



**Maritime Rights of Coastal States
and Climate Change:
Should States Adapt to Submerged
Boundaries?**

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Abstract

The threats of climate change have gone beyond environmental concerns - they have now reached a stage where they raise geopolitical concerns due to their potential effect on national boundaries. Given rapidly rising sea levels, coastal states and low-lying areas are particularly vulnerable to the impacts of climate change. These regions contain some of the world's highest population densities and most critical infrastructure. In addition to their direct impact on the infrastructure and the livelihood of the populations of these regions, rising sea levels may also bring about new challenges for these states. Namely, as sea levels rise, coastlines may shift or submerge. Some commentators have theorized that this change could lead to claims of altered marine boundaries, which may affect territorial claims between states.

The purpose of this paper is to shed light on some of the potential legal implications of such a possible shift in coastlines. The paper notes that if such a shift occurs, it may have grave implications, particularly for developing countries that lack the resources and capacity to address complicated historical and geographic approaches to boundary claims. The paper concludes by recommending that both technical and financial assistance be provided to these developing coastal states and low-lying regions so that they can approach any future territorial and maritime boundary negotiations with the necessary tools.

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Table of Contents

Acknowledgements	ii
Acronyms	iii
Introduction	1
I. Climate Change: A Multifaceted Challenge	2
II. Potential Implications of Climate Change for Coastal States	12
Rights of Coastal States under UNCLOS	12
<i>Territorial Sea</i>	12
<i>Archipelagic Sea</i>	13
<i>Contiguous Zone</i>	13
<i>Exclusive Economic Zone (EEZ)</i>	13
<i>Continental Shelf</i>	14
<i>The High Seas</i>	15
Changing the Baselines: Potential Implications	15
1. <i>Baseline points that would be most threatened by rising sea levels</i>	15
2. <i>Relevant Provisions of UNCLOS</i>	17
3. <i>What are the requirements for existing baselines under UNCLOS?</i>	19
4. <i>What are the potential legal implications of changing baselines?</i>	20
5. <i>If faced with a dispute concerning changes in baselines, what might a court consider?</i>	21
III. What are the next steps?	26
The Role of Developing and Developed Countries	29
Conclusion	32
Selected Bibliography	33

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Acronyms

DOALAS	Division for Ocean Affairs and Law of the Sea, United Nations
CLCS	UN Commission on the Limits of the Continental Shelf
GHG	Greenhouse gases
ICJ	International Court of Justice
ILC	International Law Commission
IPCC	Intergovernmental Panel on Climate Change
NAPA	National Adaptation Programmes of Action
UNCLOS	United Nations Convention on the Law of the Sea, 1982
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WGBU	German Advisory Council on Global Change

Introduction

The threats of climate change have gone beyond environmental concerns. They have now reached a stage where they raise geopolitical concerns due to their potential effect on the relationship among states. Such effects may include changes to traditionally used shipping routes, access to resources previously considered beyond reach, as well as to agricultural production, water supply, energy use, and the possibility of related shifts in migration. Because of these effects, a number of states presented climate change as an issue of global security before the United Nations Security Council, for the first time, in April 2007.¹ The international community is also beginning to address issues related to climate change in fora where they have not been traditionally discussed, such as the Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer and at the World Trade Organization.²

With the current rapid rate of the rise in sea levels, the impact of climate change on coastal states and low-lying areas is becoming a particularly serious concern. As sea levels rise, coastlines may shift or submerge, leading certain commentators to theorize that this change has potential implications for the rights of coastal states over their maritime zones.³ If this theory has resonance, the future may pose grave problems for developing countries that lack adequate resources and capacity to adapt to climate change. This paper analyzes some of the potential legal implications of climate change on coastal states and low-lying areas as coastlines continue to shift with rising sea levels. The first section of the paper highlights a number of climate change impacts and looks at how the United Nations has placed this issue on its agenda. The paper goes on to summarize the relevant provisions of the U.N. Convention on the Law of the Sea (UNCLOS)⁴ that spell out the rights of coastal states, as well as to discuss the possible impacts of climate change on baselines for maritime zones. The paper then concludes with some recommendations.

¹ For more information on what was discussed at the U.N. meeting in April 2007, see page 7 of this paper.

² In the context of the “global warming potential” of certain alternatives to Ozone-Depleting Substances (ODS), issues related to climate change were raised at the 19th Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (MOP-19) in September 2007. The WTO took up climate change issues at its annual public forum on October 4–5, 2007, where 4 out of 39 sessions focused on the linkages between trade and climate change. (See WTO, “WTO Public Forum 2007: How Can the WTO Help Harness Globalization?,” WTO, Geneva, Switzerland, http://www.wto.org/english/forums_e/public_forum2007_e/programme_e.htm [accessed October 26, 2007]).

³ The issue concerns whether or not climate change impacts could lead to claims of altered marine boundaries, which would affect territorial claims among states. The authors realize that coastal dynamics are determined by, among other things, sea levels, waves, currents, winds, and tsunamis, all of which are impacted by climate change. However, this paper will focus only on the impacts of the rise in sea levels on coastal areas.

⁴ United Nations Convention on the Law of the Sea (UNCLOS), *opened for signature* Dec. 10, 1982, 1834 U.N.T.S. 4, U.N. Doc. A/CONF.62/122 (1982), *reprinted in* 21 I.L.M. 1261 (1982).

I. Climate Change: A Multifaceted Challenge

Global temperature is warming at rapid speed. According to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), eleven out of the last twelve years (1995–2006) have ranked among the warmest years since 1850.⁵ In addition, the linear warming trend over the 50 years between 1956 and 2005 (0.13°C per decade) was nearly twice that for the 100 years between 1906 and 2005.⁶ The ocean has been absorbing over 80 percent of the heat that is being added to the climate system.⁷ This warming is likely to lead in turn to extreme weather events, increased risk of droughts and floods due to changes in precipitation patterns, and a significant sea level rise resulting from melting glaciers and sea ice. Changes in temperatures and weather patterns will affect access to water, food production, health, and land use.⁸

In addition, climate change is projected to “dry out” certain regions of the world, thereby potentially causing further desertification and associated environmental degradation.⁹ The poorest countries and people—who are least able to cope with these changes—are expected to suffer earliest and most because of their geographical location, low incomes, weak institutional capacity, and their greater reliance on climate sensitive sectors like agriculture.¹⁰ It is predicted that agricultural productivity in developing countries will face a 9–21 percent decrease overall by 2080, with some countries facing greater adversity than others. India, for

⁵ The Intergovernmental Panel on Climate Change (IPCC), 2007, “Topic 1—Observed Changes in Climate and Their Effects,” *IPCC Fourth Assessment Report* (Cambridge, UK: Cambridge University Press), 1. According to the Stern Review, if annual greenhouse gas emissions remain at the current level, the global temperature will increase by 3–10°C by 2100 (Nicholas Stern, 2007, “Part I: Climate Change—Our Approach,” *The Economics of Climate Change: The Stern Review* [Cambridge, UK: Cambridge University Press], 2).

⁶ Stern Review, 2007, 2.

⁷ Ibid.

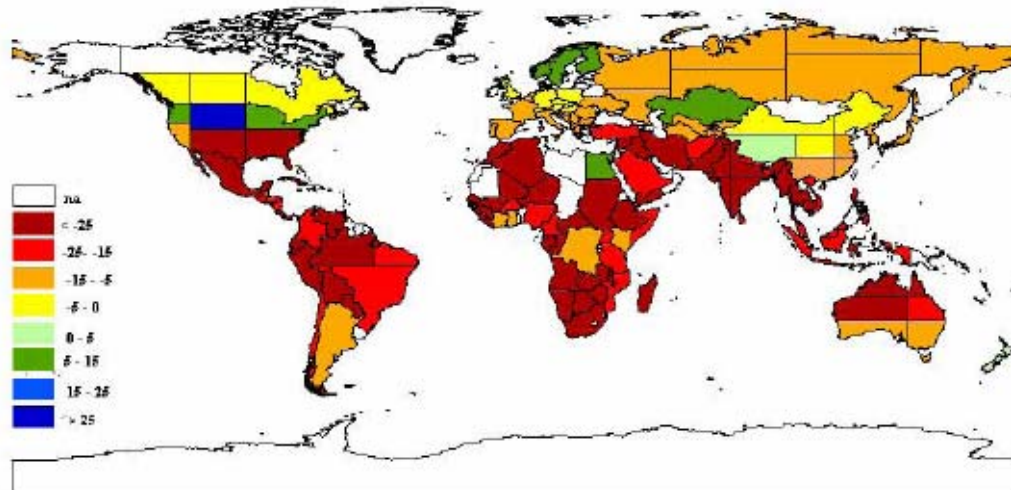
⁸ For a discussion on the causal link between climate change and water conflicts, food crisis, storm and flood disasters, and environmentally induced human migration, see German Advisory Council on Global Change (German acronym, WBGU), 2007 [unedited prepress copy], *World in Transition: Climate Change as a Security Risk*, (London: Earthscan), chapters 5 and 6. It is estimated that for every 1°C rise in temperature above the historical average during the growing season, grain yields will drop 10 percent (Lester Brown, 2006, “World Grain Stocks Fall to 57 Days of Consumption: Grain Prices Starting to Rise,” Earth Polity Institute, Washington, DC, <http://www.earth-policy.org/Indicators/Grain/2006.htm>, accessed March 2008). Another estimate projects that under the most conservative climate change projections, net cereal production in South Asia will decline by 4-10 percent by the end of this century (CNA Corporation, 2007, *National Security and the Threat of Climate Change* [Alexandria, Virginia: CNA Corporation], 27). For potential positive impacts of global warming, see John Drexhage et al., 2007, “Climate Change and Foreign Policy: An Exploration of Options for Greater Integration,” International Institute for Sustainable Development, Winnipeg, Manitoba, Canada, 4.

⁹ Drexhage et al., 2007, “Climate Change and Foreign Policy,” 20–21; and WBGU, 2007, *World in Transition*, chapter 6.

¹⁰ See William Burns, 2005, “Potential Implications of Climate Change for the Coastal Resources of Pacific Island Developing Countries and Potential Legal and Policy Responses,” 8(1) *Harv. Asia Pac. Rev.*; Ranee Khooshie Lal Panjabi, 1993, “Can International Law Improve the Climate? An Analysis of the United Nations Framework Convention on Climate Change Signed at the Rio Summit in 1992,” 18 *N.C.J. Int'l & Comm. Reg.* 491, 500; IPCC, 2001, *Climate Change 2001: Impacts, Adaptation, and Vulnerability* (Cambridge, UK: Cambridge University Press), 854–5; WBGU, 2007, *World in Transition*, 2–3.

example, is especially at risk, facing projected agricultural losses of up to 44 percent of total agricultural output in the northeast in the worst-case scenario, and as much as 30 percent even in the best-case scenario (see figure 1).¹¹

Figure 1. Global warming impact on agricultural productivity without carbon fertilization (percent)



Source: Cline, 2007, “Global Warming and Agriculture.” (Reprinted with permission)

The sum of these impacts is prompting some scholars to link climate change and global security (see figure 2). As availability of land and water resources becomes increasingly scarce,¹² there may well be intensified competition for food, water, and energy, possibly triggering large-scale human migration and providing an impetus for political and social instability.¹³ Climate change may also possibly foster the conditions for internal conflicts and

¹¹ William R. Cline, 2007, “Global Warming and Agriculture: New Country Estimates Show Developing Countries Face Declines in Agricultural Productivity,” CGD Brief, Center for Global Development, Washington, DC.

¹² Scarcity of water resources may in part be due to increased evaporation during transportation or flooding, among other causes.

¹³ In its most recent report, the German Advisory Council on Global Change (WBGU), an independent, scientific advisory body to the German federal government, concluded that “climate-induced interstate wars are unlikely to occur. However, climate change could well trigger national and international distributional conflicts and intensify problems already hard to manage, such as state failure, the erosion of social order, and rising violence. In the worst-affected regions, this could lead to the proliferation of destabilization processes with diffuse conflict structures. These dynamics threaten to overstretch the established global governance system, thus jeopardizing international stability and security.” WBGU, 2007, *World in Transition*, 2.

In June 2007, Sir Jock Stirrup, the U.K. Chief of Defence Staff, stated at a Chatham House conference that “[R]ising temperatures, changes in rainfall patterns and desertification will affect food and water supplies. Crop yields will fall and land once used for grazing and crop growing will disappear into the desert sands. Expanding populations around the world are already placing a strain on scarce resources. Climate change will make this competition more acute and history is replete with cases of resource

extremism, especially in countries with weak or failing governments.¹⁴ We have already witnessed this resource-related instability in Darfur, where conflicts have been linked to diminishing land and water availability. Moreover, recent extreme weather events—possibly linked to climate change—have had destabilizing effects even in highly developed regions of the world, as we saw with Hurricane Katrina in 2005 and the heat wave in Europe in 2006 that caused significant physical damage and claimed many lives.¹⁵ As global warming worsens, it is predicted that its impacts on both the environment and human well-being will only become larger in terms of scale *and* scope.

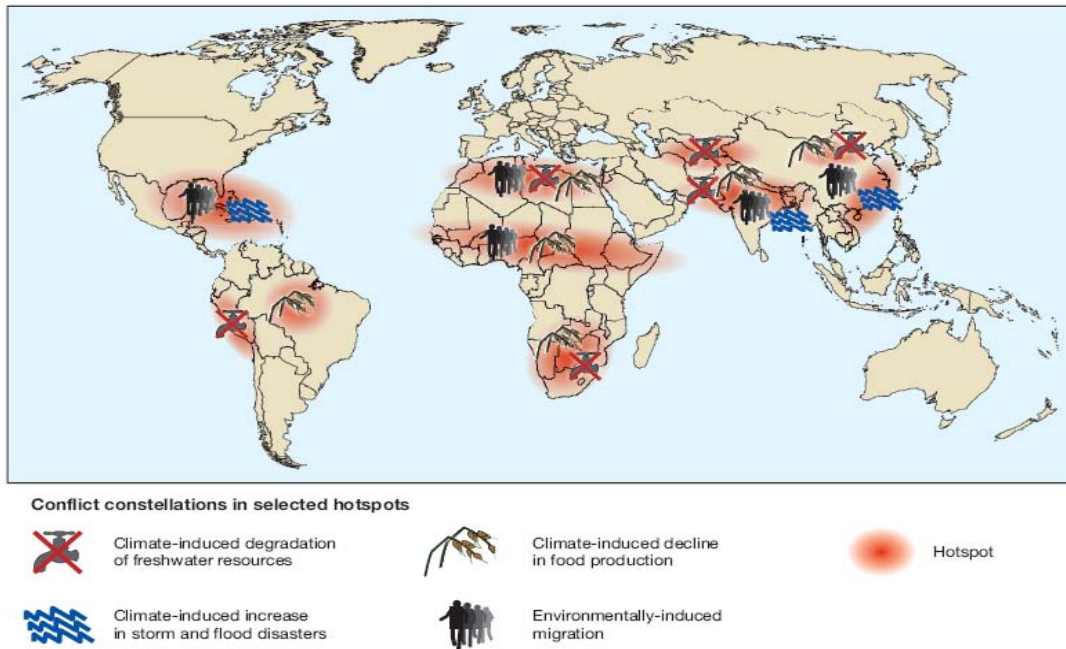
competition that have rapidly descended into armed conflict...Just a glance at a map showing the areas most likely to be affected and you are struck at once by the fact that they're exactly those parts of the world where we see fragility, instability and weak governance today. It seems to me rather like pouring petrol onto a burning fire" ("200/06/25 Climate Change: Politics vs. Economics," Speech by Air Chief Marshal Sir Jock Sitrup, Chatham House, June 25, 2007, available on the website of U.K. Ministry of Defence, <http://www.mod.uk/DefenceInternet/AboutDefence/People/Speeches/ChiefStaff/20070625ClimateChangePoliticsVsEconomics.htm> [accessed March 2008].)

See also Peter Schwartz and Doug Randall, 2003, "An Abrupt Climate Change Scenario and Its Implications for United States National Security," Environmental Defense Fund, New York, http://www.edf.org/documents/3566_AbruptClimateChange.pdf (accessed March 2008); and Nils Petter Gleditsch, Ragnhild Nordas, and Idean Salehyan, 2007, "Climate Change and Conflict: The Migration Link," *Coping with Crisis Working Paper Series*, International Peace Academy, New York, New York, http://www.ipacademy.org/asset/file/169/CWC_Working_Paper_Climate_Change.pdf (accessed January 2008).

¹⁴ WBGU, *World in Transition*, 2. See also CNA Corporation, 2007, *National Security*.

¹⁵ The National Climate Data Center of the U.S. National Oceanic and Atmospheric Administration (NOAA) estimated in 2005 that the total losses resulting from Hurricane Katrina would exceed US\$100 billion, with over US\$34 billion in insured losses. National Climatic Data Center, NOAA, 2005 "Summary of Hurricane Katrina" (December 29), *Climate of 2005*, U.S. Department of Commerce, Washington, DC, <http://www.ncdc.noaa.gov/oa/climate/research/2005/katrina.html> (accessed December 2007). Statistics Netherlands, a national authority responsible for producing statistics used by policy makers and scientific researchers, estimated that in July 2006, 1,000 more people died in the Netherlands than in an average July (Statistics Netherlands, "July Heat Causes One Thousand Extra Deaths," *Web Magazine*, August 31, 2006, Web site of Statistics Netherlands, Voorburg/Heerlen, The Netherlands, <http://www.cbs.nl/en-GB/menu/themas/bevolking/publicaties/artikelen/archief/2006/2006-2019-wm.htm> (accessed December 2007). According to *The New York Times*, a heat wave contributed to at least 140 deaths in New York City alone in 2006 (Richard Pérez-Peña, "Heat Wave Was a Factor in 140 Deaths, New York Says," November 16, 2006, http://www.nytimes.com/2006/11/16/nyregion/16heat.html?_r=2&ref=nyregion&oref=slogin&oref=slogin (accessed December 2007).

Figure 2. Security risks associated with climate change: Selected hotspots



Source: WBGU, 2007, *World in Transition*. (Reprinted with permission)

Another climate change related to global security is the melting of ice in the Arctic Region, which is expected to open the Northwest Passage. With global warming, icecaps in the polar region are beginning to quickly melt away, opening up the region for possible future exploration.¹⁶ According to the Hadley Center for Climate Prediction and Research, the entire Arctic may become ice-free during the summer by the end of the century.¹⁷ Currently,

¹⁶ UNCLOS is silent on baselines along permanently ice-bound coasts. See Victor Prescott and Clive Schofield, 2005, *The Maritime Political Boundaries of the World*, 2d. ed. (Boston: Martinus Nijhoff), 519. See also Barry H. Dubner, 2005, "On the Basis for Creation of a New Method of Defining International Jurisdiction in the Arctic Ocean," 13 *Mo. Env'tl. L. & Pol'y Rev.* 1; James Kraska, 2007, "The Law of the Sea Convention and the Northwest Passage," 22(2) *The Int'l J. Marine & Coastal Law*, 257–282. For alleged impacts of climate change on the Arctic region and its wildlife and indigenous communities, see Martin Wagner and Donald M. Goldberg, 2004, "An Inuit Petition to the Inter-American Commission on Human Rights for Dangerous Impacts of Climate Change," Petition presented at the 10th Conference of the Parties to the Framework Convention on Climate Change, December 15, 2004, Buenos Aires, Argentina, available on the Web site of Center for International Environmental Law, Washington, DC, http://www.ciel.org/Publications/COP10_Handout_EJCIEL.pdf (accessed November 2007). See also, Drexhage et al., 2007, "Climate Change and Foreign Policy," 9. The most recent study by NOAA found that the 2007 extent of summer sea ice marked a new record minimum, with a dramatic reduction in area of coverage (4.3 million km²), compared to the previous record set two years earlier in 2005 (a reduction of 23 percent) (J. Richter-Menge et al., "Sea Ice Cover," Arctic Report Card 2007, Web site of U.S. NOAA (National Oceanic and Atmospheric Administration) Climate Program Office, <http://www.arctic.noaa.gov/reportcard/seaice.html> (accessed October 2007).

¹⁷ J.M. Gregory et al., 2002, "Recent and Future Changes in Arctic Sea Ice Simulated by the HadCM3 AOGCM," 29(24), *Geophys. Res. Lett.*, 2175. See also Arctic Climate Impact Assessment (ACIA), 2004,

Russia, Canada, the United States, Norway, and Denmark are competing to secure subsurface rights to the Arctic seabed. A successful claim to the seabed would be significant because the Arctic has as much as 25 percent of the world's undiscovered oil and gas, according to the U.S. Geological Survey. In addition, the opening up of the Northwest Passage could dramatically cut traveling time between Asia and Eastern North America and Europe. For example, traveling between New York and Shanghai through the Northwest Passage would be about 6,500 km shorter than through the Panama Canal.

While these openings in frozen passages may be heralded as new and efficient opportunities for trade and resource exploitation, these potential opportunities may also increase political tensions between states.¹⁸ As an example, in summer 2007, Canada announced it would spend Can\$3.1 billion for the purchase of new patrol ships and Can\$4.3 billion for their maintenance over the 25-year life span of the ships. These ships will be used by the Navy to increase its military presence in the Arctic.¹⁹ Russia in turn sent a submarine to plant a Russian flag in the seabed beneath the North Pole to symbolize its claim to the polar territory and its resources.²⁰ The Associated Press reports that the U.S. Congress is considering a US\$8.7 billion budget reauthorization bill for the Coast Guard that includes US\$100 million to operate and maintain the nation's three existing polar icebreakers.²¹

Impacts of a Warming Arctic: Arctic Climate Impact Assessment (Cambridge, UK: Cambridge University Press); IPCC, 2007, *Climate Change 2007* (Cambridge, UK: Cambridge University Press).

¹⁸ For a diverging opinion, see Colin Woodard, "Who Resolves Arctic Oil Disputes? Antarctica Provides a Model for Settling Competing Claims," *Christian Science Monitor*, August 20, 2007, <http://www.csmonitor.com/2007/0820/p01s02-woeu.html>. (accessed October 2007). Woodard quotes Ted McDorman to the effect, "The international community has dealt with lots of maritime boundary issues with a lot of resources at stake... When you have an overlapping claim, you negotiate with one another. The Arctic won't be any different."

¹⁹ Web site of the Office of the Prime Minister of Canada, 2007, "Backgrounder—Strengthening Canada's Arctic Sovereignty—Constructing Arctic Offshore Patrol Ships," July 9, 2007, <http://www.pm.gc.ca/eng/media.asp?id=1743> (accessed February 2008).

²⁰ In 2001, Russia submitted documents to the U.N. Commission on the Limits of the Continental Shelf claiming that the Lomonosov Ridge, which underlies the Arctic Ocean, is actually an extension of the Siberian continental shelf and that it should therefore be treated as Russian territory. In 2002, the U.N. Commission neither rejected nor accepted the Russian proposal, but recommended additional research (U.N. Commission on the Limits of the Continental Shelf (CLCS), 2004, "Outer Limits of the Continental Shelf beyond 200 Nautical Miles from the Baselines: Submissions to the Commission; Submission by the Russian Federation" (updated November 15, 2004), http://www.un.org/depts/los/clcs_new/submissions_files/submission_rus.htm (accessed October 2007). Russia is set to resubmit its claim in 2009. See also Fred Weir, "As Ice Caps Melt, Russia Stakes its Claim to Oil-rich Arctic," *The Christian Science Monitor*, August 3, 2007, <http://www.csmonitor.com/2007/0803/p25s01-wogi.html?page=1> (accessed November 2007); "Canadian PM Vows to Defend Arctic," CNN.com, August 9, 2007, <http://www.cnn.com/2007/WORLD/americas/08/09/canada.arctic.ap/index.html> (accessed November 2007); Cleo Paskal, "Climate change and borders," *Ecologist Online*, August 2, 2007, http://www.theecologist.org/archive_detail.asp?content_id=1009 (accessed November 2007).

²¹ *The New York Times* reported that the U.S. Coast Guard is now planning its first operating base in the Arctic as a way of increasing its presence in the region. See Matthew L. Wald and Andrew C. Revkin, 2007, "New Coast Guard Task in Arctic's Warming Seas," *The New York Times*, October 18, 2007,

As noted in the opening paragraph of this paper, the importance of the link between global security and climate change was recognized internationally in April 2007, when the United Nations Security Council held an open debate on the issue for the first time. At this gathering, more than 50 delegations exchanged their views and examined the relationship between energy, security, and climate change. Although some delegates raised doubts whether the Council was the proper forum to discuss the issue,²² many delegates acknowledged the strong link between climate change and security. For example, Secretary-General Ban Ki-moon noted that climate change will not only have serious environmental, social, and economic implications, but also has implications for peace and security, particularly in vulnerable regions that already face multiple stresses, including pre-existing conflicts, poverty, unequal access to resources, weak institutions, food insecurity, and the incidence of diseases such as HIV/AIDS.²³ British Foreign Secretary, Margaret Beckett, President of the Security Council, also stressed that climate change was not a “narrow national security” issue of a particular country (speaking for the UK), but rather, a matter of “collective security in an increasingly fragile world for all.”²⁴

Despite increased attention to the security aspect of global warming and the adverse impacts of climate change generally, there has been little discussion about the implications of climate change on the rights of coastal states and low-lying areas. Currently, sea levels are rising globally at around 2 mm per year and the rate of rise has been accelerating.²⁵ According to the most recent Assessment Report published by the IPCC, sea levels are projected to rise by

<http://www.nytimes.com/2007/10/19/us/19arctic.html?bl&ex=1193112000&en=f097172b9e1d7ed5&ei=5087%0A> (accessed December 2007).

²² Some developing countries expressed their reservations about discussing climate change in the Security Council because they saw climate change as a socioeconomic development issue that should be dealt with by more widely representative fora, such as the General Assembly. For example, the representative of China stated that “[T]he developing countries believe that the Security Council has neither the professional competence in handling climate change—nor is it the right decision-making place for extensive participation leading up to widely acceptable proposals.” Pakistan agreed, saying that issues related to economic and social development were assigned to the Economic and Social Council and the General Assembly and that the Security Council was not an appropriate body to address these issues. At the beginning of the debate, the President of the Security Council, Margaret Beckett, clarified that “the Council was not seeking to pre-empt the authority of other bodies, including the General Assembly, the Economic and Social Council and various subsidiary bodies and agencies.” United Nations Security Council, 2007, “Security Council Holds First-Ever Debate on Impact of Climate Change on Peace, Security, Hearing Over 50 Speakers” (April 17, 2007), Security Council Meeting Report, UN Doc. SC/9000, <http://www.un.org/News/Press/docs/2007/sc9000.doc.htm> (accessed November 2007).

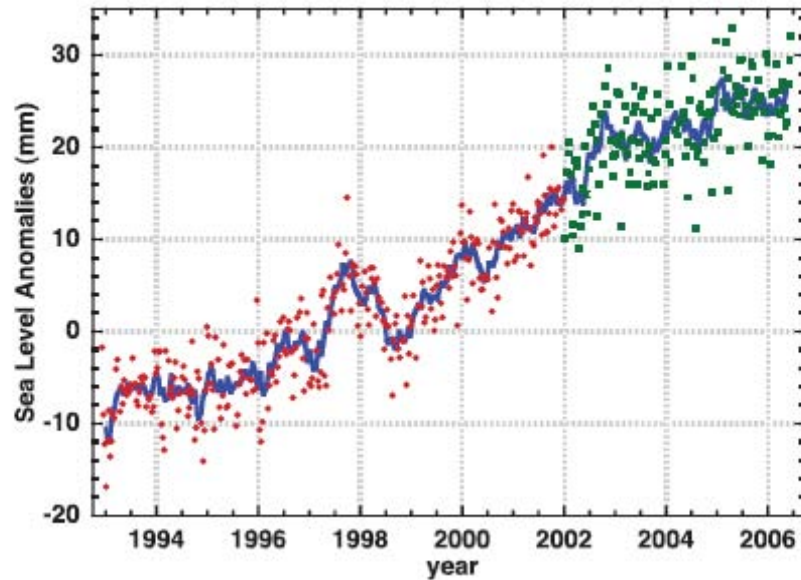
²³ Ibid. The Secretary General reiterated this view in December 2007 when addressing the Thirteenth Meeting of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in Bali, Indonesia. See UNFCCC, “U.N. Secretary-General: ‘Eyes of the World’ on Ministers and Heads of State Meeting at United Nations Climate Change Conference in Bali,” UNFCCC Press Release, December 12, 2007, http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/20071212_bali_high_level.pdf (accessed January 2008).

²⁴ United Nations Security Council, 2007.

²⁵ The IPCC has estimated that the total sea level rise between 1961 and 2003 was 1.8 ± 0.5 mm/year, while that for the 1993–2003 period was 3.1 ± 0.7 mm/year (IPCC, 2007, *Climate Change 2007*, chapter 5).

0.18–0.59 meters by 2009, mainly due to the expansion of warmer oceans and melting glaciers on land.²⁶

Figure 3. Increase in global mean sea level, 1994–2006



Source: IPCC, 2007, *Climate Change 2007*. (Reprinted with permission)

Low-lying areas are extremely vulnerable to even small changes in the sea level. For example, a one-meter rise in the sea level could result in the loss of 75 percent of certain low-lying islands of Vanuatu, and 80 percent of the Majuro atoll in the Marshall Islands—home to 50 percent of that nation’s population.²⁷ Bangladesh, a very low-lying country, where about 10

²⁶ Ibid., 750. Other experts estimate a sea level rise of as much as 1–5 meters by 2009. See Susmita Dasgupta et al., 2007, “The Impact of Sea Level Rise on Developing Countries: A Comparative Analysis,” World Bank Policy Research Working Paper, no. WPS 4136, World Bank, Washington, DC; Piet Buys et al., 2007, “Country Stakes in Climate Change Negotiations: Two Dimensions of Vulnerability,” World Bank Policy Research Working Paper, no. 4300, World Bank, Washington, DC.

²⁷ Burns, 2005, “Potential Implications,” 6. One study estimates that between 50 and 70 percent of the world’s population currently lives in low-lying coastal areas (Drexhage et al., 2007, “Climate Change and Foreign Policy,” 3. See also Gordon McGranahan, Deborah Blak, and Bridget Anderson, 2007, “The Rising Tide: Assessing the Risks of Climate Change and Human Settlements in Low Elevation Coastal Zones,” 19(1) *Env’t & Urbanization* 17, which estimates that about 2 percent of the world’s land area, containing 10 percent of the world’s population and 13 percent of world’s urban population, is located less than 10 meters above sea level. In December 2005, a small community living in Vanuatu became perhaps the first community reported to have been formally forced to move as a result of climate change (UNEP [United Nations Environment Programme], 2007, “Melting Ice: A Hot Topic?”, Factsheet, UNEP, Nairobi, Kenya, http://www.unep.org/wed/2007/downloads/documents/Factsheet_en.pdf [accessed March 2008]. See also, IPCC, 2001, *Climate Change 2001*, which estimates that with a 1-meter rise in the sea level, 10.3 km² of land in Tongatapu island, Tonga, would be lost. This figure would increase to 37.3 km² (14 percent) when a storm surge is superimposed on a 1-meter sea-level rise scenario.) In November 2007, the Small Island States gathered in the Maldives to discuss the “human dimension of global climate change,” namely, how climate change affects the lives and livelihoods of people who live on small islands, which are among the most vulnerable states to climate change. (See Ministry of Foreign Affairs, Republic of Maldives, “The Maldives to Host the Small Island States Conference on ‘Human

percent of the land is located within three feet of the mean sea level, is also at grave risk.²⁸ In addition, coastal states typically locate most of their critical infrastructure within the coastal zone, (e.g., energy and water supply pipelines, trade and transportation structures, industrial and port facilities), making them even more vulnerable to the risks posed by climate change. Between 1994 and 2004, about one-third of the 1,562 flood disasters, half of the 120,000 people killed, and 98 percent of the 2 million people affected by floods were in Asia, where a large portion of the population lives in the flood plains of rivers and cyclone-prone coastal regions.²⁹ Rising sea levels also contribute to the salinization of coastal aquifers, thereby further threatening livelihoods of people in coastal regions.

Table 1. Population and land area in the Low Elevation Coastal Zone (LECZ), by region, 2000

Region	<i>Population and land area in LECZ</i>				<i>Share of population and area in LECZ</i>			
	<i>Population (million)</i>		<i>Land ('000 km²)</i>		<i>Population (%)</i>		<i>Land (%)</i>	
	Total	Urban	Total	Urban	Total	Urban	Total	Urban
Africa	56	31	191	15	7	12	1	7
Asia	466	238	881	113	13	18	3	12
Europe	50	40	490	56	7	8	2	7
Latin America	29	23	397	33	6	7	2	7
Australia and New Zealand	3	3	131	6	13	13	2	13
North America	24	21	553	52	8	8	3	6
Small Island States	6	4	58	5	13	13	16	13
World	634	360	2,700	279	10	13	28	8

Source: McGranahan, Blak, and Anderson, "The Rising Tide," (2007). (Reprinted with permission)

Dimension of Global Climate Change," Press Release, November 8, 2007, <http://www.foreign.gov.mv/v2/news.php?news=219> [accessed January 2008].

²⁸ CNA Corporation, 2007, "National Security," 24.

²⁹ McGranahan, Blak, and Anderson, 2007, "The Rising Tide," 19.

Table 2. Population and land area in the Low Elevation Coastal Zone (LECZ), by national income, 2000

	<u>Population and land area in LECZ</u>				<u>Share of population and land area in LECZ</u>			
	<u>Population (million)</u>		<u>Land ('000 km²)</u>		<u>Population (%)</u>		<u>Land (%)</u>	
Income group	Total	Urban	Total	Urban	Total	Urban	Total	Urban
Low income	247	102	594	35	10	14	2	8
Lower-middle income	227	127	735	70	11	14	2	8
Upper-middle income	37	30	397	42	7	9	2	8
High income	107	93	916	129	12	12	3	9
World	618	352	2,642	275	10	13	2	8

Source: McGranahan, Blak, and Anderson, "The Rising Tide," (2007). (Reprinted with permission)

Note: Total population estimate for the world does not match that found in Table 1 because no income classification was available for several countries.

Dasgupta and others conducted a study in 2007 that analyzed the impacts of a 1- to 5-meter sea level rise on 84 developing coastal countries.³⁰ Their findings are summarized in table 3.

Table 3. Impacts of 1–5 meter sea level rise in 84 developing coastal countries

	1m	2m	3m	4m	5m
Area (Total = 63,332,530 sq. km.)					
Impacted area	194,309	305,036	449,428	608,239	768,804
% of total area	0.31	0.48	0.71	0.96	1.21
Population (Total = 4,414,030,000)					
Impacted population	56,344,110	89,640,441	133,049,836	183,467,312	245,904,401
% of total population	1.28	2.03	3.01	4.16	5.57
GDP (Total = 16,890,948 million USD)					
Impacted GDP (USD)	219,181	357,401	541,744	789,569	1,022,349
% of total GDP	1.30	2.12	3.21	4.67	6.05
Urban extent (Total = 1,434,712 sq. km.)					
Impacted area	14,646	23,497	35,794	50,742	67,140
% of total area	1.02	1.64	2.49	3.54	4.68
Agricultural extent (Total = 17,975,807 sq. km.)					
Impacted area	70,671	124,247	196,834	285,172	377,930
% of total area	0.39	0.69	1.09	1.59	2.10
Wetlands area (Total = 4,744,149 sq. km.)					
Impacted area	88,224	140,355	205,697	283,009	347,400
% of total area	1.86	2.96	4.34	5.97	7.32

Source: Dasgupta et al., 2007, "The Impact of Sea Level Rise." (Reprinted with permission)

Dasgupta further broke down their findings by region, showing a significant variation in the impacts of a rise in the sea level (1m and 5m) from region to region (see table 4).

³⁰ See note 26.

Table 4. Impacts of sea-level rise by region (1m and 5m)

	World	LA	MENA	SSA	EA	SA
Indicators						
	1m SLR					
Area	0.31	0.34	0.25	0.12	0.52	0.29
Population	1.28	0.57	3.20	0.45	1.97	0.45
GDP	1.30	0.54	1.49	0.23	2.09	0.55
Urban extent	1.02	0.61	1.94	0.39	1.71	0.33
Ag. extent	0.39	0.33	1.15	0.04	0.83	0.11
Wetlands	1.86	1.35	3.32	1.11	2.67	1.59
	5m SLR					
Area	1.21	1.24	0.63	0.48	2.30	1.65
Population	5.57	2.69	7.49	2.38	8.63	3.02
GDP	6.05	2.38	3.91	1.42	10.2	2.85
Urban extent	4.68	3.03	4.94	2.24	8.99	2.72
Ag. extent	2.10	1.76	3.23	0.38	4.19	1.16
Wetlands	7.30	6.57	7.09	4.70	9.57	7.94

LA: Latin America and Caribbean; MENA: Middle East and North Africa; SSA: Sub-Saharan Africa; EA: East Asia; SA: South Asia.

Source: Dasgupta et al., 2007, "The Impact of Sea Level Rise." (Reprinted with permission)

These tables present a grim picture for developing countries. Even if greenhouse gas (GHG) emissions were stabilized now, thermal expansion and deglaciation would continue to raise the sea level for many decades to come. As climate change continues to contribute to the retreat, advance, and in the case of low-lying islands, complete disappearance of coastlines, it poses potentially crucial questions for the rights of coastal states over their maritime zones. Is it possible for maritime boundaries to shift? Could a country's right to explore offshore resources be affected? What about those resources currently within international waters? Could there be a change in the ownership of strategic sea lanes? The next section will analyze the relevant provisions of UNCLOS to shed some light on these questions.

II. Potential Implications of Climate Change for Coastal States

Rights of Coastal States under UNCLOS

UNCLOS entered into force in 1994. It provides certain rights and obligations to coastal states and allows them to establish various maritime zones, such as a territorial sea and an exclusive economic zone (EEZ). This section of the paper highlights certain rights of coastal states over their maritime zones.

Territorial sea

A coastal state can extend its sovereignty beyond its land territory and internal waters up to a limit of 12 nautical miles to an adjacent belt of sea. Pursuant to UNCLOS, this area is referred to as the “territorial sea.”³¹ This sovereignty also extends to the airspace over the territorial sea and to its bed and subsoil. Baselines are normally measured from the low-water line along the coast.³² Where the coasts of two states are opposite or adjacent to each other, neither state is entitled to extend its territorial sea beyond the median line, every point of which is equidistant from each state’s baseline, unless there are historic or other “special” circumstances that dictate otherwise.³³

A coastal state may promulgate legislation concerning a range of issues within its territorial sea, including the safety of navigation; protection of cables and pipelines; the conservation of living resources and prevention of infringements of fisheries laws; the preservation of the environment and the prevention, reduction, and control of marine pollution; marine scientific research; and the prevention of infringements of customs, fiscal, immigration, and sanitary laws.³⁴ While ships of all states, whether coastal or landlocked, can enjoy the right of “innocent passage” (as defined in Articles 18 and 19 of UNCLOS) through a territorial sea, any such ship must also comply with the coastal state’s relevant legislation governing the territorial sea.³⁵

³¹ UNCLOS, art. 3.

³² *Ibid.*, art. 5. Different baselines apply to particular geographical situations, including reefs (art. 6), indented coastline or fringe of islands (art. 7), mouth of rivers (art. 9), and low tide elevations (art. 13). See also art. 47 for archipelagic baselines. The use of the low-water line has become international customary law and generally allows a country to claim the maximum area within its maritime zones. See David Freestone, 1991, “International Law and Sea Level Rise,” in *International Law and Global Climate Change*, edited by Robin Churchill and David Freestone (London: Springer), 111.

³³ UNCLOS, art. 15. UNCLOS does not define these “special” circumstances. The “equidistance/special circumstances” rule has been accepted by the International Court of Justice (ICJ) as customary international law. See the discussion in “Maritime Delimitation and Territorial Questions between Qatar and Bahrain, Merits, Judgment” (hereinafter “Qatar and Bahrain”), *ICJ Reports 2001*, 40, paras 175–6.

³⁴ UNCLOS, art. 21.

³⁵ *Ibid.*, art. 17, 18, and 19.

Archipelagic sea

Archipelagic states³⁶ have the right to draw archipelagic baselines, which are straight baselines joining the outermost points of the outermost islands and drying reefs of the archipelago, provided that included within such baselines are the main islands and an area in which the ratio of the area of the water to the area of the land, including atolls, is between 1 to 1 and 9 to 1.³⁷ The sovereignty of archipelagic states extends to the airspace over archipelagic waters, as well as to their bed and subsoil and the resources contained therein, subject to certain conditions. An archipelagic state is required to “respect existing agreements with other [s]tates,” “recognize traditional fishing rights and other legitimate activities” of neighboring states, as well as to respect rights connected to existing submarine cables in certain areas of its archipelagic water, and other states’ rights of innocent passage and archipelagic sea lanes passage.³⁸

Contiguous zone

In a belt of sea contiguous to the territorial sea, coastal states may exercise the control necessary to prevent or punish infringement of customs, fiscal, immigration, and sanitary laws in its territory or territorial sea.³⁹ This zone may not exceed 24 nautical miles in breadth from “the baselines from which the breadth of the territorial sea is measured.”⁴⁰

Exclusive Economic Zone (EEZ)

A major feature of UNCLOS is that it legitimizes claims by coastal states of the sovereign right, within a 200-nautical mile exclusive economic zone (EEZ), to explore, exploit, conserve, and manage the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil.⁴¹ An EEZ is measured from the baselines of the territorial sea. As part of these rights, coastal states can engage in the following activities, among others:

- determine the allowable catch of the living resources in its EEZ. Taking into account the best scientific evidence available to it, the coastal state is responsible for ensuring, through proper conservation and management measures, that the maintenance of the living resources in the EEZ is not endangered by over-exploitation.⁴²
- promote the objective of optimum utilization of these living resources. Nationals of other states that engage in fishing activities in the EEZ are required to comply with conservation measures and other terms and conditions specified in the laws and regulations of the coastal state.⁴³

³⁶ An archipelagic state is a state constituted wholly by one or more archipelagos and may include other islands. *Ibid.*, art. 46.

³⁷ *Ibid.*, art. 47.

³⁸ *Ibid.*, art. 51, 52, and 53. See also Myron Nordquist, 1985, *United Nations Convention on the Law of the Sea, 1982: A Commentary* (Charlottesville, NC: Center for Oceans Law and Policy, and, Dordrecht, The Netherlands: Martinus Nijhoff Publishers), 448.

³⁹ UNCLOS, art. 33(1).

⁴⁰ *Ibid.*, art. 33(2).

⁴¹ *Ibid.*, art. 56.

⁴² *Ibid.*, art. 61.

⁴³ *Ibid.*, art. 62.

- take such measures, including boarding, inspection, arrest, and judicial proceedings, as may be necessary to ensure compliance with the laws and regulations adopted by it in conformity with UNCLOS.⁴⁴

In engaging in these activities, the coastal state must give due regard to the rights and duties of other states. For example, all states, whether coastal or landlocked, enjoy the freedoms of navigation and overflight,⁴⁵ and “of the laying of submarine cables and pipelines, and other internationally lawful uses of the sea related to these freedoms, such as those associated with the operation of ships, aircraft and submarine cables and pipelines, and compatible with the other provisions of [the] Convention.”⁴⁶

Establishment of an EEZ is optional and its existence depends on an actual claim by a coastal state.⁴⁷ Once claimed, an EEZ coexists with the regime of the nation state’s continental shelf, which governs rights with respect to the seabed and the subsoil (see below).⁴⁸

Continental Shelf

The continental shelf of a coastal state comprises the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the “natural prolongation” of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured, where the outer edge of the continental margin does not extend up to that distance.⁴⁹ Coastal states have sovereign rights over the continental shelf to explore and exploit its natural resources, including “mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species.”⁵⁰ These rights do not “depend on

⁴⁴ Ibid., art. 73.

⁴⁵ Ibid., art. 87.

⁴⁶ Ibid., art. 58. See also the rights of landlocked states (art. 69) and of geographically disadvantaged states (art. 70) in an EEZ.

⁴⁷ A number of coastal states have chosen not to establish an EEZ, but have instead claimed a fishery zone, although the 1982 UNCLOS does not provide for such a zone. In such fishery zones, coastal states are allowed to exercise sovereign rights limited only to marine living resources. U.N. Division for Ocean Affairs and the Law of the Sea, 2000, *Handbook on the Delimitation of Maritime Boundaries* (New York: United Nations), 9. If all coastal states claimed 200-mile zones, they would collectively cover nearly 40 percent of the world’s oceans (Joseph K. Kalo et al., 2007, *Coastal and Ocean Law Cases and Materials*, 3d ed. [St. Paul, Minnesota: West Group], 305).

⁴⁸ Ian Brownlie, 2003, *Principles of Public International Law*, 6th ed. (Oxford: Oxford University Press), 200.

⁴⁹ UNCLOS, art. 76. In some cases, the outer limit of the continental margin can be located beyond 200 nautical miles (see Ibid., art. 76(4) and (6)). See also Ted McDorman, 1995, “The Entry into Force of the 1982 LOS Convention and the Article 76 Outer Continental Shelf Regime,” 10(2) *The Int’l J. Marine & Coastal L.*, 165–87 (1995). Under article 4 of annex II to the Convention, a coastal state intending to establish the outer limits to its continental shelf beyond 200 nautical miles is required to submit particulars of such limits to the Commission on the Limits of the Continental Shelf, along with supporting scientific and technical data by May 12, 2009 (United Nations Convention on the Law of the Sea, 2001, “Report of Meeting of States Parties,” Eleventh Meeting, May 14–18, 2001, Document SPLOS/73. Available on the Web site of the United Nations,

<http://daccessdds.un.org/doc/UNDOC/GEN/N01/411/52/PDF/N0141152.pdf?OpenElement> [accessed February 2008]).

⁵⁰ UNCLOS, art. 77(4).

occupation, effective or notional, or on any express proclamation.”⁵¹ In the *North Sea Continental Shelf* case, the International Court of Justice (ICJ) recognized these rights as customary law, stressing that these rights exist “*ipso facto* and *ab initio*.”⁵² Coastal states also have the “exclusive right to authorize and regulate drilling on the continental shelf for all purposes.”⁵³

The high seas

Article 86 of UNCLOS defines the high seas as “all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a state, or in the archipelagic waters of an archipelagic state.” UNCLOS further provides that the high seas are “open to all states” and that all states can exercise freedom of, among others, navigation, over-flight, construction of artificial islands, and other installations, fishing, and scientific research.⁵⁴ These freedoms “shall be exercised by all [s]tates with due regard for the interests of other [s]tates.”⁵⁵ Activities on board a ship are subject to the jurisdiction and control of its flag state.⁵⁶

All of the maritime zones discussed in this section are contingent upon the continued existence of a baseline, since they are all measured from the “baseline” as defined in UNCLOS.⁵⁷ Therefore, it seems to follow that if the baseline moves, under normal circumstances, the boundary would also move, and if a baseline point such as an exposed rock disappears, one might well contend that the boundary generated by that point would also move or even disappear.⁵⁸ The next section will analyze the potential implications of such a shift in baselines under UNCLOS.

Changing the Baselines—Potential Implications

1. Baseline points that would be most threatened by rising sea levels

The baseline points that would be most threatened by rising sea levels include the following:

⁵¹ *Ibid.*, art. 77(3).

⁵² “North Sea Continental Shelf, Judgment,” *ICJ Reports 1969*, 3, paras 19, 39, and 43.

⁵³ UNCLOS, art. 81.

⁵⁴ *Ibid.*, art. 87.

⁵⁵ *Ibid.*

⁵⁶ *Ibid.*, art. 94.

⁵⁷ Relevant provisions of UNCLOS include Articles 5, 6, 7, 9, 13, and 47.

⁵⁸ See, for example, Michael W. Reed, 2000, “Shore and Sea Boundaries: The Development of International Maritime Boundary Principles through United States Practice,” U.S. Department of Commerce, Washington, DC, 185, which states that “the coast line, or baseline, is the mean low-water line. As that line moves landward or seaward with accretion and erosion, so does the baseline. As the baseline ambulates, so does each of the maritime zones measured from it”. Freestone notes, “If the low-water line retreats landward then because all maritime zones are measured from that baseline, the outward limits of maritime zones will similarly move landward and the coastal state’s maritime zone limits will shrink proportionately” (Freestone, 1991, “International Law and Sea Level Rise,” 111). See also Alfred Soons, 1990, “The Effects of a Rising Sea Level on Maritime Limits and Boundaries,” 37(2) *Netherlands Int’l L. Rev.* 216, which states: “Because of the landward shift of the baseline, the outer limits of the territorial sea and EEZ will also shift landward accordingly.”

- low-tide elevations (drying rocks). These can serve as a baseline point if they are located within the territorial sea.⁵⁹ According to some commentators, if a drying rock is located within 12 nautical miles from shore (see the definition of territorial sea above), permanent submergence of this rock by a rising sea level could mean a loss of territorial sea generated by the rock.⁶⁰
- fringing reefs. In the case of islands having fringing reefs, the baseline for measuring the breadth of the territorial sea is the seaward low-water line of the reef.⁶¹ With rising sea levels, therefore, the extent of the territorial sea may change for these islands.
- riverbanks. Article 9 of UNCLOS provides that “if a river flows directly into the sea, the baseline shall be a straight line across the mouth of the river between points on the low-water line of its banks.”⁶² Riverbanks, however, are subject to constant erosion and accretion. Therefore, a maritime zone generated using the riverbank as a base point may shift.⁶³

⁵⁹ UNCLOS, Article 13, defines a “low-tide elevation” as the following:

1. A low-tide elevation is a naturally formed area of land which is surrounded by and above water at low tide but submerged at high tide. Where a low-tide elevation is situated wholly or partly at a distance not exceeding the breadth of the territorial sea from the mainland or an island, the low-water line on that elevation may be used as the baseline for measuring the breadth of the territorial sea.

2. Where a low-tide elevation is wholly situated at a distance exceeding the breadth of the territorial sea from the mainland or an island, it has no territorial sea of its own.

⁶⁰ See, for example, David Caron, 1990, “When Law Makes Climate Change Worse: Rethinking the Law of Baselines in Light of a Rising Sea Level,” 17 *Ecology L.Q.*, 621. It is not clear whether low-tide elevation can be used as a base point for any other maritime zone besides a territorial sea. See, R. Lavalley, 2004, “Not Quite a Sure Thing: The Maritime Areas of Rocks and Low-Tide Elevations Under the UN Law of the Sea Convention,” 19(1), *IJMCL* 43. If it can be used as a base point for other maritime zones, a loss due to a rising sea level could also influence all the maritime zones generated using the low-tide elevation as a base point.

⁶¹ UNCLOS, art. 6. UNCLOS does not define a “fringing reef”, but it is a coral reef that is directly attached to or borders the shore of an island or continent, having a rough table-like surface that is exposed at low-tide. For a detailed discussion on reefs and UNCLOS, see P.B. Beazley, 1991, “Reefs and the 1982 Convention on the Law of the Sea,” 6(4) *Int’l J. Estuarine & Coastal L.* 283.

⁶² Where a river forms a delta and creates “other natural conditions,” making the coastline highly unstable, the coastal state may draw straight baselines by selecting appropriate points along the furthest seaward extent of the low-water line. In these situations, it would appear that UNCLOS, Article 7, and not Article 9, would apply (see below for more on art. 7) (Nordquist, 1985, *United Nations Convention*, 111).

⁶³ See Hiran W. Jayewardene, 1990, *The Regime of Islands in International Law* (Dordrecht, The Netherlands: Martinus Nijhoff Publishers), 224. Where rivers have formed a boundary between states, at least one tribunal has concluded that the boundary should be located on the “actual” bank of the river, regardless of any potential changes in the course of streams due to accretion, erosion, or avulsion (Opinion and Award of the Special Boundary Tribunal, Guatemala and Honduras, Washington, DC, 1933.) For the history of this dispute, see F.C. Fisher, 1933, “The Arbitration of the Guatemalan-Honduran Boundary Dispute” 27(3) *The Am. J. of Int’l Law*, 426.

A related issue has arisen concerning the Orange River between Namibia and South Africa. The Orange River forms the boundary between the two countries and demonstrates the difficulty of determining a maritime boundary using the mouth of a river as a base point. Namibia claims that the border should be the middle line of the river, while South Africa claims that the border should be the deepest part of the river, which would be on the northern high-water mark, and not the middle of the river. The discussion has been ongoing since 1990, when Namibia became independent, but there is as yet

- islands. UNCLOS Article 121 provides that islands are entitled to a 200-mile wide EEZ as well as a territorial sea, contiguous zone, and the continental shelf.⁶⁴ According to most commentators, an island in the legal sense has to meet two conditions: (i) it must be natural and not an artificial installation and (ii) it must always be above sea level.⁶⁵ Formations visible only at low tide, and permanently submerged banks and reefs, do not in general produce a territorial sea.⁶⁶ One key, therefore, to the issue of climate change as discussed here is that the rising sea level could submerge part of or an entire island, thereby potentially giving rise to the claim that the impacted island state has been deprived of its right to use that part of its island group to extend its EEZ.⁶⁷

2. Relevant provisions of UNCLOS

It is important to note that UNCLOS does not expressly provide that boundaries should move with baselines. However, it may be worthwhile to consider how UNCLOS might influence this issue as a result of the negative implications in two of its provisions. First, UNCLOS arguably “permanently” fixes the outer boundary of the continental shelf by providing that the “coastal [s]tate 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” (emphasis added).⁶⁸

no agreement. Consequently, the maritime boundary generated from the river is also disputed. See Salman Salman, 2004, “Shared Watercourses in the Southern African Development Community: Challenges and Opportunities,” 6 *Water Pol’y* 29; Leon E. Moller, 2003, “The Outstanding Namibian Maritime Boundaries with Angola and South Africa,” 18(2) *The Int’l J. of Marine & Coastal Law*, 248–9. See also S. Akweenda, 1997, *International Law and Protection of Namibia’s Territorial Integrity: Boundaries And Territorial Claims* (The Hague: Kluwer Law International).

⁶⁴ Article 121(3) of UNCLOS distinguishes “islands” from “rocks,” saying that “rocks which cannot sustain human habitation or economic life of their own shall have no exclusive economic zone or continental shelf.” Read together with other paragraphs in Article 121, this paragraph implies that rocks can establish maritime areas other than an EEZ or continental shelf, i.e., internal waters, a territorial sea, and a contiguous zone. However, this is not clear and some scholars have argued otherwise. See Lavalle, 2004, “Not Quite a Sure Thing.” In “Qatar v. Bahrain,” the ICJ concluded that “the terrestrial territorial situation. . . must be taken as starting point for the determination of the maritime rights of a coastal [s]tate. In accordance with Article 121, paragraph 2, of the 1982 Convention on the Law of the Sea, which reflects customary international law, islands, regardless of their size, in this respect enjoy the same status, and therefore generate the same maritime rights, as other land territory” (“Qatar v. Bahrain,” 97, para. 185).

⁶⁵ In *Nicaragua v. Honduras*, the ICJ analyzed the status of Bobel Cay, Savanna Cay, Port Royal Cay, and South Cay in the Caribbean, concluding that these “remain above water at high tide” and that “they thus fall within the definition and regime of islands under Article 121 of UNCLOS” (“Case Concerning Territorial and Maritime Dispute between Nicaragua and Honduras in the Caribbean Sea, Judgment,” *ICJ Reports 2007*, 40, para. 137).

⁶⁶ See Brownlie, 2003, *Principles of Public International Law*, 183.

⁶⁷ See generally, Caron, 1990, “When Law Makes Climate Change Worse,” 637; Freestone, 1991, “International Law and Sea Level Rise,” 110–12. See also David Freestone and John Pethick, 1994, “Sea Level Rise and Maritime Boundaries: International Implications of Impacts and Responses,” in *Maritime Boundaries*, vol. 5, edited by Gerald H. Blake (London: Routledge); Soons, 1990, “The Effects of a Rising Sea Level,” 218.

⁶⁸ UNCLOS, art. 76(9).

Second, UNCLOS also seems to fix the baselines for deltas and other natural conditions that make coastlines “highly unstable.” Article 7 provides that:

Where because of the presence of a delta and other natural conditions the coastline is highly unstable, the appropriate points may be selected along the furthest seaward extent of the low-water line and, ***notwithstanding subsequent regression of the low-water line, the straight baselines shall remain effective until changed by the coastal State in accordance with this Convention*** (emphasis added).⁶⁹

This provision allows coastal states to change the baseline as long as such a change is done in accordance with the Convention. If a state does not take any actions to change the baseline, however, the old baseline “remains effective.”⁷⁰ No state, to date, has changed its baseline pursuant to this Article.

There are no provisions that potentially “fix” the outer boundary of the EEZ, the contiguous zone, or the territorial sea. Many scholars have therefore considered the legal and physical boundary of these maritime zones to be ambulatory.⁷¹ For example, one expert who has been involved in maritime boundary issues for almost four decades concludes that “as [the normal low-water line] moves landward and seaward with accretion and erosion, so does the baseline. As the baseline ambulates, so does each of the maritime zones measured from it.”⁷² This view, perhaps more than any other, makes clear how rising sea levels may soon affect boundary lines, at least as viewed by some scholars.

Moreover, the draft provision of the 1958 Geneva Convention,⁷³ the precursor to UNCLOS, as well as the comments made by members of the International Law Commission (ILC) during the preparation of that draft, appear to support the idea of an “ambulatory coastline.” One of the discussions at the ILC’s Fourth Session (170th and 171st meetings) focused on Article 5, paragraph 3 of the draft provision, which states:

⁶⁹ This provision was advocated by Bangladesh and drafted with the specific case of the Ganges/Brahmaputra River delta in mind. See Nordquist, 1985, *United Nations Convention*, 101. However, this provision is presumably not only applicable to deltas, since it also refers to “and other natural conditions.” It is interesting to note that Bangladesh did not utilize this provision to declare its coastal baselines on April 13, 1974 (see Freestone, 1991, “International Law and Sea Level Rise,” 111).

⁷⁰ On the issue of whether a coastal state is obliged to change the baseline, Soons argues that a “coastal [s]tate is supposed to make the necessary changes, for example, when the discrepancy between the former and the new situation has become quite substantial or when through various causes the instability of the coastline has been substantially reduced. The coastal [s]tate has, however, been left a certain degree of freedom to decide when (and therefore also: how frequently) it will effect the changes” (Soons, 1990, “The Effects of a Rising Sea Level,” 220).

⁷¹ See, for example, Richard G. Hildreth and Ralph W. Johnson, 1983, *Ocean and Coastal Law* (Englewood Cliffs, New Jersey: Prentice Hall), 32; Caron, 1990, “When Law Makes Climate Change Worse,” 641; Kalo et al., 2006, *Coastal and Ocean Law*, 49.

⁷² Reed, 2000, “Shore and Sea Boundaries.” It is interesting to note that in the USA, an amendment to the Submerged Lands Act provides that when an offshore boundary has been established by final Supreme Court decree, it will remain fixed in that location regardless of changes in the coastline (43 U.S.C. 1301(b)).

⁷³ United Nations Convention on the Territorial Sea and the Contiguous Zone, *opened for signature* Apr. 29, 1958, 516 U.N.T.S. 205.

The line of low-water mark is that indicated on the charts officially used by the coastal [s]tate, provided the latter line [the line indicated on the charts] does not appreciably depart from the line of mean low-water spring tides.⁷⁴

From this language, the original drafters of the Convention seem to suggest that they recognized the possibility that a mean low-water mark may change, or that the mark charted on a map may not always be accurate.⁷⁵ In the discussion, no member objected to this draft language, except one, who expressed his concern that the word “appreciably” may introduce unnecessary subjectivity in determining what is “appreciable.”⁷⁶ Without deciding on any definition, the discussion on this Article ended with one member suggesting that “if a dispute arose as to whether a chart did or did not ‘appreciably’ depart from [the more scientific] criterion, it could be referred to an international tribunal.”⁷⁷ Notably, however, this particular paragraph was not included in the two subsequent sessions (Sixth and the Seventh Sessions) of the ILC, where the members discussed the regime of the territorial sea again, nor in the final text of UNCLOS.

3. What are the requirements for establishing baselines under UNCLOS?

If the boundaries of an EEZ, contiguous zone, and territorial sea are indeed ambulatory, as claimed by some scholars, what are the steps that a coastal state would need to take to legally change a baseline? UNCLOS does not specify the steps that are required to change baselines. However, as noted above, it does provide a detailed description of how baselines should be drawn. Presumably, the same requirements must be met to change the baselines.

*First, a baseline must be drawn in accordance with the Convention.*⁷⁸ A coastal state must then fulfill the deposit and due publicity requirements. The purpose of these requirements is to ensure that the international community is adequately informed of the boundaries of the territorial sea and other maritime zones of a coastal state.

Deposit requirement. Coastal states are required under UNCLOS to deposit with the U.N. Secretary-General charts showing straight baselines and archipelagic baselines, as well as the outer limits of the territorial sea, the EEZ, and the continental shelf.⁷⁹ Alternatively, lists of geographical coordinates of points, specifying the geodetic datum, may be substituted.

⁷⁴ International Law Commission, 1952, *Yearbook of International Law Commission 1952*, vol. I (New York: United Nations), 171.

⁷⁵ See, for example, *ibid.*, Mr. Scelle (France), 177: “[N]ot all States possessed expert hydrographic services, and an international body of the standing of the Commission could not assume that official charts were always accurate”).

⁷⁶ *Ibid.*, Mr. Amado (Brazil), 177: “. . . the latter part of the paragraph seemed to him entirely superfluous, since an official chart which departed appreciably from the line of mean low-water spring tides would not be used for drawing the baseline. . . such a provision was dangerously subjective and might give rise to ambiguity. . .” and “. . . the cases where official charts were more than slightly inaccurate were so infrequent as to make it unnecessary to introduce the element of subjective appreciation contained in the second clause.”

⁷⁷ *Ibid.*, Mr. Yepes (Columbia), 178.

⁷⁸ Again, the relevant provisions for drawing the baselines include UNCLOS, Articles 5, 6, 7, 9, 13, and 47.

⁷⁹ Relevant provisions are UNCLOS, Articles 16(2), 47(9), 75(2), and 84(2).

Publicity requirement. Coastal states are required to give due publicity to the charts and lists of geographical coordinates mentioned above. These states are also obliged to give due publicity to all laws and regulations relating to innocent passage through the territorial sea⁸⁰ and all laws and regulations adopted by states bordering straits that relate to transit passage through such straits for international navigation.⁸¹

4. What are potential legal implications of changing baselines?

Provided that coastal states meet the deposit and publicity requirements of UNCLOS, they can presumably submit information to support a reported change in their baselines. Although it is difficult to predict with certainty all the possible legal implications of such a change, we can list some potential consequences here.⁸² For example, if the outer limit of the territorial sea shifts landward, it could mean that some area that now falls in territorial sea becomes part of the EEZ, and what is now within the EEZ would become part of the high seas. This, in turn, would imply that a coastal state can start exercising its “sovereign rights” granted to it in the EEZ for the “economic exploitation and exploration” in what is now the territorial sea, but that it could lose part of its current EEZ.⁸³ In addition, if such a shift occurs, other states would have “freedom of navigation” instead of “innocent passage” in certain parts of the coastal state’s waters. This change could in turn mean that a warship would possibly gain increased flexibility in its navigation in those parts of the water.⁸⁴

One could postulate that rising sea levels may lead some states to try to preserve the current baselines by arguing that it would promote stability in boundaries (less uncertainty), be fair (in that it maintains the present allocation of authority over the oceans and their resources, preserving the “historic use” of the waters), and be efficient (in that it avoids the costs of adjustment).⁸⁵ In addition, constant changes to boundaries have the potential to cause confusion and possibly reduce confidence in the location of maritime limits. Some scholars have also argued that tying maritime boundaries to ambulatory baselines would encourage wasteful spending by states to protect the baselines.⁸⁶ Alternatively, other states may try to

⁸⁰ UNCLOS, art. 21(3).

⁸¹ *Ibid.*, art. 42(3).

⁸² For a detailed discussion of possible implications of rising sea levels on maritime limits and boundaries, see Soons, 1990, “The Effects of a Rising Sea Level,” 221–30.

⁸³ As discussed above, the high seas are “open to all [s]tates” (UNCLOS, art. 87).

⁸⁴ UNCLOS specifically includes several provisions governing navigation of warships in territorial sea (e.g., art. 30–31), but does not have any similar provisions for an EEZ.

⁸⁵ Some officials in the British and Dutch governments, for example, have expressed the view that the chart is the legal document which determines the position of the normal baseline and that it should remain so even where the coastline’s configuration has changed. According to this view, even if the coastline shifts, if a country does not update and publish the chart, the legal baseline would remain the one on the published chart. See Prescott and Schofield, 2005, *Maritime Political Boundaries*, 101 (citing personal communications in 2001). For an “historic water” argument, see Soons, 1990, “The Effects of a Rising Sea Level,” 224–5.

⁸⁶ See, for example, Caron, 1990, “When Law Makes Climate Change Worse.” Keeping charts and baseline information up to date can be a very expensive undertaking and, for many coastal states, it receives low priority. See E. Bird and V. Prescott, 1989, “Rising Global Sea Levels and National Maritime Claims,” 1 *Mar. Pol’y Rep.*, 177–96; Prescott and Schofield, 2005, *Maritime Political Boundaries*, 101. This point is of particular interest to the authors, as it raises concerns about how developing countries will adapt to climate change and the rise in sea levels.

take advantage of these shifting coastlines and argue that they should be entitled to augment their baselines and their maritime boundaries accordingly.

It is questionable, however, whether any state would attempt to change its baseline. One possible such situation is that the sea level rises in such a way that a state loses its coastline and this loss leads to a potentially expanded territorial claim by another state (most likely an opposite or an adjacent state). In such a case, it may be in the interest of the state with the potentially increased territorial claim to seek to change its baseline. Even in such a situation, however, a state may be dissuaded from doing so because of, among other reasons, high costs and uncertainties associated with such a shift.

Many maritime zones are subject to bilateral or multilateral maritime boundary delimitation treaties, and these treaties may further complicate the situation, especially where not all countries involved are party to UNCLOS.⁸⁷ Maritime boundary delimitation treaties generally define the maritime boundaries, as well as the access rights that each state has over their various maritime zones.⁸⁸ Given that more than 90 percent of the global fish catch is taken within zones that are under national jurisdiction,⁸⁹ states are increasingly turning to these treaties to define their own rights and obligations, as well as those of others. Negotiations of these treaties entail extensive preparatory work, expertise, and substantial amounts of data. Thus, once they are negotiated, they are unlikely to change for a long time. It is therefore important that these maritime boundary delimitation treaties adequately take account of possible future shifts in baselines⁹⁰ and that developing countries receive appropriate and sufficient technical support when negotiating these treaties so that their interests are effectively represented.

5. If faced with a dispute concerning changes in baselines, what might a court consider?

There are no cases directly on point that answer how a court would rule if one state sought to limit territorial or maritime claims of another because the latter state allegedly lost territory due to rising sea levels, and it is not within the purview of this paper to predict such cases. Nevertheless, in the authors' view, it is interesting that on a number of occasions, the U.S. Supreme Court, in contrast to the relevant provisions of UNCLOS noted above, has defined

⁸⁷ UNCLOS allows bilateral and regional agreements to define certain rights of states. See, for example, art. 51, which provides that, "[A]n archipelagic State shall respect existing agreements with other States and shall recognize traditional fishing rights and other legitimate activities of the immediately adjacent to neighboring States in certain areas falling within archipelagic waters. The terms and conditions for the exercise of such rights and activities, including the nature, the extent and the areas to which they apply, shall, at the request of any of the States concerned, be regulated by bilateral agreements between them." See also art. 69, which allows bilateral, sub-regional, and regional agreements for landlocked states; and art. 70, for geographically disadvantaged states. For a discussion on possible implications of adjusting boundary delimitation agreements, see Soons, 1990, "The Effects of a Rising Sea Level," 227–8.

⁸⁸ These agreements are available on the Web site of the U.N. Division for Ocean Affairs and the Law of the Sea (DOALAS), <http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/regionslist.htm> (accessed February 2008). See also DOALAS, 2000, *Handbook*, chap. 6.

⁸⁹ Fisheries and Aquaculture Department, Food and Agriculture Organization (FAO) of the United Nations, n.d., "Governance of Exclusive Economic Zones," Rome, Italy, <http://www.fao.org/fi/website/FIRetrieveAction.do?dom=topic&fid=12271> (accessed October 2007).

⁹⁰ This is particularly true for bilateral boundary delimitation treaties because a shift in one state's baseline may impact the boundary of maritime zones of its neighboring state.

coastlines as “modern” and “ambulatory.”⁹¹ In these cases, the Court treated coastlines as something that can be “heretofore or hereafter modified by natural or artificial means,” as opposed to something that is fixed at one point in the history.⁹²

The U.S. Supreme Court affirmed this approach in *United States v. Alaska* and concluded that “the shifts in a low-water line along the shore . . . could lead to a shift in the baseline for measuring a maritime zone,” and that the “State’s entitlement to submerged lands beneath the territorial sea would change” accordingly as the baseline shifts.⁹³ In addition, in *United States v. Louisiana*, where a Special Master considered whether or not to use the actual low-water line or the one charted on a map, the Master cited a federal concession that “extrinsic evidence is admissible to show significant deviations on such charts from the actual low-water line, in which case the actual low-water line prevails.”⁹⁴

In 2007, the U.S. Supreme Court confronted the issue of shrinking coastlines resulting from global warming in *Massachusetts v. EPA*.⁹⁵ In that case, the state of Massachusetts argued, among other things, that the potential loss of the state’s 200 miles of coastline due to the rise in the sea level was a “concrete and particularized injury that is either actual or imminent.”⁹⁶ The Court expressly relied on Massachusetts’ uncontested allegation that the “rising seas have already begun to swallow Massachusetts’ coastal land” and found that “because the Commonwealth ‘owns a substantial portion of the state’s coastal property,’ it has alleged a particularized injury” that can be attributed to the defendant (the Environmental Protection Agency).⁹⁷ Among other reasons, this case was significant because it was the first time that the Court addressed and recognized the loss of coastlines due to climate change. The USA has a number of other cases pending, in which plaintiffs claim various industries are responsible for the effects of global warming.⁹⁸

⁹¹ These cases are discussed as an example of how a court has ruled in the past; the authors realize that they do not set precedent outside of the United States.

⁹² *United States v. California*, 382 U.S. 448, 449 (1966). See also *United States v. California*, 381 U.S. 139, 177 (1965); *United States v. Louisiana*, 382 U.S. 288, 290 (1965); *United States v. Louisiana*, 394 U.S. 1, 5 (1969)(Texas Boundary Case); *United States v. Louisiana*, 394 U.S. 11, 32–3 (1969)(Louisiana Boundary Case); *United States v. Alaska*, 521 U.S. 1, 31 (1997).

⁹³ *United States v. Alaska*, 521 U.S. 1, 31 (1997).

⁹⁴ *United States v. Louisiana*, Report of the Special Master, at 43 (July 31, 1974). The Special Master in this case did not define “significant deviation,” but one expert has concluded, based on his analysis of federal and state practices in the USA, that Special Masters have accepted “evidence of relatively minor deviations” as sufficient to justify the use of actual coastline instead of one charted on a map. See Reed, 2000, “Shore and Sea Boundaries,” 182–3.

⁹⁵ *Massachusetts v. Environmental Protection Agency*, 549 U.S. (2007).

⁹⁶ The petitioners presented uncontested affidavits that showed that there will be a possible loss of roughly 14 acres of land per mile of coastline by 2100, and that a 10-year flood will have the magnitude of the present 100-year flood, and a 100-year flood will have the magnitude of the present 500-year flood, due to a rise in the sea level (Ibid. footnote 20). The petitioner also argued that, “where the slope is less than 2 percent, which is true of much of the Massachusetts coastline, every foot rise will create a loss of more than 50 feet of horizontal land” (Oral Argument, *Massachusetts v. Environmental Protection Agency*, 549 U.S. (2007)(No. 05-1120) 13).

⁹⁷ Ibid., 20–23.

⁹⁸ See Justin Pidot, 2006, “Global Warming in the Courts: An Overview of Current Litigation and Common Legal Issues,” The Georgetown Environmental Law and Policy Institute, Georgetown University, Washington, DC; Jim Salzman and David Hunter, 2007, “Negligence in the Air: The Duty of Care in Climate Change Litigation,” 155 *U.Pa.L.Rev.* 1741; David Hunter, 2007 “The Implications of

At the international level, the authors are not aware of any cases involving boundary disputes arising from changes in coastlines or baselines, certainly none arising from the changes postulated in this paper.⁹⁹ The ICJ has, however, decided many cases involving delimitation of maritime zones between opposite or adjacent states. As mentioned above, the ICJ has accepted the “equidistance/special circumstances” rule as customary international law. In determining maritime boundaries, the Court has also taken the equity principle into account. For example, in the *North Sea Continental Shelf* case, the Court said:

In fact, there is no legal limit to the considerations which [s]tates may take account of for the purpose of making sure that they apply equitable procedures, and more often than not it is the balancing-up of all such considerations that will produce this result rather than reliance on one to the exclusion of all others.¹⁰⁰

In the 1980s, the ICJ reaffirmed this approach in a trilogy of judgments, all of which emphasized the role of equity.¹⁰¹ More recently, the ICJ clarified the method of drawing delimitation boundaries in *Cameroon v. Nigeria*:

The Court has on various occasions made it clear what the applicable criteria, principles and rules of delimitation are when a line covering several zones of coincident jurisdiction is to be determined. They are expressed in the so-called equitable principles/relevant circumstances method. This method...involves first drawing an equidistance line, then considering whether

Climate Change Litigation for International Environmental Law-Making” (July 15), Washington College of Law Research Paper, No. 2008–14, American University, Washington, DC, available on the Social Science Research Network Web site, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1005345 (accessed January 2008). See also Danny Hakim, “States Set to Sue the U.S. Over Greenhouse Gases,” *The New York Times*, October 24, 2007, <http://www.nytimes.com/2007/10/24/nyregion/24emissions.html> (accessed November 2007).

Some scholars have argued that a shift in the EEZ constitutes damages that may be redressed by a court: “The alteration of a coastline due to sea level rise will otherwise lead to a shift of the EEZ. . . . The overall size of a country’s EEZ would remain the same, but it would shift landwards. Since many fish stocks are dependent on the topography of the seabed rather than the distance of the coast, this could lead to fish stocks becoming high seas stocks that formerly were located in or straddled the EEZ of a given country. Since coastal states would lose their (restricted) sovereign rights over these stocks, such shift of EEZ could also be defined as a damage” (Richard S.J. Tol and Roda Verheyen, 2004, “State Responsibility and Compensation for Climate Change Damages: A Legal and Economic Assessment,” 32 *Energy Pol’y* 1109, 1116. For an interesting article on using UNCLOS to bring litigation for damages resulting from climate change, including shifts in coastlines, see William Burns, 2006, “Potential Causes of Action for Climate Change Damages in International Fora: The Law of the Sea,” 2 *Int’l J. Sust. Dev. L. & Pol’y* 27–52.

⁹⁹ On a related matter, the Inuit people of the Arctic have filed a claim before the Inter-American Commission on Human Rights concerning threatened losses to their way of life from warming temperatures and rising seas. For a discussion of this case, see Wagner and Goldberg, 2004, “An Inuit Petition.” There have also been petitions filed with the World Heritage Committee that request it to add Belize Barrier Reef, the Huarascan National Park (Peruvian Andes), and the Sagarmatha National Park (Nepal, Mt. Everest) to the List of World Heritage in Danger because of damages resulting from climate change. See the “Media/Press Releases” page of the Climate Justice Web site, <http://www.climatelaw.org/media>, for relevant legal, scientific and general media articles.

¹⁰⁰ “North Sea Continental Shelf,” *ICJ Reports 1969*, para 93. para 93.

¹⁰¹ “Continental Shelf (Tunisia/Libya Arab Jamahiriya), Judgment,” *ICJ Reports 1982*, 18; “Delimitation of the Maritime Boundary in the Gulf of Maine Area, Judgment,” *ICJ Reports 1984*, 246; and “Continental Shelf (Libyan Arab Jamahiriya/Malta), Judgment,” *ICJ Reports 1985*, 13.

there are factors calling for the adjustment or shifting of that line in order to achieve an “equitable result.”¹⁰²

This equidistance/special circumstance method was also adopted by the Annex VII Arbitral Tribunal of UNCLOS in *Guyana and Suriname* in 2007.¹⁰³

The relevant circumstances recognized by the Court and the international tribunals include the following:¹⁰⁴

- the general configuration of the coasts of the parties;
- general geomorphological, geological, and geographical factors;
- the incidence of natural resources (usually oil and natural gas) in the disputed area and the principle of equitable access to these resources;
- defense and security interests of the states that are party to the dispute; and
- consistency with the general direction of the land boundary.

In the most recent maritime boundary dispute in *Nicaragua v. Honduras*, the ICJ considered a number of factors to “achieve an equitable result.” First, the Court recognized that although the equidistance method is “widely used in the practice of maritime delimitation,” it “does not automatically have priority over other methods of delimitation and, in particular circumstances, there may be factors which make the application of the equidistance method inappropriate.”¹⁰⁵ Second, noting the highly unstable nature of the mouth of the River Coco at the Nicaragua-Honduras land boundary terminus, the Court decided that fixing base points on either bank of the river and using them to construct a provisional equidistance line would be “unduly problematic.”¹⁰⁶ Therefore, the Court used the bisector line method

¹⁰² “Land and Maritime Boundary between Cameroon and Nigeria (Cameroon v. Nigeria: Equatorial Guinea Intervening), Merits, Judgment,” *ICJ Reports 2002*, 303, para 288.

¹⁰³ The Arbitral Tribunal was constituted pursuant to Article 287 and in accordance with Annex VII of the U.N. Convention on the Law of the Sea, “In the Matter of an Arbitration Between Guyana and Suriname, Award of the Arbitral Tribunal” (September 17, 2007), <http://www.pca-cpa.org/upload/files/Guyana-Suriname%20Award.pdf> (accessed April 2008). In this case, the Tribunal considered whether the “established practice of navigation” and the historical oil practice of the parties should be taken into consideration in the delimitation of the maritime boundary between these two countries. It found that the former can be considered, but that the latter can be taken into account “only if they are based on express or tacit agreement between parties” (Ibid., 125). Finding no such agreement, the Tribunal concluded that “there are no factors which would render the equidistance line determined by the Tribunal inequitable” (Ibid., 127).

¹⁰⁴ Brownlie, 2003, *Principles of Public International Law*, 217. See also DOALAS, 2000, *Handbook*, chap 3; Malcolm D. Evans, 1991, “Maritime Delimitation and Expanding Categories of Relevant Circumstances,” 40(1) *Int’l & Comp. L.Q.*, 1–33.

¹⁰⁵ “Case Concerning Territorial and Maritime Dispute between Nicaragua and Honduras in the Caribbean Sea, Judgment,” *ICJ Reports 2007*, 74. Nicaragua was not party to UNCLOS at the time it filed the application in this dispute, but Nicaragua and Honduras agreed that relevant articles of UNCLOS would apply between them in this dispute (UNCLOS entered into force on November 16, 1994; Nicaragua became a party to it on May 4, 2000).

¹⁰⁶ Ibid., 74, para. 273. On the unstable nature of the river mouth, the Court found that, “the Parties agree. . . that the sediment carried to and deposited at sea by the River Coco have caused its delta, as well as the coastline to the north and south of the Cape [where the Nicaragua-Honduras land boundary ends],

instead—the line formed by bisecting the angle created by the linear approximations of coastlines—to draw the maritime boundary.¹⁰⁷

Third, the Court analyzed the status of a number of cays in the Caribbean claimed by different countries to be within their respective territorial seas. Specifically, the Court concluded that four cays in the Caribbean have the status of an “island” under UNCLOS 121, since they “remain above water at high tide.”¹⁰⁸ However, the Court refused to rule on other cays about which the parties disagreed (the dispute concerned whether these cays were only slightly above water or completely submerged at high tide).¹⁰⁹ It is not clear whether the Court could have used more data to determine the actual water level surrounding these cays.

As discussed above, the distinction between “an island,” “a rock,” and “a low-tide elevation” is important because coastal states’ maritime rights may alter depending on the category into which the maritime feature falls. With the current rising sea level, maritime features that now fall under “islands” or “low-tide elevation” may become permanently submerged. If that happens, a coastal state may potentially lose its territorial and maritime claim over the zones previously generated by that submerged maritime feature (or part of its archipelagic sea, if the submerged feature constitutes an “archipelago” as defined under UNCLOS). The Court’s ruling in *Nicaragua v. Honduras*, which addressed only the status of those islands that “remain above water at high tide,” and not other cays, thus did not clarify the uncertainties surrounding the potential loss of a coastal state’s maritime rights caused by climate change.

It may bear reiterating that the authors are unaware of any case at the international level involving a shift in coastlines caused by climate change, and that this paper merely considers the likelihood of such a case taking place. After the *Nicaragua vs. Honduras* case, it seems that the ICJ decided it can take into account the instability of coastlines and the status of a maritime feature (i.e., whether they constitute an “island”) when drawing maritime boundaries. Although ICJ cases are not *per se* precedent setting, given the approach taken by the ICJ in recent years, one might assume that it will likely continue to take these and other

to exhibit a very active morpho-dynamism. Thus continued accretion at the Cape might render any equidistance line so constructed today arbitrary and unreasonable in the near future” (Ibid., 75, para 277).

¹⁰⁷ In justifying the use of this method, the Court said (quoting “Delimitation of the Maritime Boundary in the Gulf of Maine Area, Judgment,” *ICJ Reports 1984*, 327, para. 195) that the justification “lies in the configuration of and relationship between the relevant coastal fronts and the maritime areas to be delimited. In instances where, as in the present case, any base points that could be determined by the Court are inherently unstable, the bisector method may be seen as an approximation of the equidistance method. Like equidistance, the bisector method is a geometrical approach that can be used to give legal effect to the ‘criterion long held to be as equitable as it is simple, namely that in principle, while having regard to the special circumstances of the case, one should aim at an equal division of areas where the maritime projections of the coasts of the States. . . converge and overlap’” (*Nicaragua and Honduras*, *ICJ Report 2007*, 78, para. 287).

¹⁰⁸ Ibid., 40, para. 137.

¹⁰⁹ “Uncertainty prevails in the case of Logwood Cay’s current condition: according to Honduras it remains above water (though only slightly) at high tide; according to Nicaragua, it is completely submerged at high tide. Given all these circumstances, the Court is not in a position to make a determinative finding on the maritime features in the area in dispute other than the four islands [Bobel Cay, Savanna Cay, Port Royal Cay and South Cay]. The Court thus regards it appropriate to pronounce only upon the question of sovereignty over [these four islands]” (Ibid., 41, paras. 143—4).

equity considerations into account if any disputes were to arise in the future to “achieve equitable results.”

III. What are the next steps?

While the potential impact of climate change has become one of the most prominent issues facing governments,¹¹⁰ its potential impact on coastal states’ rights over maritime zones has not yet received much attention. As discussed above, the economic, social, and environmental implications for coastal states may be significant. Given the current rapid rate of the rise in sea levels, certain issues may have important implications for their governments.

An important first step to address these implications is continued ratification of UNCLOS, particularly by key coastal states and those with vulnerable coastlines. Twenty-years after the text was finalized and more than a decade since it came into force, the Convention has 155 parties, which include both coastal and landlocked states.¹¹¹ However, 20 coastal states are still not parties to the Convention, including the United States.¹¹² Although many of these states have maritime zones that generally comply with the conditions set forth in the Convention, some have maritime boundaries that go beyond the provisions of the Convention. For example, Congo, El Salvador, Liberia, and Peru have set their territorial sea at 200 nautical miles.¹¹³ Although many principles in UNCLOS have become international customary law, most commentators agree that the more universal the ratification of the Convention becomes, the more the Convention can serve one of its key intended purposes: to help avoid potential tensions and conflicts over maritime claims.

Perhaps equally important is the drawing of accurate baselines and complying with the deposit and publicity requirements of UNCLOS. As of January 4, 2008, only 39 coastal states that are party to the Convention had fulfilled its deposit and publicity requirements.¹¹⁴ The authors believe it is worth considering whether the baseline information deposited with the UN, as well as the information contained in the maritime boundary delimitation treaties,

¹¹⁰ Climate change issues have also entered international fora where such issues were not traditionally addressed. See footnote 2.

¹¹¹ See “Status of the United Nations Convention on the Law of the Sea” (last updated February 1, 2008), Web site of U.N. Division for Ocean Affairs and the Law of the Sea, http://www.un.org/depts/los/reference_files/status2007.pdf, (accessed February 2008).

¹¹² As of August 7, 2007, the 20 states not party to the Convention were four in Africa (Republic of the Congo, Eritrea, Liberia, and Libyan Arab Jamahiriya); nine in Asia and the Middle East (Cambodia, Democratic People’s Republic of Korea, Islamic Republic of Iran, Israel, Syrian Arab Republic, Thailand, Timor-Leste, Turkey, and United Arab Emirates), one in North America (United States of America), and six in Latin America and the Caribbean (Colombia, Dominican Republic, Ecuador, El Salvador, Peru, and Venezuela).

¹¹³ These countries do not distinguish between different maritime zones.

¹¹⁴ See “Deposit of Charts” (updated March 18, 2008), Web site of U.N. Division for Ocean Affairs and the Law of the Sea, <http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/depositpublicity.htm> (accessed March 2008).

is still accurate and if not, considering whether to update the information.¹¹⁵ Moreover, it may be worth considering including a provision in the bilateral delimitation agreements that would accommodate possible future shifts in base points due to climate change. In certain regions that are at particularly high risk from rising sea levels, such an inclusion may help avoid potential future maritime boundary disputes.

Even if these shifts fail to provide the basis for, or give rise to any legal claims, it seems an appropriate precautionary measure to have the territorial survey records up to date in order to determine where current boundaries lie and where they may shift. This is especially true given that courts and arbiters have closely analyzed deposited maps in a number of territorial and maritime boundary disputes, including the recent cases of *Nicaragua v. Honduras*¹¹⁶ and *Guyana and Suriname* in 2007.¹¹⁷ Further, it would be in the interest of states to update their survey records if they have a continental shelf that potentially extends beyond 200 nautical miles, but have yet to submit their claim to the Commission on the Limits of the Continental Shelf. As mentioned above, the deadline to submit to the Commission the particulars of such limits, along with supporting scientific and technical data, is May 12, 2009.¹¹⁸

Moreover, it is essential that countries with extensive low-lying coastal areas and continental shelves, as well as “highly unstable” coastlines, receive the support necessary to carry out such surveys. Technologies such as Geographic Information Systems (GIS), Web mapping, and online databases may help in regularly collecting and updating this kind of information.¹¹⁹

Finally, it would be prudent for coastal states and low-lying areas to implement certain adaptive measures to help preserve their maritime boundaries.¹²⁰ These steps can, of course, help protect the coast against further erosion by, for example, constructing and enlarging sea walls, using “soft-engineering” techniques (e.g., beach recharge), and improving early-warning mechanisms. Under Article 60 of UNCLOS, coastal states can construct, operate, and use artificial islands, installations, and structures in EEZ. However, it is important to note that these structures do not “possess the status of islands” as defined under Article 121

¹¹⁵ See points 3 and 4 of the “Changing the Baselines—Potential Implications” subsection of Part II of this paper for a discussion of the publication and deposit requirements, as well as maritime boundary delimitation treaties. UNCLOS explicitly requires the publication and deposit, but not regular updating, of this information. However, the authors would argue that it may be prudent for a state to do so, especially if it risks possible loss of part of its territorial claim.

¹¹⁶ “Case Concerning Territorial and Maritime Dispute between Nicaragua and Honduras in the Caribbean Sea, Judgment,” *ICJ Reports 2007*.

¹¹⁷ “In the Matter of an Arbitration Between Guyana and Suriname, Award of the Arbitral Tribunal” (September 17, 2007).

¹¹⁸ Brownlie, 2003, *Principles of Public International Law*.

¹¹⁹ For an excellent discussion on GIS and UNCLOS, see Bill Hirst and David Robertson, 2003, “GIS, Charts and UNCLOS—Can They Live Together?”, School of Surveying and Spatial Information Systems, University of New South Wales, Sydney, Australia, www.gmat.unsw.edu.au/ablos/ABLOS03Folder/PAPER3-3.PDF (accessed March 2008).

¹²⁰ For a detailed overview of adaptation to climate change, see IPCC, 2001, *Climate Change 2001*, 18.

of UNCLOS and that they do not establish a territorial sea or affect the delimitation of a territorial sea, EEZ, or continental shelf.¹²¹

Coastal states may also want to adapt their economic development plans and actions in ways that will make their economy more robust to climate change, as well as mainstream risk management into national development planning.¹²² This shift may include use of catastrophic risk insurance systems, such as that set up in the Caribbean with the support of the World Bank and the Global Environmental Facility.¹²³ In addition, coastal states may develop coastal zoning and management plans in such a way as to avoid catastrophic impacts of climate change. The Ministry of Environment of Spain, with the technical cooperation of the University of Cantabria, has, for example, recently developed a computer model that can help assess potential impacts of climate change on coastal areas. The model can be adapted to local conditions and has already been tested in a few pilot countries. Such a tool would be especially helpful for policy makers to develop strategies for mitigation, prevention, and/or adaptation to the impacts of climate change in coastal areas.

Under the provisions of the U.N. Framework Convention on Climate Change (UNFCCC),¹²⁴ some work has also begun on National Adaptation Programmes of Action (NAPAs), which are aimed at facilitating the identification of priority activities, including adaptation to a rise in sea levels, for least-developed countries. To date, however, only 26 countries have developed comprehensive NAPAs.¹²⁵ Several coastal countries that are likely to be severely impacted by a sea level rise have not yet prepared a NAPA. These countries include Benin, Egypt, Gambia, Guinea-Bissau, Guyana, Sri Lanka, Suriname, and Vietnam.¹²⁶ In 2005, Hurricane Katrina demonstrated that even a highly developed country like the United States

¹²¹ UNCLOS, art. 60(8). Soons argues that “the artificial conservation of an islet exclusively for the purpose of preventing it from degenerating, as a result of sea level rise, to the status of ‘rock’ as provided in Article 121, paragraph 3 of the Law of the Sea Convention (and thus no longer generating an EEZ) should be considered as permissible” (Soons, 1990, “The Effects of a Rising Sea Level,” 223).

¹²² Sofia Bettencourt et al., 2006, “Not If, but When: Adapting to Natural Hazards in the Pacific Islands Region,” World Bank Policy Note, World Bank, Washington, DC. Such a national development plan may consider the possibility of relocating people away from highly vulnerable coastal areas as a potential adaptation measure, as well as building new infrastructure in coastal regions in such a way so that it can withstand possible impacts of climate change.

¹²³ The Caribbean Catastrophe Risk Insurance Facility (CCRIF) allows certain Caribbean countries to purchase coverage akin to a business continuity insurance, which would provide them with an early cash payment in the event of a major natural disaster. Under this facility, payment is a function of the intensity of a disaster, rather than damage incurred, thereby expediting payment of claims to the affected countries (i.e., it bypasses the step of evaluating losses caused by the disaster). See “The Caribbean Catastrophe Risk Insurance Facility Brief for Journalists” (February 22, 2007), Web site of the World Bank, <http://siteresources.worldbank.org/INTOECS/Resources/CCRIFBriefforJournalistspart1final.pdf> (accessed October 26, 2007).

¹²⁴ U.N. Framework Convention on Climate Change (UNFCCC), *opened for signature* May 9, 1992, 1771 U.N.T.S. 164, U.N. Doc. A:AC237/18 (1992), *reprinted in* 31 I.L.M. 851 (1992).

¹²⁵ These countries are Bangladesh, Bhutan, Burundi, Cambodian, Comoros, Djibouti, Eritrea, Guinea, Haiti, Kiribati, Lesotho, Madagascar, Malawi, Mali, Mauritania, Niger, Democratic Republic of Congo, Rwanda, Samoa, Sao Tome and Principe, Senegal, Sudan, Tanzania, Tuvalu, Uganda, and Zambia (“National Adaptation Programmes of Action (NAPAs),” n.d., UNFCCC Web site, http://unfccc.int/national_reports/napa/items/2719.php (accessed January 2008).

¹²⁶ Dasgupta et al., 2007, “The Impact of Sea Level Rise,” 45.

is vulnerable to the effects of natural disasters. Given that this kind of extreme weather event could occur more frequently and with greater severity, climate change and adaptation measures must become fully integrated into development policy, particularly in developing countries.¹²⁷

The Role of Developing and Developed Countries

The UNFCCC and its Kyoto Protocol specifically require that developed countries take the lead and assist their developing country counterparts in efforts to address climate change and minimize and adapt to its adverse impacts. For example, the UNFCCC provides that the developed country parties shall:

- provide new and additional financial resources to meet the agreed full costs incurred by developing country parties in complying with their obligations under the Convention,¹²⁸
- provide such financial resources, including for the transfer of technology, needed by the developing country parties to meet the agreed full incremental costs;¹²⁹
- assist developing country parties that are particularly vulnerable to the adverse effects of climate change in meeting the cost of adaptation to those adverse effects;¹³⁰ and
- take all practicable steps to promote, facilitate, and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other parties, particularly developing-country parties, to enable them to implement the provisions of the Convention.¹³¹

The Kyoto Protocol lays out similar responsibilities for developed countries.¹³² The IPCC's *Second Assessment Report* also directly addresses international equity concerns in coping with the impacts of climate change and its associated risks.¹³³

¹²⁷ For a link between climate change and increased frequency and severity of hurricanes, see Robert Glicksman, 2006, "Global Climate Change and the Risks to Coastal Areas from Hurricanes and Rising Sea Levels: The Costs of Doing Nothing," 52 *Loyola L. Rev.* 1127; Walter Vergara et al., 2007, "Visualizing Future Climate in Latin America: Results from the Application of the Earth Simulator," Sustainable Development Working Paper, no. 30, Latin America and Caribbean Region, World Bank, Washington, DC. For a discussion of insurance coverage and climate change, see Howard C. Kunreuther and Erwann O. Michel-Kerjan, 2007, "Climate Change, Insurability of Large-scale Disasters, and the Emerging Liability Challenge," 155 *U. Pa. L. Rev.* 1795; Michael G. Faure, 2007, "Insurability of Damage Caused by Climate Change: A Commentary," 155 *U. Pa. L. Rev.* 1875; Sandra Fleishman, 2006, "Sea Change in Insurers' Coastal Coverage," *The Washington Post*, December 30, 2006, F1; "Reaping the Whirlwind," 2006, *The Economist*, September 9, 2006, 9, 10.

¹²⁸ UNFCCC, art. 4(3).

¹²⁹ *Ibid.*

¹³⁰ *Ibid.*, art. 4(4).

¹³¹ *Ibid.*, art. 4(5).

¹³² The Kyoto Protocol provides that developed countries "shall provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties" and also "provide such financial resources, including for the transfer of technology, needed by the developing country Parties to meet the agreed full incremental costs" (Kyoto Protocol to the UNFCCC, *opened for signature*, Dec. 10, 1997, art. 11(2), UN Doc. FCCC/CP/1997/L.7/Add.1, *reprinted in* 37 *I.L.M.* 22 [1998]).

The idea that developed countries should be assigned a range of responsibilities to address the impacts of climate change is also taking root in important legal principles.¹³⁴ Given the accepted fact that developed countries are responsible for the vast majority of greenhouse gases that are currently in the atmosphere,¹³⁵ assigning them responsibility for addressing the potential harm from climate change finds support in Principle 21 of the Stockholm Declaration on the Human Environment and Principle 2 of the Rio Declaration. These principles state that, “States have the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States.”¹³⁶ In addition, the “polluter pays principle” states that the costs of pollution should be borne by those responsible for causing the pollution.¹³⁷

¹³³ IPCC, 1996, *Climate Change 1995: Economic and Social Dimensions of Climate Change*, Contribution of Working Group III to the Second Assessment Report of the IPCC (Cambridge, UK: Cambridge University Press).

¹³⁴ For a good overview of these principles, see Frank Biermann, “Justice in the Greenhouse: Perspectives from International Law,” in *Fair Weather? Equity Concerns in Climate Change*, edited by F.L. Toth (London: Earthscan) 161–6.

¹³⁵ See IPCC, 2005, *Special Report on Carbon Dioxide Capture and Storage* (London: Earthscan); Robert W. Bacon and Soma Bhattacharya, 2007, “Growth and CO₂ Emissions: How do Different Countries Fare?,” World Bank Paper, *Climate Change Series*, no. 113, Washington, DC. On a related note, for an interesting study of how vulnerability to climate change and the distribution of energy sources affect countries’ positions on negotiation of international treaties that regulate carbon emissions, see Buys et al., 2007, “Country Stakes in Climate Change Negotiations.”

¹³⁶ *Declaration of the United Nations Conference on the Human Environment*, 1972, Web site of the United Nations Environmental Programme (UNEP), <http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=97&ArticleID=1503> (accessed January 2008); *Rio Declaration on Environment and Development*, 1992, UNEP Web site, <http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=78&ArticleID=1163> (accessed January 2008).

¹³⁷ The first international instrument to refer expressly to the “polluter pays” principle was the 1972 OECD Council Recommendation on Guiding Principles Concerning the International Economic Aspects of Environmental Policies. The principle was also endorsed by Principle 16 of the Rio Declaration, which provides that, “National authorities should endeavor to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment” (*Rio Declaration*, 1992, see note 141).

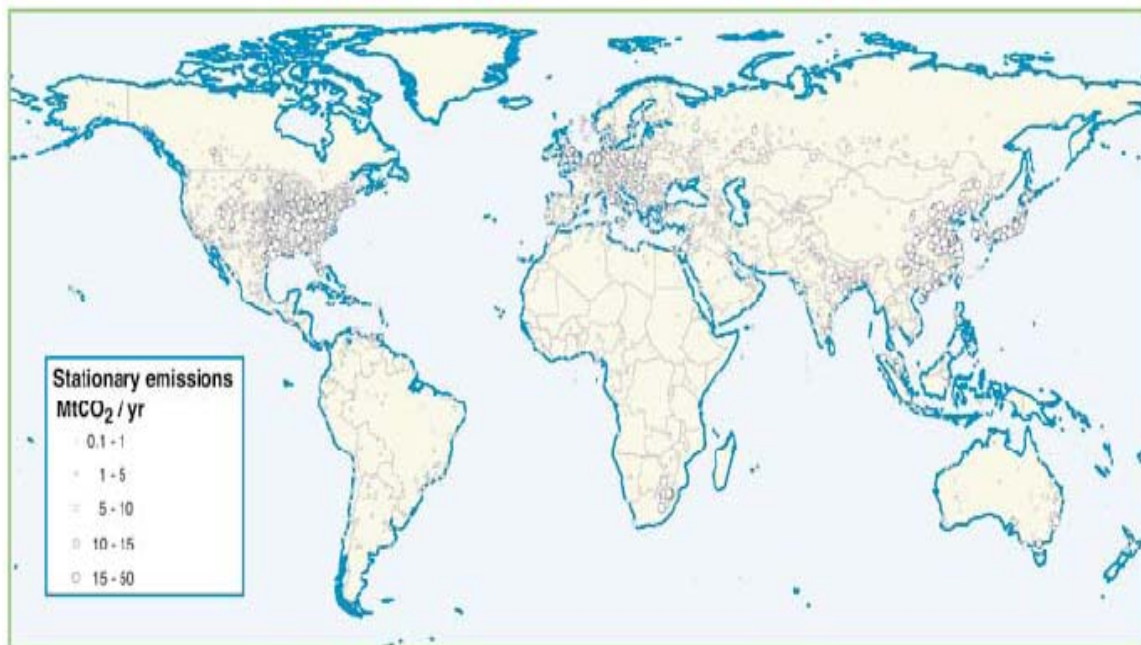
Some commentators doubt “whether [the principle] has achieved the status of generally applicable rule of customary international law,” and consider the principle not legally binding, “absolute nor obligatory” (see Philippe Sands, 2003, *Principles of International Environmental Law*, 2d ed. [Cambridge, UK: Cambridge University Press], 285; Patricia Birnie and Alan Boyle, 2002, *International Law and the Environment*, 2d ed. [Oxford: Oxford University Press], 92; Brownlie, 2003, *Principles of Public International Law*, 277). However, numerous international environmental instruments reflect the “polluter pays” principle, including the 1985 ASEAN Convention (Art 10(d)); the 1991 Alps Convention (Art 2(1)); the 1992 UNECE Transboundary Waters Convention (Art 2(5)(b)); the 1992 OSPAR Convention (Art 2(2)(b)); the 1992 Baltic Sea Convention (Art 3(4)); the 1993 Lugano Convention (Preamble); the 1994 Danube Convention (Art 2(4)); the 1994 Energy Charter Treaty (Art 19(1)); and the 1996 Protocol to the 1972 London Convention (Art 3(2)).

The principle has also been favorably considered by various national courts. See, for example, the following cases in India, *Vellore Citizens’ Welfare Forum v. Union of India*, 1996(5) SCC 647; in the USA, *Beazer East, Inc. v. Mead Corp.*, 412 F.3d 429 (3rd Cir. 2005), *Beanal v. Freeport-McMoran, Inc.*, 197 F.3d 161 (5th Cir. 1999), *Joslyn Mfg. Co. v. Koppers Co.*, 40 F.3d 750 (5th Cir. 1994); and in the European Community, Case C-293/97, *R. v. Secretary of State for the Environment and Ministry of Agriculture, Fisheries and Food, ex parte H.A. Standley and Others and D.G.D Metson and Others*, Case C-293/97 [1999] ECR I-2603, paras. 51–2.

Ideally, the “polluter pays” principle should also be helpful in determining the responsibility for compensation. However, one of the difficulties of applying this principle to climate change is that it dictates *who should pay* for incurred damages, but not *how much*. Assigning responsibility with any degree of precision is a complicated matter.¹³⁸ In addition, many of the most rapidly growing sources of greenhouse gases are in developing countries, some of which will soon exceed the emissions of developed countries.

The “common but differentiated responsibility” principle¹³⁹ affirms that states’ responsibilities are determined by their differing circumstances, particularly in relation to each state’s contribution to the creation of an environmental problem and its ability to prevent, reduce, and/or control the threat.¹⁴⁰

Figure 4. Global distribution of large stationary CO₂ sources, 2005



Source: IPCC, 2005, *Special Report on Carbon Dioxide Capture and Storage*.
(Reprinted with permission)

In addition to having generated the historic share of greenhouse gas (GHG) emissions, developed countries have advanced technologies and methods that can effectively address these emissions. Therefore, a common view is that developed countries should take the lead

¹³⁸ See Richard S.J. Tol et al., 1999, “Empirical and Ethical Arguments in Climate Change Impact Valuation and Aggregation, in *Fair Weather?*, ed. by F.L. Toth, 73–5.

¹³⁹ Principle 7 of the Rio Declaration provides that, “States shall co-operate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth’s ecosystem. In view of the different contributions to global environmental degradation, states have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command” (*Rio Declaration*, 1992, note 141).

¹⁴⁰ See, Sands, 2003, *Principles of International Environmental Law* 285.

in helping prevent and minimize the adverse impacts of climate change on developing-country coastal states and low-lying areas.¹⁴¹

One mechanism that could potentially assist developing countries to address the issues noted in this paper is the Adaptation Fund of the Kyoto Protocol. This fund aims to finance adaptation projects and programs in eligible developing countries that are parties to the Protocol.¹⁴² There has been progress in launching this fund, with the decision to create it made at the December 2007 meeting in Bali, Indonesia, of the parties to the UNFCCC and to the Kyoto Protocol. The parties to the Kyoto Protocol agreed on the framework of the Fund, with the World Bank invited to serve as its interim Trustee and the Global Environment Facility, as its interim secretariat. The Fund will be supervised and managed by an Adaptation Fund Board consisting of 16 government-nominated members, ten of whom will come from developing countries. In addition, the parties agreed that “eligible [p]arties shall be able to submit their project proposals directly to the Adaptation Fund Board and that implementing or executing entities chosen by governments...may also approach the Adaptation Fund Board directly.”¹⁴³

Conclusion

The purpose of this paper has been to shed light on an issue that may become of considerable concern if the rise in sea levels continue, namely, the potential challenge to currently existing maritime boundaries. Many of these boundaries are considered legally settled as a result of many years of effort to bring UNCLOS into force. At the time UNCLOS was negotiated, however, the issue of climate change was not at the forefront of the international agenda. In any event, it would have been difficult at that time to address or project the range of political and environmental concerns what would surface due to global warming.

Even if the international community determines that it needs to address the issue of shifting boundaries, developing countries may be at a disadvantage if they have only limited access to historical records or lack the capacity to address complicated historical and geographic approaches to boundary claims. For these reasons, it seems appropriate and prudent to provide both technical and financial assistance to these countries so that they can approach any future territorial and maritime boundary negotiations with the necessary tools.

¹⁴¹ This view was reiterated by a group of prominent retired U.S. generals and admirals in a recent study that noted, “[T]he U.S. government should use its many instruments of national influence, including its regional commanders, to assist nations at risk [to] build the capacity and resiliency to better cope with the effects of climate change. Doing so now can help avert humanitarian disasters later.” See CNA Corporation, 2007, “National Security,” 7, 47.

¹⁴² The Fund will be financed with a 2 percent levy on a share of proceeds from clean development mechanism (CDM) project activities and other sources. See “Adaptation Fund,” 2007, UNFCCC Web site, http://unfccc.int/cooperation_and_support/financial_mechanism/items/3659.php (accessed October 2007). The Conference of the Parties agreed in Bali in 2007 that the “Adaptation Fund shall finance concrete adaptation projects and programmes that are country driven and are based on the needs, views and priorities of eligible Parties” (“Draft Decision -/CMP.3” [Advance Unedited Version], n.d., UNFCCC Web site, http://unfccc.int/files/meetings/cop_13/application/pdf/cmp_af.pdf (accessed March 2008).

¹⁴³ “Draft Decision/CMP.3,” n.d., UNFCCC Web site, para. 29.

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