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# Shifting Sands: Sea Level Rise, Maritime Boundaries and Inter-state Conflict

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While the international security dimensions of climate change have received an increasing amount of attention, one impact that has not been widely discussed is the role that sea level rise could play in rendering maritime boundaries around the globe uncertain. The argument of this article is that this confusion of maritime boundaries could have potentially significant consequences in creating inter-state disputes, possibly leading to conflicts and international instability. This article will outline how sea level rise will confuse maritime boundaries and how these maritime boundary shifts could lead to inter-state disputes and conflict.

In recent times, the international security dimensions of climate change have received an increasing amount of attention (see, for instance, Campbell et al., 2007; Dupont, 2008; Schwartz and Randall, 2003). But one impact that has not been widely discussed is the role that sea level rise could play in rendering maritime boundaries around the globe uncertain. The argument of this article is that this confusion of maritime boundaries could have potentially significant consequences in creating inter-state disputes, possibly leading to conflicts and international instability. The article proceeds in two sections. Firstly, it will outline how sea level rise will confuse maritime boundaries. Secondly, it will demonstrate how maritime boundary shifts could lead to inter-state disputes and conflict.

## Sea level rise and maritime boundary shifts

Under international law, states may claim jurisdiction over a number of ocean zones that are adjacent to their coast. Baselines serve as the lines from which the boundaries of these zones are drawn. The United Nations Convention on the Law of the Sea (LOSC)[1] defines the 'normal baseline' as the 'low-water line along the coast as marked on large-scale charts officially recognized by the coastal state' (art. 5). But specific rules apply to: coasts that are deeply indented or fringed with islands; deltas; bays; river mouths; harbour works; low-tide elevations; islands; and reefs (see Churchill and Lowe, 1999, ch. 2). The LOSC divides maritime territory into four ocean zones that are all measured from the same baselines. These are: (1) the *territorial sea*; (2) the *contiguous zone*; (3) the *exclusive economic zone* (EEZ); and (4) the *continental shelf*.[2] When these zones intersect with the purported maritime zones of other states, boundaries are often negotiated and permanently fixed by way of delimitation agreements.



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Unless boundaries are fixed in such a way, sea level rise will alter certain existing maritime boundaries. The Intergovernmental Panel on Climate Change (IPCC) projects the rise to be between 0.18 and 0.59 metres by 2100 (IPCC, 2007, p. 8), although others project the rise to be up to a metre or more (see, for instance, Shukman, 2009). While some low-lying coastal areas are already under threat, sea level rise is a gradual process and it is likely to be some decades before low-lying rocks, islands, reefs and other features could be completely submerged. Nonetheless, in time, such a rise in sea level will affect boundaries in a number of possible ways. Firstly, because both baselines and the boundaries they support are 'ambulatory', this means that if a baseline anchor point is submerged, then the baseline is redrawn according to the next point that is above sea level (Caron, 2009, p. 9). The maritime boundaries are then redrawn according to this new baseline. While the LOSC does not expressly stipulate that boundaries must be redrawn when baselines shift, most scholars hold that there is a negative implication that this is the case, except possibly with regard to the 'permanent' outer boundary of the continental shelf (see, for instance, Soons, 1990, pp. 216–217).

The second way sea level rise could alter maritime boundaries is that some islands that support baselines and maritime boundaries could be rendered uninhabitable by the effects of sea level rise. This could see these islands reclassified as 'rocks' that can no longer sustain 'human habitation or economic life'. While they will maintain their other maritime zones, unlike islands, such rocks are not capable of supporting an EEZ or continental shelf (art. 121). Thirdly, it is also possible that an island state could be entirely submerged or rendered uninhabitable, which means the state would cease to exist and lose its claim to maritime territory altogether (see Rayfuse, 2009). Finally, there are a number of other factors that might cause physical changes to baselines including: erosion; land rising because the weight of a glacier has been removed; and land sinking because aquifers are depleted.

## Shifting maritime boundaries and inter-state conflict

If rising sea levels lead to shifts in maritime boundaries, this may result in disputes between states and, in the worst case, even military conflict. The main reason for this is that ocean zones are often very lucrative sources both of living resources (such as fish) and of non-living resources (such as minerals, oil and gas). The position of ocean zones also has significance for navigation rights which are of both economic and strategic importance. What is of concern is that these are the very sorts of factor that have commonly led to inter-state warfare throughout history. In the maritime context, disputes and clashes have occurred over fish (for instance, the Anglo–Icelandic cod wars of the 1950s and 1970s), oil and gas reserves (such as the 1988 Spratly Islands clash between China and Vietnam) and important shipping lanes (for instance, the Suez Crisis of 1956). In fact, it should be noted that, even without sea level rise, disputes over maritime jurisdiction are already a significant source of international friction.

As maritime boundaries are confused, the potential for such inter-state disputes will only grow. This is particularly so as the value of both living and non-living resources will likely increase as projected food shortages grow and non-renewable resources become scarcer. In this context, even a small shift in maritime boundaries, if it were

relevant to sovereignty over certain resources, could result in a dispute between states. Conflicts could occur as states directly and forcefully challenge other states' sovereignty over maritime territory, possibly even calling past delimitation agreements into question,[3] or as confusion over boundaries increases the occurrence of maritime incidents, such as fishing disputes, which have the potential to escalate into serious conflict (see Dupont, 2001, pp. 103–109).

There are four situations in which sea level rise will have the most significant effect on maritime boundaries and will most likely lead to disputes and possible conflict. Firstly, one of the threats to existing maritime boundaries appears to be where low-lying and unstable coasts will be inundated by sea level rise, whereby both baselines and the maritime boundaries they support would recede. If there is only a gentle gradient, a very low barrier protecting the coast and no islands or other seaward features capable of remaining above the rising sea level, baselines might retreat significantly. For instance, in Asia, the low-lying northern coasts of Sumatra and Java, as well as the southern coast of Kalimantan could be among the most drastically affected areas (Bardach, 1988, p. 8). Due to the close proximity of these parts of Indonesia and Malaysia, and some existing maritime boundary disputes elsewhere, sea level rise could complicate the situation, lead to the questioning of past delimitation agreements and contribute to tensions between the two nations.

Coastlines that are constituted of unstable materials (such as sand or sediment) are also of concern. In particular, some of the areas that are most vulnerable to erosion are the coastlines below the Arctic Ocean, where summer ice melt leaves soft material that can be removed by waves. Climate change will increase this thaw and, along with sea level rise, likely lead to increased erosion. This could cause the baselines and maritime territory of Arctic nations to retreat (Bird and Prescott, 1989, pp. 187–188). This is particularly relevant and a potential concern in the context of increased interest in securing Arctic territory by resource-hungry states.

The second area where sea level rise will have a considerable impact on maritime boundaries and increase the possibility of conflict is where existing baselines are generated from insubstantial geographical formations. This is a significant concern because, in order to maximise territorial claims, many states have drawn a number of their baselines from features such as low-tide elevations (rocks that emerge only at low tide) and reefs that fringe islands, which are now under threat from sea level rise. A low-tide elevation can function as a baseline point if it is situated within what would otherwise be the territorial sea (LOSC, art. 13). This means that if a low-tide elevation, located just within what would be the territorial sea, was submerged by sea level rise, up to 12 miles would be lost in the width of the maritime boundaries dependent on this baseline.[4] Depending on the circumstances, such relatively small shifts could still be significant, particularly with regard to claims to territorial waters in narrow straits, such as the Strait of Singapore and Bab el Mandeb, and narrow seas, such as the Baltic or Aegean (Bird and Prescott, 1989, p. 186). Such waters are important shipping lanes and confusion over boundaries could result in potentially precarious situations for international trade and fierce state disputes over economic interests.

Atolls or fringing reefs can act as baselines regardless of whether they are within what would otherwise be the territorial sea of an island (LOSC, art. 6). Reefs are

often a long way from the low-water mark of the coast and therefore, if they are submerged, it could result in a significant reduction in the width of maritime boundaries (Caron, 2009, p. 11). While coral can grow with rising sea levels, the growth rate will not match projected sea level rise (Buddemeier and Smith, 1988). Reefs are important to the baselines of many island nations, often as a part of archipelagic straight baselines, including the Maldives, Fiji and the Solomon Islands. Such areas are often rich fishing grounds, so it is possible that a shift in maritime boundaries could lead to inter-state quarrels over jurisdiction.

Thirdly, the submersion of small islands could lead to the most significant shifts in maritime boundaries and very serious implications for international security. This is because islands can support a 200-nautical-mile EEZ and a continental shelf claim on their own account (LOSC, art. 121(2)). If an island is submerged, jurisdiction over these ocean zones would be lost. Where an island is far from the mainland or other islands, the EEZ of an island could enclose up to 125,664 square nautical miles of ocean territory. This loss of maritime territory can occur in three ways. Firstly, an island could be submerged entirely, which means it would no longer support baselines and would lose jurisdiction over all of its maritime zones. Secondly, partial submersion could turn an island into an uninhabitable rock. The legal significance of this is that, while maintaining their territorial sea and contiguous zone, rocks that cannot sustain 'human habitation' or 'economic life' of their own cannot support an EEZ or continental shelf (LOSC, art. 121(3)). Finally, submerged island states may also cease to exist entirely as they fail to meet the requirements of statehood, especially the need for territory and a permanent population. This would render them unable to continue to claim maritime territory at all (see Rayfuse, 2009).

This submersion of islands presents profound concerns for the South Pacific, where islands such as Kiribati, the Marshall Islands, Tokelau and Tuvalu are some of the most likely places to be submerged or rendered uninhabitable by the effects of sea level rise, such as erosion, inundation of agricultural land and the contamination of freshwater reservoirs (see Dupont and Pearman, 2006, pp. 46–47). If the maritime boundaries of much of the South Pacific are confused, this could result in fierce competition over the rich fishing resources of the area. Disputes could break out between states from across the world, which are attempting to capitalise on what they now view as high seas, and states whose territory has been reduced. Neighbouring states also might try to exploit other states' loss of territory by claiming extended maritime boundaries into these areas.

Fourthly, as sea level rise alters maritime boundaries, it may complicate existing territorial disputes, providing situations that are ripe for conflict. For instance, sea level rise could make the resolution of disputed claims to the Spratly Islands in the South China Sea more difficult. The islands are surrounded by rich fishing grounds and oil and gas reserves and are claimed, wholly or partially, by China, Taiwan, Vietnam, Malaysia, the Philippines and Brunei. The highest point among the islands (often rocks) is only 4 metres above sea level and much of the area could be submerged by sea level rise (CIA, 2009). If the islands were entirely submerged it might also mean that the territory could be potentially claimed subject to maritime

boundaries derived from other baselines (such as in the case of Brunei's existing fishing zone claim). Such shifts would even further confuse existing claims to the territory.

Another potential territorial dispute 'hot spot' is Okinotorishima. Okinotorishima is a tiny Japanese islet that is uninhabited and is being submerged due both to sea level rise and to erosion. Japan uses the islet to claim an extended EEZ, but China has challenged the island status of Okinotorishima. In order to try and meet the requirements of article 121, Japan is attempting to increase the size and height of Okinotorishima by planting coral around the islet, and to buttress the support of the formation, which is threatened by erosion, by building circular blocks of steel and concrete (Hogg, 2007). As the effects of sea level rise and erosion increase, Japan will have to engage in increasingly more drastic and legally questionable attempts to save Okinotorishima from being submerged. As it does so, disputes with other nations, particularly China, that challenge Japan's claim to an extended EEZ from the islet, will likely become more heated.

## Conclusion

Sea level rise presents a significant threat to international security which needs to be given appropriate attention and concern. As existing boundaries are rendered uncertain, inter-state disputes and conflict will likely evolve. Fortunately, this problem is a legal one, which means a solution to the threat is well within the power of the world's governments. Probably the best means to address the problem of uncertain boundaries is to adopt a system that freezes existing ambulatory maritime boundaries (for a detailed discussion, see Caron, 2009). However, this proposal requires further development to address complications such as how to deal with maritime boundaries that cannot be frozen because they are disputed or what the status will be of the frozen maritime territory of island states that may cease to exist (see Rayfuse, 2009). If done in an appropriate manner, freezing maritime boundaries would effectively remove the uncertainty that could lead to international instability. Only time will tell if enough political will can be garnered for states to negotiate such a change to the current law of the sea regime and avert the growing threat of inter-state disputes and conflict.

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1 United Nations Convention on the Law of the Sea (LOSC), opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994).

2 (1) States have sovereignty over the *territorial sea*, which is directly adjacent to a state's coast (art. 2) and is a maximum of 12 nautical miles in breadth as measured from baselines (art. 3). (2) The coastal state can exercise control necessary to prevent and punish 'infringement of its customs, fiscal, immigration or sanitary laws' in its territory or territorial sea in the *contiguous zone* (art. 33(1)), which cannot exceed 24 nautical miles in breadth from the baselines (art. 33(2)). (3) Principally, the coastal

state has sovereign rights to explore, exploit, conserve and manage the 'natural resources', both living and non-living, of the waters and seabed in the *exclusive economic zone* (art. 56(1)), while other states have freedom of navigation and overflight (art. 58). The EEZ extends to a maximum of 200 nautical miles from the baselines (art. 57). (4) The coastal state exercises sovereign rights over the *continental shelf* (the submarine seabed and subsoil) for exploration and exploitation of natural resources (art. 77). Its edge is determined in a somewhat complex manner (art. 76), but in most cases it 'shall not exceed 350 nautical miles from the baselines from which the breadth of the territorial sea is measured' (art. 76(6)).

3 However, this would probably breach article 62(2)(a) of the Vienna Convention on the Law of Treaties, which does not allow an unforeseen fundamental change in circumstances to be invoked to withdraw from or terminate a boundary treaty. Vienna Convention on the Law of Treaties, opened for signature 23 May 1969, 1155 UNTS 331 (entered into force 27 January 1980).

4 However, except along extremely straight coastlines, any retreat of a baseline will have a proportionately smaller effect on the outer boundaries (such as the EEZ) than on the territorial sea. As Khadem (1998, p. 78) explains, applying the 'envelope of arcs of circles, the further the outer limit of a zone is from the coastline, the fewer of the sinuosities of the coastline are reflected in the outer limit of that zone'.

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