CHEMICAL CORALS: THE IMPACTS OF SUNSCREEN ON CORAL REEFS AND A PROPOSAL FOR REGULATION

Kristina O'Keefe

INTRODUCTION

Coral reefs are some of the most biodiverse ecosystems on the planet, with an abundance of thriving sea life calling these systems home. These systems play important roles in protecting coastal areas in the event of a storm, providing a biodiverse habitat for marine organisms, and providing

surrounding communities with economic value through tourism.[1] Unfortunately, these uniquely diverse ecosystems are decreasing rapidly due to various factors, including climate change and marine pollution. These factors induce coral bleaching, which causes corals under stress to "expel the symbiotic algae living in their tissues."[2] The bleaching events that happen to coral systems worldwide increase coral's susceptibility to disease while also ruining the beautiful aesthetic that these marine habitats provide.[3]

Within the United States, coral reef systems can be found in the waters of Florida, Hawaii, Puerto Rico, and other Pacific and Caribbean Island territories.[4] These systems are also impacted by the global devastation to coral reef health.[5] Stony coral cover in the Caribbean Islands has decreased from 50% to 10% in three decades.[6] The reefs off Florida's coast have been declining consistently over the past 40 years, and Hawaii's reefs face a plethora of threats that require an emphasis on mitigating local threats.[7] Each of these reefs has various monitoring and protection systems to uphold the health and beauty of America's coral reefs.[8] However, protections regarding the harm that sunscreen pollution causes coral reefs are lacking across most of these regions, and this lack can be quite detrimental to the health of coral reefs.

With around 14,000 tons of sunscreen reaching the ocean and absorbed by corals every year, the future of corals depends on the regulation of these chemicals.[9] These coral reefs desperately need protection from the pollution causing their destruction, specifically those from chemical sunscreens. First, this article will provide background on the importance of coral reefs and the

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1. *See* Mike Mastry, *Coral Reef Protection Under the United States Federal Law: An Overview of the Primary Legislative Means by Which Coral Reef Ecosystems and Their Associated Habitats May Be Protected*, 14 UNIV. BALT. J. ENV'T L. 1, 1–2 (2006) (discussing the benefits of coral reef ecosystems); Ashlyn Boatwright, Comment, *Let the Sunshine In: A Proposal to Ban Chemical Sunscreen*, 36 J. ENV'T L. & LITIG. 267, 268 (2021).

2. *What is Coral Bleaching?*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., https://oceanservice.noaa.gov/facts/coral_bleach.html (last visited Jan. 20, 2023).

3. Boatwright, *supra* note 1, at 273.

4. Nick Bradford, *US Coral Reefs in a Warming Ocean*, NEEF: NATURE, https://www.neefusa.org/nature/water/us-coral-reefs-warming-ocean (last visited May 10, 2023); *America's Coral Reefs*, EPA, https://www.epa.gov/coral-reefs/americas-coral-reefs (last updated Mar. 7, 2023).

5. *Id.*; Bradford, *supra* note 4.

6. EPA, *supra* note 4.

7. *Id.*

8. *Id.*

9. Boatwright, *supra* note 1, at 273; Downs et al., *Toxicopathological Effects of the Sunscreen UV Filter, Oxybenzone (Benzophenone-3), on Coral Planulae and Cultured Primary Cells and Its Environmental Contamination in Hawaii and the U.S. Virgin Islands,* 70 ARCHIVES ENV'T CONTAMINATION & TOXICOLOGY 265, 266 (2016); *see also* Donovaro et al., *Sunscreens Cause Coral Bleaching by Promoting Viral Infections*, 116 ENVT' L HEALTH PERSPECTIVES 441, 441 (2008) (providing scientific evidence that sunscreens cause coral bleaching).

harmful effects that sunscreen chemicals have on their health, as well as the efforts already under way within the United States and its territories to regulate these chemicals. Next, this article will propose mechanisms for implementing a regulation banning reef-harming chemicals from sunscreen at the federal level through incorporative reference and a historical analysis of sunscreen and water pollution regulation. Finally, this article will analyze the possibility of regulation on the international level through treaty law and customary law, as well as examine Palau's regulation of sunscreen chemicals harmful to coral reefs as an example of successful national policy.

I. BACKGROUND

A. Importance of Reefs and the Impact of Sunscreen on Them

Coral reef systems are some of the most biodiverse ecosystems on Earth, housing one-fourth of all marine species.[10] These ecosystems provide habitats for over 4,000 fish species,[11] yet only occupy an area about half the size of France.[12] These ecosystems are often referred to as the "rainforests of the sea" due to their slow rates of recovery from damage, which is why protecting them is necessary.[13]

Not only do coral reefs play a vital role in the ocean's function, but they also provide great benefits to humans. Due to the biodiversity and abundance of marine species that coral reefs attract, they provide an important food source,[14] especially considering seafood accounts for one-fifth of human protein consumption.[15] Coral reefs also serve important purposes during weather-related events such as hurricanes.[16] These events often cause rough waters and huge waves, which can erode coastlines, but coral reefs act as buffers and can decelerate the waves, protecting the land from erosion.[17] Recently, coral reefs have also been used by the medical field in pharmaceutical drugs for treatment of HIV and depression.[18] Coral reefs also provide a huge economic value, producing "a $375 billion industry through

10. Mastry, *supra* note 1, at 2; Mary Gray Davidson, *Protecting Coral Reefs: The Principle National and International Legal Instruments*, 26 HARV. ENV'T L. REV. 499, 501 (2002).
11. Boatwright, *supra* note 1, at 272.
12. John Misachi, *Where Are Coral Reefs Found?*, WORLDATLAS (Feb. 4, 2021), https://www.worldatlas.com/articles/where-are-coral-reefs-found.html.
13. Mastry, *supra* note 1, at 2; Davidson, *supra* note 10, at 500.
14. Boatwright, *supra* note 1, at 271.
15. Davidson, *supra* note 10, at 502.
16. Mastry, *supra* note 1, at 1.
17. Boatwright, *supra* note 1, at 272.
18. Davidson, *supra* note 10, at 502-03.

tourism and fisheries worldwide."[19] Coral reefs play an important role in the environment and human society, but without protection they may be gone for good.

The decline of coral reefs worldwide is increasing due to impacts from anthropogenic activities.[20] Over 50% of reefs have died since the end of the twenty-first century and "scientists predict that over ninety percent may die this century."[21] While the cause of coral decline can be attributed to multiple factors, including climate change and overfishing,[22] the impacts from pollution, especially sunscreen, has been a huge trigger for bleaching events and a decline in coral health.[23] Bleaching events are a major cause of coral death, and their occurrence will only become more frequent as human impacts increase.[24]

Sunscreen pollution is one of the causes of coral reef bleaching.[25] Studies found that "[b]ecause human use of tropical ecosystems and coral reef areas is progressively increasing, we predict that the impact of sunscreens on coral bleaching will grow considerably in the future on a global scale."[26] This prediction is based on the harsh effects that certain chemicals found in chemical sunscreens have on coral reefs. Typical chemical sunscreens can contain upwards of 20 different chemicals and research shows that common sunscreen chemicals such as parabens, cinnamates, benzophenones, and camphor contribute to coral bleaching.[27] One study examined oxybenzone's effects on coral's larval stage and found a change in morphological structure, a decline in movement after just four hours of exposure, as well as a decrease in the presence of zooxanthellae, which is typical of a bleaching event.[28] Another study "resulted in the release of large amounts of coral mucous (composed of zooxanthellae and coral tissue) within 18-48 hours, and complete bleaching of hard corals within 96 hours."[29] Research also finds that some chemicals found in sunscreen amplify the production of viruses in the water, which are then absorbed by the zooxanthellae and cause viral infections that lead to coral bleaching and mortality.[30]

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19. Boatwright, *supra* note 1, at 271; *See Coral Reefs Support Jobs, Tourism, and Fisheries*, FLA. KEYS NAT'L MARINE SANCTUARY, https://floridakeys.noaa.gov/corals/economy.html (last visited Apr. 6, 2023) (discussing the importance that coral reefs play in the tourism economy).
20. Davidson, *supra* note 10, at 505.
21. Boatwright, *supra* note 1, at 272.
22. Davidson, *supra* note 10, at 505.
23. Boatwright, *supra* note 1, at 271.
24. NAT'L OCEANIC & ATMOSPHERIC ADMIN., *supra* note 2.
25. Downs, *supra* note 9, at 265.
26. Donovaro, *supra* note 9, at 446.
27. *Id.*
28. Downs, *supra* note 9, at 270.
29. Donovaro, *supra* note 9, at 445.
30. *Id.*

About 25% of applied sunscreen is washed off when swimming in the water, which results in over 4,000 tons of sunscreen washed off in waters containing reef systems per year.[31] From this statistic, an estimated 10% of the world's coral reefs have the potential to be affected by coral bleaching due to chemical sunscreens.[32] Allowing the continued use of these chemicals will only elevate the damage being caused to coral by increasing the rate and intensity of bleaching through exposure.

B. Current Regulations Within the United States to be Used as Models

1. Hawaii

In 2018, Hawaii Governor David Ige signed Hawaii Senate Bill 2571 into law.[33] With this bill, Hawaii became the first government to ban the sale or distribution of sunscreen products that included the chemicals oxybenzone and octinoxate.[34] The Hawaiian government stated that this law's purpose is to preserve coral reefs and, more broadly, marine ecosystems in general.[35] The bill, originally introduced in 2017,[36] relied heavily on a 2016 study on coral reefs in Hawaii and the U.S. Virgin Islands.[37] This study observed the effects of oxybenzone on the larval stage of coral and found that increasing concentrations of oxybenzone correlated with an increase in coral bleaching.[38] Results of lab tests concluded that oxybenzone is toxic to seven coral species tested.[39]

Although Hawaii enacted the bill in 2018, the ban of oxybenzone and octinoxate did not go into effect until January 1, 2021.[40] The text of the bill states that "oxybenzone and octinoxate[] have significant harmful impacts on Hawaii's marine environment and residing ecosystems, including coral reefs that protect Hawaii's shoreline."[41] The bill found that these two chemicals kill developing corals and cause stress and bleaching events to corals even

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31. *Id.*
32. *Id.*
33. *Governor Signs Bill First in The World To Ban Certain Sunscreens*, KO OLINA (Jan. 22, 2021), http://koolina.com/press/hawaii-world-to-ban-certain-sunscreens/; Will Coldwell, *Hawaii Becomes First US State to Ban Sunscreens Harmful to Coral Reefs*, THE GUARDIAN, (May 3, 2018), https://www.theguardian.com/travel/2018/may/03/hawaii-becomes-first-us-state-to-ban-sunscreens-harmful-to-coral-reefs.
34. *Id.*
35. KO OLINA, *supra* note 33.
36. Inga Vesper, *Hawaii Seeks to Ban 'Reef-Unfriendly' Sunscreen*, NATURE (Feb. 3, 2017), https://www.nature.com/articles/nature.2017.21332.
37. Downs, *supra* note 9, at 265.
38. *Id.*
39. *Id.*
40. S.B. 2571, 29th Leg. (Haw. 2018).
41. *Id.*

when temperatures do not surpass 87.8 degrees Fahrenheit, amongst other negative impacts.[42] Not only did the legislature find that these chemicals are harmful to Hawaii's coral reefs and marine ecosystems, but also that contamination of these ecosystems with oxybenzone and octinoxate is a persistent issue because the contamination is caused by swimmers and beach visitors.[43] Because of this, the legislature found higher concentrations of these chemicals in the waters at popular beaches and coral reefs across Hawaii.[44]

This bill's enactment did not come without pushback. Many sunscreen manufacturers criticized the bill, stating that it relied on insufficient evidence that oxybenzone and octinoxate were the causes of a decline in coral reef health.[45] The ban is also opposed by some medical specialists,[46] who believe that such a ban will result in a decline in sunscreen use altogether because these chemicals are found in over half the sunscreens on the market today.[47] However, one survey asked beachgoers from four different locations across two Hawaiian Islands about their willingness to switch to sunscreens without octinoxate and oxybenzone.[48] The results showed that 97% of those surveyed were willing to switch to reef-safe alternatives, with 12% of that group asking that the alternatives were clearly labeled, affordable, and provided adequate protection from the sun.[49]

2. U.S. Virgin Islands

The U.S. Virgin Islands followed in Hawaii's footsteps by passing a similar bill in June 2019.[50] The passage of this bill made the U.S. Virgin Islands the first American jurisdiction to implement such a ban.[51] Unlike Hawaii, however, the U.S. Virgin Islands banned the chemical octocrylene

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42. *Id.*
43. *Id.*
44. *Id.*
45. Vesper, *supra* note 36.
46. *Hawaii First Place to Ban Toxic Sunscreen*, CAYMAN NEWS SERV. (Oct. 10, 2018), https://caymannewsservice.com/2018/07/hawaii-first-place-to-ban-toxic-sunscreen/.
47. Lindsey Bever, *Hawaii Just Banned Your Favorite Sunscreen to Protect its Coral Reefs*, WASH. POST (Jul. 6, 2018), https://www.washingtonpost.com/news/energy-environment/wp/2018/07/02/hawaii-is-about-to-ban-your-favorite-sunscreen-to-protect-its-coral-reefs/.
48. ARIELLE LEVINE, SUNSCREEN USE IN HAWAII: AN ASSESSMENT OF BEACH-GOER USE OF SUNSCREEN PRIOR TO IMPLEMENTATION OF THE 2021 CHEMICAL BAN 2, 3 (Sept. 2019), https://www.kohalacenter.org/docs/reports/Sunscreen_ReportSept2019.pdf.
49. *Id.* at 16.
50. Mary Forgione, *U.S. Virgin Islands' Ban on Harmful Sunscreens to Go into Effect Jan. 1*, L.A. TIMES (Aug. 28, 2019), https://www.latimes.com/travel/story/2019-08-27/us-virgin-islands-ban-on-harmful-sunscreens-to-go-into-effect-jan-1.
51. Heather Gies, *The U.S. Virgin Islands Become the First American Jurisdiction to Ban Common Chemical Sunscreens*, PAC. STANDARD: ENV'T (Jul. 18, 2019), https://psmag.com/environment/sunscreen-is-corals-biggest-anemone.

in addition to oxybenzone and octinoxate.[52] This ban went into effect on March 30, 2020, and prohibited "[the] distribution, sale, possession, and use" of sunscreens containing the banned chemicals.[53]

While the health of their coral reefs and marine ecosystems was the driving force behind this legislation, the U.S. Virgin Islands also wanted to ensure that a beautiful destination for tourists remained.[54] Governor Albert Bryan Jr. stated that protecting Caribbean reefs is one way to ensure the implementation of sustainable tourism in these naturally beautiful ecosystems.[55] Coral reefs contribute $187 million a year to the U.S. Virgin Islands alone.[56] The health and prosperity of the U.S. Virgin Islands is heavily dependent on the health of their coral reefs and marine environment. That is why Senator Janelle K. Sarauw stated that implementing an aggressive ban on environmentally harmful chemicals will lead to "[a] cleaner Virgin Islands, both in the health of its people and spaces. . . ."[57]

3. Unsuccessful Efforts

The awareness around the harm that sunscreen causes to coral reefs is clearly growing, with the number of proposals and implementations increasing both nationally and internationally. Unfortunately, there is also increasing opposition to the implementation of such bans.[58] Faced with backlash from senators, dermatologists, and sunscreen companies, some bans were struck down or failed to pass due to the impacts they might have on consumer sunscreen use.[59] Key West is one example of such opposition. In 2019, the City of Key West voted in favor of a bill that would ban the sale of oxybenzone and octinoxate in sunscreen.[60] With the world's third-largest barrier reef system located off the shores of the Florida Keys, this bill's passage was an important step for Key West to "take one of the stressors away" that has been negatively impacting coral health.[61] The bill was set to

52. Forgione, *supra* note 50.
53. S.B. 33-0043, 33rd Leg. (V.I. 2019); Gies, *supra* note 51.
54. Gies, *supra* note 51; Forgione, *supra* note 50.
55. Forgione, *supra* note 50.
56. Gies, *supra* note 51.
57. *Id.*
58. Nancy Klingener, *As Key West Tries to Set Precedents, Tallahassee Lawmakers Say: Not So Fast*, WLRN (Mar. 16, 2021), https://www.wlrn.org/news/2021-03-16/as-key-west-tries-to-set-precedents-tallahassee-lawmakers-say-not-so-fast.
59. *Id.*
60. Karen Zraick, *Key West Bans Sunscreen Containing Chemicals Believed to Harm Coral Reefs*, N.Y. TIMES (Feb. 7, 2019), https://www.nytimes.com/2019/02/07/us/sunscreen-coral-reef-key-west.html.
61. *Id.*

be implemented in January 2021.[62] However, in direct response to Key West's ban, a bill was introduced in the Senate at the state level that prohibited Key West's sunscreen regulation.[63]

In August 2019, Senator Rob Bradley introduced Senate Bill 172 in response to the bill passed in Key West.[64] This bill preempts the regulation of certain products under the Florida Drug and Cosmetic Act, including sunscreen products.[65] Bradley states that his bill is meant to "encourage [citizens] to use sunscreen, not discourage it."[66] However, Key West's bill did not ban sunscreen altogether—the bill only banned two harmful chemicals commonly found in sunscreen.[67] Many sunscreens on the market already exclude these two chemicals from their ingredients, leaving consumers viable options for sun protection under the ban.[68] Unfortunately, the bill was approved by Florida Governor Ron DeSantis on June 29, 2020, thus barring Key West from implementing its ban of oxybenzone and octinoxate.[69]

While these efforts to prevent the safeguard of coral reefs from harmful chemicals are discouraging, there is clearly a growing desire for protective legislation across the country. California introduced a bill that would ban the sale of sunscreens containing oxybenzone and octinoxate absent a prescription—with the potential for a $500 fine.[70] This bill regrettably did not pass, but its introduction still shows the growing support for such legislation.[71] There are efforts to implement oxybenzone and octinoxate bans at local and state levels across the country. A federal ban at the national level would create uniformity among these efforts and help protect coral reefs not only off the United States' shores, but around the world.

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62. Mandy Miles, *Banning Our Ban? – Senator Targets Key West's Sunscreen Ban*, KEYS WKLY: KEY WEST: KEY WEST NEWS (Nov. 7, 2019), https://keysweekly.com/42/banning-our-ban-senator-targets-key-wests-sunscreen-ban/.

63. *Id.*; Klingener, *supra* note 58; Jim Saunders, *DeSantis backs bill that prohibits cities from banning sunscreen*, TAMPA BAY TIMES: FLA. POL. (June 30, 2020), https://www.tampabay.com/florida-politics/buzz/2020/06/30/desantis-backs-bill-that-prohibits-cities-from-banning-sunscreen/.

64. Miles, *supra* note 62; Saunders, *supra* note 63; Klingener, *supra* note 58.

65. S.B. 172, 2020 Leg. (Fla. 2020).

66. Miles, *supra* note 62.

67. Klingener, *supra* note 58.

68. *Id.*

69. Saunders, *supra* note 63.

70. A.B. 60, 2019-2020 Leg., Reg. Sess. (Cal. 2019).

71. *Id.*

II. CHEMICAL SUNSCREEN BAN AT THE FEDERAL LEVEL IN THE UNITED STATES

A. Incorporative Reference

Having established the environmental harms to which chemical sunscreens contribute, implementation of a federal ban of these toxic substances would be a step in the right direction to safeguard reef ecosystems that provide the United States with a plethora of benefits. Implementation of a federal ban of octinoxate and oxybenzone may be as simple as drafting legislation through incorporative reference. Seeing as there are multiple bans on reef-harming chemicals in sunscreens across multiple U.S. jurisdictions, the federal government could enact a new piece of legislation or amend an existing piece of legislation by referencing those already implemented.[72] This practice is known as incorporative reference, which occurs when a piece of legislation references either part or all of another piece of legislation.[73] Drafting legislation in this manner is a valid way to create law and is used at all levels of government, including the federal government's adoption of state law into federal statutes.[74]

The federal government could reference the Hawaii and U.S. Virgin Islands bills into a federal statute by incorporating part or all of these jurisdictions' laws. Preemption is often an issue for many environmental laws at the state and local level,[75] as evidenced by the prohibition on Key West's ability to implement their city ordinance.[76] Drafting federal laws through incorporation—by referencing the Hawaii or U.S. Virgin Islands bans, for example—would help to clear up the complexities that occur with differing laws at lower levels of government, as well as to avoid preemption. One uniform federal law banning oxybenzone and octinoxate would be an effective solution to protect coral reefs from chemical harm. Incorporative reference is one tool that the United States could use, looking to Hawaii and the U.S. Virgin Islands as models, to implement such a ban at the federal level.

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72. 73 AM. JUR. 2D *Statutes* §15 (2023); SUTHERLAND § 51:7; F. Scott Boyd, *Looking Glass Law: Legislation by Reference in the States*, 68 LA. L. REV. 1201, 1210 (2008).

73. *Id.* at 1210.

74. *Id.*

75. *See* Robert L. Glickman & Richard E. Levy, *A Collective Action Perspective on Ceiling Preemption by Federal Environmental Regulation: The Case of Global Climate Change*, 102 NW. U. L. REV. 579, 582 (2008) (opining that some state and local entities have adopted environmental protection regulations only to encounter federal obstructions). *See generally* Jonathan H. Adler, *When is Two a Crowd? The Impact of Federal Action on State Environmental Regulation*, 31 HARV. ENV'T L. REV. 67 (2007) (discussing the role of preemption in environmental laws).

76. *Supra* Part I(B)(3).

B. Ban of Octinoxate and Oxybenzone Under the Federal Food, Drug, and Cosmetic Act

1. Sunscreen Regulation

The federal government could also turn to legislation already in effect to ban these substances. The U.S. Food and Drug Administration (FDA) regulates the ingredients in sunscreen.[77] The Food, Drug, and Cosmetics Act (FDCA) gives the FDA authority to regulate sunscreen that contains "certain ingredients or color additives that have been deemed dangerous by the FDA."[78] However, the line between what is considered a cosmetic and what is considered a drug is very thin.

Under the FDCA, drugs are "articles (other than food) intended to affect the structure or any function of the body of man or other animals."[79] Cosmetics are classified as "articles intended to be rubbed, poured, sprinkled, or sprayed on, introduced into, or otherwise applied to the human body or any part thereof for cleansing, beautifying, promoting attractiveness, or altering the appearance."[80] Sunscreen, along with any cosmetics that contain sunscreen, are considered over-the-counter drugs under the FDCA, and are regulated as such, because they protect and prevent skin damage from exposure to the sun.[81] This means that sunscreens are regulated more strictly than they would be if they fell under the category of cosmetics.[82] The FDA only has the authority under the FDCA to control cosmetic products after they have hit the market, and regulation is based only on the information on these products that the cosmetic companies voluntarily provide.[83] In contrast, the FDA has the authority to control and regulate a drug "at any time if it deems the drug poses a 'hazard to public health.'"[84]

With sunscreen categorized under a stricter set of regulations within the FDCA, the FDA clearly has the authority to ban toxic ingredients used in sunscreen. However, the process for regulating over-the-counter drugs moves a lot slower than for other forms of drugs, such as prescription drugs, which limits the FDA's approach in approving new sunscreen products.[85]

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77. *See* Emily Davidson, *Time for Reapplication: A Review of FDA Sunscreen Regulation & Why it Needs an Update*, 20 U. PITT. J. TECH. L. & POL'Y 212, 212-13 (2019-2020) (discussing the ways in which the FDA has regulated sunscreen).

78. Amity Hartman, *FDA's Minimal Regulation of Cosmetics, and the Daring Claims of Cosmetic Companies that Cause Consumers Economic Harm*, 36 W. ST. U. L. REV. 53, 54 (2008).

79. *Id.* at 56.

80. *Id.* at 57.

81. *Id.* at 56; Davidson *supra* note 77, at 213–214.

82. Hartman, *supra* note 78, at 59.

83. *Id.*

84. *Id.*

85. Davidson, *supra* note 77, at 216-17.

The process through which sunscreens are regulated differs from that used for prescription drugs because the process used to regulate sunscreen is designed for products categorized as having minimal risk.[86] This process does not allow for timely review and approval for new sunscreen formulas and products, as outlined through the extensive process within 21 U.S.C. § 360fff-1, 2, 3,[87] which can lead to negative impacts to human health and the environment.[88]

Under 21 U.S.C. § 360fff, the Secretary of Health and Human Services may determine whether an ingredient or combination of ingredients used in sunscreens is recognized by qualified experts as safe for use.[89] This authorizes the Secretary of Health and Human Services to deem octinoxate and oxybenzone unqualified to meet the standards for safe usage.[90] These substances would not be eligible for approval because they are not GRASE ("generally recognized, among experts qualified by scientific training and experience to evaluate the safety and effectiveness of drugs, as safe and effective for use under the conditions prescribed, recommended, or suggested in the labeling of a drug").[91]

Although both oxybenzone and octinoxate are FDA-approved, allowing them to be commonly used in sunscreen formulas throughout the U.S.,[92] many other agencies within the U.S. have warned against the use of these two ingredients. As part of a presentation by the Institute for Environmental Solutions, the Environmental Protection Agency (EPA) classified oxybenzone as a "contaminant of emerging concern."[93] EPA found that oxybenzone can disrupt the endocrine system in corals and suggested using alternatives such as physical sunscreens or protective clothing.[94] The National Oceanic and Atmospheric Administration (NOAA) also warns about some of the dangers of chemicals in sunscreen.[95] NOAA provides a list of eight chemicals, including octinoxate and oxybenzone, that it says "can induce bleaching, damage DNA, deform young, and even kill" corals.[96] And

86. *Id.* at 216.
87. 21 U.S.C. §§ 360fff-1, 2, 3.
88. Davidson, *supra* note 77, at 215.
89. *See* 21 U.S.C. § 360fff (discussing the Secretary of Health and Human Services's role in determining whether ingredients found in nonprescription sunscreen are safe or not).
90. *Id.* at § 360fff-2-7.
91. *Id.* at § 360fff-3.
92. Davidson, *supra* note 77, at 215.
93. Lyons et al., *Reducing Chemical Footprints to Prevent Water Pollution and Improve Human and Environmental Health*, INST. FOR ENV'T SOLUTIONS, 1, 4 (Nov. 19, 2019), https://www.epa.gov/sites/default/files/2020-04/documents/ies_presentation_for_spruwp_11-19-19_1.pdf.
94. *Id.* at 6.
95. *Skincare Chemicals and Coral Reefs*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., https://oceanservice.noaa.gov/news/sunscreen-corals.html (last updated Aug. 17, 2022).
96. *Id.*

the Center for Disease Control (CDC) states that, due to the harmful environmental impacts of sunscreens with chemicals such as octinoxate and oxybenzone, people may want to use inorganic sunscreens.[97] These sunscreens usually contain chemicals like titanium dioxide and zinc oxide instead of the more harmful octinoxate and oxybenzone.[98] These warnings from various agency experts undermine the prior consensus that it is safe to include these substances in sunscreen; therefore, it seems implausible for oxybenzone and octinoxate usage to be considered safe.

The concern over the use of sunscreens that contain octinoxate and oxybenzone is widespread, with multiple government agencies warning about their use and effects. Why then has nothing been done to further regulate the use of these chemicals within sunscreens? The FDA's failure to restrict the use of oxybenzone and octinoxate under the FDCA only allows the harm done by these chemicals to continue.

2. Microbead-Free Waters Act of 2015

A model for regulating environmentally harmful substances in products under the FDCA is the Microbead-Free Waters Act of 2015. This act bans the use of microbeads, defined by the act as "any solid plastic particle that is less than five millimeters in size and is intended to be used to exfoliate or cleanse the human body or any part thereof," in products that are typically rinsed off.[99] Congress drafted this act in response to growing public concern over microplastics pollution in U.S. waterways and the ocean.[100]

Like sunscreen, microbeads have been shown to pose a danger to the health of marine ecosystems.[101] A microbead is a form of microplastic typically ranging from particles less than five millimeters in diameter to particles less than one millimeter in diameter.[102] Microbeads are made up of polyethylene, but they have the capability to absorb substances such as PCB, oils, and pesticides—which increases their environmental hazard.[103] Also like sunscreen, once these microbeads reach wetlands or marine ecosystems,

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97. Karolyn Wanat & Scott Norton, *Sun Exposure*, CDC YELLOWBOOK 2020: HEALTH INFORMATION FOR INTERNATIONAL TRAVEL (2020), https://wwwnc.cdc.gov/travel/yellowbook/2020/noninfectious-health-risks/sun-exposure.

98. Davidson, *supra* note 77, at 215.

99. 21 U.S.C. § 331(ddd)(2)(A).

100. David A. Strifling, *The Microbead-Free Waters Act of 2015: Model for Future Environmental Legislation, or Black Swan?*, 32 J. LAND USE & ENV'T L. 151, 156-57 (2016).

101. John Schwartz, *Ban on Microbeads Proves Easy to Pass Through Pipeline*, N.Y. TIMES: SCIENCE (Dec. 22, 2015), https://www.nytimes.com/2015/12/23/science/ban-on-microbeads-proves-easy-topass-through-pipeline.html; Strifling, *supra* note 100, at 153-54.

102. *Id.* at 154.

103. *Id.*

it is extremely difficult to remove them,[104] which is why their regulation is necessary.

The use of microbeads significantly rose in popularity in the 1990s when companies discovered the less expensive alternative to natural exfoliants.[105] The most common products that contain microbeads include shower gels, face washes, and toothpastes.[106] These products are also some of the most commonly used consumer cosmetic products that get washed down the drain.[107] Researchers estimate that around 11 billion microbeads make their way into waterways in the U.S. every day.[108] This is because microbeads that get washed down the drain make their way to water treatment facilities where, due to their size, they fall through filtration systems and make their way into water systems.[109] Until recently, microbeads were largely unregulated because they are not toxic until they are released into the environment.[110] Microbeads are a threat to the food chain because, due to their resemblance to food, marine animals consume them and absorb their toxins.[111]

Preceding the passage of the Microbead-Free Waters Act, many state and local governments took action to regulate the use of microbeads and prevent their release into waterways.[112] By 2015, at least 10 states enacted statewide microbead legislation, and more bills are pending.[113] This parallels the U.S.'s current situation with sunscreen legislation. State and territorial action on the issue of sunscreen pollution has preceded any federal action, with bans passed in Hawaii and the U.S. Virgin Islands and introduced in other jurisdictions, such as California and Hawaii.[114] The growing popularity of microbead bans heavily contributed to the enactment of the Microbead-Free Waters Act.[115] Thus, the increasing concern and legislative action regarding

104. Sarah Kettenmann, *Nationwide Ban on Plastic Microbeads in Cosmetics*, 31 NAT. RES. & ENV'T 58, 58 (2016).

105. Strifling, *supra* note 100, at 154.

106. Kettenmann, *supra* note 104, at 58.

107. Strifling, *supra* note 100, at 154.

108. Schwartz, *supra* note 101.

109. *Id.*; Kettenmann, *supra* note 104, at 58.

110. Davis Truslow, *Microbeads and the Toxics Use Reduction Act: Preventing Pollution at Its Source*, 44 B.C. ENV'T AFF. L. REV. 149, 151 (2017).

111. Strifling, *supra* note 100, at 155-56.

112. *Id.* at 157-58.

113. Doug Farquhar, *States Continue Moves to Ban Microbeads*, NAT'L CONF. OF STATE LEGISLATURES, https://www.ncsl.org/blog/2015/10/14/states-continue-moves-to-ban-microbeads.aspx.

114. *See, e.g.*, S.B. 2571, 29th Leg. (Haw. 2018) (prohibiting the sale of sunscreen containing oxybenzone and octinoxate); S.B. 33-0043, 33d Leg. (V.I. 2019) (banning the sale of oxybenzone and octinoxate in the Virgin Islands unless prescribed by a healthcare provider); Assemb. B. 60, 2019-2020 Leg. (Cal. 2019) (prohibiting the sale of any sunscreen containing oxybenzone or octinoxate without a prescription).

115. *See* MARINE DEBRIS PROGRAM, *The President Signs a National Microbead Ban*, NOAA (Dec. 30, 2015), https://blog.marinedebris.noaa.gov/president-signs-national-microbead-ban (explaining that 47 microbead bills were introduced nationwide in 2015); Kettenmann, *supra* note 104, at 59.

toxic sunscreen ingredients should yield a similar result: a federal ban of oxybenzone and octinoxate.

When Congress enacted the Microbead-Free Waters Act, it prohibited "[t]he manufacture or the introduction or delivery for introduction into interstate commerce of a rinse-off cosmetic that contains intentionally-added plastic microbeads."[116] This law is applicable to products defined as "cosmetics" and "over-the-counter drugs" under the FDCA.[117] The language in this act, similar to many of the existing sunscreen bans, places the burden of compliance on manufacturers, not consumers.[118] In fact, many companies, such as Unilever, L'Oreal, and Johnson & Johnson, stopped using microbeads in their products to more easily comply with the differing state and local regulations before the act was even implemented.[119] One of the biggest barriers to implementing a ban on these chemicals in sunscreen is that they are found in a number of sunscreens on the market, and therefore a ban could lead to a decrease in sunscreen availability and use.[120] However, the language and impact of the Microbead-Free Waters Act indicate that legislation regulating ingredients in cosmetics and over-the-counter drugs results in companies changing the formulas of their products to comply with the legislation and satisfy consumers.[121]

Both microbeads and reef-toxic sunscreen ingredients have negative impacts on the environmental health of marine environments.[122] The reason for implementing the Microbead-Free Waters Act was based mostly on the environmental impact of microbeads because there is insufficient evidence that microbeads pose a risk to human health.[123] The act amended the FDCA,[124] which gives the FDA the authority to regulate the products included within the FDCA.[125] As stated previously, sunscreen is defined as an over-the-counter drug under the FDCA.[126] Therefore, amending the FDCA to ban oxybenzone and octinoxate to further the objective of

116. 21 U.S.C. § 331(ddd)(1).

117. *See The Microbead-Free Waters Act: FAQs*, U.S. FOOD & DRUG ADMIN., https://www.fda.gov/cosmetics/cosmetics-laws-regulations/microbead-free-waters-act-faqs (last visited Apr. 4, 2023) (discussing the applicability of The Microbead-Free Waters Act).

118. 21 U.S.C. § 331(ddd)(1); S.B. 2571, 29th Leg. (Haw. 2018).

119. Farquhar, *supra* note 113.

120. *See* Davidson, *supra* note 77 at 215 (explaining that oxybenzone and octinoxate are the most commonly used absorbers); Klingener, *supra* note 58 (summarizing then-Sen. Rob Bradley's concerns that eliminating sunscreen containing oxybenzone and octinoxate would discourage people from using sunscreen); Bever, *supra* note 47 (noting that a ban on sunscreen containing oxybenzone and octinoxate removes at least 70 percent of sunscreen on the market).

121. 21 U.S.C. § 331(ddd); Farquhar, *supra* note 113.

122. Truslow, *supra* note 110, at 154.

123. *The Microbead-Free Waters Act: FAQs*, *supra* note 117.

124. *Id.*

125. Hartman, *supra* note 78, at 55.

126. *See supra* Part II(B)(1).

preventing harm to the marine environment would align with the objectives of current legislation. With state legislation already in effect, like that in Hawaii, a federal ban would simplify sunscreen regulations by providing a uniform law that citizens and industries must follow.[127]

Many legislators were surprised at the popularity and easy passage of the bill and hoped that it could serve as an example to guide future environmental legislation.[128] While the Microbead-Free Waters Act is in no way perfect, the act provides a blueprint for regulating sunscreen-related marine pollution in the future.[129] The act shows that even if the FDA itself does not issue a ban or impose regulations, Congress may enact an amendment in the interest of environmental health.[130] While microbeads and sunscreen chemicals have different effects on the environment, they have similarities that make the Microbead-Free Waters Act the perfect template for a piece of legislation banning the use of oxybenzone and octinoxate at the federal level. Implementing a ban on oxybenzone and octinoxate, similar to the ban on microbeads, is an important step for the U.S. to protect its dying coral reef ecosystems.

C. Federal Marine Pollution Regulation

Marine pollution regulation is another avenue to regulate toxic sunscreen chemicals. In fact, the U.S. already has regulations in place to protect and conserve its marine environment, which highlights the federal government's acknowledgement of the crucial role these ecosystems play and the importance of their health.[131]

In 1972, Congress passed the National Marine Sanctuaries Act (NMSA).[132] According to NOAA, the NMSA "authorizes the Secretary of Commerce to designate and protect areas of the marine environment with special national significance due to their conservation, recreational, ecological, historical, scientific, cultural, archeological, educational or esthetic qualities as national marine sanctuaries."[133] Marine environments protected under the NMSA include coral reefs and unique marine habitats.[134] NMSA regulations govern activities that can or cannot take place within sanctuaries, and these regulations may be applied to an individual sanctuary

127. S.B. 2571, 29th Leg. (Haw. 2018).

128. Strifling, *supra* note 100, at 159.

129. *See generally*, Microbeads Free Waters Act (prohibiting the manufacturing, packaging, and distribution of rinse-off cosmetics with plastic microbeads).

130. *Id.*

131. 33 U.S.C. § 1401; 16 U.S.C. § 1431.

132. NAT'L MARINE SANCTUARIES, *Legislation*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., https://sanctuaries.noaa.gov/about/legislation/ (last visited Apr. 7, 2023).

133. *Id.*

134. *Id.*

or to all sanctuaries generally.[135] Under the NMSA, "[a]ny person who destroys, causes the loss of, or injures any sanctuary resource is liable to the United States . . . ."[136] This may result in the assessment of civil penalties that vary with the severity of the violation.[137]

Also passed in 1972, The Marine Protection, Research and Sanctuaries Act (MPRSA) "prohibits the dumping of material into the ocean that would unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities."[138] This act establishes a permit system for dumping, making it illegal to dump into the ocean without a permit.[139]

Case law provides examples for implementing these acts while also establishing the U.S.'s stance on the importance of protecting marine ecosystems. In *Hawai'i Wildlife Fund v. County of Maui*, the County of Maui in Hawaii released toxic wastewater into the Pacific Ocean through leaks in its underground injection wells.[140] In this case, the plaintiff's expert testified as to the effects this pollution had on the nearby coral reefs.[141] The expert found "that corals living within the . . . seep area are impacted by sewage-effluent injected at the [Wastewater Reclamation Facility]."[142] The court voiced concerns over the environmental harm caused by the leak and ultimately found that the county was in violation of federal law.[143]

In another case, *United States v. M/V Miss Beholden*, the court found the defendant liable for damage caused to the Florida Keys National Marine Sanctuary after purposely running a ship aground into the Western Sambo Reef.[144] The court found that the defendant violated the NMSA and was therefore liable for the corresponding statutory penalties.[145] The way the NMSA and MPRSA were enforced in these cases indicates the seriousness of protecting the U.S.'s coral reefs from harm.

These statutes provide a viable way to implement a ban of reef-toxic sunscreen chemicals. An amendment to either or both statutes that would prohibit the sale, manufacture, or distribution of sunscreens containing oxybenzone and octinoxate would provide an avenue to protect coral reefs.

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135. *Id.*
136. 16 U.S.C. § 1443(a)(1).
137. 16 U.S.C. § 1437(d).
138. *Marine Protection, Research and Sanctuaries Act (MPRSA) and Federal Facilities*, U.S. EPA, https://19january2017snapshot.epa.gov/enforcement/marine-protection-research-and-sanctuaries-act-mprsa-and-federal-facilities_.html (last updated May 17, 2016).
139. 33 U.S.C. § 1412 (2021).
140. 550 F.Supp.3d 871, 873 (D. Haw. 2021).
141. *Id.* at 881.
142. *Id.*
143. *Id.* at 893.
144. 856 F. Supp. 668, 671 (S.D. Fla. 1994).
145. *Id.* at 670.

Classifying these chemicals as substances "that would unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities," would subject these chemicals to a ban under the MPRSA.[146] Establishing that these chemicals injure the ecosystems in national marine sanctuaries would prohibit their use within these areas.

III. IMPLEMENTATION OF REGULATIONS INTERNATIONALLY

A. Sunscreen Ban Internationally Under the Law of the Sea Treaty

While a national ban on oxybenzone and octinoxate is a great first step in protecting coral ecosystems, it is not enough, and international regulation would be more comprehensive. International regulation of the ocean falls under the jurisdiction of the United Nations Convention for the Law of the Sea (UNCLOS).[147] The adoption of this treaty was an "unprecedented attempt by the international community to regulate all aspects of the resources of the sea and uses of the ocean, and thus bring a stable order to mankind's very source of life."[148]

Throughout UNCLOS, there are various parts, sections, and articles pertaining to the maintenance of a healthy marine environment.[149] Part XII of the treaty is dedicated to the protection and preservation of the marine environment, with Article 9 stating that "States have the obligation to protect and preserve the marine environment."[150] However, Article 194 in Section 1 of Part XII deals specifically with preventing and controlling pollution of the marine environment.[151]

Alternatively, in 2015 the United Nations General Assembly proposed the development of a legally binding international instrument under UNCLOS for the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction.[152] The conference held three sessions throughout 2018 and 2019, with the postponed fourth session taking

146. EPA, *supra* note 139.

147. *The United Nations Convention on the Law of the Sea (A Historical Perspective)*, U.N., https://www.un.org/depts/los/convention_agreements/convention_historical_perspective.htm (last visited Apr. 4, 2023).

148. *Id.*

149. United Nations Convention on the Law of the Sea (Dec. 10, 1982).

150. *Id.*

151. *Id.* pt. XII, § 1, art. 194.

152. *United Nations Convention on the Law of the Sea*, INT'L MARITIME ORG., https://www.imo.org/en/OurWork/Legal/Pages/UnitedNationsConventionOnTheLawOfTheSea.aspx (last visited Apr. 5, 2023).

place in March 2022.[153] The fifth session convened in August 2022, but was later suspended and postponed to a later date to be determined.[154] Due to the legally binding nature of this instrument and the subject matter that it touches upon, UNCLOS seems to be ideal for implementing a ban on reef-toxic substances. However, because the fifth session remains suspended, the conference is not a legally binding instrument yet, which makes Article 194 one of the more likely avenues to implement an international ban on coral-reef-harming chemicals at this time.

Article 194 requires that States take measures consistent with the treaty to "prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities, and [that] they shall endeavor to harmonize their policies in this connection."[155] Under this article, States must also conduct activities within their jurisdiction so as to avoid causing pollution damage to other States or permitting jurisdictional pollution to spread beyond that State's sovereign area.[156] If there were a uniform list of pollutants under UNCLOS, States could more easily prevent, reduce, and control pollution.

To comply with Article 194 of UNCLOS, a ban on reef-harming chemicals in sunscreens is necessary, because otherwise oxybenzone and octinoxate pollution jeopardizes the marine environment. Wearing sunscreen that contains harmful chemicals should also be considered pollution of the marine environment.[157] For a State to conduct activities—such as swimming in the ocean—in a manner that does not pollute the jurisdictions of other States, the sunscreen its citizens use must not contain oxybenzone or octinoxate. Any scenario to the contrary would pollute the marine environment within the jurisdiction the sunscreen originated from as well as other jurisdictions once the tides move and the polluted water travels.

One issue, however, with regulation through UNCLOS is its enforceability. Enforcing certain sections of UNCLOS, like Article 194, falls on the treaty's member States.[158] Articles 207 and 208, dealing with marine pollution from land-based sources and seabed activities, respectively, provide that "States shall adopt laws and regulations to prevent, reduce and

153. *Intergovernmental Conference on an International Legally Binding Instrument Under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction (General Assembly Resolution 72/249)*, UNITED NATIONS, https://www.un.org/bbnj/ (last visited May 12, 2023).

154. *Id.*

155. U.N., *supra* note 149, at art. 194.

156. *Id.*

157. *Id.*

158. Olga Goldberg, *Biodegradable Plastics: A Stopgap Solution for the Intractable Marine Debris Problem*, 42 TEX. ENV'T L. J. 307, 329 (2012).

control pollution of the marine environment . . . ."[159] Unfortunately, many States (the U.S. included) have failed to ratify UNCLOS and are therefore not members to the treaty.[160] This means that nonmember States, like the U.S., are not bound to comply with UNCLOS provisions.

But while the U.S. has not ratified UNCLOS, the country has long recognized the treaty as customary international law.[161] Customary law is the usage of repeated state practice over time that consists of uniformity, consistency, and regularity.[162] This form of international law is carried out due to a sense of legal obligation known as *opinio juris* and is based on implicit consent by States.[163] Since the adoption of UNCLOS, court cases within the U.S. have frequently cited to various UNCLOS provisions, indicating a willingness to rely on the treaty to help govern the oceans.[164] Customary international law is binding on all States that do not object to the law.[165] Thus, introducing a ban on oxybenzone and octinoxate into UNCLOS to prevent harm to coral reefs worldwide could lead to the implementation becoming state practice, which could evolve into international customary law. Regulation on the international level is vital due to the global nature of the issue at hand. A ban on toxic chemicals through treaty law, such as UNCLOS, and customary law are avenues that ought to be explored when it comes to protecting coral reefs from these dangers.

B. Case Study: Palau

On January 1, 2020, Palau became the first country to implement a national ban on reef-toxic sunscreen ingredients found to have negative impacts on the health of marine ecosystems.[166] Following in the footsteps of

159. U.N., *supra* note 149, at arts. 207, 208.

160. *Law of the Sea Convention*, U.S. DEPT. OF STATE, https://www.state.gov/law-of-the-sea-convention/ (last visited Apr. 6, 2023).

161. *See* John A. Duff, *The United States and the Law of the Sea Convention: Sliding Back from Accession and Ratification*, 11 OCEAN & COASTAL L. J. 1, 12-13 (2006) (describing the U.S.'s customary compliance with UNCLOS despite never having ratified it); Lieutenant Benedict S. Gullo, *The Illegal Discharge of Oil on the High Seas: The U.S. Coast Guard's Ongoing Battle Against Vessel Polluters and a New Approach Towards Environmental Compliance*, 209 MIL. L. REV. 122, 140-41 (2011).

162. JEFFREY L. DUNOFF ET AL., INTERNATIONAL LAW: NORMS, ACTORS, PROCESS 73 (Erwin Chemerinsky et al. eds., 4th ed. 2015).

163. *Id.*

164. Duff, *supra* note 161, at 12-13.

165. DUNOFF ET AL., *supra* note 162, at 73; *see also Customary Law*, INT'L COMM. OF THE RED CROSS, https://www.icrc.org/en/war-and-law/treaties-customary-law/customary-law (last visited Apr. 6, 2023) (explaining that customary law is binding because states recognize it as international law).

166. Matt McGrath, *Coral: Palau to ban sunscreen products to protect reefs*, BBC: NEWS (Nov. 1, 2018), https://www.bbc.com/news/science-environment-46046064; *Palau is first country to ban 'reef toxic' sun cream*, BBC: NEWS (Jan. 1, 2020), https://www.bbc.com/news/world-asia-50963080.

the Hawaii ban, Palau's law is said to be the more comprehensive one, as it bans 10 ingredients found to harm environmental health.[167]

Palau is an archipelagic island nation in Micronesia located in the western Pacific Ocean.[168] While Palau is an independent nation with a constitutional government, it is in free association with the U.S.[169] The 50-year Compact of Free Association brokered in 1994 established Palau as an independent nation and allowed the U.S. to continuously provide "economic and financial assistance, [defend] Palau's territorial integrity, and [allow] uninhibited access by Palauan citizens to the United States in return for exclusive and unlimited access to Palau's land and waterways for strategic purposes."[170]

There is no surprise that Palau's main economic source is the ocean, as it is a country made up of 12 inhabited islands and over 700 islets, with a barrier reef system surrounding most of the archipelago.[171] When the government of Palau found out that sunscreen chemicals may jeopardize this unique habitat, it acted fast.[172]

On January 16, 2017, the Coral Reef Research Foundation released a report that analyzed the pollution from sunscreen in Palau's Jellyfish Lake coral reef.[173] Jellyfish Lake, named after its famous Golden Jellyfish population, is a UNESCO World Heritage site located in Palau's Koror State Rock Island Southern Lagoon.[174] The results of the analysis showed that there were concentrations of sunscreen compounds in the waters of the Jellyfish Lake area, including in areas that are considered pristine due to minimal human use.[175] A comparison of different sites found that Jellyfish Lake had the highest concentration of reef-toxic compounds.[176] The presence of these compounds caused concern for the development of the jellyfish that live in those waters.[177] Appendix 5 of the study provided a list of 10 harmful

167. McGrath, *supra* note 166.

168. *Palau*, BRITANNICA, https://www.britannica.com/place/Palau (last updated May 9, 2023).

169. *About Palau*, PALAUGOV, https://www.palaugov.pw/about-palau/ (last visited Apr. 7, 2023).

170. *Republic of Palau*, U.S. DEPT. OF INTERIOR: OFF. INSULAR AFFS., https://www.doi.gov/oia/islands/palau (last visited Apr. 6, 2023).

171. *Republic of Palau*, NAT'L OCEANIC & ATMOSPHERIC ADMIN.: CORAL REEF INFORMATION SYSTEM, https://www.coris.noaa.gov/portals/palau.html (last visited Apr. 4, 2023).

172. RPPL No. 10-30 (Palau, 2018).

173. LORI J. BELL ET AL., CORAL REEF RSCH. FOUND., FINAL REPORT: SUNSCREEN POLLUTION ANALYSIS IN JELLYFISH LAKE (Jan. 16, 2017), https://coralreefpalau.org/wp-content/uploads/2017/10/CRRF-UNESCO-Sunscreen-in-Jellyfish-Lake-no.2732.pdf.

174. *Id.* at 2.

175. *Id.* at 15.

176. *Id.* at 11.

177. *Id.* at 14.

chemicals not found in eco-friendly sunscreen products.[178] Oxybenzone was the first chemical on that list.[179]

Palau passed an amendment to its Responsible Tourism Education Act of 2018, which banned a list of 10 chemicals found to be harmful to the marine environment.[180] This ban allows for the confiscation of sunscreens containing any of the banned substances from tourists entering the country.[181] Retailers found selling banned sunscreens can be fined up to $1000.[182]Adopting an approach similar to Palau's—in which Palau became aware of the problem and immediately took action to fix it—could benefit the U.S. and the rest of the world.

An amendment to an existing piece of legislation, like Palau's,[183] would be a feasible route to follow for implementing a ban at the national level in the U.S., as well as a blueprint for other countries to follow. Palau's legislation, which puts the burden on manufacturers and retailers to implement the ban of these chemicals, rather than consumers, also prohibits bringing toxic sunscreens into the country.[184] This approach is favorable because it makes compliance easier for the consumer by making reef-safe options the only ones available, thereby shielding them from violation.

Congress is the governing body that creates and passes legislation of this nature within the U.S.[185] To amend an existing piece of legislation, a draft amendment is first created and then voted on by the House of Representatives and the Senate, and, if the vote passes, is sent to the President for signature.[186] After a piece of legislation passes, an executive agency or agencies are responsible for enforcing it and regulating activities relating to the legislation.[187] Palau's regulation gives authority to the Minister to consult with experts to regulate the use of reef-toxic sunscreens and to help inform and guide retailers and visitors on how to identify which sunscreens contain banned chemicals. [188] With an amendment to the FDCA, the FDA Commissioner "oversees the full breadth of the FDA portfolio and execution of the Federal Food, Drug, and Cosmetic Act and other applicable laws."[189]

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178. *Id.* at 26.
179. *Id.*
180. RPPL No. 10-30, at 4 (Palau, 2018).
181. *Id.*
182. *Id.*
183. *Id.*
184. *Id.*
185. LINDA D. JELLUM, THE LEGISLATIVE PROCESS, STATUTORY INTERPRETATION, AND ADMINISTRATIVE AGENCIES 33 (2d ed. 2021).
186. *Id.*
187. *See Executive Agencies*, JUSTIA, https://www.justia.com/administrative-law/executive-agencies/ (last updated May 2023) (explaining that agencies develop, oversee, and enforce regulations).
188. RPPL No. 10-30, at 5 (Palau, 2018).
189. *FDA Commissioner*, FDA: ABOUT FDA (Jan. 1, 2021), https://www.fda.gov/about-fda/fda-commissioner.

Alternatively, with an amendment to current marine pollution regulations, the Administrator of the EPA would be "responsible for managing and enforcing [these] laws and regulations."[190]

Using Palau as a guidepost for a regulatory framework on banning coral-reef-harming chemicals is one way to protect these valuable ecosystems on a global scale. Defining octinoxate and oxybenzone as environmentally harmful substances, prohibiting their use, and establishing implementation and regulation protocols can be incorporated into the U.S.'s federal regulatory framework and the international treaty regime. Palau's ban will likely be the first of many to take action to protect coral reefs from toxic chemicals.

CONCLUSION

Coral reefs are important to many aspects of human life and play a key role in the ecology of the ocean. The reef systems within the U.S.'s waters provide an abundance of benefits and are vital to upkeeping ocean health. The importance of protecting ecosystems across the country from harmful sunscreen chemicals is clear, especially for regions in close proximity to the nation's coral reefs.

Sunscreen use has negative impacts on coral reef health—from the induction of bleaching events to a rise in coral viruses.[191] Legal limitations on using the chemicals that indisputably have these effects on corals would contribute significantly to improving the health of and decreasing the bleaching events in coral reefs worldwide. A regulation to this effect on the national and international levels would contribute to a more comprehensive conservation plan and maintain the health of these important reef ecosystems. Similar regulations have been implemented around the world. In the U.S., Hawaii has implemented a ban on the use of chemicals such as oxybenzone and octinoxate in sunscreens,[192] and the U.S. Virgin Islands has done the same.[193] The island nation of Palau was the first country to pass a national ban on the use of reef-harming chemicals in sunscreens.[194]

Implementing policy on the federal and international level would help protect the world's coral reefs while harmonizing the regulations already in place by creating a uniform piece of legislation applicable to all jurisdictions. The importance of sun protection should not be neglected and promoting proper sun protection and decreased sun exposure should be maintained.

190. *EPA's Administrators*, EPA: HISTORY (June 3, 2022), https://www.epa.gov/history/epas-administrators.

191. Downs et al., *supra* note 9, at 265; Donovaro et al., *supra* note 9, at 441.

192. S.B. 2571, 29th Leg. (Haw. 2018).

193. Bill 33-0043, 33rd Leg. (V.I. 2019).

194. McGrath, *supra* note 166.

However, the amount of damage that substances such as oxybenzone and octinoxate have on the environment requires reconsideration of their proposed benefits in comparison to their adverse effects. A regulation banning reef-harming chemicals that are washed into the ocean every day is a crucial step towards protecting these ecosystems and preventing their disappearance.