

# Sea-Level Rise and International Law: At the Convergence of Two Epochs

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## Abstract

Since core aspects of international law rely on the general stability of geographical conditions, sea-level rise may bring fundamental challenges and require profound re-examination of currently accepted paradigms of international law. This article briefly addresses three questions: first, are the prospects of sea-level rise already a real concern from the viewpoint of international law? Second, what is the relevance of this perspective for current international law? And third, how should international law in the future approach the phenomenon of sea-level rise?

## Keywords

sea-level rise – law of the sea – baselines – statehood anthropocene

## 1 Introduction

With climate change and the resultant sea-level rise projected already for this century, fundamental challenges for international law may be on the horizon. Core aspects of international law rely on the general stability of geographical conditions. Coastal geography, due to its perceived stability, serves as the key objective circumstance on the basis of which the rights of states to maritime zones are determined, and maritime delimitation disputes resolved. A defined territory is a constituent element of statehood under international law. In the not-too-distant future, important questions may arise about the sustainability of those aspects of international law, while other aspects, such as the

population of the state—and, accordingly, human rights—may gain in prominence and acquire new dimensions, all likely to require profound re-examination of currently accepted paradigms of international law.

This article briefly addresses three questions: first, are the prospects of sea-level rise already a real concern from the viewpoint of international law? Second, what is the relevance of this perspective for current international law? And third, how should international law in the future approach the phenomenon of sea-level rise?

## 2 Are the Prospects of Sea-Level Rise a Real Concern?

A rise in sea levels is one of the most certain outcomes of a warmer world. However, a number of recent scientific reports differ as to the actual figures for sea-level rise, even for the present century. The results of process-based modelling as used for projections by the Intergovernmental Panel on Climate Change and those of semi-empirical model projections differ significantly, with the latter being almost twice the size of the former. The span of difference is illustrated by a review of the recent scientific literature on sea-level rise which indicated that, in a world that has warmed by 4°C by the year 2100, the rise in global sea levels was estimated to be between 0.5 and 2 metres.<sup>1</sup> Will global warming reach 2°C or 4°C above pre-industrial levels by the end of this century—or will it be even more than that? There is no certainty today, and so estimates of sea-level rise differ significantly.

Nevertheless, increasing importance is attributed to sea-level rise as an expected consequence of climate change. This is clear from a simple comparison of the two latest IPCC Assessment Reports—issued in 2007 and in 2013. This regards both the extent to which these reports focused on the issue of sea-level rise, and the projections of sea-level rise presented. The most recent IPCC estimates indicate sea-level rise of up to 98 cm—a considerable increase over the previous, 2007, projections of up to 59 cm.<sup>2</sup> As explained by the IPCC

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- 1 Robert J. Nicholls, Natasha Marinova, Jason A. Lowe, et al., 'Sea-level Rise and Its Possible Impacts Given a "Beyond 4 C World" in the Twenty-First Century', *Philosophical Transactions of the Royal Society – A*, vol. 369, 2011, 161–181. However, as the authors indicate, rises greater than 1 m are deemed less likely.
  - 2 Compare figures in the IPCC's 4th Assessment Report (*Climate Change 2007: Synthesis Report – Summary for Policymakers*, at 8) with those in the IPCC's 5th Assessment Report (IPCC, *Climate Change 2013: The Physical Science Basis – Summary for Policymakers*, October 2013, at 23).

in its latest report, the discrepancy is due primarily to new and improved modelling of land-ice contributions.<sup>3</sup>

On the basis of currently available scientific knowledge, it can be concluded that a significant increase in sea levels can be expected even in the present century. However, the issue is not only about the extent of sea-level rise by the end of the century, but very much also about the *pace* of the phenomenon. Today, satellite technology has made remote sensing possible and thus comparisons of sea-level rise with any recent reference year. Geological information derived from the Earth's past may also prove highly relevant. The key point here is that while sea-level rise is widely seen as a phenomenon that progresses slowly, gradually, and linearly over a very long period, there is geological evidence to the contrary: some sea-level rises of the past have proceeded with significant 'jumps' over a relatively short timespan of centennial—perhaps even decadal—scale,<sup>4</sup> followed by longer periods of still-stand or slower rise. The timing of future 'jumps' is very difficult to predict. The acceleration of sea-level rise as recorded during the last several decades is projected to continue over the present century—but the pace of the acceleration is as yet unknown.<sup>5</sup>

Despite differing projections, even for the current century, scientists do agree that one major feature of a warmer world will be rising sea levels. In one section of the Working Group II contribution to AR5, issued in March 2014, the IPCC relates the projected sea-level rise to the 'threats to territorial integrity' or 'viability of states', as well as to the 'physical integrity' of low-lying island states.<sup>6</sup> These points are highly relevant for several core areas of international law.

### 3 International Law and the Perspective of Sea-Level Rise: Central Issues

The perspective of sea-level rise is not just one more new legal case to be solved. It is not a problem that can be dealt with merely by adjusting

3 IPCC, *Climate Change 2013*, supra note 2, at 18.

4 Paul Blanchon and John Shaw, 'Reef Drowning during the Last Deglaciation: Evidence for Catastrophic Sea-level Rise and Ice-sheet Collapse', *Geology*, vol. 23, 1995, 4–8; see also Michael J. O'Leary et al., 'Ice Sheet Collapse Following a Prolonged Period of Stable Sea Level during the Last Interglacial', *Nature Geoscience*, vol. 9, Sept. 2013, 796–800.

5 IPCC, *Climate Change 2013*, supra note 2, at 9 and 23.

6 IPCC 5th Assessment Report: Working Group II, Chapter 12, 'Human Security', publicly released on 31 March 2014, at 3 and 20, see also at 13–14. Available at <[http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap12\\_FGDall.pdf](http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap12_FGDall.pdf)>.

certain rules or adopting amendments to this or that international treaty. It is not a political controversy per se, either. It is a major natural phenomenon, unprecedented since the emergence of modern human civilization and the development of its organizing forms as currently regulated through a territorially based and state-centred system of international law. Since core aspects of current international law rest on geographical conditions that are generally perceived as relatively stable, a significant change in those conditions—as a consequence of sea-level rise—could come to pose major challenges to the sustainability of our present-day system of international law. The severity of the challenges would depend on the progression of sea-level rise. Initially, drastic consequences would affect only some low-lying states—in particular, several Pacific and Indian Ocean island-states.

In any scenario of significant sea-level rise, such as already projected to occur in the course of the present century, challenges for the current law of the sea are bound to emerge. Additionally, in some cases, as with low-lying island states, further issues will be raised: the question of their continued statehood as well as a myriad of questions raised by the forced transboundary migration of their populations.

Naturally, the first part of international law to be affected by sea-level rise is that directly related to the sea: the law of the sea, regulating the maritime entitlements of states and the delimitation of their maritime zones. With rising sea levels, the baselines from which the breadth of the territorial sea is measured will move landward, affecting the outer limits of various maritime zones. Ultimately, sea-level rise may call into question the entire structure of the maritime zones under today's law of the sea. However, issues related to sea-level rise extend far beyond the law of the sea and the determination of baselines and maritime zones of coastal states. Even the early cases of affected low-lying island states, although limited in number, will necessarily give rise to fundamental questions regarding aspects of state territory and the principles of statehood under international law.

All these challenges go deeper than simply questioning the appropriateness of certain existing rules of international law. The nature of the challenges is such that they call into question some basic axioms of international law. In the following, only a cursory overview of prominent examples is provided. The first two examples relate to essential aspects of the law-of-the-sea architecture, while the third concerns the principal basis of the architecture of international law as we know it today: the state itself.

### 3.1 *The Land Dominates the Sea—By the Intermediary of the Coastal Front*

The core axiom of the law of the sea, explaining the philosophy behind the maritime entitlements of the coastal states, is well captured in this observation by a leading expert: ‘From the moment States were recognised as having rights over areas of sea ... these rights have been based on two principles which have acquired an almost idiomatic force: the land dominates the sea and it dominates it by the intermediary [of] the coastal front.’<sup>7</sup>

Accordingly, the basis for all maritime coastal zones as today codified in the United Nations Convention on the Law of the Sea<sup>8</sup> (UNCLOS) is just one line—a line that is, in each case, determined by reliance on coastal geography. That line is the *baseline*. It either directly follows the coast, in which case it is called the ‘normal baseline’; or it depends on the specific configuration of the coastline and other coastal features (a chain of islands, fjords, and the like), in which case it is called the ‘straight’ baseline, and everything landward of it is considered the internal waters of a coastal state. From the baselines (whether normal or straight), different maritime zones are measured. This objective criterion, which relies on a given coastal geography,<sup>9</sup> serves not only as the basis for the various maritime zones of a coastal state, it is also central to the delimitation of maritime boundaries between states—to which we return below. The purpose of those rules of international law of the sea is to maintain certainty. The effect of the consequences of sea-level rise will be to introduce uncertainty, and increasingly exacerbate it.

In 2012, the Committee on Baselines of the International Law Association concluded:

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 ... and also landward to reflect changes caused by erosion and sea level rise. Under extreme circumstances the latter category

7 Prosper Weil, ‘Geographic Considerations in Maritime Delimitation’, in Jonathan I. Charney and Lewis M. Alexander (eds), *International Maritime Boundaries*, vol. 1 (Dordrecht: Martinus Nijhoff, 1993), at 115, drawing on: Prosper Weil, *The Law of Maritime Delimitation—Reflections* (Cambridge University Press, 1989), at 50.

8 UN doc. A/CONF.62/122; text in *United Nations Treaty Series*, vol. 1833, at 3; text reprinted in *International Legal Materials*, vol. 21, 1982, at 1261; available at <[www.un.org/ Depts/los](http://www.un.org/Depts/los)>. The Convention was opened for signature on 10 December 1982, and entered into force on 16 November 1994. As of 17 May 2014 there were 166 parties.

9 Certain limited exceptions for very specific situations are provided in UNCLOS—see Articles 7(2) and 76(9)—however, these, *argumentum a contrario*, confirm the main rule.

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.<sup>10</sup>

Attention has been drawn to this and the resultant issues in the international law literature since the late 1980s and early 1990s.<sup>11</sup> UNCLOS does not provide a readily available solution: its negotiators did not foresee substantial changes in coastal geography caused by a major natural phenomenon such as sea-level rise.<sup>12</sup> There is a further aspect of UNCLOS to be kept in mind: as the UN Secretary-General appropriately remarked, ‘UNCLOS was not negotiated to correct geographical circumstances. To compensate partially for the latter, the Convention provides adequate remedies for situations where States are at a disadvantage.’<sup>13</sup> However, no remedies for the consequences of sea-level rise can be found in UNCLOS: it was tailored to the geographical circumstances of its own time, not the ones yet to come.

10 ILA, 75th Conference (Sofia, 2012), *Final Report of the International Committee on Baselines under the International Law of the Sea*, at 31. Text available at the ILA website, at <[www.ila-hq.org/en/committees/index.cfm/cid/1028](http://www.ila-hq.org/en/committees/index.cfm/cid/1028)>.

11 See especially David D. Caron, ‘When Law Makes Climate Change Worse: Rethinking the Law of Baselines in Light of a Rising Sea Level’, *Ecology Law Quarterly*, vol. 17, 1990, 621–653; David Freestone, ‘International Law and Sea Level Rise’, in Robin Churchill and David Freestone (eds), *International Law and Global Climate Change* (Dordrecht: Martinus Nijhoff, 1991), 109–125; and Alfred H. A. Soons, ‘The Effects of a Rising Sea Level on Maritime Limits and Boundaries’, *Netherlands International Law Review*, vol. 37, 1990, 207–232. See also Eric Bird and Victor Prescott, ‘Rising Global Sea Levels and National Maritime Claims’, *Marine Policy Reports*, vol. 1, 1989, 177–196. An updated overview of the international law literature on this issue is provided in the *Final Report of the International Committee on Baselines under the International Law of the Sea* (supra note 10), especially at 29–31.

12 The ‘Bangladesh exception’—Article 7(2) of UNCLOS, applying primarily to highly unstable coastlines caused by river deltas and the related impact on straight baselines—is of a limited reach, targeted to specific situations. On the negotiating history of Article 7(2) see Satya N. Nandan and Shabtai Rosenne (eds), *United Nations Convention on the Law of the Sea, 1982: A Commentary*, vol. 2 (Dordrecht: Martinus Nijhoff, 1993), 97–101, stating that ‘the provisions in paragraph 2 were drafted with the specific case of the Ganges/Brahmaputra River delta in mind’ (at 101).

13 *Oceans and the Law of the Sea: Report of the Secretary-General*, UN Doc. A/59/62 of 4 March 2004, para. 41.

### 3.2 *Objective and Predictable Criteria in the Determination of Maritime Boundaries*<sup>14</sup>

Less than half of the world's maritime boundaries have been delimited to date. Unlike terrestrial delimitation, maritime delimitation involves, in addition to the settlement of the boundaries of sovereignty (internal waters and the territorial sea), also the settlement of the boundaries of states' other maritime zones, those conferring sovereign rights and jurisdiction, including continental shelves, EEZs, and some other zones of functional jurisdiction. As a consequence of this multiplicity of zones, the maritime political map of the world has remained profoundly incomplete—in fact, the number of maritime delimitation disputes is increasing as new issues emerge.

The role of international law is of the utmost importance in (maritime) boundary delimitation, as it enables the determination of boundaries based on the rule of law instead of recourse to force or political action. Reliance on international law thus emerges as a key factor in facilitating long-term stability in relations between neighbouring states, as well as in entire regions. The basic consideration in maritime delimitation under international law is the importance accorded to neutral, objective, legal criteria, to enable predictability, together with an appreciation of the specific circumstances of each case, to achieve an equitable solution. By offering predictability and balance, the principles and rules of international law, consolidated through an increasingly consistent judicial and arbitral practice, have significant potential as a factor for stability.

In a series of judgments over the past twenty years, the International Court of Justice has consolidated the importance of predictable, objectively determined criteria for delimitation, as opposed to subjective views. Reliance on the actual geographical features in each case has been repeatedly confirmed by the ICJ. For instance, in its 2002 judgment in the case of the land and maritime boundary between Cameroon and Nigeria, the Court stated: 'the geographical configuration of the maritime areas that the Court is called upon to delimit is a given. It is not an element open to modification by the Court but a fact on the basis of which the Court must effect the delimitation.'<sup>15</sup>

14 For a more complete treatment see Davor Vidas, 'Consolidation or Deviation? On Trends and Challenges in the Settlement of Maritime Delimitation Disputes by International Courts and Tribunals', in Nerina Boschiero, Tullio Scovazzi, Cesare Pitea, and Chiara Ragni (eds), *International Courts and the Development of International Law: Essays in Honour of Tullio Treves* (The Hague: TMC Asser Press/Springer, 2013), 323–332, on which this section partly draws.

15 *Land and Maritime Boundary between Cameroon and Nigeria*, ICJ Judgment of 10 October 2002, para. 295.

The 2006 Award in the Barbados/Trinidad and Tobago arbitration<sup>16</sup> contributed to this overall trend by providing a highly authoritative and clear restatement of the development of the law governing the delimitation of maritime boundaries. The Arbitral Tribunal observed: ‘the search for an approach that would accommodate both the need for predictability and stability within the rule of law and the need for flexibility in the outcome that could meet the requirements of equity resulted in the identification of a variety of criteria and methods of delimitation.’<sup>17</sup> The Tribunal then stated that, with very few exceptions, ‘the quest for neutral criteria of a geographical character prevailed in the end over area-specific criteria such as geomorphological aspects or resource-specific criteria such as the distribution of fish stocks.’<sup>18</sup>

In that respect, geographical circumstances have been repeatedly accorded a predominant role by the ICJ and arbitral tribunals. This has led to an increasingly consistent international juridical practice, in which other factors, if justified by specific circumstances, may also play a role, albeit a lesser one.

The possible consequences of projected sea-level rise—reversing the hitherto predictable and relatively stable characteristics attributed to coastal geography, to become a less stable factor and, ultimately, practically meaningless—entail the potential of major destabilization in inter-state relations. The fundamental purpose of the law of maritime delimitation is to facilitate expectations of certainty, or predictability—and therefore also of stability. The consequences of climate change and sea-level rise could seriously undermine this objective.

### 3.3 *Territorial Foundation of (the State in) International Law*

Our present-day international legal world (still ‘Westphalian’, as some term it) rests heavily on geography<sup>19</sup>—with state-based territory as a central feature of international law. This is clearly seen from Article 1 of the 1933 Montevideo Convention on Rights and Duties of States,<sup>20</sup> which contains the best-known

16 *Award of the Arbitral Tribunal in the Matter of an Arbitration between Barbados and the Republic of the Trinidad and Tobago*, The Hague, 11 April 2006; text available at <[www.pca-cpa.org/upload/files/Final%20Award.pdf](http://www.pca-cpa.org/upload/files/Final%20Award.pdf)>; reprinted in *International Legal Materials*, vol. 45, 2006, at 789–869.

17 *Ibid.*, para. 232.

18 *Ibid.*, para. 228.

19 See Daniel Bethlehem, ‘The End of Geography: The Changing Nature of the International System and the Challenge to International Law’, *The European Journal of International Law*, vol. 25, 2014, 9–24.

20 *League of Nations Treaty Series*, vol. 165, at 19.



formulation of the effectiveness criteria for statehood:<sup>21</sup> '(a) a permanent population; (b) a defined territory; (c) government; and (d) capacity to enter into relations with the other States.' In addition to these essential elements of a state, various other principles and rules of international law are also territorially based. Indeed, as succinctly observed by Daniel Bethlehem, geography stands at the very core of current international law, in which it is deeply embedded<sup>22</sup>—from specific rules to the most fundamental principles.

While the theory of the creation of a state has been thoroughly developed in international law doctrine,<sup>23</sup> questions surrounding the termination of a state—often termed 'state extinction'—are as a rule dealt with briefly and associated with the criteria on which the creation of a state is based.<sup>24</sup> The logic behind this approach is that the 'extinction of States must be determined by reference to [the] same criteria ... on which the existence of a state can be determined.'<sup>25</sup> However, Ziemele observes that state practice and doctrinal development on state 'extinction' show that this logic can provide only a 'starting point for further examination in the search for a modern concept of the notion.'<sup>26</sup>

A conceptual change might, for the first time, come about as the consequence of a natural phenomenon such as sea-level rise. Ziemele refers to a basic rule applicable in determining state 'extinction' in the following: 'Changes affecting the basic criteria of statehood such as territory, population, and government, separately or together, do not automatically affect the existence of a State *unless territory and/or population disappears*.'<sup>27</sup>

In relation to the prospects of sea-level rise, the pioneering contribution to the literature of international law has been made by Rosemary Rayfuse in a series of research articles;<sup>28</sup> and a comprehensive study on the subject has

21 See James Crawford, 'State', in Rüdiger Wolfrum (ed.), *Max Planck Encyclopedia of Public International Law* (Oxford University Press, 2013), on-line edition, at para. 13; entry updated as of January 2011, available at <<http://opil.ouplaw.com>>.

22 Bethlehem, 'The End of Geography', supra note 19, at 14.

23 See especially James Crawford, *The Creation of States in International Law*, 2nd edn (Oxford University Press, 2006).

24 For instance, in Crawford's 700-plus-page volume (supra note 23), one of the shortest sections is on 'The Extinction of States', to which altogether 18 pages are devoted.

25 See Ineta Ziemele, 'States, Extinction of', in Rüdiger Wolfrum (ed.), *Max Planck Encyclopedia of Public International Law* (Oxford University Press, 2013), on-line edition, at para. 1; entry up-dated as of May 2007, available at <<http://opil.ouplaw.com>>.

26 Ibid.

27 Ibid., at para. 3 (emphasis added).

28 See especially Rosemary Rayfuse, 'W(h)ither Tuvalu? International Law and Disappearing States', *University of New South Wales Faculty of Law Research Series*, Paper 9, 2009

recently come from Derek Wong.<sup>29</sup> Differences in their views can be seen as representing two streams of opinion in the literature on this issue.<sup>30</sup>

First, Rayfuse observes that, with full inundation, ‘the criterion of territory will no longer be met and the claim to statehood will fail’.<sup>31</sup> Further, in connection with the observation that the territory will become uninhabitable long before its total physical disappearance, Rayfuse observes that in that case, too, ‘the criteria for statehood will cease to be met from the time of evacuation and the State will cease to exist’.<sup>32</sup> Wong, however, considers this analysis problematic, since it assumes that failure to satisfy the requirements for the creation of states automatically results in the state’s extinction.<sup>33</sup> He, moreover, stresses that there is ‘a strong presumption in favour of the continued existence of a state’.<sup>34</sup>

While this discussion may be based on the precedents of the past, on the use of analogies and on differences in the interpretation of today’s legal rules—the phenomenon of sea-level rise is something looming on the horizon of the future. It may be the change of context, rather than the change or interpretation

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(based on a paper presented the International Symposium on Islands and Oceans, Tokyo, January 2009); Rayfuse, ‘International Law and Disappearing States: Maritime Zones and the Criteria for Statehood’, *Environmental Policy and Law*, vol. 41, 2011, 281–287; and Rayfuse, ‘Sea Level Rise and Maritime Zones: Preserving the Maritime Entitlements of “Disappearing” States’, in Michael B. Gerrard and Gregory E. Wannier (eds), *Threatened Island Nations: Legal Implications of Rising Seas and a Changing Climate* (Cambridge University Press, 2013), at 187–191.

29 Derek Wong, ‘Sovereignty Sunk? The Position of “Sinking States” at International Law’, *Melbourne Journal of International Law*, vol. 14, 2013, 346–391.

30 Other notable contributions to the literature include, from the pages of this journal, Maxine Burkett, ‘The Nation Ex-Situ: On Climate Change, Deterritorialized Nationhood, and the Post-Climate Era’, *Climate Law*, 2011, vol. 2, 345–374; Susin Park, ‘Climate Change and the Risk of Statelessness: The Situation of Low-lying Island States’, *UNHCR Legal and Protection Policy Research Series*, May 2011; and Jenny Grote Stoutenburg, ‘When Do States Disappear? Thresholds of Effective Statehood and the Continued Recognition of “Deterritorialized” Island States’, in Gerrard and Wannier (eds), *Threatened Island Nations*, supra note 28, at 57–87. A most comprehensive discussion of that matter so far is, however, provided in: Alejandra Torres Camprubí, *Climate Change and International Security: Revealing New Challenges to the Continuation of Pacific Islands’ Statehood* (unpublished doctoral dissertation, defended at the Autonomous University of Madrid, Spain, on 26 March 2014), Part II, at 201–421.

31 Rayfuse, ‘International Law and Disappearing States’, supra note 28, at 284.

32 Ibid.

33 Wong, ‘Sovereignty Sunk?’, supra note 29, at 360.

34 Ibid., at 360 and 362.

of rules themselves, that ought to be examined first. This is the purpose of the next section.

## 4 International Law and the End of the Holocene

### 4.1 *Are We Now Living in the Anthropocene?*

A new concern is being voiced by an increasing number of scientists who consider that the Earth may be undergoing a shift from the most recent known geological epoch, the Holocene (the past 11,700 years),<sup>35</sup> to a new one—the ‘Anthropocene’. The Holocene is the latest, and formally still the current, geological epoch; especially in its later part, the Holocene has been characterized by relative environmental stability—a factor highly significant for the development of today’s human civilization. The Anthropocene, on the contrary, is seen as characterized by uncertainty and, possibly, a considerable degree of instability.<sup>36</sup>

Systematic stratigraphic inquiry into the validity of the Anthropocene concept in geological terms originates in discussions among the members of the Stratigraphy Commission of the Geological Society of London in 2007. In 2008, they co-authored an article titled ‘Are We Now Living in the Anthropocene?’<sup>37</sup> In 2009, the International Commission on Stratigraphy—the body concerned with the examination and approval of changes in geological time-units—established the Anthropocene Working Group to examine the stratigraphic basis for the Anthropocene as the most recent geological time-unit, and one in which human actions have become a decisive factor. The preliminary findings of the working group are expected in 2016. The process entailed in formally changing the Geologic Time Scale is a complex one and requires the approval of the International Commission on Stratigraphy and the International Union

35 The base of the Holocene epoch as starting 11,700 (+/- 99) years before year 2000 was scientifically established only a few years ago, as ratified in 2008 by the International Union of Geological Sciences; see M. Walker, S. Johnsen, S. O. Rasmussen, 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*, vol. 24, 2009, 3–17.

36 See Jan Zalasiewicz, Paul J. Crutzen, and Will Steffen, ‘The Anthropocene’, in Felix M. Gradstein et al. (eds), *The Geologic Time Scale 2012*, vol. 2 (Amsterdam: Elsevier, 2012), 1033–1040.

37 Jan Zalasiewicz, Mark Williams, Alan Smith, et al., ‘Are We Now Living in the Anthropocene?’ *GSA Today*, vol. 18, 2008, 4–8. The article was co-authored by 21 out of 22 members of the Stratigraphy Commission of the Geological Society of London.

of Geological Sciences. However, *The Geologic Time Scale 2012* already differs from its preceding (2004) edition through inclusion of a chapter on the Anthropocene.<sup>38</sup>

The actual change from one geological time unit (such as an epoch) to another is not necessarily an abrupt process. The history of stratigraphic correlation and the subdivision of geological time have long been associated with understanding the changes in sea level.<sup>39</sup>

All this adds considerably to the relevance of insights from geology in the context of climate change and sea-level rise. An official change in the Geologic Time Scale, formally recognizing the Anthropocene as a new epoch in the geological history of our planet, could powerfully raise awareness and highlight the magnitude of the human impact on the Earth System.<sup>40</sup> Whereas our generation may be the first to become aware of this shift in geological epochs, the impacts will be felt by many future generations. That should prompt serious reflection on our present-day social structures.

#### 4.2 *Implications for International Law*

Current international law is a system of rules in many aspects resting on foundations that evolved under the understanding that the circumstances of the late Holocene, characterized by relative stability, would be perpetually valid. Key aspects of international law are linked to, and dependent on, stable geographical conditions. With the onset of the Anthropocene, marked by uncertainty and instability, fundamental challenges for international law may be on the horizon. The perspective of sea-level rise may be among the key factors prompting a thorough re-examination of several fundamental aspects of international law.

The concept of statehood in today's international law involves, as a key constitutive element, the existence of a territorial base—and a human population living

38 See Zalasiewicz, Crutzen and Steffen, *supra* note 36.

39 M. D. Simmons, 'Sequence Stratigraphy and Sea-level Change', in Gradstein et al. (ed.), *The Geologic Time Scale 2012*, vol. 1 (Amsterdam: Elsevier, 2012), 239–267. Sequence stratigraphy can be summarized as an attempt to subdivide sedimentary successions into packages relating to changes in relative sea level.

40 Changing the terminology by adopting a new category on a Geologic Time Scale is of course a different sort of 'change' from the actual geological changes involved between the Holocene and today. The two aspects (or meanings) of *change*—the one involving human definitions and perspectives, the other involving actual geological phenomena—should not be viewed as necessarily identical. Actual geological change does not depend on its formal acceptance; our awareness of it, however, may be sharpened by the formalization emerging from due scientific process.

on that territory, subject to and organized under a government. Under the new conditions likely to prevail in the Anthropocene of tomorrow, including the perspective of sea-level rise, the loss of state territory could be attributed to changes in the factual situation of natural conditions, and not only in consequence of political changes as is the case under present-day Holocene conditions.

As we leave the relative stability of the Holocene and enter the more uncertain and less stable epoch of the Anthropocene, international law will need to adapt to new parameters provided by the factual circumstances. Here we are not discussing primarily questions of law but questions of fact—in the face of which law, if it proves unsuited to the factual situation, may become irrelevant or even absurd.

Many proposals on how to address the issues of sea-level rise aim at preserving a static legal situation in the face of an increasingly dynamic process of natural change. However, such processes require a response or transformation in accordance with the needs and purposes in the new situation, rather than the imposition of static forms that were built on the basis of an earlier, no longer valid, situation.

In this context, it has been argued that there is a ‘strong presumption’ in favour of the continuity of statehood under international law. That presumption is, indeed, a safeguard from arbitrary political claims and changes these might impose. Ultimately, however, what is the reach of this presumption in the changing factual situation of sea-level rise? ‘Presumption’ is a legal device that operates in the absence of other proof; a presumption is, simply, an assumption of fact required by law—but it is not evidence, and it is rebuttable if evidence to the contrary is introduced.<sup>41</sup> Can a presumption of the continuity of statehood still be held, in the face of the physical facts of natural change? How can we oppose the fact that a territory that previously provided the geographical basis for a state has become inundated, or uninhabitable, or both? And without a territory, there can be no territorially based nation-state.

The lawyer’s instinct, or training, is to invoke precedents and search for analogies, in an attempt to prove or maintain a certain legal situation. However, the phenomenon discussed here is unprecedented—it has never been experienced since the invention of international law and the territorially centred state. There are no suitable analogies available (let alone those with liminal cases, such as the ‘Sovereign Order of Malta’,<sup>42</sup> and the like). Drawing on

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41 See *Black’s Law Dictionary*, 6th edn (St. Paul, MN: West, 1990), at 1185.

42 In full: the Sovereign Military Hospitaller Order of St. John of Jerusalem of Rhodes and of Malta. The Order has no sovereign territory; however, it maintains a webpage: see <[www.orderofmalta.int](http://www.orderofmalta.int)>.

precedents of, or analogies with, the situation of the Holocene in order to solve quite a different situation in an Anthropocene context cannot yield any meaningful solution.

Seeking to find a solution to the land/sea interface dilemma under the law of the sea when faced with sea-level rise, most commentators have proposed the development of a new rule of international law that would have the effect of freezing the baselines, or permanently fixing the boundaries of maritime zones at today's status—by fixing them on a chart, or such-like.<sup>43</sup> But will we be able to do that, if our perspective of 'permanent' is in fact *constant change*? On what basis could we expect that a 'frozen' rule of the Holocene would endure indefinitely under the ever-changing circumstances of the Anthropocene?

The international legal order will always be in search of stability and, ultimately, solutions to facilitate peace and prevent conflict. However, with a fundamental change in the context in which international law operates—as with the change of the conditions of the Holocene to those of the Anthropocene—new legal axioms will have to evolve. In the face of fundamentally changing facts, no forcing of presumptions, no invention of unsuitable analogies, and no artificial fixing of a 'permanent' legal situation can produce the ultimate objectives of international law: stability and peace.

It is international law, not the facts, that will have to change. That transformation must embrace the fundamental principles of this legal system—in the core of which geography is firmly and deeply embedded.<sup>44</sup> If international law is to be adequate to meet the new challenges of changing circumstances and achieve the overall objectives of facilitating stability and peace, humankind will have to organize society differently, in line with its actual needs and purposes, and not primarily on the basis of assertion of sovereign rights over territory.

## 5 Final Remarks

The prospects of sea-level rise introduce a general dilemma that international law may need to face in the foreseeable future. To put it briefly: *If the Earth is entering the Anthropocene, will international law stay in the Holocene?*

43 See a succinct overview of literature in Rayfuse, 'Sea Level Rise and Maritime Zones', supra note 28, at 187–191.

44 See Bethlehem, supra note 19, at 14.

This question has many aspects. The focus of all aspects, however, should be on *humankind*—from the individual person, to people connected in a community by belonging to a nation, and to other forms of joint identity as well.

From an element in the definition of statehood, people connected in a community will have to become a de-territorialized subject of international law, with a recognized legal subjectivity under it. The purpose should not be to maintain an illusion, or even a ‘strong presumption’, of the continuity of a state, but to serve the legitimate needs of such a group of people due to their unprecedentedly changed situation.

As to sea-level rise and low-lying island states, it is unlikely that populations will move all at once; their movement will be gradual and, most likely, also quite random.<sup>45</sup> It can realistically be expected that the ‘population element’ of the state will slowly disintegrate; and also that it will face a plethora of legal, economic, financial, educational, cultural, and other types of obstacles. In view of such prospects, the development of international law will need to be pre-emptive in character; and it should focus on the real needs and perceptions of the affected populations.<sup>46</sup>

Will the international law of the Anthropocene be capable of facilitating a far broader range of human concerns than it can today? If yes, it might become, truly, *the International Law for Humankind*.<sup>47</sup>

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45 For thorough study, see Jane McAdam, *Climate Change, Forced Migration, and International Law* (Oxford University Press, 2012).

46 For an account of attempts at the international level to develop a normative framework relating to climate change and migration from late 2010 to mid-2013, including the Nansen Initiative—an intergovernmental process supported by Norway and Switzerland and launched in October 2012—see Jane McAdam, ‘Creating New Norms on Climate Change, Natural Disasters and Displacement: International Developments 2010–2013’, *Refugee*, Vol. 29, 2013, at 11–26.

47 See Antonio Augusto Cançadao Trindade, *International Law for Humankind: Towards a New Jus Gentium* (Leiden: Martinus Nijhoff, 2010).