William & Mary Environmental Law and Policy Review

Volume *47 (2022-2023)*
Issue 2

Article 10

1-2023

Sargassum Systems: A Comparative Analysis of Policy Responses to the New Caribbean Seaweed Crisis

Leo Jobsis Rossignol

SARGASSUM SYSTEMS: A COMPARATIVE ANALYSIS OF POLICY RESPONSES TO THE NEW CARIBBEAN SEAWEED CRISIS

LEO JOBSIS ROSSIGNOL*

INTRODUCTION

Sargassum seaweed was once a mere occasional guest to American coasts.[1] However, beginning in 2011, the minor out-drifts from the Sargasso Sea that found their way to Caribbean shores have been replaced by thick mats of the free-floating pelagic algae stretching miles and weighing millions of tons.[2] These new masses of *Sargassum* have swamped and choked out important ecosystems, destroyed local economies dependent on fishing and tourism, and even rendered certain towns and communities uninhabitable throughout the region.[3] In just a decade, *Sargassum* has gone from a nonfactor to the source of a terrible crisis, likely as a result of changing climate patterns and increased logging and farming in the Amazon watershed.[4]

Of course, the challenges posed by this new crisis have not gone unanswered. Government agencies and international organizations, as well as private parties, have all made attempts to tackle the new problems

---

* JD Candidate, William & Mary Law School, 2023; BA Economics and History, New College of Florida, 2018. The author thanks his colleagues at *ELPR* for their patience and diligence in producing this work, and friends and family back home for their important assistance with research.

[1] *See* Y.A. Fidai, J. Dash, E.L. Tompkins & T. Tonon, *A Systematic Review of Floating and Beach Landing Records of* Sargassum *Beyond the Sargasso Sea*, ENV'T RSCH. COMMC'NS, Dec. 2020, at 1, 3.

[2] *Id.*

[3] Clifford Louime, Jodany Fortune & Gary Gervais, *Sargassum Invasion of Coastal Environments: A Growing Concern*, 13 AM. J. ENV'T SCIS. 58, 60–61 (2017).

[4] Jake Spring, *Examiner: Scientists Come Closer to Solving Caribbean Seaweed Mystery*, REUTERS, https://www.reuters.com/world/americas/scientists-come-closer-solving-caribbean-seaweed-mystery-2021-09-29/ [https://perma.cc/7PZG-BPU2] (Sept. 29, 2021, 8:07 AM). This is, predictably, disputed. While many stakeholders identify anthropogenic factors as the primary cause of the new *Sargassum* blooms, others blame warm seas and high nutrient load without asserting the source of these changes, and others still cite likely, unrelated natural phenomena. Sien van der Plank, Jack Corbett, Janice Cumberbatch, Bethia Thomas & Emma Tompkins, *Management of* Sargassum *Influxes in the Caribbean: National and Regional Governance of a Transboundary Marine Species* 13–16 (SARTRAC, Working Paper No. 1, 2021).

posed by this facet of environmental change.[5] Unfortunately, these attempts have been tentative and uncoordinated, diminishing their effectiveness.[6] Many of the Caribbean islands are governed by (and consist of) Small Independent Developing States ("SIDS"), which have not been able to muster the resources and manpower necessary to confront the problem.[7] Most others are dependencies of powerful but distant nations, whose national governments may be resource-rich, but are largely focused on other problems, and may worsen the situation through national-level environmental policy.[8] Additionally, many different languages are spoken in the region, which adds barriers to quick and effective cooperation.[9] Despite these issues, some regional initiatives have been undertaken, and independent strategies have been implemented with varying levels of effectiveness.[10]

In light of the emerging policy responses to the Caribbean *Sargassum* crisis, it is crucial that in-depth comparative studies be taken to understand the effectiveness of those policies and their common characteristics. With that resource, policymakers will be able to learn from their neighbors more quickly and reduce the damage done by future *Sargassum* events, as well as adopt more unified data standards.

The United States has been slow to respond, despite the increasing damage to its Caribbean dependencies, like the U.S. Virgin Islands and Puerto Rico.[11] This Note will show that because this problem is international in scope, the approaches taken by regional organizations and the United Nations have been and will be key to success but only if

---

[5] *See* van der Plank et al., *supra* note 4, at 13–14; Valeria Chávez, Abigail Uribe-Martínez, Eduardo Cuevas, Rosa E. Rodríguez-Martínez, Brigitta I. van Tussenbroek, Vanessa Francisco, Miriam Estévez, Lourdes B. Celis, L. Verónica Monroy-Velázquez, Rosa Leal-Bautista, Lorenzo Álvarez-Filip, Marta García-Sánchez, Luis Masia & Rodolfo Silva, *Massive Influx of Pelagic* Sargassum *spp. on the Coasts of the Mexican Caribbean 2014–2020: Challenges and Opportunities*, WATER, Oct. 2020, at 1, 11.

[6] *See* van der Plank et al., *supra* note 4, at 6.

[7] CARIBBEAN REG'L FISHERIES MECHANISM, FACT-FINDING SURVEY REGARDING THE INFLUX AND IMPACTS OF *SARGASSUM* SEAWEED IN THE CARIBBEAN REGION 33 (2019).

[8] *See infra* Part II.

[9] Ursula Petula Barzey, *Caribbean Languages: Spanish, English, French, Dutch-Speaking Countries & More*, CARIBBEAN & CO. (May 20, 2021), https://www.caribbeanandco.com/caribbean-languages/ [https://perma.cc/73LF-UL3A].

[10] *See* van der Plank et al., *supra* note 4, at 11–12.

[11] *See* Bernetia Akin, Sargassum*'s Future Poses Bigger Mystery than Its Origins*, ST. THOMAS SOURCE (May 12, 2021), https://stthomassource.com/content/2021/05/12/sargassums-future-poses-bigger-mystery-than-its-origins/ [https://perma.cc/MJU2-7KY7]; Rafael R. Díaz Torres, *Puerto Rico Lacks Direction to Manage Sargassum Problem*, CENTRE DE PERIODISMO INVESTIGATIVO (July 15, 2021), https://periodismoinvestigativo.com/2021/07/puerto-rico-manage-sargassum/ [https://perma.cc/C9G6-4VPR].

the United States takes an active role in the process. Due to the proliferation of independent stakeholders in the region, "tragedy of the commons" and "race to the bottom" problems loom large, and the presence of small dependencies to several larger countries makes the need for international cooperation all the more pressing.[12]

I. SETTING THE STAGE: THE CARIBBEAN, *SARGASSUM*, AND THE EMERGING CRISIS

A. The Caribbean

The Caribbean Sea is a well-known area of the world, playing host to many international tourists.[13] However, it is also subject to many common misconceptions, so it is worth defining in detail.[14] Geographically, the Caribbean Sea is bounded to the West by Central America (starting from the Yucatan peninsula and ending in the Panamanian isthmus), and to the South by South America's northern coast, including Colombia and Venezuela.[15] To the North, the Sea is primarily hemmed in by Cuba, Hispaniola, and Puerto Rico, which make up the Greater Antilles islands.[16] Finally, the many small islands of the Lesser Antilles, composed of the Windward Islands to the south and Leeward Islands to the north, define the eastern boundary for the Caribbean Sea.[17]

Many places we feel are "Caribbean" are left out if we simply define the region by what that body of water touches.[18] The Bahamas, Turks and Caicos, and Barbados are commonly thought of as Caribbean islands, and the continental states of Guyana, Suriname, and French Guiana are considered to be part of the Caribbean politically and culturally, if not

---

[12] *See, e.g.*, *Dominican Republic Can Eliminate Sargassum and Have an Advantage over Other Competitors*, DOM. TODAY (Sept. 22, 2020, 3:04 PM), https://dominicantoday.com/dr/economy/2020/09/22/dominican-republic-can-eliminate-sargassum-and-have-an-advantage-over-other-competitors/ [https://perma.cc/M8XC-6BEE].

[13] *See* Alexandra A. Taylor, Sargassum *Is Strangling Tourism in the Caribbean. Can Scientists Find a Use for It?*, CHEM. & ENG'G NEWS (Sept. 1, 2019), https://cen.acs.org/environment/sustainability/Sargassum-strangling-tourism-Caribbean-scientists/97/i34 [https://perma.cc/VY3S-SNPK].

[14] M. Nelson, *What Do You Mean by Caribbean, Anyway?*, CARIBBEAN DEVTRENDS+ (Dec. 23, 2014), https://blogs.iadb.org/caribbean-dev-trends/en/mean-caribbean-anyway/ [https://perma.cc/LJX4-7DTG].

[15] *See id.*; INT'L HYDROGRAPHIC ORG., LIMITS OF OCEANS AND SEAS 14–15 (3d ed. 1957).

[16] *See* INT'L HYDROGRAPHIC ORG., *supra* note 15, at 14–15.

[17] *Id.*

[18] *See* Nelson, *supra* note 14.

geographically.[19] This Note will address most of these areas but focuses primarily on the Antilles islands.

The political and legal status of the region is also complex, and because some bare-bones familiarity will be very useful in understanding the analysis to follow, I will review it briefly. The Greater Antilles islands consist of the independent countries of Cuba, Jamaica, Haiti, and the Dominican Republic, as well as the United States' dependency of Puerto Rico.[20] The Lesser Antilles includes a greater number of dependencies: the U.S. Virgin Islands, the British Virgin Islands, Anguilla (U.K.), Montserrat (U.K.), St. Martin (FR.), Guadeloupe (FR.), Martinique (FR.), St. Barthelemy (FR.), Sint Maarten (Neth.), Saba (Neth.), and Sint Eustatius (Neth.).[21] Also in the Lesser Antilles are the independent countries of St. Kitts and Nevis, Antigua and Barbuda, Dominica, St. Lucia, Saint Vincent and the Grenadines, Grenada, and Trinidad and Tobago.[22] Within the Caribbean Sea itself are the Dutch "ABC Islands" of Aruba, Bonaire, and Curaçao, and the British Cayman Islands.[23]

There are also several international organizations in the region with significant pull. For the purposes of this Note, the most relevant are the Association of Caribbean States ("ACS"), the Caribbean Community ("CARICOM"), the Organization of Eastern Caribbean States ("OECS"), and the Caribbean Regional Fisheries Mechanism ("CRFM").[24] The ACS is a regional cooperative body, generally tasked with addressing problems that afflict the region as a whole.[25] Both CARICOM and the OECS are broadly focused economic and political integration projects, seeking to establish a common market.[26] The CRFM is a more narrowly focused regional body that works on environmental and economic issues centered around the ocean.[27] The ACS, CARICOM and CRFM are separately

---

[19] *Id.*

[20] *The Greater Antilles*, ENCYC. BRITANNICA, https://www.britannica.com/place/Greater-Antilles [https://perma.cc/U8PP-28EC] (last visited Jan. 16, 2023).

[21] *The Lesser Antilles*, ENCYC. BRITANNICA, https://www.britannica.com/place/Lesser-Antilles [https://perma.cc/NVS6-8A9D] (last visited Jan. 16, 2023).

[22] *Id.*

[23] *Id.*

[24] *See* CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 14–15.

[25] *About the ACS*, ASS'N OF CARIBBEAN STATES, http://www.acs-aec.org/index.php?q=about-the-acs [https://perma.cc/L636-PY2B] (last visited Jan. 16, 2023).

[26] *Who We Are*, CARIBBEAN CMTY. SECRETARIAT, https://caricom.org/our-community/who-we-are/ [https://perma.cc/KP5N-A48L] (last visited Jan. 16, 2023); *About the OECS*, ORG. OF E. CARIBBEAN STATES, https://www.oecs.org/en/who-we-are/about-us [https://perma.cc/9YZS-S8UR] (last visited Jan. 16, 2023).

[27] *About CRFM*, CARIBBEAN REG'L FISHERIES MECHANISM, https://www.crfm.int/index

organized bodies but have most members in common and include most of the Caribbean islands and some surrounding continental governments.[28] The OECS is constituted solely of Lesser Antilles island nations and territories.[29]

B. Sargassum

There are likely several species of free-floating pelagic (open sea) algal seaweed known as "*Sargassum*."[30] It is unclear how many of these varieties are significantly genetically distinct, and how many are merely variances in phenotypic appearance.[31] These organisms generally float in the top half-meter of the water column, borne aloft by small, gas-filled, "berry-like" bladders.[32] Some species sink to the ocean floor for one step of their life cycle, but the best known varieties, *S. natans* and *S. fluitans*, are holopelagic, meaning that they remain free-floating throughout.[33]

The "floating . . . reef[s]"[34] of *Sargassum* provide an extremely important habitat for many species in their juvenile stages, including flying fish, jacks, tuna, and dorado, also known as mahi-mahi.[35] Even some freshwater fish, like the European eel, spawn in floating *Sargassum* patches.[36] Immature marine sea turtles make their way to *Sargassum* patches to hide from predators while they grow.[37] Some species even exist entirely within the *Sargassum* habitat.[38]

.php?option=com_k2&view=item&layout=item&id=1&Itemid=114 [https://perma.cc/25E4-UXDA] (last visited Jan. 16, 2023).

[28] *See supra* notes 25–27.

[29] *See Who We Are*, *supra* note 26.

[30] Jeffrey Schell, Deborah S. Goodwin & Amy N.S. Siuda, *Recent* Sargassum *Inundation Events in the Caribbean: Shipboard Observations Reveal Dominance of a Previously Rare Form*, OCEANOGRAPHY, Sept. 2015, at 8, 8.

[31] *Id.* at 8–9.

[32] *See* CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 16; *What Is* Sargassum*?*, NOAA OCEAN EXPL., https://oceanexplorer.noaa.gov/facts/sargassum.html [https://perma.cc/GUH5-PKAY] (last visited Jan. 16, 2023).

[33] *See* CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 16.

[34] Derek Cox, The Role of Chemical Cues in Locating Pelagic Sargassum by the Associated Fish *Stephanolepis Hispidus* (Aug. 2016) (Master of Sci. thesis, Florida Atlantic University) (on file with Florida Atlantic University Digital Library).

[35] CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 16.

[36] Alessandro Cresci, *A Comprehensive Hypothesis on the Migration of European Glass Eels (*Anguilla anguilla*)*, 95 BIOLOGICAL REVS. 1237, 1273 (2020).

[37] *About the Sargasso Sea: Biological Significance*, SARGASSO SEA COMM'N, http://www.sargassoseacommission.org/sargasso-sea/biological-significance [https://perma.cc/3RA7-XW27] (last visited Jan. 16, 2023).

[38] *Id.*; Teresa Mackey, *Saving the Sargasso Sea*, ENV'T COASTAL & OFFSHORE, 2021, at 84,

Sargassum plays most of these ecologically important roles in the Sargasso Sea of the mid-Atlantic, miles from any coast.[39] However, it is not unusual for the seaweed to escape the oceanic gyre and wash up elsewhere.[40] Small strands of the golden-brown seaweed have long been a common sight on American beaches, where they are generally left to decompose naturally.[41] Along the way these strands support wild fish populations, particularly those of the much-sought-after dorado.[42] After landing, the small amounts of *Sargassum* also play an important role in beach stabilization and have been harvested for use as fertilizer.[43] Although an occasional annoyance to beachgoers, these strands were generally small enough to have little impact on the wider environment.[44]

C. Changes and Crisis

Since 2011 this has changed. Beginning in that year, *Sargassum* started showing up in great amounts farther south, in the Caribbean and

---

85–87; Rebecca R. Helm, *The Mysterious Ecosystem at the Ocean's Surface*, PLOS BIOLOGY, Apr. 2021, at 1, 3.

[39] Any coast, save that of Bermuda—Bermuda has played an admirable role in protecting the *Sargassum* in its natural ecosystem and promoting its general ecological benefits, although this is beyond the scope of this Note. *See* David Freestone & Kristina Gjerde, *Lessons from the Sargasso Sea*, SARGASSO SEA COMM'N, http://www.sargassoseacommission.org/storage/SargassoSea.pdf [https://perma.cc/L6Y7-7T7F] (last visited Jan. 16, 2023).

[40] *See id.*; Louime et al., *supra* note 3, at 58.

[41] *See* Stephen P. Leatherman, *What's Driving the Huge Blooms of Brown Seaweed Piling Up on Florida and Caribbean Beaches?*, FLA. INT'L U. NEWS (Aug. 2, 2021, 7:00 AM), https://news.fiu.edu/2021/whats-driving-the-huge-blooms-of-brown-seaweed-piling-up-on-florida-and-caribbeanbeaches [https://perma.cc/4G2E-K2RC]; Kim Kavin, *Sargassum Blooms Grow Monstrous, and Researchers Say More Will Come*, SOUNDINGS (Sept. 21, 2018), https://www.soundingsonline.com/features/sargassum-blooms-grow-monstrous-and-researchers-say-more-will-come [https://perma.cc/CP7A-J49M]; Statement, British Virgin Islands Department of Agriculture and Fisheries, Remarks by Deputy Premier and Minister for Natural Resources and Labour, Dr. the Honourable Kedrick D. Pickering at Press Briefing—Update on Sargassum Seaweed Phenomena (Oct. 5, 2015) (Statement, British Virgin Islands Department of Agriculture and Fisheries) [hereinafter Statement, British Virgin Islands Department of Agriculture and Fisheries], https://bvi.gov.vg/media-centre/sargassum-seaweed-important-element-beaches-and-shoreline-stability [https://perma.cc/6DD3-C6PH].

[42] Dorado are more commonly known by their Hawaiian name, mahi-mahi. *See* Mary Kate Leming, *On the Water: Summer Sargassum Mats Lead South Florida Anglers to Mahi Mahi*, COASTAL STAR (June 30, 2020, 1:30 PM), https://thecoastalstar.com/profiles/blogs/on-the-water-sargassum-brings-mahi-mahi-close-to-shore-during-sum?context=tag-mahi [https://perma.cc/2MNZ-LZ3U].

[43] Statement, British Virgin Islands Department of Agriculture and Fisheries, *supra* note 41.

[44] *See* Mengqiu Wang, Chuanmin Hu, Brian B. Barnes, Gary Mitchum, Brian Lapointe & Joseph P. Montoya, *The Great Atlantic* Sargassum *Belt*, 365 SCIENCE 83, 87 (2019).

along the West African coast.[45] Although it was not a total stranger to such shores, that year the sudden arrival of many tons of *Sargassum* shocked the communities it impacted.[46] By 2018, the new seaweed was the source of a full-blown crisis, as over twenty-two million tons made its way through the region.[47] As it went, it choked beaches, obscured reefs, and suffocated fish populations.[48]

As it piled up, it began to rot.[49] The beached weed emitted noxious fumes, especially hydrogen sulfide.[50] This led to severe public health and infrastructural problems, as the chemical rot caused asthmatic fits and rashes, among other things, to the people living nearby, and quickly degraded metals and electronics in the area.[51]

As *Sargassum* showed up in greater and greater amounts, it accumulated in bays and inlets.[52] Where it did, it near perfectly stopped sunlight from reaching coral reefs and seagrass beds that needed it to survive.[53] Fish became tangled in it, and as it deoxygenated the water, many tons of them were killed.[54] Where it piled up on beaches, it collapsed turtle nest sites and buried oceanside vegetation.[55] Already troubled ecosystems were damaged further or destroyed entirely.[56]

Local economies were also devastated. In addition to the costs to health and infrastructure, as well as the high costs of clean-up after

---

[45] *See id.* at 84.
[46] JAMES S. FRANKS, DONALD R. JOHNSON, DONG-SHAN KO, GUILLERMO SANCHEZ-RUBIO, J. READ HENDON & MITCHELL LAY, UNPRECEDENTED INFLUX OF PELAGIC *SARGASSUM* ALONG CARIBBEAN COASTLINES DURING SUMMER 2011, at 1 (2011).
[47] Leatherman, *supra* note 41.
[48] *See* SHELLY-ANN COX & A. KARIMA DEGIA, U.N. ENV'T PROGRAMME, SARGASSUM WHITE PAPER: TURNING THE CRISIS INTO AN OPPORTUNITY 2021, at 11–15 (2021).
[49] *Id.*
[50] Dabor Resiere, Hossein Mehdaoui, Jonathan Florentin, Papa Gueye, Thierry Lebrun, Alain Blateau, Jerome Viguier, Ruddy Valentino, Yannick Brouste, Hatem Kallel, Bruno Megarbane, André Cabie, Rishika Banydeen & Remi Neviere, *Sargassum Seaweed Health Menace in the Caribbean: Clinical Characteristics of a Population Exposed to Hydrogen Sulfide During the 2018 Massive Stranding*, 59 CLINICAL TOXICOLOGY 215, 215 (2021).
[51] COX & DEGIA, *supra* note 48, at 13.
[52] *See* FRANKS ET AL., *supra* note 46, at 1.
[53] COX & DEGIA, *supra* note 48, at 12.
[54] *See* Hazel A. Oxenford, Shelly-Ann Cox, Brigitta I. van Tussenbroek & Anne Desrochers, *Challenges of Turning the Sargassum Crisis into Gold: Current Constraints and Implications for the Caribbean*, 1 PHYCOLOGY 27, 27 (2021).
[55] *See* Ravidya Burrowes, Colette Wabnitz & Jimena Eyzaguirre, *The Great Sargassum Disaster of 2018*, ESSA TECHS. (Feb. 7, 2019), https://essa.com/the-great-sargassum-disaster-of-2018/ [https://perma.cc/QB76-YMLD].
[56] *See* Louime et al., *supra* note 3, at 63; DUTCH CARIBBEAN NATURE ALL., PREVENTION AND CLEAN-UP OF SARGASSUM *IN THE DUTCH CARIBBEAN* 1 (2019).

Sargassum washed up on the beaches, the fisheries of many islands were damaged and fish stocks were greatly altered.[57] Although the intake of certain fish actually increased at the time, the increasing ecological instability left communities economically vulnerable.[58] Year to year, the catch could vary by over ninety percent.[59] The seaweed itself fouled fishing vessels and facilities, imposing unexpected costs for the industry.[60]

Tourism was, predictably, greatly impacted.[61] The clean air, clear waters and beautiful white coral sand beaches that attract tens of millions of people to the region every year were nowhere to be seen as new algal blooms, or *Sargassum* "events," covered the attractions.[62] The stench of rotting seaweed washed over beachside resorts, as hotel-hired haulers using heavy machinery struggled to keep up with the onslaught.[63] Even as tons were taken away, the material worked its way into the sand and contaminated it.[64] In the water, passing *Sargassum* made recreational swimming difficult and uncomfortable.[65] Where the *Sargassum* pooled, rather than passed through, it would rot and pollute the water, decreasing visibility.[66] Research suggests that increased turbidity also increases rates of disease in the environment, leading to longer-term degradation of that environment's economic and ecological value.[67]

So far, the impact on the tourism industry as a whole, is hard to estimate, as no systematic studies have been undertaken.[68] It is possible

---

[57] *See, e.g.*, N.R. RAMLOGAN, P. MCCONNEY & H.A. OXENFORD, CTR. FOR RES. MGMT. & ENV'T STUD., SOCIO-ECONOMIC IMPACTS OF *SARGASSUM* INFLUX EVENTS ON THE FISHERY SECTOR OF BARBADOS 51 (2017).
[58] *See* CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 26–32.
[59] *Id.*
[60] *See* COX & DEGIA, *supra* note 48, at 14; Sam Fortesque, *Why Sargassum Weed Is Posing Increasing Problems for Transatlantic Sailors*, YACHTING WORLD (Apr. 30, 2020), https://www.yachtingworld.com/sailing-across-atlantic/sargassum-weed-increasing-problem-transatlantic-sailors-125971 [https://perma.cc/8DGW-MRX6].
[61] *See* Taylor, *supra* note 13.
[62] *Id.*; DUTCH CARIBBEAN NATURE ALL., *supra* note 56, at 1.
[63] Chávez et al., *supra* note 5, at 10.
[64] *Id.*
[65] *See* Debbie Bartlett & Franziska Elmer, *The Impact of Sargassum Inundations on the Turks and Caicos Islands*, 1 PHYCOLOGY 83, 89 (2021).
[66] RENATA J. PLATENBERG & JENNIFER M. VALIULIS, UNIV. OF THE V.I. ST. CROIX ENV'T ASS'N, UNITED STATES VIRGIN ISLANDS WILDLIFE ACTION PLAN VOLUME 2: HABITATS AND SPECIES 71–72 (2018).
[67] *Id.* at 48.
[68] There does appear to be some correlations between the most severe *Sargassum* outbreaks and decreases in tourism in specific localities, but the tourism industry has continued to grow overall since the beginning of the *Sargassum* crisis. *See* COX & DEGIA, *supra* note

that, as the total tourism revenue of the region has continued to increase, *Sargassum* has only been a factor toward cost and intra-region location choice.[69]

Where the material rotted on land, the sulfurous fumes quickly degraded electronics, including those in boat and removal equipment engines.[70] The paint on nearby houses was dirtied.[71] A desalinization plant stopped functioning as it became clogged with the noxious seaweed, endangering access to clean water for the surrounding population.[72] In Puerto Rico, *Sargassum* blocked a water intake pipe at a major power plant, causing the majority of the island's population to lose power until the blockage could be cleared.[73] In the U.S. Virgin Islands, Department of Planning and Natural Resources offices were forced to close by *Sargassum* build-up, directly interfering with the ability of the community to respond quickly to the problem.[74]

Where *Sargassum* had its most extreme accumulations, its decomposition made communities unlivable.[75] The rotting seaweed releases high levels of hydrogen sulfide, burning the eyes and lungs of those who come into contact with it.[76] Inhalation of too much hydrogen sulfide can cause severe medical harms, including "potentially fatal hypoxic cardiac, respiratory and neurological failure," and regular exposure can cause long-lasting "neurological and cognitive impairments."[77] Many communities

---

48, at 13; Ana M. López, *International Tourism Revenue in the Caribbean 2010–2019*, STATISTA (Aug. 10, 2021), https://www.statista.com/statistics/814613/caribbean-tourism-revenue/ [https://perma.cc/8YCS-GJFS].

[69] *See, e.g.*, Bartlett & Elmer, *supra* note 65, at 89.

[70] COX & DEGIA, *supra* note 48, at 13.

[71] S. Peter, *Saint Lucia Works to Free Itself from* Sargassum*'s Stranglehold*, EOS (Sept. 25, 2020), https://eos.org/articles/saint-lucia-works-to-release-itself-from-sargassums-stranglehold [https://perma.cc/Z6CZ-SABL].

[72] *Concerns Raised About Fish Kill, Desal Plant*, BVI BEACON (Oct. 7, 2015), https://www.bvibeacon.com/concerns-raised-about-fish-kill-desal-plant/ [https://perma.cc/6T38-UGY3].

[73] Patricia Mazzei, *'Why Don't We Have Electricity?': Outages Plague Puerto Rico*, N.Y. TIMES, https://www.nytimes.com/2021/10/19/us/puerto-rico-electricity-protest.html [https://perma.cc/7EQG-VYVL] (Nov. 10, 2021); Rosario Fajardo, *PREPA's Woes Continue*, WKLY. J. (Sept. 29, 2021), https://www.theweeklyjournal.com/business/prepa-s-woes-continue/article_6d56f9ac-208c-11ec-b9c2-cb796ba52c17.html [https://perma.cc/6YHH-C5WY].

[74] Press Release, Virgin Islands Department of Planning and Natural Resources, St. Thomas Fish and Wildlife Office Closed Due to Sargassum Stench (June 8, 2021), https://dpnr.vi.gov/wp-content/uploads/2021/06/DFW-office-closure-2.pdf [https://perma.cc/JAZ8-2AME].

[75] *See* Louime et al., *supra* note 3, at 61.

[76] *Id.*

[77] Dabor Resiere, Hossein Mehdaoui & Rémi Névière, Letter to the Editor, Sargassum

afflicted are extremely poor, and the individuals harmed because of the *Sargassum* may not have the resources to move away.[78]

In addition to the effects suffered on the land, the huge quantities of *Sargassum* also pose a problem at sea. Due to the immense new quantities of *Sargassum*, navigation is made more difficult for boaters, as the seaweed threatens to entangle engine equipment and make mid-voyage repairs highly difficult.[79] This is important to understand: sea barriers and removal after landing may deal with the land-based effects of the crisis but does not deal with the damage caused at sea to navigation and fishing industries.[80] In lieu of outright reversal of the environmental conditions, which have caused the new crisis (and it is unclear whether such a thing is possible), new anti-fouling technology may need to be developed if navigational hazards are to be avoided.[81]

There has been significant disagreement on the exact cause of the new *Sargassum* crisis, but national policies have increasingly come to agree on several common factors.[82] One cause regularly cited is the increase in oceanic temperatures in the mid-Atlantic and Caribbean, allowing *Sargassum* to proliferate in formerly clear waters.[83] However, it is unlikely that this is the only cause of new *Sargassum* growths, and some research even suggests that warmer water may actually discourage growth.[84] While some have proposed a *Sargassum* strand simply washed further south than before and took hold, it is likely that some other environmental change added to and accelerated the development of a new *Sargassum* growth center.[85] This additional factor is the increased nutrient content of the Atlantic Ocean off the coast of Brazil.[86] Due to increased logging

---

Invasion in the Caribbean: The Role of Medical and Scientific Cooperation, PAN AM. J. OF PUB. HEALTH, May 2019, at 1, 1.

[78] *See* Glenn Bowen, *The Challenges of Poverty and Social Welfare in the Caribbean*, 16 INT'L J. SOC. WELFARE 150, 150 (2007).

[79] *See, e.g.*, Kavin, *supra* note 41.

[80] *See Every Possible Solution to the Sargassum Crisis Has an Environmental Downside*, YUCATÁN MAG. (May 10, 2019), https://yucatanmagazine.com/is-sargassum-the-new-normal-for-the-riviera-maya/ [https://perma.cc/JX8A-FJ4Z].

[81] *See, e.g.*, Kavin, *supra* note 41.

[82] *See* van der Plank et al., *supra* note 4, at 5–6.

[83] *Id.*

[84] Akin, *supra* note 11; *see* Wang et al., *supra* note 44, at 85–86.

[85] *See* DEP'T OF ENV'T CAYMAN IS. GOV'T, GUIDELINES ON REMOVING SARGASSUM FROM BEACHES, OCTOBER 2015, at 1 (2015); Wang et al., *supra* note 44, at 83.

[86] Aldem Bourscheit, *Amazon Destruction Linked to the Largest Belt of Algae on the Planet*, NOLA (Mar. 22, 2021, 4:00 AM), https://www.nola.com/news/environment/article_8f73ac64-8916-11eb-8ca1-2b9612ea17ff.html [https://perma.cc/CNZ7-84HC].

and agriculture in the Amazon basin, more natural soil nutrients and fertilizer have been washed into northern Brazilian waters.[87] This high nutrient load allows more marine plants to grow, including *Sargassum*, which in turn use up natural water resources like dissolved oxygen, killing local wildlife.[88]

Dealing with the *Sargassum* crisis is expensive—by one estimate, the clean-up required in 2018 alone cost over 120 million dollars.[89] Although 2018 is currently the worst year on record, the algae has been turning up more regularly and is now present at detectable levels in the mid-Atlantic Ocean and Caribbean Sea year-round, and there is no evidence indicating that costs have significantly declined.[90]

On both the micro and macro levels, these costs bear with them a significant "free rider" problem.[91] For individual beaches and their surrounding communities, interested parties may attempt to shift the financial burden to one another. After all, if the nearby resort is likely to pay for a beach clean-up operation, why would those living nearby pay the cost themselves?[92] If the islands upstream of your own are facing even more *Sargassum*, why not leave it to them to research and develop the most efficient mitigation strategies?[93] These communities, with small populations and limited resources, often cannot afford to proactively confront the environmental crisis bearing down on them.[94]

There is another problem specific to island nations. Some policies that solve problems for one community will merely inflict a greater problem to those further down-current.[95] Among continental nations, similar problems arise when dealing with shared watersheds and air pollution—why

---

[87] Sarah Sloat, *There's a Stinky Link Between the Amazon Fires and Calamity in the Caribbean*, INVERSE (Sept. 27, 2019), https://www.inverse.com/article/59633-amazon-rainforest-great-atlantic-sargassum-belt [https://perma.cc/E3HD-7JJV].

[88] Alejandro Castro, *Sargassum: Brown Tide Threatens the Caribbean*, INFOAMAZONIA, https://infoamazonia.org/en/2021/03/23/sargassum-brown-tide-threatens-the-caribbean/ [https://perma.cc/UJ5U-BCQA] (Mar. 24, 2021, 8:44 AM).

[89] Gisele Galoustian, *Sargassum Now World's Largest Harmful Algal Bloom Due to Nitrogen*, FLA. ATL. U. NEWSDESK (May 24, 2021), https://www.fau.edu/newsdesk/articles/nitrogen-seaweed-study.php [https://perma.cc/NJG2-YHGC].

[90] *Id.*

[91] Russell Hardin & Garrett Cullity, *The Free Rider Problem*, STAN. ENCYC. OF PHIL., https://plato.stanford.edu/entries/free-rider/ [https://perma.cc/PML8-DT47] (Oct. 13, 2020).

[92] *See* Peter, *supra* note 71.

[93] *Id.*

[94] *See* CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 4, 6, 9–10.

[95] *See, e.g.*, RODRIGO RIQUELME, PAOLA MÉNDEZ & IANTHE SMITH, INTER-AM. DEV. BANK, SOLID WASTE MANAGEMENT IN THE CARIBBEAN: PROCEEDINGS FROM THE CARIBBEAN SOLID WASTE CONFERENCE 10 (2016).

pay to prevent damage being inflicted on your own country when you can simply externalize that damage for a fraction of the cost?[96]

In the Caribbean, and especially among the tightly grouped Virgin Islands, this issue is a common problem when it comes to waste management.[97] SIDS struggle to bear the costs of water filtration and waste purification systems and instead pump waste into the ocean or let it wash out with the rain.[98] While each island will experience the resulting water pollution for a short period of time, ocean currents soon carry it away—often to another island community.[99] This not only strains relations between islands but also results in greater pollution overall, since those with the ability to prevent the problem in the first place are separated from those with the strongest incentive to do so.[100]

II. AMERICAN POLICY BACKGROUND

Before the current crisis, most ocean environmental policies, to the extent they dealt with *Sargassum*, treated it as a resource to be conserved.[101] This is still reflected in many national policies, despite the destructive nature of recent blooms.[102] The apparent advantages of this approach are debatable, since the new *Sargassum* offers less ecological

---

[96] *See, e.g.*, Elena M. McCarthy, *International Regulation of Transboundary Pollutants: The Emerging Challenge of Ocean Noise*, 6 OCEAN & COASTAL L.J. 257, 258, 275–76, 288 (2001).
[97] *See* Kerolyn K. Shairsingh, Cheol-Heon Jeong & Greg J. Evans, *Transboundary and Traffic Influences on Air Pollution Across Two Caribbean Islands*, 653 SCI. TOTAL ENV'T 1105, 1106, 1109 (2019); *Nearly Half-Dozen Sewerage Complaints Weekly | Overpopulation Among the Causes of Issue*, BVINEWS.COM (Sept. 24, 2019, 8:10 AM), https://bvinews.com/nearly-half-dozen-sewerage-complaints-weekly-overpopulation-among-the-causes-of-issue/ [https://perma.cc/SBR5-GHW9].
[98] Erin Gray, *Beneath the Caribbean Sea, a Wastewater Problem Lurks Unnoticed*, WORLD RES. INST. (June 20, 2016), https://www.wri.org/insights/beneath-caribbean-sea-wastewater-problem-lurks-unnoticed [https://perma.cc/2NCQ-885J]; Daphne Ewing-Chow, *Caribbean Islands Are the Biggest Plastic Polluters in the World*, FORBES (Sept. 20, 2019, 1:20 AM), https://www.forbes.com/sites/daphneewingchow/2019/09/20/caribbean-islands-are-the-biggest-plastic-polluters-per-capita-in-the-world/?sh=14a50227774b [https://perma.cc/GZD4-7CLK]; SYLVIA MICHELE DIEZ, PAWAN PATIL, JOHN MORTON, DIEGO J. RODRIGUEZ, ALESSANDRA VANSELLA, DAVID ROBIN, THOMAS MAES & CHRISTOPHER CORBIN, WORLD BANK GRP., MARINE POLLUTION IN THE CARIBBEAN: NOT A MINUTE TO WASTE 33 (2019).
[99] Leonard Nurse, Adrian Cashman & John Mwansa, *Confronting the Challenges of Sewerage Management in the Caribbean: A Case Study from the Island of Barbados*, 54 ENV'T: SCI. & POL'Y FOR SUSTAINABLE DEV. 30, 32, 36 (2012); Ramón Guzmán, *Sewer Outfalls to the Caribbean*, 37 WATER POLLUTION CONTROL FED'N 1530, 1530, 1535 (1965).
[100] RIQUELME ET AL., *supra* note 95, at 14.
[101] *See* van der Plank et al., *supra* note 4, at 4.
[102] *Id.* at 21–22; *see* Schell et al., *supra* note 30, at 8–9.

benefits at sea and poses a much greater threat on accumulation than more typical forms of *Sargassum*.[103] Additionally, for many SIDS, official policy may have little impact on practice, and be slower to change as a result.[104] For larger, more resource-rich countries (some with Caribbean dependencies), the official channels of law and policy reflect practice more closely.[105] This is beneficial in both the French and Dutch Antilles, as the national governments of both have developed official policies responding directly to the new Caribbean *Sargassum* problem.[106] However, the United Kingdom and United States have been slower to respond, which has complicated matters on the ground.[107]

In the United States, *Sargassum* harvest is managed under the Magnuson-Stevens Fishery Conservation and Management Act ("MSA").[108] As the name suggests, the MSA was put in place primarily to manage fish populations, but captures marine plants within its definition of fish, including *Sargassum*.[109] The Act broadly delegates responsibility for specific fishery regulations to Regional Fishery Management Councils under the direction of a single National Marine Fisheries Service.[110] However, only one of the Regional Councils has ever designated a *Sargassum* fishery for regulation and not in the Caribbean.[111] That regulation for the southeastern continental United States predates the *Sargassum* overgrowth problem and simply limits the total weight of *Sargassum* that can be harvested.[112] The Regional Council for the Caribbean, meanwhile, has not taken any steps to manage harvest and removal of *Sargassum* accumulations.[113]

---

[103] Schell et al., *supra* note 30, at 10.
[104] Edwin Jones & Eris Schoburgh, *Deconstructing Policy-Making and Implementation Issues in a Caribbean Context*, 53 SOC. & ECON. STUD. 35, 43, 50–51 (2004).
[105] *Id.*
[106] *See* TRISTAN FLORENNE, FRANC¸OIS GUERBER & FRANC¸OIS COLAS-BELCOUR, LE PHÉNOMÈNE D'ÉCHOUAGE DES SARGASSES DANS LES ANTILLES ET EN GUYANE 5–6 (2016); DUTCH CARIBBEAN NATURE ALL., *supra* note 56, at 1.
[107] Ethan Prall, *Is Seaweed a Fish? U.S. Seaweed Fisheries and Climate Change*, ABA (Apr. 28, 2021), https://www.americanbar.org/groups/environment_energy_resources/publications/natural_resources_environment/2020-21/spring/is-seaweed-fish-us-seaweed-fisheries-and-climate-change/ [https://perma.cc/EY8D-3LF2]; van der Plank et al., *supra* note 4, at 10.
[108] Prall, *supra* note 107 (citing 16 U.S.C. § 1802(12)).
[109] 16 U.S.C. § 1801(b).
[110] *Id.* § 1801(b)(5).
[111] 68 Fed. Reg. 57375, 57375 (Oct. 3, 2003) (to be codified at 50 C.F.R. pt. 622).
[112] *Id.*
[113] *See* Prall, *supra* note 107.

At the same time localized limitations on environmental alteration, originally intended to prevent human damage to valuable ecosystems, have prevented the removal of *Sargassum* from protected waters and beaches despite the damage these accumulations cause.[114] Ironically, because regulations prohibit the collection or disturbance of marine plants like *Sargassum* (without special permitting), local responses to protect these environments are delayed and reduced in their effectiveness.[115] Many of the most threatened areas of the U.S. Caribbean are subject to such localized environmental protections, exacerbating the problem.[116] The most threatened parts of U.S. states, like the Florida Keys, are similarly burdened.[117]

The United States has also adopted elements of the United Nations Convention for the Law of the Sea, including its classification of *Sargassum* as a "living marine resource" subject to protection for purposes of international relations.[118] Other limited areas of United States participation in international environmental treaties have been in the realm of *Sargassum* protection, like the Cartagena Convention Protocol for Specially Protected Areas and Wildlife.[119] As a result of NOAA's and the EPA's continued adherence to these now outdated protocols, gathering or shifting *Sargassum* before it reaches the shore is subject to unreasonable restrictions or outright prohibition.[120] These laws were originally to protect the highly important role played by *Sargassum*, which is an extremely biodiverse spawning ground for many keystone[121] (and market-desirable) species.[122] In any other context, this would be an important

---

[114] *See, e.g.*, 12 V.I. R. & Regs. § 96-3, https://dpnr.vi.gov/wp-content/uploads/2021/12/Wildlife_MarineSanctuaries_VIRR_6.10.21.pdf [https://perma.cc/8MZA-EY9J].
[115] *Id.*
[116] *See* SIMON J. PITTMAN, LAURIE BAUER, SARAH D. HILE, CHRISTOPHER F.G. JEFFREY, ERIK DAVENPORT & CHRIS CALDOW, NOAA NAT'L CTR. FOR COASTAL OCEAN SCI., MARINE PROTECTED AREAS OF THE U.S. VIRGIN ISLANDS: ECOLOGICAL PERFORMANCE REPORT 10–11 (2014).
[117] Sarah Fangman, *Superintendent's Welcome*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., https://floridakeys.noaa.gov/about/welcome.html?s=about [https://perma.cc/SZZ2-RK7A] (last visited Jan. 16, 2023); 15 C.F.R. § 922.163(a)(12) (2012).
[118] Van der Plank et al., *supra* note 4, at 19–20.
[119] *Id.* at 20.
[120] Telephone Interview with Dr. Paul Jobsis, Dir. of Marine & Env't Sci., Univ. of the V.I. (Mar. 15, 2022).
[121] Lindsay M. Martin, Pelagic *Sargassum* and Its Associated Mobile Fauna in the Caribbean, Gulf of Mexico, and Sargasso Sea, at ii (May 2016) (Master of Sci. thesis, Texas A&M University) (on file with Texas A&M University Libraries). A "keystone" species is one upon which the function of an entire ecosystem may depend. *Id. Sargassum* is an extreme example of a keystone species, in that its elimination would not just radically alter an important ecosystem but destroy it altogether. *See id.* at 11.
[122] D.D'A LAFFOLEY, H.S.J. ROE, M.V. ANGEL, J. ARDON, N.R. BATES, I.L. BOYD, S. BROOKE,

and intelligent policy; tourist-economy stakeholders would opt for the cheapest solution and seek to simply destroy *Sargassum* at the mouths of resort bays or beyond, obliterating the habitat before the seaweed had a chance to disturb guests.[123]

These prohibitive measures, though born of noble intentions, have unfortunate results.[124] Although federal policy leaves room for response to the crisis, the extra bureaucratic headaches and delays of the permitting process leaves U.S. territories vulnerable.[125] The regulatory framework already in place is designed to prevent direct human-caused damage; it is not equipped to respond to mass inundations of natural matter.[126] This Note can turn to the policies of other countries and evaluate their effectiveness. We will look at these in a somewhat chronological order, starting with strategies to gain information about the problem. Then, we will look at potential avenues to preventing the blooms from happening in the first place, before covering pre-landing interception, post-landing removal, and storage/disposal. We will also cover planned regional developments, before finishing with policy conclusions and recommendations.

A. Policy Responses

All Caribbean countries impacted by the new *Sargassum* crisis have responded in some way.[127] However, there are still a few which do

---

K.N. BUCK, C.A. CARLSON, B. CAUSEY, M.H. CONTE, S. CHRISTIANSEN, J. CLEARY, J. DONNELLY, S.A. EARLE, R. EDWARDS, K.M. GJERDE, S.J. GIOVANNONI, S. GULICK, M. GOLLOCK, J. HALLET, P. HALPIN, R. HANEL, A. HEMPHILL, R.J. JOHNSON, A.H. KNAP, M.W. LOMAS, S.A. MCKENNA, M.J. MILLER, P.I. MILLER, F.W. MING, R. MOFFIT, N.B. NELSON, L. PARSON, A.J. PETERS, J. PITT, P. ROUJA, J. ROBERTS, J. ROBERTS, D.A. SIEGEL, A.N.S. SIUDA, D.K. STEINBERG, A. STEVENSON, V.R. SUMAILA, W. SWARTZ, S. THORROLD, T.M. TROTT & V. VATS, SARGASSO SEA COMM'N, THE PROTECTION AND MANAGEMENT OF THE SARGASSO SEA: THE GOLDEN FLOATING RAINFOREST OF THE ATLANTIC OCEAN 31–32 (2011).

[123] *See, e.g.*, *Every Possible Solution to the Sargassum Crisis Has an Environmental Downside*, *supra* note 80 (quoting president of Quintana Roo's employer's federation demanding to "stop it before it even reaches the beaches," questioning efficacy of barriers).

[124] *Id.*

[125] *See* Prall, *supra* note 107 (noting need for action in response to changing circumstances of *Sargassum* on the federal level).

[126] *See* 16 U.S.C. § 1801(b) (regulatory framework designed around management and prevention of human action, no mention of prevention of natural damage).

[127] *See* Sien van der Plank, Shelly-Ann Cox, Janice Cumberbatch, Robin Mahon, Bethiaa Thomas, Emma L. Tompkins & Jack Corbett, *Polycentric Governance, Coordination and Capacity: The Case of Sargassum Influxes in the Caribbean*, 50 COASTAL MGMT. 285, 293–95 (2022) [hereinafter *Polycentric Governance*] (noting official top-level policy responses for almost all Caribbean states and dependencies, though states without national policies are members to international organizations with policies in place).

not have a formal national policy set.[128] These include the United States' dependencies of Puerto Rico and the Virgin Islands, as well as most UK dependencies.[129] Some larger Caribbean countries have also been responding ad hoc, allowing different departments and interested parties to formulate policy as needed.[130] While we will discuss the independent strategies pursued within these countries as they become relevant, our primary focus will be on formal national policy.[131]

B. Information Gathering

Because the *Sargassum* problem is largely new to the Caribbean, the first hurdle to cross is knowing exactly what damage is being caused and where.[132] Many national and local policies reflect this, imposing various reporting and monitoring requirements.[133] These are present in the policies of the French Caribbean, Dominica, Jamaica, St. Kitts and Nevis, St. Vincent and the Grenadines, and Trinidad and Tobago.[134] With monitoring and reporting policies spread well across the Caribbean, especially within the Eastern Caribbean impacted first and foremost by westward-bound *Sargassum*, the data collected has the potential to aid response efforts considerably, if coordinated.[135] Unfortunately, this is easier said than done.

While the most developed monitoring policies contain clearly defined responsibilities and priorities, others do not. For example, the policy of Dominica recommends gathering data and compiling that data into reports for review by a "Sargassum Action Committee," but does not define who is responsible for gathering the data or compiling the reports in the

---

[128] *Id.*
[129] *Id.*
[130] *Id.* (noting that Cuba, Haiti, Belize, Suriname, Guyana and the Bahamas all rely on non-national-level policy); *see, e.g.*, Resolución No. 022/2012, Ministerio de Medio Ambiente y Recursos Naturales (Dom. Rep., 2012); *Haiti—ALERT: Algae Invade the Coast of the Great South*, HAITI LIBRE (Dec. 30, 2015), https://www.haitilibre.com/en/news-16193-haiti-alert-algae-invade-the-coast-of-the-great-south.html [https://perma.cc/N2LF-L9BG]; Laura Dowrich-Phillips, *Belize Tourist Board Helps Properties Affected by Sargassum*, LOOP NEWS (Nov. 1, 2018), https://tt.loopnews.com/content/belize-tourist-board-helps-properties-affected-sargassum [https://perma.cc/4M76-VLYP].
[131] *Id.*
[132] *See, e.g.*, ASS'N OF CARIBBEAN STATES & CARIBBEAN SEA COMM'N, SYMPOSIUM: CHALLENGES, DIALOGUE AND COOPERATION TOWARDS THE SUSTAINABILITY OF THE CARIBBEAN SEA 3 (2015).
[133] *See* van der Plank et al., *supra* note 4, at 6.
[134] *Id.* at 17–19 tbl.3.
[135] *See* CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 32.

first place.[136] Others are problematic in that the metrics for monitoring and reporting are not well-defined and could lead to inconsistent reporting within a single country (over-reporting some *Sargassum* events, under-reporting others); on the regional scale this potential for inconsistency likely renders the data gathered unusable.[137] Because *Sargassum* is inherently a regional problem, the unstandardized nature of the data collected may significantly reduce its usefulness.[138] Thankfully, some progress has been made in this area, with an ACS-backed coalition of impacted states having agreed to information coordination on the problem in 2019, but much of the planned framework remains uncompleted.[139]

The uses of this data are many and varied, but focus is foremost on future forecasting of *Sargassum* events and early warning systems, as well as additional research on the causes and origins of the blooms.[140] Although the root cause cannot be functionally addressed in the countries where these data collection policies are in place, at each step the data could provide more warning for *Sargassum* events as they arise, allowing for more flexibility and effectiveness in their responses.[141] From this research, we must now consider action: preventing the problem in the first place. For that, we look to Brazil's Amazonian agriculture and the global community's climate change control efforts.[142]

C. Prevention

While logging has been a problem in the Amazon basin for some time, recent intensification of agricultural cultivation and the use of heavy chemical fertilizers has led to new problems.[143] Thanks to a strong effort by the international press, many are now aware that the Amazon

---

[136] RESILIFY INC., STRATEGIC SARGASSUM PREPAREDNESS PLAN 20 (2019).
[137] Daniel Robledo, Erika Vázquez-Delfín, Yolanda Freile-Pelegrín, Román Manuel Vasquez-Elizondo, Zujaila Nohemy Qui-Minet & Adán Salazar-Garibay, *Challenges and Opportunities in Relation to* Sargassum *Events Along the Caribbean Sea*, FRONTIERS MARINE SCI., 2021, at 1, 9–10.
[138] *See id.*
[139] Kayla Young, *Caribbean Sargassum Invasion Garners Regional Response*, CAYMAN COMPASS (July 2, 2019), https://www.caymancompass.com/2019/07/02/caribbean-sargassum-invasion-garners-regional-response/ [https://perma.cc/JHF2-KUSA].
[140] *See* CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 17.
[141] *See id.*
[142] Kathi Jo Jankowski, Christopher Neill, Eric Davidson, Marcia Macedo, Ciniro Costa Jr., Gillian Galford, Leonardo Maracahipes Santos, Paul Lefebvre, Darlisson Nunes, Carlos Cerri, Richard McHorney, Christine O'Connell & Michael Coe, *Deep Soils Modify Environmental Consequences of Increased Nitrogen Fertilizer Use in Intensifying Amazon Agriculture*, SCI. REPS., 2018, at 1, 1.
[143] *Id.*

Rainforest is being rapidly depleted by both legal and illegal logging operations, as land is cleared for ranching, farming, and mining purposes.[144] However, under Brazilian President Jair Bolsonaro, deforestation has only accelerated.[145] Forest fires in the area have also opened up larger areas for cultivation.[146]

While this may be economically advantageous in the short term, there are many environmentally deleterious effects.[147] Among these is the increased concentration of nutrients and heavy metals in the discharge of the Amazon River.[148] These additions to the Amazon's waters not only damage the wildlife in the Amazon and directly off of Brazil's coast, but they have also created a toxic new hazard affecting millions of people in the form of the resulting blooms of *Sargassum* in the mid-Atlantic.[149] The current party in power has taken steps to increase economic exploitation of the Amazon River basin but has done little to address the environmental knock-on effects like *Sargassum*.[150]

One of the realms of environmental policy most demanding of international cooperation is global anthropogenic climate change.[151] This has been closely tied to the new *Sargassum* crisis, as recognized by the national policies of most Caribbean countries.[152] Unfortunately, international action on climate change has remained an elusive goal, and as it is not tackled specifically in efforts to combat the *Sargassum* crisis, we will not be discussing it in depth here.[153]

---

[144] *See, e.g.*, William Langewiesche, *The War for the Rainforest*, N.Y. TIMES MAG., https://www.nytimes.com/2022/03/16/magazine/amazon-rainforest-ituna-itata.html [https://perma.cc/3LBU-WT8C] (Apr. 18, 2022).

[145] *Id.*

[146] *See* Rebecca Lindsey, *From Forest to Field: How Fire Is Transforming the Amazon*, NASA EARTH OBSERVATORY (June 8, 2004), https://www.earthobservatory.nasa.gov/features/AmazonFire [https://perma.cc/44GW-WEKR].

[147] *See* Mario Osava, *Agricultural Power, Waning Industry Dictate Brazil's Future*, GLOB. ISSUES (Feb. 14, 2022), https://www.globalissues.org/news/2022/02/14/30073 [https://perma.cc/ZEB6-9CRD].

[148] Anderson Martins de Souza Braz, Marcondes Lima da Costa, Sílvio Junio Ramos, Roberto Dall'Agnol & Antonio Rodrigues Fernandes, *Environmental Impact of Potentially Toxic Elements on Tropical Soils Used for Large-Scale Crop Commodities in the Eastern Amazon, Brazil*, 11 MINERALS 990, 991 (2021).

[149] *See* Wang et al., *supra* note 44, at 83.

[150] Langewiesche, *supra* note 144.

[151] Laurie Anderson & Nathan Rowley, *Global Climate Solutions Require Global Cooperation*, OHIO WESLEYAN UNIV., https://www.owu.edu/news-media/from-our-perspective/global-climate-solutions-require-global-cooperation/ [https://perma.cc/SH5S-DGYL] (last visited Jan. 16, 2023).

[152] Van der Plank et al., *supra* note 4, at 13–14.

[153] *See* Andres Bisono & Christopher Walker, *Sargassum: A Grave Threat and a Great*

D. Mitigation

Unfortunately, an effective strategy to end the problem outright is unlikely to take shape any time soon, as we are only beginning to understand what caused the crisis in the first place.[154] Instead, one area that has been a focus of many national policies is the interception of *Sargassum* blooms before they reach the shore, as offshore interception should be less environmentally destructive and less costly than post-landing removal.[155] The two primary methods of interception are direct intervention via boat, and the installation of sea barriers.[156]

Not every state impacted has been able to use these tools. Due to U.S. environmental protections intended to protect key environments and habitats for endangered species, in American waters *Sargassum* blooms may not be confronted until landing.[157] Most Caribbean states are not in possession of the equipment required to install effective sea barriers or to attack the blooms navally, which has slowed, but not halted, deployment of these strategies.[158]

The two countries which have used interception strategies the most aggressively are Mexico and the Dominican Republic.[159] While most of Mexico's eastern coast is on the Gulf of Mexico, rather than the Caribbean, the state of Quintana Roo in the Yucatan region of the country does border on Caribbean waters, and has faced a great deal of Caribbean *Sargassum*.[160] In response, looking to safeguard the tourism industry and

---

Opportunity, GLOB. AMS. (July 1, 2022), https://theglobalamericans.org/2022/07/sargassum-a-grave-threat-and-a-great-opportunity/ [https://perma.cc/MG45-KKMC].

[154] *See* Ed Yong, *Why Waves of Seaweed Have Been Smothering Caribbean Beaches*, ATLANTIC (July 4, 2019), https://www.theatlantic.com/science/archive/2019/07/great-atlantic-sargassum-belt-here-stay/593290/ [https://perma.cc/U3JH-FEK7].

[155] *See* van der Plank et al., *supra* note 4, at 21; CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 34.

[156] CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 34.

[157] Telephone Interview with Dr. Paul Jobsis, *supra* note 120.

[158] *See* CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 34; van der Plank et al., *supra* note 4, at 21.

[159] *See* Danny Lewis, *Mexico's Navy Is Battling Seaweed Along the Caribbean Coast*, SMITHSONIAN MAG. (Nov. 2, 2015), https://www.smithsonianmag.com/smart-news/mexicos-navy-battling-seaweed-along-caribbean-coast-180957112/ [https://perma.cc/CB3Y-HWEH]; Marta Florian, *Massive Seaweed Bloom Sparking Tourism Concerns in Dominican Republic*, LA PRENSA LATINA (Sept. 3, 2021), https://www.laprensalatina.com/massive-seaweed-bloom-sparking-tourism-concerns-in-dominican-republic/ [https://perma.cc/ZY4E-EFAF].

[160] *See* INT'L HYDROGRAPHIC ORG., *supra* note 15, at 14; *Government Will Build Four Sargassum-Gathering Vessels*, MEXICO NEWS DAILY (May 30, 2019) [hereinafter *Government Will Build*], https://mexiconewsdaily.com/news/government-will-build-sargassum-gathering-vessels/ [https://perma.cc/END4-2GD4].

the state's world-famous beaches, the Mexican Navy was deployed to gather and remove *Sargassum* from coast-bound currents.[161] The effectiveness of this method is questionable, however, as the amount gathered has been low and shrinking over time.[162] While the fuel and man-hours required per pound of *Sargassum* are likely lower than beach removal, due to the low costs of simple trawling rather than gathering by hand, the damage to ecological value of the blooms at sea and apparent low impact on the overall amount of *Sargassum* may decrease the attractiveness of this method.[163]

A more practicable solution for most Caribbean countries, without the resources of the Mexican government, has been the installation of sea barriers.[164] Because the seaweed floats along the very top of the water column, line-like barriers made of floating material may be attached to the sea-floor by tethers in order to hold back the majority of material, preventing it from reaching the beach in the first place.[165] Official policy has begun to embrace this strategy more and more.[166] It should be noted, however, that still more recommend only post-landing removal, and some of the policies that do sanction nearshore interception caution against removal further out to sea, due to environmental concerns.[167]

The premier employers of sea barriers have been Mexico and the Dominican Republic.[168] While these barriers have proven fairly effective at preventing popular beaches from booms" direct *Sargassum* along the current, rather than causing build-up on the site of installation, the *Sargassum* may later land on less-affluent shores, where local community stakeholders cannot afford to install booms.[169] The sea barriers

---

[161] *Government Will Build*, *supra* note 160.
[162] *Mexican Navy Unable to Handle the Excessive Amount of Sargassum Approaching the Shore*, CANCUN POST (June 1, 2022), https://thecancunpost.com/mexican-navy-unable-to-handle-the-excessive-amount-of-sargassum-approaching-the-shore/ [https://perma.cc/J6CJ-3YA6].
[163] *See id.*; DUTCH CARIBBEAN NATURE ALL., *supra* note 56, at 11.
[164] *See* van der Plank et al., *supra* note 4, at 21.
[165] DUTCH CARIBBEAN NATURE ALL., *supra* note 56, at 11.
[166] Van der Plank et al., *supra* note 4, at 21; *see, e.g.*, Steven Cruse, *60KM Long Sargassum Seaweed Barrier May Be Built Near Cancun*, CANCUN SUN (May 10, 2022), https://thecancunsun.com/60km-long-sargassum-seaweed-barrier-may-be-built-near-cancun/ [https://perma.cc/7JDP-97VP].
[167] *See* van der Plank et al., *supra* note 4, at 21; DUTCH CARIBBEAN NATURE ALL., *supra* note 56, at 11.
[168] Kayla Young, *To Protect Tourist Economy, Resorts Invest in Seaweed-Control Business*, CAYMAN COMPASS (Oct. 21, 2019), https://www.caymancompass.com/2019/10/21/to-protect-tourist-economy-resorts-invest-in-seaweed-control-business/ [https://perma.cc/2QWE-ZK8S].
[169] *Id.*

themselves block shipping, and are highly vulnerable to damage from the region's frequent hurricanes.[170]

At the same time, there are many response costs and environmental dangers avoided by the use of booms and offshore collection, especially in protecting the bays, inlets, and mangroves from which *Sargassum* cannot escape.[171] Remote areas may be host to particularly valuable habitats but be inaccessible to the labor force and equipment that would be necessary for post-landing removal.[172] Mangroves and rocky shores also do not allow access to the large numbers of people or heavy equipment necessary to clear heavy *Sargassum* build-up, making barriers the only effective solution in some scenarios.[173]

III. SHORELINE REMOVAL

New *Sargassum* blooms also pose more environmental risks than typical *Sargassum* does. As a result of the new phenomenon's origin in the Amazon watershed, the algae carry more heavy metals and toxic loads of other nutrients.[174] As it accumulates in bays and on beaches, it contaminates the water and soil with the nutrients it holds.[175] This accumulation also makes it unsuitable for many market purposes.[176]

Some policy documents reflect this, skipping over the non-interference stage and suggesting more aggressive intervention.[177] More are in line with *Sargassum*'s typical ecological role, and only prescribe removal if damage is otherwise unavoidable.[178]

While not all national policies address offshore strategies for dealing with the *Sargassum* crisis, mention is always made of how to address the problem post-landing.[179] At the same time, policies are divided on the

---

[170] *Id.*
[171] *Id.*
[172] *Id.*
[173] DUTCH CARIBBEAN NATURE ALL., *supra* note 56, at 11.
[174] Rosa E. Rodríguez-Martínez, Priyadarsi D. Roy, Nuria Torrescano-Valle, Nancy Cabanillas-Terán, Silvia Carrillo-Domínguez, Ligia Collado-Vides, Marta García-Sánchez & Brigitta I. van Tussenbroek, *Element Concentrations in Pelagic* Sargassum *Along the Mexican Caribbean Coast in 2018–2019*, PEERJ, 2020, at 1, 1, 8.
[175] *Id.* at 8.
[176] *See, e.g.*, Martin Morgan, *Mexico Pioneers Recycled Seaweed Shoes*, BBC (Mar. 29, 2019), https://www.bbc.com/news/blogs-news-from-elsewhere-47745641 [https://perma.cc/4W8N-RU8C].
[177] Van der Plank et al., *supra* note 4, at 19–20.
[178] *Id.*
[179] *Id.* at 21.

method of removal at that point.[180] Most call for the use of hand tools when possible, and most allow for the use of mechanized equipment when necessary.[181] Fewer and fewer policies recommend simple avoidance and conservation, but the change has not been complete: Grenada and Aruba's policies call for such an approach.[182]

Most Caribbean polities recommend hand removal by light tools, like rakes and brooms.[183] This is generally recommended over heavy machinery due to the environmental damage caused by using such equipment on beaches.[184] Removal by hand poses far less threat of erosion and compaction, preserving the beaches key to many Caribbean economies as well as the hidden nests of endangered sea turtles.[185] The draw of mechanized removal is strong, however, due to the small labor force of most island nations and the greater speed at which removal can be achieved.[186]

The legal barriers to the use of mechanized equipment vary, with some policies merely recommending the use of hand tools when possible and others requiring permits before other methods are allowed.[187] Despite the destruction caused by heavy machinery, such equipment is frequently used, as *Sargassum* build-up in the worst-affected areas is unmanageable by hand.[188] The policy developed for the French Caribbean actually defines a strict time period by which *Sargassum* should be cleaned from the beach—only three days after landing—in order to prevent toxification of the sand as the *Sargassum* decomposes.[189] No other policy has an explicitly defined timeline for removal, perhaps out of concern that it

---

[180] *Id.*
[181] *Id.*
[182] *Id.* at 20–21. Note Aruba's policy may be outdated because it has been superseded by a broader strategy document adopted by the larger Dutch Caribbean. Van der Plank et al., *supra* note 4, at 9.
[183] Model Protocol for the Management of Extreme Accumulations of *Sargassum* on the Coasts of CRFM Member States, 10, CRFM Secretariat Technical & Advisory Document no. 2016/5 (2016).
[184] CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 37.
[185] *See id.*; Oxenford et al., *supra* note 54, at 28.
[186] *See* CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 37; Oxenford et al., *supra* note 54, at 37.
[187] Van der Plank et al., *supra* note 4, at 21.
[188] *See, e.g.*, Bernetia Akin, *Here It Comes Again—Sargassum Stretches Across the V.I. Shoreline*, ST. THOMAS SOURCE (Aug. 8, 2021), https://stthomassource.com/content/2021/08/08/here-it-comes-again-sargassum-stretches-across-the-v-i-shoreline/ [https://perma.cc/QCL7-WYVP].
[189] Van der Plank et al., *supra* note 4, at 21–22.

may lead to overdependence on quick-but-destructive clean-up methods, like the use of heavy equipment.[190]

Another thing left unclear by most policies is who, exactly, is responsible for removal.[191] This may be practically necessary, as government resources are highly limited in SIDS, and the relevant stakeholders able to implement removal vary from beach to beach.[192] On some, single resorts sit on their own beaches[193] and will be the most interested party in removal. In other places, privately owned marinas are in the best place to handle the *Sargassum* and in still others, local community organizations may be most interested and capable.[194] As a result, most national policies take the form of recommendations and guidelines, rather than positive legal commands.[195]

IV. POST-REMOVAL

After removal is done, however, there is another question to answer: where does it all go? It cannot simply be dumped back into the ocean or piled up and left to rot. Unfortunately, most policies leave this key subject practically unaddressed, or dealt with only hypothetically.[196] In many places, the outcome is simply default, attempting to dispose of accumulated and gathered *Sargassum* in local dumps and landfills.[197]

In the French Caribbean, resources have been devoted to finding special-use *Sargassum* disposal sites, where it can be stored most safely, away from drinking water resources, human population concentrations, and valuable habitats for local wildlife.[198] The Bureau de Recherches

---

[190] *Cf. id.*
[191] *See Polycentric Governance*, *supra* note 127, at 298.
[192] *Id.*
[193] *See id.* at 298–99.
[194] *See id.* at 298.
[195] *See id.* at 291–93.
[196] *See* van der Plank et al., *supra* note 4, at 17–19.
[197] *See, e.g.*, Alana Fearon, *Majority of Sargassum Seaweed Being Taken to Landfill for Burial*, LOOP (July 15, 2019, 6:49 PM), https://cayman.loopnews.com/content/majority-sargassum-seaweed-being-taken-landfill-burial [https://perma.cc/MZ54-3XP7]; *Sargassum on the Beach Is One Problem, Disposing of It Is Another*, MEXICO NEWS DAILY (June 8, 2022), https://mexiconewsdaily.com/news/sargassum-on-the-beach-is-one-problem-disposing-of-it-is-another/ [https://perma.cc/UM7E-XVB4].
[198] Laureen Nacimento, *Preliminary Characterisation of Sargassum Storage Sites in Martinique*, BRGM (Sept. 21, 2020), https://www.brgm.fr/en/reference-completed-project/preliminary-characterisation-sargassum-storage-sites-martinique [https://perma.cc/6ZDL-Q8TP].

Géologiques et Minières ("BRGM") conducts geographic research on the islands to discover which sites are most suited for safe disposal and ranks them accordingly.[199] Unfortunately, other policies have not been as proactive, and on some islands such a strategy may be near impossible due to their small sizes and concentrated populations.[200]

Most policies suppose some economic use for the gathered *Sargassum*, but solutions are still being developed in this area.[201] The most traditional uses of *Sargassum*, including erosion control and fertilizer, are limited by circumstances unique to the new crisis.[202] While small amounts have been used as fertilizer supplement in the past, great quantities of *Sargassum* must be cleaned to avoid poisoning soil with the salt absorbed out of the ocean and dried to the plant on removal, and the heavy metals that accumulate in *Sargassum* originating from Amazon fertilizer make it less valuable as an organic resource, carrying with it many of the downsides of industrial fertilizers.[203]

This limited potential has been the focus of a great deal of research, since (short of reversing the crisis altogether) it may be crucial to find economic advantages in dealing with *Sargassum* to make up for increased costs and lost revenues in traditional economic sectors like fishing and tourism.[204] Although some progress has been made in terms of using *Sargassum* in new manufacturing methods and products, the same problems face manufacturing as agriculture: The sheer quantity is difficult to handle, *Sargassum* is not simple to process, and the heavy metals make it unsuitable for many purposes.[205] For the time being, most *Sargassum* is still simply disposed of.[206]

V. REGIONAL DEVELOPMENTS

One promising area of development has been increasing regional cooperation on the *Sargassum* problem. While not exactly addressed by any one country's policy, the work done by the ACS, CARICOM, OECS, and CRFM have been key to progress of many independent national

---

[199] *Id.*
[200] Van der Plank et al., *supra* note 4, at 17–19; *see Polycentric Governance*, *supra* note 127, at 297.
[201] Van der Plank et al., *supra* note 4, at 22.
[202] *See* Oxenford et al., *supra* note 54, at 30.
[203] *Id.* at 36–37.
[204] *See* Fidai et al., *supra* note 1, at 8–9.
[205] *See* Oxenford et al., *supra* note 54, at 37–39.
[206] *See id.*

policies.[207] Few of the policies adopted have been solely national in origin, with contributions from regional institutions and organizations in development.[208] Additionally, some large research initiatives important to understanding the origin of the *Sargassum* problem and the threats posed by it have been undertaken largely through international cooperation.[209]

There has been a problem plaguing some of these efforts, however: lack of communication between organizations has caused overlapping projects to waste resources that could likely be better utilized under unified direction.[210] For example, both CARICOM and the CRFM have developed so-called "model protocols" for tackling the crisis, essentially fill-in-the-blank legislation to be adopted by individual governments to unify the response across national boundaries.[211] Although similar in many respects, these model protocols are not identical, and could cause confusion when it is most important to understand which entities are responsible for which aspects of the crisis.[212] The different languages used for each also confuse matters further: created in English and Spanish, respectively, direct translation creates problems for the diverse countries of the Caribbean trying to adopt these policies for themselves.[213]

Although these model protocols are somewhat redundant, they are still a great advancement over the alternative in which every country must devote its own resources to developing an independent policy.[214] While there will be differences between the states that adopt different models, there will still be greater consensus among responsible parties and agencies than would be the case otherwise.[215]

CONCLUSION

Greater international cooperation will be required if the Caribbean is to survive and adapt to the ongoing crisis, and the United States should take a more active role in promoting that cooperation. Unlike SIDS and larger Caribbean states like the Dominican Republic, Haiti, and Cuba,

---

[207] *See Polycentric Governance*, *supra* note 127, at 296, 299.
[208] *Id.* at 299.
[209] *See, e.g.*, CARIBBEAN REG'L FISHERIES MECHANISM, *supra* note 7, at 15; *Polycentric Governance*, *supra* note 127, at 287 (research sponsored by three organizations of differing nationalities).
[210] *See Polycentric Governance*, *supra* note 127, at 299.
[211] *Id.* at 291.
[212] *Id.* at 296.
[213] *See id.*
[214] *Id.* at 298.
[215] *Id.* at 287.

the United States has significant resources that could be put towards addressing the crisis: Some of these resources are currently being used in ways that worsen the crisis, enforcing legal prohibitions that prevent private parties from dealing with *Sargassum* more effectively,[216] and a great deal more is being used to address other international problems like drug trafficking.[217] Due to its status as the pre-eminent economic power of the region, the United States is in a unique position to contribute to international policy efforts: Most Caribbean islands are highly dependent on U.S. trade and tourism, and with the strong relationships developed therefrom already in place, the United States may be able to coordinate with Caribbean constituent countries better than other international partners.[218] Additionally, unlike other rich countries with territories in the Caribbean, like the UK, Netherlands, and France, the United States has significant resources in the area and is better equipped to deal with SIDS directly.[219] The United States is also the largest foreign investor in the Caribbean, and with more invested in the region, the United States has more interests to protect there than any other potential intervenor.[220] In short, the United States has the means, the resources, and the incentive to respond in a way no other country could.

The simplest step that could be taken would be through minor regulatory reforms, allowing local government and private efforts to intercept nearshore *Sargassum*. This could likely be accomplished without requiring the intervention of Congress, as the legislature has not directly placed prohibitions on interference with *Sargassum*.[221] Although this saves a great deal of trouble on the road to reform, any change would still need to make its way through the regulatory processes of the NMFS and regulatory Councils.[222]

---

[216] *See supra* Part II.
[217] *See* Joshua Goodman, *New Ruling Threatens Coast Guard's High Seas Counter-Drug Mission*, AP NEWS (May 5, 2022), https://apnews.com/article/sports-miami-florida-united-states-south-america-1b7d5dda8d4cc3bdc9d24d6cc194d892 [https://perma.cc/Q75M-WSXN].
[218] *See* Ransford W. Palmer, *The United States' Win-Win Relationship with the Caribbean*, 16 BROWN J. WORLD AFFS. 151, 151 (2009).
[219] *See Caribbean*, EUR. COMM'N, https://policy.trade.ec.europa.eu/eu-trade-relationships-country-and-region/countries-and-regions/caribbean_en [https://perma.cc/Y74Q-S75Y] (last visited Jan. 16, 2023) (European Union combined is the Caribbean's third-largest trading partner; the United States is first).
[220] *See* Olaf De Groot & Miguel Preéz Ludeña, Econ. Comm'n for Latin Am. & the Caribbean, *U.N. Foreign Direct Investment in the Caribbean: Trends, Determinants and Policies* 46, Annex 3, LC/L.3777 (Feb. 2014).
[221] *See* Prall, *supra* note 107.
[222] *Id.*

There are some reforms that should not be made, at least not until further study can be completed. Although the laws against interference with marine plants in protected wildlife sanctuaries may cause damage when accumulated *Sargassum* cannot be removed, these fragile ecosystems must be handled with care. Legalizing the installation of collection booms to protect these areas, rather than opening them to haphazard cleaning, should be the goal of such reforms for now. Many national policies, with reason, emphasize the costs of botched clean-up efforts, and the United States must learn from their mistakes.[223]

Unity in response and responsibility, which may be achieved more easily with the United States involved, also avoids tragedy-of-the-commons problems inherent to international environmental issues. In terms of *Sargassum*, deflection and disposal in particular pose threats of cost-shifting over problem-solving: Sea barriers may simply push the burden on to islands further down-current, and communities struggling with the quantity of *Sargassum* waste may resort to simply dumping it where the harm will be experienced by others, instead of the disposers.

Altogether, the U.S. regulatory state should bring its force to bear in dealing with the new *Sargassum* crisis. As it stands currently, national-level policy is at odds with the needs of the Caribbean, preventing interested parties from contributing to the solution. The United States should invest into the international governmental mechanisms of the Caribbean, as well as other relevant international organizations like the OAS and the United Nations. If further research proves it to be effective, maritime resources could be used to redirect or gather *Sargassum* before it lands on shore causing more problems and requiring higher-cost measures in response. The scale and threat of this crisis to the well-being of millions of Americans and others, to unique and valuable ecosystems, as well as to international shipping and navigation, demand action.

---

[223] Van der Plank et al., *supra* note 4, at 21.