WG I to AR5*.

[23] See further below.

[24] Satellite sea level altimetry began in 1993; see further below, especially footnotes 33 to 35, and the related text.

It is notable when comparing the projections of sea level rise for 2100 contained in the earlier IPCC Assessment Reports that they contain remarkably similar range of predictions, despite changes in the scenarios. However, there was a progressive reduction in the upper end of their predictions:

- FAR (1990): sea level rise from 31 cm, at the lower end, to 110 cm at the upper end;
- SAR (1996): from 13 to 94 cm;
- TAR (2001): from 9 to 88 cm;
- AR4 (2007): from 18 to 59 cm (not including dynamic ice-sheet response additions).

The Fifth Assessment Report (AR5)[25] of 2013/2014 was the first to reverse this trend of successive reductions in the upper end of projections for 2100. With an upper end prediction of 98 cm,[26] it is the second highest so far. It is important, however, that this prediction is based on significant scientific advances since AR4, resulting in a much better understanding of 20th century sea level changes and their components, and in an improved ability to project future rise.[27] The AR5 also acknowledged, however, that significant challenges remain, in particular in incorporating the dynamics of the Greenland and Antarctic ice sheets.[28]

The next three subsections briefly review the salient aspects of AR5: its progress in the understanding of on-going sea level change; its improved projections of future sea level rise; and its analysis of the key challenges that remain.

Progress in the understanding of on-going sea level change

The findings of AR5 reflect a significantly improved understanding of the components that contribute to total sea level change.[29] The evidence now available in AR5 gives a much clearer account of the observed sea-level change than did the AR4.[30]

AR5 confirms that the amount of global mean sea level rise in the course of the 20th century and up to 2010 was ~20 cm.[31] A transition from relatively low mean rates of sea level change, that were characteristic for the previous two millennia (in the order of tenths of mm/year),

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[25] In addition to *Contribution of WG I to AR5*, two further reports of IPCC within AR5 were drawn upon for presenting the overview in this section: *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Core Writing Team, RK Pachauri and LA Meyer (eds)), IPCC: Geneva, 2015 (hereinafter: *AR5 – Synthesis*); and *Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2013), hereinafter: *AR5 – Summary for Policymakers*.

[26] 'Sea Level Change', *Contribution of WG I to AR5*, at 1186. It is, moreover, noted that if the Antarctic precipitation increase is omitted from the process-based projections, the likely range increases to 103 cm; ibid.

[27] 'Sea Level Change', *Contribution of WG I to AR5*, at 1204; also *AR5 – Synthesis*, at 62.

[28] *AR5 – Synthesis*, at 56.

[29] 'Sea Level Change', *Contribution of WG I to AR5*, at 1157-1159 and 1204; also *AR5 – Synthesis*, at 56.

[30] Models used in AR4 were able to explain only about 60% of the observed sea-level rise, and consequently projections of future sea-level rise in AR4 were underestimated; see *Contribution of WG I to AR5*, at 1182.

[31] That is: 0.19 [0.17 to 0.21, i.e., +/-0.02] m; see 'Sea Level Change', *Contribution of WG I to AR5*, at 1150.

occurred at some time between the end of the 19th to the early 20th century,[32] and led to higher rates of rise in the course of the 20th century (in the order of mm/year) – with a global mean rate of rise of 1.7 mm/year over the span of the century.[33] The key distinction observed in the course of the 20th century, as compared to previous centuries and even previous millennia, is not only the absolute amount of rise but also the accelerating rate of mean sea level rise that was noted, especially in measurements since 1971.[34] Between 1993 and 2010, the observed rate is already markedly greater: 3.2 mm/year.[35] This indicates both a greater amount of rise and an acceleration in the rate in the late 20th and the early 21st century.[36]

Current understanding of sea level rise identifies ocean thermal expansion and glacier melting (not including Antarctica) as the dominant contributors for most of the 20th century mean sea level rise; observations since 1971 result in estimates, with a degree of high confidence, that those two sources contribute about 75% of the observed rise.[37] However, the contribution of the Greenland and the Antarctic ice sheets to sea-level rise has increased since the early 1990s.[38] AR5 indicates a progressive trend in which the Greenland contribution has 'very likely' increased from 0.09 mm/year (for 1992-2001) to 0.59 mm/year (for 2002-2011), while the Antarctic contribution 'likely' increased from 0.08 mm/year (for 1992-2001) to 0.40 mm/year (for 2002-2011).[39] This trend is significant for future projections, and it also poses important challenges for the (process-based model) projections, especially regarding the dynamical responses of the Antarctic ice sheet.

Improvements in projections of future sea level rise

Confidence in the projections of global mean sea level rise has increased since the AR4, because of improved understanding of the physical components of sea level, the improved correlation between the process-based models and actual observations, and the inclusion of

[32] AR5 refers to most recent studies concluding that sea level began to rise above the late Holocene background rate (characteristic of the previous ca 2000 years) between 1905 and 1945; 'Sea Level Change', *Contribution of WG I to AR5*, at 1146 and 1184–1185.

[33] 'Sea Level Change', *Contribution of WG I to AR5*, at 1146 and 1150, indicating the rate as 'very likely', meaning in AR5: 90 to 100 % probability; see also *AR5 – Summary for Policymakers*, at 9.

[34] Since 1971, significantly more ocean data became available and systematic glacier reconstructions began; global mean rate of sea-level rise since 1971 was estimated to approximately 2.0 mm/year.

[35] 'Sea Level Change', *Contribution of WG I to AR5*, at 1204, 1150; with the indication of this being 'very likely'. This rate is found by the satellite sea-level altimetry data.

[36] In this context, 1993 is also important as the first year when satellite sea level altimetry record, and observations of all sea level components, became available; a 20-year span (1993-2012) enabled trend analyses as presented in AR5; see *AR5 – Synthesis*, at 41; 'Sea Level Change', *Contribution of WG I to AR5*, at 1139 and, especially, at 1150.

[37] 'Sea Level Change', *Contribution of WG I to AR5*, at 1139 and 1157.

[38] Ibid, at 1153–1157. Data for those contributions comes primarily from satellite and airborne surveys.

[39] 'Sea Level Change', *Contribution of WG I to AR5*, at 1153. This translates into the average rate of ice loss from the Greenland, from 34 Gt/year (for 1992-2001) to 215 Gt/year (for 2002–2011), and from the Antarctic, from 30 Gt/year (for 1992-2001) to 147 Gt/year (for 2002–2011). As to contribution to global mean sea level rise: 100 Gt/year of ice loss is equivalent to 0.28 mm/year increase; *AR5 – Summary for Policymakers*, at 7.

ice-sheet dynamical changes.[40] The projections of sea level rise contained in AR5 are larger than in AR4, primarily because of the improved modelling of land-ice contributions.

The projections of the amount of sea level rise likely in the 21st century in AR5 range from 26 cm rise at the lower-end of the lowest scenario (RCP2.6) to 98 cm rise at the upper-end of the highest scenario (RCP8.5).[41] The rate of rise, between 2081 and 2100, in the latter scenario is 8 to 16 mm/year.[42] This is, in the upper-end, a five-fold increase if compared with the rate of rise from 1993 to 2010, or almost ten times the average rate of rise (of 1.7 mm/year) in the 20th century.

Two additional aspects are estimated by AR5 as 'very likely' in the 21st century. First, that sea level change will have a *strong regional pattern*, with some places experiencing significant deviations of local and regional change, which can differ from the global average rate by more than 100%; second, that there will be a significant increase in the occurrence of future sea level *extremes* in some regions (with a likely increase in the early 21st century).[43]

While exact figures of amounts and rates of future sea level rise still remain uncertain, even for the 21st century, AR5 states that it is 'virtually certain'[44] that sea level will continue to rise during the 21st century, and for centuries beyond – even if greenhouse gases (GHG) concentrations are stabilized (with the amount of rise in later centuries dependent on future GHG emissions).[45] For higher emission scenarios and warmer temperatures, surface melting of the Greenland ice sheet is projected to exceed accumulation, leading to its long-term decay and a sea level rise of several metres, consistent with paleo sea-level data,[46] which indicates – for the last interglacial (between 129 and 116 thousand years ago) – between 5 and 10 m higher than the present-day global mean sea level that has been relatively constant for the last several thousand years.[47]

On current understanding, the only event that could cause global mean sea level to rise substantially above the *likely* range presented in AR5 during this century would be the collapse of the marine-based sections of the Antarctic ice sheet. However, the effect of this, which AR5 states 'cannot be precisely quantified', is, with *medium confidence*, predicted to be within several tenths of a meter of sea-level rise during the 21st century.[48] The distinction between

[40] 'Sea Level Change', *Contribution of WG I to AR5*, at 1139.
[41] 'Sea Level Change', *Contribution of WG I to AR5*, at 1180. 'RCP' in AR5 means 'Representative Concentration Pathways', which are different future scenarios of concentration of GHGs, aerosols and other climate drivers.
[42] Ibid.
[43] 'Sea Level Change', *Contribution of WG I to AR5*, at 1140.
[44] In AR5 terminology of likelihood, 'virtually certain' means 99 to 100% probability.
[45] 'Sea Level Change', *Contribution of WG I to AR5*, at 1205.
[46] Ibid.
[47] 'Sea Level Change', *Contribution of WG I to AR5*, at 1139 – implying, for estimates up to 10 m, substantial contributions from both the Greenland and the Antarctic ice sheets.
[48] *AR5 – Synthesis*, at 59; 'Sea Level Change', *Contribution of WG I to AR5*, at 1140.

Antarctica and Greenland is that the latter has no known large-scale instabilities that might generate an abrupt increase in sea level rise during the 21st century.[49]

Challenges that remain

Despite the progress since AR4, it is clearly acknowledged in AR5 that significant uncertainties remain, particularly related to the magnitude and rate of the ice sheet contribution to sea level during the 21st century and beyond, as well as the regional distribution of sea level rise and the regional changes in storm frequency and intensity. AR5 states that:

> "Although improved understanding has allowed the projection of a *likely* range of sea level rise during the 21st century, it has not been possible to quantify a *very likely* range or give an upper bound to future rise. The potential collapse of ice shelves, as observed on the Antarctic Peninsula (…), could lead to a larger 21st century rise."[50]

It should be added here that, regarding ocean warming, the AR5 predicts the most pronounced warming at greater depth in the Southern (Antarctic) Ocean. Recent studies, including those following the publication of AR5, have focused on the destabilisation of the West Antarctic ice sheet and its potential for contributing rapidly to global sea level rise.[51]

Another challenging aspect, as already pointed out above, is the wide range of differences in the results for the upper bounds of projected sea-level rise, identified in assessments using process-based modelling, on the one hand, and those based on semi-empirical models, on the other.

A further important consideration here is, moreover, that of *relative* sea level rise, which is defined by the elevation of both the land and the sea. This concept acknowledges that as sea levels rise, complex feedbacks may occur on the shape or morphology of the coast as well as its associated systems (such as coral reefs) making some coasts highly responsive to changing sea levels.[52]

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[49] 'Sea Level Change', *Contribution of WG I to AR5*, at 1179. For most recent studies on the destabilization of the West Antarctic ice sheet (especially around the Antarctic Peninsula and the Amundsen Sea area), see, e.g., Craig Rye et al, 'Rapid sea-level rise along the Antarctic margins in response to increased glacial discharge', *Nature Geoscience*, 7 (2014), 732–735, estimating that an excess of freshwater input of 430 (+/- 230) Gt/year is required to explain the observed sea-level rise. Compare this with AR5 data, as presented above.

[50] 'Sea Level Change', *Contribution of WG I to AR5*, at 1205. In AR5 terminology of likelihood, 'likely' refers to a probability between 66 and 100% (while 'very likely' is 90 to 100% probability).

[51] See, e.g., Rye et al, 'Rapid sea-level rise along the Antarctic margins'.

[52] On relative sea level rise, see further, e.g., Kerrylee Rogers and Clive Schofield, 'Responding to Changing Coasts: the Need for Fixed and Flexible Limits and Boundaries in the Face of Sea Leve Rise', in Carlos Esposito,James Kraska, Harry Scheiber and Moon-Sang Kwon (eds), *Ocean Law and Policy: 20 Years under UNCLOS* (Brill Nijhoff, 2017), 419-445.

Records of past sea level changes provide insights into the sensitivity of sea level to past climatic changes, and may also be able to contribute to our understanding of current changes and to provide a means of evaluating projections. In contrast to the more recent gradual progressions of sea-level rise that have occurred over a very long period, there is geological evidence of significant 'jumps' over a relatively short time-span of centennial – perhaps even decadal – scale,[53] followed by longer periods of general stability or slower rises. The timing of such future 'jumps' is very difficult to predict.

Discussing risk and the management of an uncertain future, AR5 states that – while it is 'unlikely' for global mean sea level rise to exceed one meter in this century – the consequence of a greater rise could be so severe that this possibility must become a significant part of risk assessment.[54] Relatively low confidence but high consequence outcomes are policy relevant, and therefore an aspect pertinent also in the considerations of the ILA Committee on International Law and Sea Level Rise.

Sea-level Rise and Maritime Zones

A sea level rise of up to one meter, as predicted in AR5, may pose potentially serious, maybe even disastrous, threat to many coastal States, especially those with large, heavily populated and low-lying coastal areas, as well as for small, low-lying island States. Such sea-level variability is also highly likely to impact coastal areas where wetlands and other sites may be protected by international treaty regimes.[55]

In addition to the threat posed to low-lying coastal areas and their associated populations, as well as to coastal infrastructure from inundation by rising seas, there are also threats to the ocean spaces adjacent to such threatened territories. In particular, sea-level rise has the potential to significantly impact the spatial extent of national claims to maritime jurisdiction.[56]

Generally, the baseline from which States' maritime zones are measured is the "normal" baseline, determined in accordance with Article 5 of the 1982 United Nations Convention on

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[53] See, e.g., Michael O'Leary et al, 'Ice Sheet Collapse Following a Prolonged Period of Stable Sea Level during the Last Interglacial', *Nature Geoscience*, 9 (2013), 796–800.

[54] *AR5–Synthesis*, at 36.

[55] Under, e.g., the 1971 Ramsar Convention on Wetlands of International Importance, 996 UNTS 245; (1972) ILM 963; as well as under regional conventions.

[56] The literature on this is extensive. Early writers agreed that this was a consequence of ambulatory baselines: Eric Bird and JRV Prescott, 'Rising Global Sea Levels and National Maritime Claims', (1989) *Marine Policy Reports* 177: 177-96; Alfred HA Soons, 'The Effects of a Rising Sea Level on Maritime Limits and Boundaries', (1990) *Netherlands International Law Review*, 37: 207–232. David D Caron, 'When Law Makes Climate Change Worse: Rethinking the Law of Baselines in Light of Rising Sea Level' (1990) *Ecology Law Quarterly*, 17: 621. David Freestone, 'International Law and Sea Level Rise' in: Robin R Churchill and David Freestone (eds), *International Law and Global Climate Change* (London/Dordrecht: Graham and Trotman/Martinus Nijhoff, 1991), 109, 119–122. David Freestone and John Pethick, 'Sea Level Rise and Maritime Boundaries: International Implications of Impacts and Responses', in: Gerald Blake (ed.) *International Boundaries: Fresh Perspectives*, Vol 5 (Routledge, 1994), 73–90.

the Law of the Sea (LOSC).[57] From the baseline States may measure their territorial sea,[58] contiguous zone,[59] exclusive economic zone (EEZ)[60] and continental shelf.[61] Consequently, if those "normal" baselines move inland as a consequence of sea level rise, so too will the outer limits of those maritime zones measured from such baselines. As a result of such shifting baselines and a re-adjustment of the boundary of maritime zones, waters previously under national jurisdiction could become part of the high seas.

Further, sea-level rise has the potential to inundate small islands and other geographical features which may have generated their own maritime zones[62] or been used by the coastal State as base points for drawing straight baselines.[63] This too may have major impacts on the capacity of a feature to generate maritime jurisdictional claims.[64] Some low-lying island States, already under pressure, may find their land area rendered uninhabitable well before they are overrun by the sea. In extreme cases this will raise questions as to the ability of some island States to maintain their statehood without a habitable land area, and to maintain sovereignty over the territorial sea, and sovereign rights over the resources of the maritime zones appurtenant to those land areas.[65]

The ILA Sea Level Rise Committee decided that in its next report in 2018 it will consider how international law may be able to respond to these unprecedented existential challenges as well as the serious human dimension of the issues. It will consider whether these issues need to be addressed by treaty law or whether customary international law and "softer" methods of norm creation will be sufficiently flexible to address these challenges, and what might be the appropriate mechanisms for this.

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[57] Article 5 of the 1982 United Nations Convention on the Law of the Sea, UN doc. A/CONF.62/122; text in UNTS, vol. 1833, at 3; text reprinted in (1982) ILM, Vol 21, at 1261; available at <www.un.org/ Depts/los>.

[58] Article 3, LOSC.

[59] Article 33, LOSC.

[60] Article 57, LOSC.

[61] Article 76(1), LOSC. Of course, defining the outer limit of the continental shelf is more complex as the continental shelf extends beyond a coastal State's territorial sea "throughout the natural prolongation of its land territory to the outer edge of the continental margin", and therefore for many coastal States it extends beyond 200 nautical miles from the baselines.

[62] Article 121, LOSC.

[63] As permitted by Article 7, LOSC.

[64] See generally the detailed provisions of Part II LOSC. For example, the low water line of islands may be used to measure maritime zones (Art 121(2)). The low water line of low tide elevations (LTE) may also be used to measure maritime zones if the LTE is situated "wholly or partly at a distance not exceeding the breadth of the territorial sea from the mainland or an island." (Art 13(1), LOSC) All these features are susceptible to change.

[65] This may include the resources of the 200 nautical mile EEZ in which coastal States have "sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the sea-bed and of the sea-bed and its subsoil" (Part V, LOSC), and of the continental shelf over which coastal States exercise "sovereign rights for the purpose of exploring it and exploiting its natural resources" (Part VI, LOSC). See also Rosemary Rayfuse, 'Sea Level Rise and Maritime Zones: Preserving the Entitlements of "Disappearing" States' in: Michael B Gerrard and Gregory E Wannier, *Threatened Island Nations: Legal Implications of Rising Seas and a Changing Climate* (Cambridge University Press, 2013), 167–191

In its first interim report, presented at the 77th ILA Conference in Johannesburg in August 2016, the Sea Level Rise Committee, however, considered some preliminary legal issues regarding the potential impacts of sea-level rise on coastal States' maritime zones.[66] The Committee decided that it was appropriate to begin its review by revisiting the findings of the ILA Committee charged with examining the international law of baselines (hereinafter: the ILA Baselines Committee) as regards its interpretation of Article 5 of the Law of the Sea Convention as the basis for its own further deliberations.

The Existing Law of the 'Normal' Baseline

In its 2012 Report,[67] the ILA Baselines Committee considered at some length the legal implications of Article 5 LOSC which in the English text reads as follows:

> 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 recognized by the coastal State.

The Baselines Committee concluded that "the legal normal baseline is the actual low-water line along the coast at the vertical datum, also known as the chart datum, indicated on charts officially recognized by the coastal State" and that "the phrase 'as marked on large-scale charts officially recognized by the coastal State' provides for coastal State discretion to choose the vertical datum at which that State measures and depicts its low-water line." The charted low-water line "illustrates the legal normal baseline, and in most instances and for most purposes the charted low-water line provides a sufficiently accurate representation of the normal baseline". However, the Committee considered that although the charted line appears to enjoy a strong presumption of accuracy, "where significant physical changes have occurred so that the chart does not provide an accurate representation of the actual low-water line at the chosen vertical datum, extrinsic evidence has been considered by international courts and tribunals in order to determine the location of the legal normal baseline."[68]

Therefore, the Baselines Committee argued: "it follows that if the legal baseline changes with human-induced expansions of the actual low-water line to seaward, then it must also change

[66] See above, footnote 20.

[67] 'Baselines under the International Law of the Sea: Committee Report', in: International Law Association, *Report of the Seventy-Fifth Conference held in Sofia, August 2012* (London: ILA, 2012), 385–428. Hereinafter: *Baselines Committee Sofia Report*. That report is available also on-line at ILA Baselines Committee webpage, at <www.ila-hq.org/en/committees/index.cfm/cid/1028>. In further references to that report below, page numbers indicated relate to the on-line report version.

[68] *Baselines Committee Sofia Report*, at 31. This was the view of 28 of the 30 member Committee, with two statements of dissent, from Dr Oude Elferink (Netherlands) and Professor Yee (HQ), with reasons as further explained in footnotes 217 and 218 of the *Baselines Committee Sofia Report*, at 31.

with contractions of the actual low-water line to the landward."[69] The Baselines Committee therefore reached the view that:

> the existing law of normal baseline applies in situations of significant coastal change caused by both territorial gain and territorial loss. Coastal States may protect and preserve territory through physical reinforcement, but not through the legal fiction of a charted line that is unrepresentative of the actual low-water line.[70]

Consequently, the Baselines Committee concluded that:

> … the normal baseline is ambulatory, moving seaward to reflect changes to the coast caused by accretion, land rise, and the construction of human-made structures associated with harbour systems, coastal protection and land reclamation projects, and also landward to reflect changes caused by erosion and sea level rise. Under extreme circumstances the latter category of change could result in total territorial loss and the consequent total loss of baselines and of the maritime zones measured from those baselines. The existing law of the normal baseline does not offer an adequate solution to this potentially serious problem.[71]

Hence, the Baselines Committee recommended "that the issue of impacts of substantial territorial loss resulting from sea level rise be considered further by a Committee established for the specific purpose of addressing the wide range of concerns it raises".[72] This, therefore, was the wider issue that the ILA Baselines Committee passed on to the new, Sea Level Rise Committee.

Preliminary Issues Addressed by the Sea Level Rise Committee

The Sea Level Rise Committee decided to reserve until its report in 2018 consideration of the extreme scenario of sea-level rise leading to the submergence of the entire territory of low-lying small island states below the vertical datum, thereby, as stated by the Baselines Committee, "eliminating entirely the normal baseline and any entitlement to maritime zones generated from the baseline."[73]

However, in its Johannesburg Interim Report of August 2016, the Sea Level Rise Committee addressed two important preliminary issues that the Baselines Committee had identified in its 2012 report:

> [T]he prospect of significant sea level rise carries with it problems of global scale and effect and serious existential implications for some States. Among these problems are negative impacts on maritime boundaries negotiated in reliance on normal baselines

[69] Ibid., at 28.
[70] Ibid., at 30.
[71] Ibid., at 31.
[72] Ibid., at 31.
[73] Ibid.

in existence at the time of a delimitation, and the outer limits of a State's maritime zones proclaimed in reliance upon a normal baseline.[74]

This article concerns itself with the second of these two questions namely the effect of sea-level rise on the outer limits of maritime zones.

The Effect of Sea-level Rise on the Outer Limits of Maritime Zones

The issue simply stated is that as sea levels rise the low water line along the coast, which marks the 'normal baseline' for the purposes of Article 5, will usually move inland and some key geographical features used as base points may be inundated and lost.

If, as a matter of international law, the coastal baseline is ambulatory (as the ILA Baselines Committee had concluded)[75] then where a baseline moves inland[76] and critical base points from which maritime zones are measured are inundated, then the outer limits of the maritime zones which are measured from this baseline may also move landward.[77] Where key geographical features which are used as basepoints for the construction of straight baselines, are totally inundated then these movements inland may be even more substantial. This same principle of course applies to the archipelagic baselines of archipelagic States, (i.e. States which are "constituted wholly by archipelagos and may include other islands")[78] where the effect of losses of key basepoint features may appear to be even more pronounced.

This is the issue which has exercised writers. For example, Judge Jesus has argued that "a substantial rise in sea level, whatever the cause, should not entail the loss of States' ocean space and their rights over maritime resources, already recognized by the 1982 Convention and by the community of nations."[79] However, this is the unavoidable legal consequence of the finding of the Baselines Committee that baselines are ambulatory.

Schofield has however cautioned that, extreme as this issue may seem in theory, the outer limits of broader maritime zones, notably the EEZ, are often less susceptible to change as they are reliant on a restricted number of contributing or critical basepoints. Thus, even significant

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[74] Ibid., at 29. The Baselines Committee had also flagged a third issue, namely that: "[T]he likelihood that some offshore low-lying islands will be completely submerged … which will give rise to debate as to whether coastal State loses the totality of its entitlement to claim a normal baseline from territory that has become submerged."
[75] Ibid., at 31.
[76] Also, note that because of changes in sediment flows rising sea may in some circumstances also have an opposite effect in some places – accreting sediments to push the low water line seaward.
[77] Where the outer edge of the natural prolongation of the continental shelf is less than 200 nautical miles from the coastal baseline, then the outer limit of the shelf may extend to 200 nm from the baseline (Article 76(1) LOSC). Due consideration should be here also given to Article 76(9) LOSC, which states that the 'coastal State shall deposit with the Secretary-General of the United Nations charts and relevant information, including geodetic data, permanently describing the outer limits of its continental shelf'.
[78] Article 46(a) LOSC.
[79] José Luís Jesus, 'Rocks, New-born Islands, Sea Level Rise and Maritime Space' in: Jochen Frowein et al. (eds), *Negotiating For Peace – Liber Amicorum Tono Eitel* (Berlin/Heidelberg: Springer, 2003), 599, 602

changes in the location of the coastline may have only limited impacts in terms of 200 nautical miles outer limits so long as key basepoints are not subject to change.[80]

In the longer term however, as reported above,[81] the planet is already irrevocably committed to continued sea-level rises in the course of this and the coming centuries, and the actual amount and pace of sea-level rise is as yet unknown. Moreover, as IPCC reports in AR5,[82] the actual amount of sea-level rise is uncertain even in the course of the 21st century, and significant changes, especially in some most affected regions, cannot be excluded at this point.

The ILA Committee on International Law and Sea Level Rise considered the views of a number of scholars who have written on this issue. There was a common understanding that the unavoidable consequence of the impact of sea-level rise, using the existing law of the normal baseline, is the loss of maritime space. However, legal authors that have addressed this issue so far seem equally dissatisfied by this result, and have proposed different solutions *de lege ferenda*. Soons had pointed out in 1990 that coastal States may legally defend existing coastlines by artificial means but accepted that this was an extremely expensive option.[83] As the 2012 ILA Baselines Committee Sofia Report summarized the issue: "Short of actual physical protection of the coast the authors do not find that the existing law provides for any other way to protect the maritime interests of States threatened with a total loss of territory."[84]

The Sea Level Rise Committee considered that this was an appropriate issue on which to make proposals for progressive development of international law. In order to preserve – at least provisionally – existing maritime zone entitlements, the Committee discussed two possible options for progressive development. The first option would be to propose a new rule freezing the existing baselines in their current position, using the "large scale charts officially recognized by the coastal State";[85] the second option would be to propose a new rule freezing the existing defined outer limits of maritime zones as originally measured from the baselines established in accordance with the LOSC.

The practical complications of divorcing the actual low water line from the "legal" low water line had already been explored by the ILA Baselines Committee, which had also looked at State practice in some detail. Although it had found evidence that at least one State took the

[80] Clive H Schofield, 'Defining the "Boundary" between Land and Sea: Territorial Sea Baselines in the South China Sea', in: R Beckman, MR Page and L Bernard (eds), *UNCLOS and the South China Sea* (Cheltenham: Edward Elgar Publishers, 2014), 21–54.
[81] See the section on IPCC projections in AR5, above.
[82] Ibid.
[83] Soons, 'The Effects of a Rising Sea Level on Maritime Limits and Boundaries', at 231.
[84] *Baselines Committee Sofia Report*, at 29.
[85] Art 5, LOSC. Note there is no requirement in the LOSC for the coastal State to notify these "normal baselines." Article 16(2) appears only to require coastal state to give "due publicity" to such charts when lines are "determined in accordance with articles 7, 9 and 10."

view that the charted line was the definitive baseline for maritime entitlements even where it might depart from the actual low water line,[86] this was found by the Baselines Committee to be at the extreme end of the spectrum of State practice studied, and the majority of State practice was to the contrary or hybrid,[87] while also "the preponderance of the scholarship in this area appears to support the view that charts are not determinative of the naturally ambulatory normal baseline."[88]

The second option of proposing the freezing of the outer limits of maritime zones was the option also discussed by a number of authors cited, most of whom now take part in the work of the Sea Level Rise Committee as its members. Soons had suggested the creation of a new rule of customary international law which allows coastal States in case of sea level rise to maintain the original outer limits of their maritime zones."[89] Like Soons, Caron had recognized early on the waste of resources that would be involved in physically defending basepoints simply to protect maritime interests[90] and has suggested that, in order to address the problems of inefficiency and conflict, "States should move toward permanently fixing ocean boundaries."[91] He, like Jesus, is in favour of freezing baselines, whereas Rayfuse has proposed that a freezing of maritime zone outer limits "would be consistent with, and would significantly assist in, the promotion and achievement of the LOSC objectives of peace, stability, certainty, fairness, and efficiency in ocean governance."[92] Schofield and Arsana had considered that one option would be to "legally fix or declare the location of normal baselines and/or the maritime limits derived from them."[93]

Hayashi thinks that "the idea of freezing, and thus permanently fixing, the baselines and consequently the outer limits of various maritime zones, has considerable merit."[94] However he contrasts the two possible approaches pointing out that "the fixing of baselines would

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[86] See *Baselines Committee Sofia Report*, at 21, citing Netherlands Ministry of Defence press release of 22 December 2009, stating: "A change in the actual coastline thus has no effect, until it is included in the nautical chart" (translation by the Baselines Committee members Oude Elferink, Soons, and Kwiatkowska).

[87] *Ibid.,* at 21–22.

[88] Ibid., at 22.

[89] Soons, 'The Effects of a Rising Sea Level on Maritime Limits and Boundaries', at 231.

[90] Caron, 'When Law Makes Climate Change Worse', at 621.

[91] David D. Caron, 'Climate Change, Sea Level Rise and the Coming Uncertainty in Oceanic Boundaries: A Proposal to Avoid Conflict', in: Seoung-Yong Hong and Jon M. Van Dyke (eds), *Maritime Boundary Disputes, Settlement Processes, and the Law of the Sea* (Boston/Leiden: Brill/Martinus Nijhoff, 2009), 1, 14.

[92] Rayfuse, 'Sea Level Rise and Maritime Zones: Preserving the Entitlements of "Disappearing" States', at 191.

[93] Clive Schofield and I Made Andi Arsana, *Imaginary Islands? Options to Preserve Maritime Jurisdictional Entitlements and Provide Stable Maritime Limits in the Face of Coastal Instability*, 6th IHO-IAG ABLOS Conference, 25–27 October 2010, at 6, *available at* http://www.iho.int/mtg_docs/com_wg/ABLOS/ABLOS_Conf6/ABLOS_Conf6.htm. While considering the potential for unilateral state practice in this area to develop new customary law, they assert that a "preferable approach would be to seek multilateral agreement on, effectively, a revised legal regime applicable to normal baselines".

[94] Moritaka Hayashi, 'Sea Level Rise and the Law of the Sea – Future Options', in: Davor Vidas and Peter Johan Schei (eds), *The World Ocean in Globalisation: Challenges and Responses* (Boston/Leiden: Brill/Martinus Nijhoff, 2011), at 197.

mean that the future submerged area becomes internal waters, whereas fixing only the outer limits of maritime zones would result in expanding the breadth of the territorial sea landward to the extent of the shifting baselines" and he considers the proposal to fix baselines, in contrast to fixing outer limits, as having "the merit of not changing the rules on the breadth of the territorial sea and the EEZ as stipulated in Articles 3 and 57, respectively."[95]

This issue is still being discussed by the Committee and any conclusions are pending, although some preference was expressed for considering modalities *de lege ferenda* for freezing of the outer limits of maritime zones. The legal consequences of "divorcing" coastal baselines (which would still be ambulatory) from the outer limits of maritime zones, by freezing the outer limit without freezing the baseline, has implications for some of the key provisions of the LOS Convention, including the breadth of the territorial sea[96] and of the EEZ.[97] Hayashi has also highlighted the risks of freezing what might already be "excessive" claims where States have established baselines in violation of the rules of the Convention.[98] Moreover, a decision would also need to be made as to which specific point in time that any 'freezing' might be permissible. Concerns have also been raised about the fundamental principles of the law of the sea, such as the principle of the land dominating the sea, rather than vice versa.[99] Although the motive for making such a proposal would be to facilitate stability and orderly relations between States, there might well be unintended negative consequences.

There is also the question of for how long such a "freezing" might be effective? Would it be regarded as a permanent solution or as a temporary provisional measure until such time as the international community might agree upon a more permanent approach? Moreover, the Sea-level Rise Committee has also yet to discuss in detail how any proposal *de lege ferenda* might best be implemented. These issues are still pending wider discussion within the Committee in its work on the 2018 report.

Challenges to the Continuity of Statehood

The challenges to maritime zones described above are likely to affect *all* coastal States, from the long narrow Chilean coast in the Pacific, to the warm coastline of Florida in the Gulf of Mexico, from the unstable and deltaic shore of Bangladesh in the Bay of Bengal, to the lowlands of the Netherlands fronting the North Sea. Sea-level rise is already a common source of concern for many coastal states, with various geographical locations, the shape of their

[95] Ibid, at 196.
[96] Article 3, LOSC: "Every State has the right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles, measured from baselines determined in accordance with this Convention."
[97] Article 57, LOSC: "The exclusive economic zone shall not extend beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured."
[98] Hayashi, 'Sea Level Rise and the Law of the Sea – Future Options', at 196, citing T. Palmer, 'Sea-level Change and Baselines', in: *Proceedings of the Canadian Hydrographic Conference and National Surveyors Conference, 2008*, at 4.
[99] *Baselines Committee Sofia Report*, at 29.

coastal fronts, or even their level of economic development (which is nevertheless among major factors in determining resilience).

In the upcoming phase of its work the ILA International Law and Sea Level Rise Committee will be looking at the second part of its mandate namely: "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, including the impacts on statehood, nationality, and human rights."

These issues are very poignant for small island states, particularly those in the Pacific. The most dramatic face of the prospects of sea-level rise for generations to come can be found in Kiribati, Tuvalu and the Marshall Islands, three Pacific Island States mostly composed of low-lying coral atolls and islands less than five metres above sea-level. [100] The future of these three Pacific Island States, together with, for example, the Maldives in the Indian Ocean, presents a major challenge to the current, general system of international law. In their cases, what is at stake is not simply the loss of maritime spaces and the resources they contain, but a threat to their very continuity as states. Sea-level rise will at some point pose a major existential threat to these states and perhaps require us to reexamine the essential characteristics of the primary subject of international law - the State.

International law is based upon the principles of stability and order, and as such has a reluctance to accept a "vacuum" in sovereignty.[101] Legal scholars have written widely about the processes of State creation,[102] as opposed to State extinction or termination of statehood. The possibility that one or several states could one day disappear underwater, or become uninhabitable, poses new challenges. There was initially some reluctance in the international community to take this risk seriously as well as to consider carefully its implications. It was initially the voices of small island states warning of the danger of disappearance that brought the matter to the global political arena.

After initial attempts to draw international attention to this issue as a possible threat to international peace and security before both the UN Security Council and the UN General Assembly,[103] the negotiations under the UN Framework Convention on Climate Change

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[100] According to the *CIA World Factbook*, the highest point in Tuvalu is at 5 m above sea-level. The Marshall Islands' highest point is 10 m (on Likiep), while in Kiribati it is 81 m (on Banaba).
See: https://www.cia.gov/library/publications/the-world-factbook/

[101] M. Aznar, 'The Extinction of States', in E. Rieter and H. De Waele, eds., *Evolving Principles of International Law: Studies in Honour of Karel C. Wellens* (Leiden: Nijhoff, 2012), pp. 25-51.

[102] E.g., the classic work of James R. Crawford, *The Creation of States in International Law* (Oxford, 1979; 2nd edn 2006).

[103] For an overview of the three main stages of the 'peace and security' debate over climate change, which led to the recognition of sea-level rise as an existential threat to low-lying island States, see the Verbatim Record of Security Council debate on 'Energy, Security and Climate Change', 17 April 2007, UN doc.: S/PV.5663; followed two years later by the adoption of General Assembly Resolution 63/281 on Climate Change and Its Possible Security Implications, 3 June 2009, 85th plenary meeting, UN doc.A/RES/63/281; and developed further, again before the Security Council, in its Presidential Statement on Maintenance of International Peace and Security and Impacts of Climate Change, 20 July 2011, UN doc. S/PRST/2011/15. As of July 2015, the Security Council has

(UNFCCC) became the primary platform for low-lying island states to draw attention to this issue. At the Fifteenth Session of the Conference of the Parties to the UNFCCC (COP15) in Copenhagen in 2009, the former President of the Maldives, Mohammed Nasheed, pleaded on the last night of the negotiations for the Copenhagen Accord to be adopted as a decision of the Conference of the Parties. Six years after President Nasheed's plea, the 2015 Paris Agreement, adopted by UNFCCC COP 21, incorporated the International Mechanism for Loss and Damage associated with Climate Change, known as the 'Warsaw Mechanism.'[104] While it is still an instrument in progress, the Mechanism marked a crucial development in this area, as it recognizes and earmarks "loss of statehood" as one of the possible non-quantitatively measurable losses that can result from climate change.

The starting point for an analysis of the risk of loss of statehood is the criteria set out in Article 1 of the 1934 Montevideo Convention on the Rights and Duties of States.[105] Article 1 of the Montevideo Convention – now generally accepted as a part of customary international law[106] - reads: "The state as a person of international law should possess the following qualifications: (a) a permanent population; (b) a defined territory; (c) government; and (d) capacity to enter into relations with the other states."

Sea-level rise affects each of these and consequently could jeopardise the continuity of a State's international legal personality.[107] The threat of loss of statehood is thus dependent on the degree of interaction between physical reality and the legal construct underlying each of the dimensions of statehood.

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continued to address the question of the specific vulnerabilities of Small Island Developing States in relation to international peace and security, including climate change; see Security Council Report, Monthly Forecast, July 2015, 19.

[104] See Article 8 of the Paris Agreement, and Decision 1/CP.21 Paragraphs 48–52 (FCCC/CP/2015/L.9/Rev.1.). The institutional anchoring of loss and damage within the UNFCCC framework was first approved by Decision 3/CP.18, 'Approaches to Address Loss and Damage Associated with Climate Change Impacts in Developing Countries that are Particularly Vulnerable to the Adverse Effects to Climate Change to Enhance Adaptive Capacity', adopted during the CP.18/MP.8 of the UNFCCC held in Doha (Qatar) on 26 November till 8 December 2012, document reference: FCCC/CP/2012/8/Add.1, 21-24.

[105] Convention on the Rights and Duties of States (Montevideo Convention), adopted on 26 December 1933, entered into force on 26 December 1934, 165 L.N.T.S 19. Text reprinted in *American Journal of International Law*, vol. 28 (Supp) (1974), p. 74.

[106] Although note the argument that (d) cannot be so regarded because of its inherent circularity, see Jenny Grote Stoutenburg, "When States Disappear" in Michael B. Gerrard and Gregory E. Wannier, *Threatened Island Nations: Legal Implications of Rising Seas in a Changing Climate* (Cambridge University Press, 2013) 57- 87, at 57.

[107] Scholarly studies on the issue of climate change impacts on statehood include M. B. Gerrard and G. E. Wannier, op cit.; Lilian Yamamoto and Miguel Esteban, *Atoll Island States and International Law: Climate Change Displacement and Sovereignty* (Berlin: Springer, 2013); Jenny Grote Stoutenberg, *Disappearing Island States in International Law* (Brill Nijhoff, 2015) and Alejandra Torres Camprubí, *Statehood Under Water Challenges of Sea Level Rise to the Continuity of Pacific Island States* (Brill Nijhoff, 2016). See also Emily Crawford and Rosemary Rayfuse, 'Climate Change and Statehood', in Rosemary Rayfuse and Shirley V. Scott, eds., *International Law in the Era of Climate Change* (Cheltenham, Northampton: Edward Elgar, 2012), 243-253; Jane McAdam, *Climate Change, Forced Migration and International Law* (Oxford: Oxford University Press, 2012), Chapter 4, 119-158.

The Challenge of "Deterritorialization"

Although the land area of many threatened island states is relatively small, the extensive maritime zones that the 1982 Law of the Sea Convention entitles coastal states to have or claim means that some of those states can today enjoy sovereign rights over the resources of huge maritime areas. It is a paradox of sorts that for these small island states, the sea, which is a fundamental element of their identity and the primary source of their livelihood, is also the threat to their continuity as states.

The loss of all, or part, of the land territory of small islands as a result of sea-level rise has been called "deterritorialization."[108] This paper has already discussed the issue of the erosion of maritime zones if sea-level rise causes baselines, which are regarded as "ambulatory" by international law, move landward. This process may render these islands uninhabitable long before the islands themselves disappear but, as discussed in detail above, this is also a threat to these states' maritime entitlements.[109] Aware that eroding maritime zones might be the first manifestation of the threat of sea-level rise to their continuity, Pacific Island States have been exploring ways to halt this process. Physical defences, such as the construction of sea walls, have also been used, following the example of Malé (capital of the Maldives), to protect the airports in Kiribati and the Marshall Island from constant flooding.

However, as Freestone and Schofield have pointed out,[110] there have also been extensive legal efforts to clarify and perhaps fix maritime boundaries and limits in the Pacific region. Regional efforts in the 1990s were oriented toward defining baselines with a view to drawing indicative EEZ boundaries for the purpose of sharing income arising from fishing license fees under the US Tuna Treaty.[111] These were pioneered by the Pacific Islands Forum Fisheries Agency (FFA).[112] Subsequently the Pacific Boundaries Project, a partnership involving the Pacific Community (SPC) and Australia with the support of the FFA, Global Resource Information Data Network (GRID-Arendal) and the Commonwealth Secretariat, has made substantial progress in assisting the Pacific Island States in clarifying the extent of their maritime jurisdictions.[113] The project was initially concerned with assisting the Pacific Island

[108] The term was introduced by Rosemary Rayfuse, *International Law and Disappearing States: Utilizing Maritime Entitlements to Overcome the Statehood Dilemma* (University of New South Wales Faculty of Law Research Paper No. 52, 2010) at 1.

[109] See discussion above, pp. 18ff.

[110] David Freestone and Clive Schofield, "Republic of the Marshall Islands: 2016 Maritime Zones Declaration Act: drawing lines in the sea" Current Legal Developments (2016) 31 *International Journal of Marine and Coastal Law* pp 720-746. Much of the following text in this section draws on that article.

[111] Treaty on Fisheries between the Governments of Certain Pacific Island States and the Government of the United States of America 1987 (Port Moresby, 2 April 1987, in force 15 June 1988). Text available at http://faolex.fao.org/docs/pdf/mul2751.pdf.

[112] The project was transferred from the FFA to the South Pacific Applied Geoscience Commission (SOPAC) which has since become the Geoscience Division of SPC.

[113] The project draws together the efforts of the Pacific Island Countries (PICs) with these agencies to build a comprehensive program featuring regular capacity-building workshops hosted by Sydney University, bringing together up to 50 representatives from 14 PICs with a team of experts from Geoscience Australia, the Commonwealth Secretariat, FFA, GRID-Arendal, Australian Attorney-General's Department and the Geoscience Division of SPC.

States in the preparation of their extended continental shelf submissions for the Commission on the Limits of the Continental Shelf, something which necessarily involved the definition of their baselines. Its scope expanded to include the updating of their maritime zones legislation and the delineation of the outer limits of their maritime zones.[114] Additionally, the project has played a significant role in terms of assisting these States in preparing and offering a forum for negotiations regarding the delimitation of maritime boundaries between them, which has led to a doubling in maritime boundary agreements in the region in recent years.[115]

This practice is, moreover, in keeping with and was foreshadowed in the *Framework for a Pacific Oceanscape.*[116] Strategic Priority 1 of this Framework concerns jurisdictional rights and responsibilities; it states at Action 1A that the Pacific Island Countries (PICS) should, "in their national interest," deposit with the UN coordinates and charts delineating their maritime zones.[117] Also, Action 1B entitled "Regional Effort to Fix Baselines and Maritime Boundaries to Ensure the Impact of Climate Change and Sea-Level Rise Does Not Result in Reduced Jurisdiction of PICTS" states:

> Once the maritime boundaries are legally established, the implications of climate change, sea-level rise and environmental change on the highly vulnerable baselines that delimit the maritime zones of Pacific Island Countries and Territories should be addressed. This could be a united regional effort that establishes baselines and maritime zones so that areas could not be challenged and reduced due to climate change and sea-level rise.[118]

A recent example was the 2016 Maritime Zones Declaration Act of the Republic of the Marshall Islands that repealed existing maritime zone legislation and declared anew all its maritime zones.[119] Detailed regulations ran to more than 450 pages and include long lists of co-

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[114] A very useful background and summary of the Pacific Boundaries Project is provided by Robyn Frost, Paul Hibberd, Masio Nidung, Emily Artack, Marie Bourrel, 'Redrawing the map of the Pacific', *Marine Policy* (in press, 2016).

[115] Of an estimated potential bilateral maritime boundaries in the region, around one-third had been settled by 2010 and this became two-thirds by the end of 2015. *Ibid*. The historic signing, on 30 August 2012, of seven maritime delimitation agreements among Pacific Island States is a prominent example. Six of them were bilateral agreements between Kiribati, the Pacific island state with the widest maritime area of the region, and its neighbours.

[116] See Cristelle Pratt and Hugh Govan, *Our Sea of Islands, Out Livelihoods, Our Oceania. Framework for a Pacific Oceanscape: a catalyst for implementation of ocean policy* (Pacific Islands Forum Secretariat, November 2010), available at, http://www.forumsec.org/resources/uploads/embeds/file/Oceanscape.pdf.

[117] *Ibid*., at 57.

[118] *Ibid*., at 58. An analogous example is the Taputapuātea Declaration on Climate Change, signed on 16 July 2015 by seven leaders of Polynesian States and Territories. The Signatories … "acknowledge, under the United Nations Convention on the Law of the Sea (UNCLOS), the importance of the Exclusive Economic Zones of the Polynesian Island States and Territories, whose area is calculated according to emerged lands and permanently establish the baselines in accordance with the UNCLOS, without taking into account sea level rise.[sic]"

[119] Act No. 13 of 2016. Text appended to Freestone and Schofield, footnote 108 above, at pp 736ff. Source at: http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/DEPOSIT/mhl_mzn120_2016_1.pdf .

ordinates, plus supporting maps.[120] Ostensibly designed to clarify the state's maritime zones it actually appears to anticipate that once established these zones will not change in the future.[121]

Notwithstanding these efforts that seek to preserve or protect the spatial dimension of Pacific Island States against the adverse climate change impacts, the prospects of a *total* de-territorialisation/submergence scenario cannot be overlooked. "Reterritorialization" strategies already in place in this region include, for instance, the purchase by the President of Kiribati of two hectares of land in Fiji's main island of Viti Levu. The transaction, which was completed in 2014 with the help of the Church of England, was initially made with a view to develop coastal agriculture for Kiribati. However, the possibility that it may become a relocation site for inhabitants of Kiribati (currently over 100,000 people) was also openly discussed by the two Heads of States. [122]

The Challenge of Depopulation

Despite attempts to preserve statehood by legal means in the face of changing geography it may be that the greatest risk to a state's legal personality will result from the displacement of all, or a great part, of its population. This is likely to happen well before island territories physically disappear.

The first impacts of sea-level rise, already being seen in some low lying island states, are likely to result in a sharp decline in the living conditions of islanders. This in turn is likely to result in large scale displacement and relocation. As the ILA Johannesburg Report outlines this is likely to be primarily internal – within the state – in the first instance and then may become predominantly external.[123] Adaptation actions are already being planned and taken in the Pacific region to preserve living conditions and deter resettlement. Approaches to relocation as a last resort must inevitably differ widely from country to country.

As the Johannesburg Report observes with respect to internal movement, the UN Guiding Principles on Internal Displacement are particularly relevant.[124] Although in themselves non-

[120] Declaration of "Baselines and Outer Zone Limits" pursuant to the Act, issued on 18 April 2016. Text at: http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/DEPOSIT/mhl_mzn120_2016_2.pdf

[121] Freestone and Schofield, footnote 108 above, at p 721.

[122] A few months prior to the purchase, the President of Fiji, Ratu Epeli Nailatikau, publicly expressed the support of his country to the people of Kiribati, who "would be able to migrate to Fiji with dignity if need arose", in 'Fiji Supports Kiribati on Sea-Level Rise', Press Release SUVA (Fiji), 11 February 2014, available at: http://www.climate.gov.ki/tag/government-of-kiribati/

[123] Johannesburg Report, pp. 24ff.

[124] *Guiding Principles on Internal Displacement*, UN Doc E/CN.4/1998/53/Add.2 (11 February 1998), http://www.un-documents.net/gpid.htm. They are complemented by other international and regional instruments on human rights and disasters, including the 2009 African Union Convention for the Protection and Assistance to Internally Displaced in Africa (Kampala Convention), which has a specific provision (Article 5(4)) obliging States parties to take measure to protect and assist persons who have been internally displaced due to natural and human made disasters, including climate change. They are further complemented by non-State initiatives, such as the

binding, the Guiding Principles reflect binding international legal standards and have been recognized by the international community as an "important international framework for the protection of internally displaced persons", addressing people's needs and rights before, during and after displacement. [125]

In cases of transnational relocations (which potentially jeopardise the continuity of the State), potential difficulties seem likely to arise out of the multiplicity of the relevant States involved (at least including the State of origin and the host State). In cases of partial de-population, the applicability of refugee law to climate-induced displaced people has not been so far accepted by the national courts of the two potential host countries of the Pacific region – Australia and New Zealand.[126] Solutions proposed include the creation of new legal instruments, the further development of existing instruments and institutions, or inter-regime linkages.[127]

Challenge of Government Failure

In addition to a settled territory and a population, the Montevideo Convention criteria envisage a government with the ability to enter into international relations. The government represents the state's sovereign powers and provides it with the necessary organs to act and to display such powers, both nationally and internationally.

Sea level rise impacts are in the long term likely to affect the capacity of small island governments to fulfil the basic functions of the state. The capacity to provide the basic attributes of government may well be undermined by the loss of habitable territory and of the population previously settled on it. Eventually, governments themselves may be forced to evacuate the state territory and settle abroad. In order for them to continue any effective governmental functions *ex situ* they will need to be able to continue governmental functions – to enact and be able to implement the legislation necessary to adapt to the new circumstances and needs, to establish disaster-response measures (including, for instance, the adoption of national and/or transnational relocation plans), to control state assets,

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Peninsula Principles on Climate Displacement, which seek to contextualize the Guiding Principles to the specific context of climate change-related displacement.

[125] UNGA, 2005 World Summit Outcome, UN Doc A/RES/60/1 (24 October 2005) para 132.

[126] New Zealand and Australian cases where claimant's demand to receive refugee protection for climate change impacts was rejected. New Zealand cases include: Refugee Appeal 72719/2001, RSAA (17 September 2001) – (Tuvaluan claimant); Refugee Appeal 72313/2000, RSAA (19 October 2000) – (Tuvaluan claimant); Refugee Appeal 72314/2000, RSAA (19 October 2000) – (Tuvaluan claimant); Australian cases: 10004726[2010] RRTA 845 (30 September 2010) – (Tongan claimant); 0907346 [2009] RRTA 1168 (10 December 2009) – (I-Kiribati claimant); N00/34089 [2000] RRTA 1052 (17 November 2000) – (Tuvaluan claimant).

[127] In favour of a new Protocol for 'climate refugees', see for instance, Frank Biermann and Ingrid Boas, 'Protecting Climate Refugees: The Case for a Global Protocol', *Environment Magazine,* vol. 50 (2008):6, 10-16; and Bonnie Docherty and Tyler Giannini, 'Confronting a Rising Tide: a Proposal for a Convention on Climate Change Refugees', *Harvard Environmental Law Review*, vol. 53 (2009), 49-403. On the opportunities for inter-regime linkages, see Angela Williams, 'Turning the Tide: Recognising Climate Change Refugees in International Law', *Law and Policy*, vol. 30 (October 2008): 4, 502-529. But see Jane McAdam, "Swimming against the Tide: Why a Climate Change Displacement Treaty is Not *the* Answer" (2011) 23/1 *International Journal of Refugee Law* pp. 2–27

including perhaps maritime resources, in their original territory as well as abroad and to fulfil their international legal obligations. They will therefore need to be able to enter into bilateral or multilateral relations for a range of issues including the protection of their populations. For that they will require some form of recognition by other states.

Prima facie, the idea of the recognition of island authorities as *ex situ* governments is not particularly new or controversial in international law, which has the experience of dealing with governments in exile.[128] Nevertheless, the particular circumstances in which small islands' governments may be forced to evacuate state territory will pose fundamentally new issues. The general assumption of *ex situ* governments is they are temporarily displaced. This would not be the case where the original territory has become uninhabitable. There would be no going back. This would generate a number of specific legal consequences, including for example, the suspension or termination of existing treaties for reasons of impossibility of compliance or *rebus sic stantibus* (fundamental change of circumstances).[129]

Through the conjunction of the threat to the three dimensions of the state, the continuity of statehood of a number of small island states will be seriously at risk. Both the response of the international community and the claims of the concerned states regarding their own situations will be determinant in defining the future of these states in such extreme situations

Final Remarks

The Committee on International Law and Sea level Rise will submit its next report to the ILA Conference in 2018. That report will address the wider international law issues raised by the erosion of maritime zones by sea level rise and possible "deterritorialization." This brief review only deals with some of the issues considered to date by the Committee. Moreover, a whole section of its work – for which the co-rapporteur is Professor Jane McAdam of the University of New South Wales in Sydney – deals with human rights and forced migration issues.[130]

The Committee has still to consider the longer term questions regarding the continuity of statehood for those countries facing the most serious impacts of sea-level rise. At this stage there are no categorical answers. It may be that the novel challenges which this situation

[128] For examples of 'traditional' cases of governments in exile, see for instance, H. L. Scanlon, *European Governments in Exile* (Washington, DC: Carnegie Endowment for International Peace, 1943), and Y. Shain, ed., *Governments-in-Exile in Contemporary World Politics* (London: Routledge, 1991).

[129] On the legal issues arising from governments in exile, see S. Talmon, *Recognition of Governments in International Law - with Particular Reference to Governments in Exile* (Oxford: Clarendon Press, 1998), 15.

[130] This part of the agenda of the Committee is set out in Vidas, Freestone and McAdam "International Law and Sea Level Rise: The New ILA Committee", footnote 19 above; and in further detail in J McAdam, B Burson, W Kälin and S Weerasinghe, *International Law and Sea-Level Rise: Forced Migration and Human Rights* (Lysaker: FNI Report 1/2016).

presents to the international legal order require equally novel approaches. These may include new concepts, such as a new order of "subjects of international law."[131]

The Committee's specific task is to develop a series of recommendations for the progressive development of international law in this area. As the Committee has started to review the legal principles involved and the challenges to them posed by sea-level rise, it is already clear that progressive development will inevitably involve reconsideration of a number of established principles and rules of the law of the sea. This is perhaps the beginning of the rethinking that the onset of the "Anthropocene" is likely to require of all of us.[132]

[131] See Davor Vidas, "Sea Level Rise and International Law: At the Convergence of Two Epochs", *Climate Law*, 4 (2014), 70–84, at 84.

[132] See Davor Vidas, "The Anthropocene and the International Law of the Sea", *Philosophical Transactions of the Royal Society-A*, 369 (2011), 909–925; see also Vidas et al, "International Law for the Anthropocene", footnote 15 above, and Vidas, Zalasiewicz and Williams, "What is the Anthropocene – and Why Is It Relevant for International Law, footnote 14 above.