Fordham International Law Journal

Volume 39, *Issue* 4 2016 *Article* 5

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NOTE

SLIPPING THROUGH THE CRACKS: HOW TINY PLASTIC MICROBEADS ARE CURRENTLY ESCAPING WATER TREATMENT PLANTS AND INTERNATIONAL POLLUTION REGULATION

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INTRODUCTION

A sea turtle strangled on a plastic six-pack ring, a fish enveloped in a floating plastic bag, an albatross found dead with a stomach loaded with bottle caps; these are the images that come to mind when we picture ocean pollution.[1] In 2010, land-sourced pollution introduced between four and twelve million metric tons of plastic alone into the world's oceans.[2] Indeed, the dangers of ocean pollution from plastic in particular are well documented and, in many regions, readily observable.[3] But not all plastic is visible, and not all pollution can be seen.[4] An increasingly persistent threat to our world's oceans is posed not by the large swaths of plastic bottles littering our beaches, but by tiny microplastics: an assortment of plastic particles almost invisible to the human eye, which threaten the survival of sea life.[5] Consider again the example of the sea turtle, only now instead of strangling on an uncut plastic six-pack ring, it slowly starves as non-

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1. This imagery is based on the National Oceanic and Atmospheric Administration's *Ocean Today* series video, *Trash Talk: Impacts of Marine Debris*. *See Trash Talk: Impacts of Marine Debris*, OCEAN TODAY, http://oceantoday.noaa.gov/trashtalk_impacts/ (last visited Apr. 4, 2016). *See generally* José G.B Derraik, *The Pollution of the Marine Environment by Plastic Debris: A Review*, 44 MARINE POLLUTION BULL. 842 (2002).

2. Jenna Jambeck et al., *Plastic Waste Inputs from Land into the Ocean*, 347 SCIENCE 768 (2015); s*ee also* Andrés Cózar et al., *Plastic Debris in the Open Ocean,* 111 PNAS 10239 (2014) (noting a phenomenon wherein ninety-nine percent of this plastic released into oceans is unaccounted for).

3. *See*, *e.g.*, Jeb Harrison, *Sea of Japan Becoming a Dumping Ground for Trash From China and South Korea*, HUFFINGTON POST (Aug. 19 2015), http://www.huffingtonpost.com/jeb-harrison/sea-of-japan-becoming-a-dumping-ground-for-trash-from-china-and-south-korea_b_8005772.html (reporting that Japanese beaches are visibly inundated with some 100,000 tons of trash and 15,000 plastic containers which wash up annually); Katie Louise Davies, *Pictured: The Shocking Amount of Plastic Rubbish That Has Washed up on a Beach in Cornwall and Sparked Fears for Local Wildlife*, DAILY MAIL (Jan. 20 2016), http://www.dailymail.co.uk/news/article-3408214/Pictured-shocking-plastic-rubbish-washed-beach-Cornwall-sparked-fears-local-wildlife.html (documenting the effects of a 'plastic tide' which washed up in Cornwall, England).

4. *See generally* Wageningen U. & Res. Ctr., *Invisible Plastic Particles in Seawater Damaging to Sea Animals,* SCIENCEDAILY (Sept. 20 2012), www.sciencedaily.com/releases/2012/09/120920082526.htm (describing the dangers of microscopic plastic particle pollution on sea life). *See also infra* note 8 and accompanying text (describing the size of microplastics as ranging between one and five mm).

5. *See* Wageningen U. & Res. Ctr.*, supra* note 4 (documenting the tendency for microscopic plastic particles to kill marine life by blocking gills and digestive tracts). For exploration of the effects of ingesting microplastics on the filter feeder Mytilus Edulis, the common mussel, *see generally* Mark A. Browne et al., *Ingested Microscopic Plastic Translocates to the Circulatory System of the Mussel, Mytilus edulis (L.)*, 42 ENVTL. SCI. TECH. 5026 (2008).

sustaining microplastics infiltrate its diet.[6] Then, consider the fact that in 2014, the United States alone introduced over 260 tons of these microplastics into the world's oceans, and one begins to see ocean microplastics as a problem too pervasive for any one nation to address on its own.[7]

"Microplastics" refers to the general class of synthetic plastic particles ranging in size between one and five millimeters.[8] These plastics can be purposefully created at microscopic size, often for use in cosmetic products, or can be created naturally by the gradual breakdown of larger plastics.[9] Microbeads, the focus of this Note, is a term which refers only to the former type of microplastics, also known as "primary microplastics."[10] Initially phased into toothpastes and soaps as a replacement to natural exfoliates in the mid-1990's, the microbead was a boon to the cosmetics industry, enjoyed by

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6. Microplastics, either mistaken for food by marine life or ingested alongside other sources of food, can lead to intestinal blockage or a failure to take in requisite nutrients, potentially leading to starvation in consumer organisms. *See* Stephanie L. Wright et al., *The Physical Impacts of Microplastics on Marine Organisms: A Review*, 178 ENVTL. POLLUTION 483, 484 (2013); *see also infra* note 14 and accompanying text.

7. Gouin et al., *A Thermodynamic Approach for Assessing the Environmental Exposure of Chemicals Absorbed to Microplastic*, 45 SCI. & TECH. 1466, 1467 (2011) (citing the volume of microplastics released from the United States from pharmaceutical products alone to be 260 tons*); see also* Stephanie Green, *Ban on Microbeads Offers Best Chance to Protect Oceans, Aquatic Species*, EUREKALERT! (Sept. 16, 2015), http://www.eurekalert.org/pub_releases/2015-09/osu-bom091615.php (estimating the number of microbeads introduced into waterways in the United States alone to be 8 trillion, or approximately 300 tennis courts, per day, with an extra 800 trillion temporarily stored in sewage sludge and threatening to leach into water systems). For a discussion of potential international avenues to regulate the microplastics *see* Part II *infra*.

8. *See Microbeads – A Science Summary*, ENVTL. AND CLIMATE CHANGE CANADA (July 2015), http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=ADDA4C5F-1 (defining microplastic in terms of particle size requirements); *What Are Microplastics?*, MARINE DEBRIS PROG., http://marinedebris.noaa.gov/what-are-microplastics (last visited Dec. 30, 2015) (providing its definition of microplastics as "pieces of plastic that are less than 5mm long").

9. *See What Are Microplastics?*, *supra* note 8 (describing the two sources of microbeads as manufactured and broken down from larger plastic objects). For further discussion of the mechanical processes which can cause plastic objects to break down into microplastic particles, *see* Carolyn Barry, *Plastic Breaks Down in the Ocean After All – And Fast*, NAT'L GEOGRAPHIC NEWS (Aug. 20, 2009), http://news.nationalgeographic.com/news/2009/08/090820-plastic-decomposes-oceans-seas.html (noting the unexpectedly rapid rate of plastic decomposition in oceans and its potential for disaster).

10. See *Microbeads – A Science Summary*, *supra* note 8 (establishing the meaning of "microbeads" as referring only to those microplastics initially created as microscopic particles); *Microplastics: Scientific Evidence*, BEAT THE MICROBEAD, http://www.beatthemicrobead.org/en/science (last visited Oct. 20, 2015) (describing microbeads as a specific form of microplastics often used in personal care products).

consumers and manufacturers alike for its cheap price and availability.[11] While allegedly harmless to humans and unnoticed in small quantities, microbeads have begun to steadily accumulate in larger bodies of water since their introduction, due in part to the inability of most modern water filtration systems to filter out the small-sized plastics.[12]

Currently, microbeads accumulating in interregional bodies of water can be found at concentration levels where their widespread ingestion and absorption by marine life risks starvation, suffocation, and, as the plastics absorb trace chemicals from their environment, food-chain poisoning.[13] In other words, in addition to contributing to a massive loss of marine biodiversity, toxin-imbued microbeads run the risk of infiltrating an ecosystem's food web, passing from prey to predator until humans and other higher-level consumers are exposed to highly concentrated levels of harmful chemicals.[14] Microbeads, and particularly their presence in ocean environments, therefore pose a

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11. *See* Chris Churchill, *Consumers Have Power to Curb Destructive Microbeads*, TIMES UNION (Sept. 14, 2015), http://www.timesunion.com/tuplus-local/article/Chris-Churchill-Consumers-have-power-to-curb-6504586.php (noting the history surrounding the microbead's rise to prominence in the cosmetics industry). Though cosmetic products are a notable source of microbeads, microbeads are also found in paints as abrasives and in some pharmaceutical products as medicinal vectors. *See Microbeads – A Science Summary*, *supra* note 8 (describing other uses for microbeads outside of the pharmaceutical industry).

12. *See* Environmental Protection Act, 415 ILL. COMP. STAT. ANN. 5/52.5 (2015) (calling microbeads a "safe and effective mild abrasive"); *Microbeads – A Science Summary*, *supra* note 8 (describing in an overview of contributing research studies how microbeads' small size allows a significant portion of them to pass through most waste-water treatment plants). *But see* Lauren Raab, *Are Microbeads in Toothpaste Dangerous? Yes, to the Environment*, L.A. TIMES (Sept. 18, 2014), http://www.latimes.com/science/sciencenow/la-sci-sn-microbeads-toothpaste-20140918-story.html (suggesting microbeads in toothpastes could pose problems for dental health if not easily removed).

13. *See supra* note 6 and accompanying text (describing the potential for microbead ingestion to lead to starvation in marine organisms); Peter Menyasz, *Canada Proposes Toxic Designation for Microbeads*, *in* INTERNATIONAL ENVIRONMENTAL REPORTER, 38 INER 1007, 1019 (Aug. 12, 2015) (listing "absorbing persistent organic pollutants" as a danger that microbeads pose to organisms that ingest them); *Microbeads – A Science Summary*, *supra* note 8 (further discussing the dangers of food web transfer posed by microbeads).

14. *See supra* note 13 and accompanying text. For further discussion of the dangers of bio-magnification in food webs, *see generally Food Chain/Web – Biomagnification*, SCIENCE.ORG, http://science.jrank.org/pages/2801/Food-Chain-Web-Biomagnification.html (last visited Apr. 5, 2016). *But see* Suedel et al., *Trophic Transfer and Biomagnification Potential of Contaminants in Aquatic Ecosystems*, 136 REVIEWS OF ENV'T CONTAMINATION AND TOXICOLOGY 21 (1994) (concluding that biomagnification is a less common phenomenon than often thought).

danger not only to the economic and aesthetic well-being of any ocean-based State, but also to the health and safety of its people.[15]

In response to a growing scientific consensus on the potential dangers of microplastics, an increasingly aware public has begun calling for steps to drastically limit the volume of microbeads directly introduced into the environment.[16] Recent legislative action in the United States, Canada, and the European Union to regulate microbeads in consumer products reflects similar efforts from governmental bodies while the United Nation's "Beat the Microbead" social awareness campaign urges consumers around the globe to avoid cosmetics containing microbeads.[17] In response, several prominent cosmetics companies have recently promised a gradual phase-out of product lines containing microbeads and a return to less harmful natural alternatives.[18] While this increased activism and legislation has boosted public awareness of the issue, the actions of individual organizations or States may be inadequate given the scope and nature of the issue.[19] Because the effects of microbead pollution

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15. Microbeads pose a danger to marine life on several levels, a reality that could be disastrous for economies that depend on fishing or marine tourism industries. *See supra* note 13 and accompanying text (outlining the dangers microbeads pose for marine life and the potential loss of marine life associated with their proliferation). Beyond environmental damage and its associated economic dangers, toxic-chemical-imbued microbeads pose potentially grave consequences to human health in any state where an individual is likely to consume microbead-laden food. *See supra* notes 13-14 and accompanying text (describing the danger that toxically contaminated microbeads may enter the human food supply in startling numbers).

16. *See*, *e.g.*, *Results, International Campaign Against Microbeads in Cosmetics*, BEAT THE MICROBEAD, http://www.beatthemicrobead.org/en/results (last visited Mar. 11, 2016) (presenting a timeline from 2012 to present showing increasing awareness of microbead pollution and bans on the substance).

17. *See infra* Part I (discussing the legislative action being taken in the United States, Canada and the European Union to address microbead usage and disposal). *See generally* PLASTIC SOUP FOUNDATION, www.plasticsoupfoundation.org/en/ (last visited Apr. 2, 2016) (discussing collectively the efforts of various nations and organizations in regulating microplastic pollution).

18. *See Companies That Have Pledged to Stop Using Microbeads*, BEAT THE MICROBEAD, http://www.beatthemicrobead.org/en/industry (last visited Jan. 27, 2016) (listing all companies which have issued statements pledging to discontinue use of microbeads in their products); *see*, *e.g.*, Press Release, L'Oréal, L'Oréal Commits to Phase Out All Polyethylene Microbeads from its Scrubs by 2017 (Jan. 29, 2014), http://www.loreal.com/media/news/2014/jan/l'or%C3%A9al-commits-to-phase-out-all-polyethylene-microbeads-from-its-scrubs-by-2017 (discussing the company's forward-looking mission statement regarding a discontinuation of microplastics in its products).

19. The conclusion that public awareness of microbeads has experienced a boost is based on a Google Trends analysis of the search term "microbeads," which increased nearly 500% between December 2014 and December 2015. *See* "Microbeads" Term Search, GOOGLE

are most present in oceans and other larger bodies of water, the issue is an inherently international one and requires an equally international-focused solution.[20]

This Note argues for the necessity of international action to address microbead pollution and proposes a model system for doing so. Part I conducts a global review of domestic microbead regulation methods currently considered or employed in the United States, Canada, and the European Union. Part II is an overview of specific sources of international law under which an international regulation of microbeads may be feasible. Finally, Part III attempts to arrive at an ideal combination of methods and mechanisms set forth in Parts I and II as a model international plan for regulating and controlling microbead pollution.

TRENDS, https://www.google.com/trends/explore#q=microbeads (last visited Apr. 5, 2016). In spite of this increased activism, the amount of microbeads dumped into the ocean has not decreased. *See supra* note 7 and accompanying text (noting as of 2015 microbeads were still entering the United States water supply in numbers measuring trillions of particles a day). Even with the recent United States ban of microbeads, as of the writing of this Note, no other government has agreed to ban microbead-laden products. *See Politics*, BEAT THE MICROBEAD, http://www.beatthemicrobead.org/en/politics (last visited Jan. 24 2016) (listing the United States and Canada as those countries with drafted bans of microbeads); Muhannad Malas, *What Happened to Banning Microbeads in Canada?,* ENVTL DEFENSE (Dec. 14, 2015), http://environmentaldefence.ca/blog/what-happened-banning-microbeads-in-canada (discussing Canada's failure to take substantial future steps towards banning microbeads since July 2015 as contrasting to the then eminent approval of a United States ban). That leaves every other nation potentially at liberty to contribute microbeads to the world's oceans in numbers potentially as high as those documented in the United States. *See also supra* note 7 and accompanying text (discussing the high volume of microbeads currently released into United States waterways).

20. *See* Lucy C. Woodall et al., *The Deep Sea is a Major Sink for Microplastic Debris*, ROYAL SOC'Y OPEN SCI. (Dec. 17, 2014), http://rsos.royalsocietypublishing.org/content/1/4/140317 (discussing in depth how the roving nature of microplastics has led to their being found in every ocean on the planet); Eric Hand, *Trillions of Plastic Pieces May Be Trapped in Arctic Ice*, SCI. MAG. (May 22, 2014), http://www.sciencemag.org/news/2014/05/trillions-plastic-pieces-may-be-trapped-arctic-ice (discussing how microplastics have migrated to such remote areas as the Antarctic). This tendency for microplastics to migrate suggests that even those nations which ban the microbead may still be forced to live with its dangers should neighboring nations continue to release them into the oceans, making the issue international in focus.

I. *ON THE CURRENT STATE OF INDEPENDENT DOMESTIC ACTION AND THE LOCALIZED FIGHT AGAINST MICROPLASTICS*

Currently, independent State action concerning the specific regulation of microbeads is limited to several countries and has only been signed into law by one.[21] However, some of the world's largest producer-nations of microbead-laden consumer products, notably the United States and Canada, have demonstrated a willingness to address the issue through a variety of proposed means catering to their own domestic environmental policies.[22] Though these policies share a common concern of microbeads, their strategies and goals differ in significant ways.[23] The following is an overview of all such national policies currently employed to address microbead pollution and use.

A. *Pending 'Toxic Substance' Designation in Canadian Parliament*

Spurred in part by the notable concentration of microbeads in the Great Lakes of North America, the Government of Canada has proposed adding microbeads to the List of Toxic Substances under the Canadian Environmental Protection Act ("CEPA").[24] Working through Canada's Chemical Management Plan, designating

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21. *See*, *e.g.*, *Politics*, *supra* note 19 (listing the countries who have taken explicit proposed action against the microbead as limited to the United States, Canada and, via the European Union, the Netherlands). For a discussion of the nation-wide ban on microbeads in the United States, *see also infra* Part I.B.

22. *See Politics*, *supra* note 19 (noting the steps the United States and Canada are taking to spearhead their own independent campaigns to ban microbead-containing products); *see also infra* Parts I.A and I.B (discussing in depth the Canadian and United States plans to address microbead pollution).

23. *Compare infra* Part I.A (discussing Canada's planned designation of microbeads as a toxic substance), *with infra* Part I.C (discussing the European Union's treatment of microplastics, including microbeads, as marine litter which member states must control).

24. *See* Marcus Eriksen et al., *Marine Pollution in the Surface Waters of the Laurentian Great Lakes*, 77 MARINE POLLUTION BULL. 177 (2013) (postulating the unpredicted high concentrations of microplastics in the Great Lakes are largely the result of consumer product microbeads); Lisa Boyle, *Journey of the Plastic Microbeads: From Science to Legal Policy*, 5GYRES ONLINE (May 23, 2015), http://www.5gyres.org/blog/posts/2015/5/23/journey-of-the-plastic-microbeads-from-science-to-legal-policy (noting the above cited study's finding that the total count of microbeads found in a small section of the Great Lakes exceeds the number found in a 50,000 mile area of ocean); Press Release, Gov't of Canada, Harper Gov't to Ban Microbeads in Personal Care Products (July 30, 2015), http://www.news.gc.ca/web/article-en.do?nid=1011649 [hereinafter Harper Gov't Press Release] (outlining generally plans to be taken to authorize Canadian regulation of microbeads).

microbeads as a toxic substance would provide the Canadian government with the authority needed to regulate their production, distribution, and usage.[25] Under CEPA and the Chemical Management Plan, the Ministers of the Environment and the Ministers of Health have the authority to recommend the addition of a substance to CEPA Schedule 1's List of Toxic Substances.[26] Such a recommendation is dependent on a finding that the substance has or could have a harmful long-term effect on the environment, poses or may pose a danger to the environment on which life depends, or poses or could pose a danger to human life or health.[27] Designating a substance as a Toxic Substance also opens the door to the implementation of "virtual elimination" protocol, wherein the government takes direct action to drastically decrease the substance's presence in the environment.[28] More specifically, within the context of CEPA, virtual elimination entails the reduction in quantity or concentration of a toxic substance released into the environment to below a "level of quantification" determined by the Ministers of

25. The Chemical Management Plan is a jointly environmental and health-based initiative that addresses the dangers to human health and the environment posed by potentially harmful chemicals. *The Chemical Management Plan*, ENV'T CANADA, https://www.ec.gc.ca/toxiques-toxics/default.asp?lang=En&n=49FA6607-1 (last visited Sept. 28, 2015); *see* Gov't of Canada, *Microbeads FAQ Sheet*, CHEMICAL SUBSTANCES, http://www.chemicalsubstanceschimiques.gc.ca/fact-fait/microb-eng.php (last visited Sept. 28 2015), (discussing the Canadian government's plans to add Microbeads to its list of designated toxic substances and the effects this would have regarding their control over the pollutants); *see also* Malas*, supra* note 19 (further discussing the Canadian governments plans to go forward with a toxic substances designation for microbeads in 2016).

26. Canadian Environmental Protection Act (CEPA), S.C. 1999, c 33, art 64 (Can.). For an example of one such order, *see also Order Adding a Toxic Substance to Schedule 1 to the Canadian Environmental Protection Act, 1999*, 149 CANADA GAZETTE (2015), http://gazette.gc.ca/rp-pr/p1/2015/2015-08-01/html/reg1-eng.php.

27. CEPA, art 64 (1999); Gov't of Canada, *CEPA and Toxic Substances FAQ,* ENV'T AND CLIMATE CHANGE CANADA, https://www.ec.gc.ca/lcpe-cepa/DEF9EA38-699F-5C10-3447-20B9C6041B91/fi-fs01_eng.pdf (last visited Apr. 6, 2016) (describing the meaning of 'Toxic' under CEPA §64 and the require conditions a substance must meet to be labeled toxic).

28. *See* Gov't of Canada, *The Canadian Environmental Protection Act, 1999 and Virtual Elimination*, ENV'T AND CLIMATE CHANGE CANADA, http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=BB1FDE0A-1 (last visited Apr. 6, 2016) [hereinafter *CEPA and Virtual Elimination*] (explaining the process and consequences of scheduling a toxin for virtual elimination). However, in order for a substance to qualify for "virtual elimination" it must first be found to be toxic, persistent, bioaccumulative, anthropogenic and non-naturally occurring. CEPA, art 65.3 (1999) (establishing the requisite conditions of virtual elimination).

Health and Environment.[29] At the very least, CEPA authorizes the Ministers to use a flexible approach in regulating a Toxic Substance, most often involving banning its use, import, and manufacture.[30]

In the context of microbeads specifically, their proposed addition to the List of Toxic Substances would be the first step in a flexible program to not only regulate the release of microbeads, but also to take steps to reduce their presence in the environment.[31] The addition would initially be accompanied by a planned ban on microbeads in personal care products.[32] Possible remedial measures as virtual elimination would not be outside the realm of possibility should the Ministers of Health and the Environment find the issue to be severe enough.[33]

B. *The United States' Microbead Free Waters Act of 2015*

Following several independent state prohibitions on the sale and manufacture of microbead products, the United States has recently passed a nationwide ban of microbeads in cosmetic products in the form of the Microbead Free Waters Act of 2015 ("MFWA").[34] A

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29. "Level of quantification" is the lowest concentration of a substance that "can be accurately measured using sensitive but routine sampling and analytical methods." CEPA, art 65.1 (1999); *see also* CEPA, art 65 (1999) (defining virtual elimination in context of CEPA); *CEPA and Virtual Elimination*, *supra* note 28 (explaining section 65 of CEPA in terms of steps taken during virtual elimination protocol).

30. *See* Tim Williams, *Virtual Elimination of Pollution from Toxic Substances*, PARLIAMENT OF CANADA, SCI. AND TECH. DIV. (July 26, 2006), http://www.lop.parl.gc.ca/content/lop/researchpublications/prb0626-e.pdf (exploring the concept of virtual elimination in Canadian environmental practice and how its flexible applications in the context of CEPA often significantly involves a ban on the hazardous substance). *But see* Malas*, supra* note 19 (doubting the effectiveness in practice of a toxic substance designation in producing a workable management plan for eliminating the substance).

31. *See supra* notes 28 and 29 and accompanying text (describing generally the process of toxic substance designation under CEPA).

32. *See* Harper Gov't Press Release, *supra* note 24 (explaining the Canadian Governments proposed plan of adding microbeads to the List of Toxic Substances and to publish a notice of intent to develop regulations under CEPA prohibiting the manufacture, import, sale and offer for sale of microbead-containing personal care products); *see also* Williams, *supra* note 30 (describing a ban on production of a 'toxic substance' as commonplace under CEPA).

33. *See supra* note 32 and accompanying text (outlining the process of virtual elimination). *But see* Williams, *supra* note 30 (describing how, to date, no substance has been targeted under CEPA for virtual elimination, and only one substance even proposed). That is, despite the theoretic possibility, the realistic odds of implementation of virtual elimination protocol may be low. *See id.*

34. *See* Microbead-Free Waters Act of 2015, Pub. L. No. 114-114, 129 Stat. 3129 (2015); Rachel Abrams, *California Becomes Latest State to Ban Plastic Microbeads*, N.Y.

follow-up to the proposed Microbead Free Waters Act of 2014, the MFWA proposes amending §361's definition of adulterated cosmetics to include those "rinse-off cosmetics" which contain intentionally added microbeads.[35] Section 301(a) of the Federal Food Drug and Cosmetic Act ("FDCA") prohibits the introduction into interstate commerce of any food, drug, device, or cosmetic deemed adulterated within the meanings set forth in separate provisions of the Act.[36] Adding "wash-off cosmetic containing microbeads" to §361 will therefore render the interstate sale and shipment of microbead-containing cosmetics a violation of federal law, punishable by civil and criminal penalties.[37]

The legislative limits of the MFWA exist chiefly in its discussion of microbeads only in the context of §361, which is limited to adulterated cosmetics, leaving non-cosmetic sources of microbeads, most notably many pharmaceuticals, outside the scope of federal regulation.[38] It is also not clear whether the FDCA's definition of "synthetic plastic microbeads" would encompass potentially

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TIMES (Oct. 8, 2015), http://www.nytimes.com/2015/10/09/business/california-bans-plastic-microbeads.html?_r=0 (listing California as the most recent state to have taken action against consumer product microbeads following similar action by Colorado, Illinois, Indiana, Maine, Maryland and New Jersey).

35. *See* Microbead-Free Waters Act of 2015, 129 Stat. 3129; *see also* Microbead-Free Waters Act of 2014, H.R. 4895, 113th Congress (2014) (describing the ultimate fate of the Microbead Free Waters Act of 2014 as not enacted during the 113th Congress). "Adulterated Cosmetics" as a class of cosmetics, banned under the FDCA, which contain unsafe substances or are produced under unsanitary conditions which render it injurious to health. 21 U.S.C. § 361 (2015).

36. 21 U.S.C. § 301(a) (2015); 21 U.S.C. § 361(a) (2015).

37. *See generally* 21 U.S.C. § 333 (2015) (outlining the criminal and civil penalties of violating the act, including up to 3 years in prison and US$10,000 in fines for a deliberate attempt to mislead). For an example of the broad reaches of the Act's interstate commerce requirement, *see also* Baker v. United States, 932 F.2d 813, 814 (9th Cir. 1991) (holding that the requirement is met even when only one ingredient used in the final product traveled in interstate commerce).

38. For a discussion of the use of microbeads in medicine and biology, *see* Piskin et al., *Monosize Microbeads Based on Polystyrene and their Modified Forms for Some Selected Medical and Biological Applications*, 5 J. BIOMATER. SCI. POLYM. ED. 451 (1994); *see also* Environmental Protection Act, 415 ILL. COMP. STAT. ANN. 5/52.5 (2015) (Illinois State ban on microbeads which extended to those used in over the counter products). Although the Microbeads Free Waters Act does establish a ban of microbead-containing over-the-counter pharmaceuticals by 2018, it does so only to those pharmaceuticals which fit within its general category of "rinse-off cosmetics." *See* Microbead-Free Waters Act of 2015, Pub. L. No. 114-114, 129 Stat. 3129 (2015).

harmful biodegradable microbeads, as several more stringent states have done.[39]

C. *European Marine Strategy Framework Directive's State Compliance Framework*

The European Union's Marine Strategy Framework Directive ("MSFD") compels European Member States to establish and implement necessary measures to achieve a Good Environmental Status ("GES") by 2020.[40] In doing so, Member States are required to develop a strategy for their own marine waters and to cooperate with other States in their shared marine region and subregion.[41] GES, the concept at the center of the MSFD, is itself framed in terms of the MSFD's eleven separate qualitative descriptors of how a marine environment should look once GES has been met.[42]

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39. *See* Microbead-Free Waters Act of 2015, 129 Stat. 3129 (defining microbeads only 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," and failing to comment on the status of biodegradable microbeads under the Act). For a discussion of the dangers of a ban which would not include biodegradable microbeads, *see* Mary Catherine O'Connor*, California Considering Banning Biodegradable Microbeads from Personal Care Products,* THE GUARDIAN (June 8, 2015), http://www.theguardian.com/vital-signs/2015/jun/08/california-microbead-ban-bioplastic-story-of-stuff-water (discussing, within the context of California's statewide ban on microbeads, how many "biodegradable" microbeads do not degrade at all in the real environment and pose many of the same risks of traditional plastic microbeads). For a discussion of the status of biodegradable microbeads in older state legislation, *see* Rachel Abrams, *Fighting Pollution from Microbeads Used in Soaps and Creams*, N.Y. TIMES (May 22, 2015), http://www.nytimes.com/2015/05/23/business/energy-environment/california-takes-step-to-ban-microbeads-used-in-soaps-and-creams.html.

40. *See* Directive 2008/56, of the European Parliament and of the Council of 17 June 2008 Establishing the Framework for Community Action in the Field of Marine Environmental Policy (Marine Strategy Framework Directive), 2008 O.J. L 164, ch. 1, art. 1 [hereinafter MSFD] (describing generally the purpose of the Marine Strategy Framework Directive); *see also Achieve Good Environmental Status*, EUROPEAN COMM'N (Feb. 4, 2016), http://ec.europa.eu/environment/marine/good-environmental-status/index_en.htm (providing a general overview of "good environmental status"). Broadly defined, Good Environmental Status is a general ecological state wherein oceans are ecologically diverse, productive, healthy and clean. *Id*.

41. MSFD, *supra* note 40, ch. 1, arts. 5-6; *see also Our Oceans, Seas and Costs, Legislation: the Marine Directive*, EUROPEAN COMM'N (Feb. 4, 2016), http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm (describing in applied terms the marine regions and cooperative strategies of the MSFD); *Achieve Good Environmental Status*, *supra* note 40 (discussing factors to be considered by Member States in crafting their cooperative strategies).

42. MSFD, *supra* note 40, ch. 2, art. 9 (establishing the duty of Member States to determine GES standards for their marine region or subregion). For a complete list of the 11 qualitative standards of good environmental status under the MSFD, *see* MSFD, *supra* note 40,

Regarding microbeads specifically, the MSFD defines any form of microplastic as marine litter, meaning that in order for a Member State to achieve Good Environmental Standing, microplastics must not cause harm to its marine or coastal environments.[43] How this is achieved is at the discretion of Member States, who were required by the end of 2015 to submit their planned "programme of measures" outlining the steps to be taken to achieve GES by 2020.[44] The Netherlands has proposed lowering microbead pollution to below their GES standards by attacking the issue at its source.[45] By increasing consumer awareness of the dangers of microbeads, the Netherlands hopes it can curb microbead usage and potentially push towards a European Union-wide ban on microbeads.[46] Other Member States facing difficulty attaining GES standards for different micropollutants plan to address the issue by installing newer filtration technologies better capable of removing micro-pollutants in general from the water supply.[47]

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annex I (including, for example, such factors as the ability to sustain a healthy population of commercial fish, biodiversity is maintained, and that marine litter does not cause harm).

43. *See* MSFD, *supra* note 40, annex I (listing Good Environmental Status Descriptor 10 as, "Properties and quantities of marine litter do not cause harm to the coastal and marine environment"); *Our Oceans Seas and Costs, Descriptor 10: Marine Litter*, EUROPEAN COMM'N, http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/index_en.htm (last visited Apr. 6, 2016) (naming microplastics as marine litter and exploring the issues surrounding their presence in the environment).

44. MSFD, *supra* note 40, ch. 1, art. 5 (providing a general overview of the flexible mechanisms of the MSFD).

45. *See Politics, supra* note 19 (describing, among others, Dutch action being taken against the microbead within the context of MSFD).

46. *See id.* (describing the Dutch plan to discourage consumer use of microbeads while pushing for a European Union-wide ban). *But see* Frederic Simon, *Dutch Rally Support for Microplastic Ban to Safeguard Their Mussels,* EURACTIV (Jan. 14, 2015), http://www.euractiv.com/section/science-policymaking/news/dutch-rally-support-for-microplastic-ban-to-safeguard-their-mussels/ (quoting Cosmetics Europe's finding that microbeads from cosmetics only account for 0.01% of all plastic litter found in the environment and questioning the effectiveness of a microbead ban towards attaining GES).

47. *See* Jabeen Bhatti, *German Action on Micro-Pollutants Under Spotlight*, 38 INER 1075 (2015) (advocating Germany adopt Switzerland's plan to invest 1 billion euros in 'fourth level' water filtration technologies). For a discussion of applying these and other water-quality protocols in Germany, *see also* Thomas Hillenbrand et al., *Measures to Reduce Micropollutant Emissions to Water*, UMWELT BUNDESAMT (2014), https://www.umweltbundesamt.de/sites/default/files/medien/378/publikationen/texte_87_2014_mikroschadstoffe_summary.pdf.

II. *INTERNATIONAL FRAMEWORKS TO ADDRESS GLOBAL MICROBEAD POLLUTION*

The United Nations Environment Programme ("UNEP") has urged States and consumers to take action against microbeads, encouraging governments to phase out their production and sale while increasing consumer awareness of environmentally harmful products.[48] But despite the United Nations' apparent advocacy of this patchwork approach to microbead regulation, direct action from the United Nations or other international parties may be a more viable means of insuring a global ban on the pollutants.[49] A discussion of two major avenues of an internationally focused microbead regulation follows.

A. *The United Nations and the UN Convention on the Law of the Seas*

Though the United Nations has so far addressed the issue of microbeads through the Beat the Microbead awareness campaign, the United Nations could afford the issue greater regulatory attention.[50] That is, UN-directed State regulation could provide a more uniformly applied regulatory scheme to the global issue of microbeads.[51] To

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48. *See Mission Statement*, BEAT THE MICROBEAD, http://www.beatthemicrobead.org (last visited Apr. 3, 2016); *see*, *e.g.*, UNITED NATIONS ENV'T PROGRAMME, PLASTIC IN COSMETICS (2015), http://unep.org/gpa/documents/publications/PlasticinCosmetics2015Fact sheet.pdf (evincing the social awareness emphasis of the UN's campaign).

49. *See supra* note 48 and accompanying text (describing the UN's Beat the Microbead campaign and its encouragement of independent State action). For a discussion on the implied dangers of a non-uniform band on microbeads, *see supra* note 21 and accompanying text (discussing inter alia the tendency of microbeads to spread once introduced into the ocean). That is, absent a more global ban on microbeads, a single microbead producer could still effect water quality for neighboring nations. In spite of the UN's recommendations, Germany, for example continues to release 500 tons of microbeads into its waterways annually. *500 Ton Microbeads Per Yin Germany,* BEAT THE MICROBEAD, http://www.beatthemicrobead.org/en/500-ton-microbeads-per-year-in-germany (last visited Apr. 3, 2016).

50. *See supra* note 48 and accompanying text (discussing United Nations advocacy under the Beat the Microbead campaign). For a discussion of the UN treaty power as applied to microbeads, *see also infra* Part III.

51. *See generally* UNITED NATIONS OFFICE OF LEGAL AFFAIRS TREATY SECTION, TREATY HANDBOOK (2012), https://treaties.un.org/doc/source/publications/THB/English.pdf (illustrating the regulatory power of treaties, generally, and providing examples of their historic scope and effects); *Security Council Resolutions*, U.N. SECURITY COUNCIL, http://www.un.org/en/sc/documents/resolutions/ (last visited Apr. 6, 2016) (discussing generally United Nations Resolutions as a less-reaching application of UN regulatory authority).

such an end, the United Nations Convention on the Law of the Seas ("UNCLOS") could serve such a State-regulatory purpose.[52]

The 1982 United Nations Convention on the Law of the Seas is, as of the publication of this Note, the only international treaty specifically addressing land-based discharge of marine pollution.[53] It establishes that all ratifying States have a general "obligation to protect and preserve the marine environment."[54] Part XII of the treaty specifically addresses marine protection and preservation, obliging States to use the "best practical means at their disposal" to prevent, reduce and control marine pollution from any source in consistence with the convention.[55]

Within Part XII of the treaty, additional articles create such obligations as a duty to avoid polluting other States' marine environments and to transform one form of pollution into another.[56] Article 207 specifically addresses land-based marine pollution, including such sources as a State's rivers and pipelines, and urges states to take into account internationally agreed rules and standards to prevent, reduce, and control such pollution.[57] Article 207 also encourages States to act through international organizations or conferences to establish global and regional rules and standards, and to take into consideration characteristic regional features in doing so.[58]

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52. *See infra* notes 55-60 and accompanying text (discussing, inter alia, the general scope of the Law of the Seas Convention and its regulation of land-based discharge of polluted waters).

53. *See* Yoshifumi Tanaka, *Regulation of Land-Based Marine Pollution in International Law: A Comparative Analysis Between Global and Regional Legal Frameworks*, 66 HEIDELBERG J. OF INT'L L. 535, 542-44 (2006) (discussing UNCLOS as the only UN treaty which specifically addresses land-based ocean pollution). The United Nations has, however, ratified other treaties which address specific *types* of pollution, which may be land-based in nature. *See*, *e.g.*, Minamata Convention on Mercury, Oct. 10, 2013 [hereinafter Minamata Convention], https://treaties.un.org/doc/Treaties/2013/10/20131010%2011-16%20AM/CTC-XXVII-17.pdf (not in force) (not-yet-in-force United Nations treaty regulating the release of mercury).

54. Convention on the Law of the Sea, 1833 U.N.T.S. 3 (Nov. 16, 1994) [hereinafter UNCLOS]. For a discussion of the Convention's effects on non-signatory States, *see also* Andrew J. Norris, *The "Other" Law of the Sea*, 64 NAVAL WAR C. REV. 78, 85 (2011).

55. UNCLOS, *supra* note 54, arts. 194(1), (4) (limiting this obligation to prevent marine pollution to only man-made sources).

56. *Id*. art. 195. An example of transforming one form of pollution into another may be exemplified by the practice of turning land-based sludge into marine pollution.

57. *Id*. arts. 207(1)-(2).

58. *Id*. art. 207(4).

UNCLOS's anti-pollution enforcement provisions begin with article 213 and continue through article 222, though most relevant to the discussion on microbeads is article 213, Enforcement with Respect to Pollution from Land-Based Sources.[59] The article holds that states shall enforce their own laws adopted pursuant to article 207's obligations to address land-based pollution and shall take other measures necessary to implement appropriate international rules and regulations.[60] In terms of microbeads regulation, UNCLOS theoretically creates an obligation for States to enforce their own laws relevant to restricting release of the plastics into the marine environment, favoring an independent national policy-driven approach to the issue over a central regulatory schema.[61]

B. *Voluntary Corporate Codes of Conduct and the ISO 14000 Series*

Outside of the treaty authority of the United Nations, industry can present and employ its own quasi-regulatory agenda with corporate codes of conduct.[62] Operating as an alternative to State regulation, voluntary corporate codes of conduct ("VCCCs") such as the ISO 14000 incentivize environmentally responsible behavior from industry players by offering a public image boosting seal of approval in exchange for a company's adherence to certain agreed-upon principles of sustainability.[63] Because microbead pollution originates in an undesirable industry practice, encouraging corporate codes of conduct to be more mindful of the issue when drafting these

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59. *Id*. art. 213-22.

60. *Id*. art. 213.

61. *See infra* note 60 and accompanying text (discussing in broad terms the United Nation's obligation to enforce a nation's own pollution laws).

62. *See* Hellen Keller, *Corporate Codes of Conduct and their Implementation: The Question of Legitimacy*, *in* LEGITIMACY IN INTERNATIONAL LAW 219, 222 (Rüdiger Wolfrum & Volker Röben ed., 2008) (discussing voluntary corporate codes of conduct as quasi-regulatory systems). Of course, industry self-regulation carries with it its own challenges as well. Notable among these challenges is the oft-criticized fee which many regulatory organizations charge for organizations to access their standards. *See*, *e.g.*, *ISO Standards - Not for Small Businesses?*, BRITISH ASSESSMENT BUREAU (Dec. 6, 2012), http://www.british-assessment.co.uk/articles/iso-standards-not-for-small-businesses (criticizing one such system of industry regulation, the ISO, as an undue financial burden on smaller businesses).

63. Paulette L. Stenzel, *Can the ISO 14000 Series Environmental Management Standards Provide a Viable Alternative to Government Regulation*?, 37 AM. BUS. L. J. 237 (2000) (touting the benefits of an ISO regulatory scheme as a boon to public reputation). *But see ISO Standards*, *supra* note 62 (criticizing the expenses of ISO compliance and implying this cost prevents smaller and startup businesses from enjoying the ISO's benefits).

sustainability principles could drastically decrease industry use of microbeads in the first place.[64]

The ISO 14000 is a family of standards that markets itself as providing practical tools for companies to manage their environmental responsibilities.[65] Developed by the International Organization for Standardization ("ISO"), the ISO 14000 series includes, most notably, the widely used ISO 14001 standard, which establishes a general framework for achieving an effective Environmental Management System ("EMS") and the ISO 14004, which includes more specialized standards designed to address specific aspects of environmental management.[66] Overall, the ISO series strives to promote effective environmental management within its participating organizations and to provide them with flexible managerial tools for interpreting and gathering relevant information about their impact on the environment.[67] While it does so without stating specific requirements, preferring to rely instead on recommended company frameworks, the ISO 14000, and in particular the ISO 14004, could include a provision that in some way raises the issue of primary microplastics, asking organizations to consider the direct down-the-drain impacts of their products.[68] That is to say, in

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64. Microbead pollution originates in the environmentally unsound industry practice of including the micro-sized plastics in certain products. *See supra* note 11 and accompanying text (describing the evolution of the use of the microbead in cosmetic products as a cost-cutting alternative to using safer natural products). If VCCC's made avoiding microbeads a prerequisite to obtaining their stamp of approval, any industry which seeks VCCC approval would likely discontinue the use of microbeads on its own. *See* GLOBAL GREEN STANDARDS: ISO 14000 AND SUSTAINABLE DEVELOPMENT, INT'L INST. FOR SUSTAINABLE DEV. 1-2 (1996), https://www.iisd.org/pdf/globlgrn.pdf (outlining generally the principle behind the ISO 14000, an environmental-geared VCC, as providing guidance for industry practice).

65. *See ISO 14000*, INT'L ORG. FOR STANDARDIZATION, http://www.iso.org/iso/iso14000 (last visited Apr. 6, 2016). This Note explores the concept of voluntary corporate codes of conduct through the ISO 14000 as an illustration, but recognizes there are other environmentally-relevant corporate codes of conduct which could be studied as well. *See*, *e.g.*, *Welcome to EMAS!*, EUROPEAN COMMISSION, http://ec.europa.eu/environment/emas/index_en.htm (last visited Apr. 9, 2016) (describing the workings and nature of EMAS, another such code of conduct).

66. *See ISO 14000*, *supra* note 65; *ISO 14001:2015 Environmental Management System*, IMSM, http://www.imsm.com/us/iso-14001/?gclid=CLrwv_elicwCFVVZhgodvGsH7A (list visited April 12, 2016).

67. *See About Us,* INT'L ORG. FOR STANDARDIZATION, http://www.iso.org/iso/home/about.htm (last visited Apr. 3, 2016) (describing the general intent and operations behind ISO codes of conduct).

68. *See supra* notes 61 and 62 and accompanying text (addressing the operation of ISO codes of conduct in practice); *supra* note 64 and accompanying text (discussing how the ISO

terms of addressing microbead pollution specifically, the ISO 14000 and other corporate codes of conduct may be an inappropriate means to prohibit use of the plastics entirely, but their organizational structure suggests that they could discourage their use by encouraging manufacturers to consider the effects of their products.[69]

Using a VCCC such as the ISO 14000 is premised on the notion that industry may be amenable enough to discontinuing the use of microbeads that international or State regulation is not necessary.[70] Because microbead pollution is an avoidable and direct form of pollution, and because consumer perception of microbeads is increasingly negative, industry may soon realize the impracticality of continuing their use, and VCCCs can help encourage that end.[71]

III. *APPROACHING A MODEL INTERNATIONAL SYSTEM FOR MICROBEAD REGULATION*

Despite the potential for a non-regulatory answer to the issue, the fact remains that a mandatory phase-out of consumer product microbeads is too specific an issue to answer with corporate codes of conduct.[72] An outright materials ban would be an unprecedented and uncharacteristically authoritative addition to the ISO 14000 and similar VCCCs, which market themselves as flexible management assistance plans.[73] While a provision encouraging organizations to consider the down-the-drain effects of their product and the viability of a less-harmful substitute may be closer to a realistic ISO 14000 provision, it remains highly ambitious and still lacking in the strict authoritative action needed with such a pressing issue as

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tends to encourage companies to be aware of their own impacts, rather than establishing absolute bars to certain policies or behaviors).

69. *See supra* note 67 and accompanying text.

70. *See supra* note 18 and accompanying text (describing industry cooperation on solving the microbead issue). *But see* Simon, *supra* note 46 (discussing Cosmetics Europe's opposition to a proposed EU-wide ban on cosmetic microbeads).

71. *See supra* note 18 and accompanying text (discussing the mounting campaigns against microbeads). *But see* Simon, *supra* note 46 (noting that despite mounting consumer and political pressure, some companies still voice an opposition to discontinuing using microbeads in their products).

72. *See supra* note 69 and accompanying text (discussing the limited application of VCCC's, in particular the ISO, in effectively banning a substance).

73. *See supra* notes 67 and 68 and accompanying text (citing ISO 14000's self-description as a collection of flexible tools for organizations to incorporate into an environmental management solution).

microbeads.[74] That is, while compliance with VCCC's has its advantages, a ban on microbeads needs more than just incentivizing; it needs something approaching true legal obligation.[75]

UNCLOS better approaches the type of central authority needed for the regulation of microbeads, but its pollution provisions lack the binding power necessary to address an issue of this magnitude.[76] Its powers are too general, particularly with regard to its land-based pollution provisions, which remain some of the weakest articles in Part XII of the treaty.[77] Article 207 merely encourages States to adopt pollution prevention laws by "taking into account internationally agreed rules [and] standards" and gives no further explanation as to what rules and standards it refers.[78] "Taking into account" likewise falls short of a demanding compliance requirement, something UNCLOS is not opposed to in articles regarding other forms of pollution.[79] In short, UNCLOS creates little obligation for States to pursue an ambitious regulatory scheme, favoring national discretion as opposed to cohesive international law and leaving the prospects of regulation of a form of pollution as specific as microbeads under UNCLOS lacking.[80] Furthermore, even if article 207 were to have sufficient authority to force any kind of harmful substance ban in

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74. *See supra* note 69 and accompanying text (entertaining the possibility of structuring new ISO codes which encourage companies to consider their use of microbeads in their products); *see also supra* note 7 and accompanying text (exploring the sheer volume of microbeads released daily); *supra* note 21 and accompanying text (emphasizing the need for a uniform ban on microbeads because in part of their tendency to migrate across large regions of ocean).

75. *See supra* note 7 and accompanying text (addressing the volume of microbeads released daily); *supra* note 21 and accompanying text (emphasizing the need for a uniform ban on microbeads because in part of their tendency to migrate across large regions of ocean).

76. *See supra* note 21 (emphasizing the need for uniform and binding authority when dealing with a proffered microbeads ban).

77. *See* Tanaka, *supra* note 53, at 543 (describing Article 207, UNCLOS XII's land-based pollution provision, as comparatively unauthoritative to the rest of the treaty). *But see* Iain Murray, *LOST at Sea*, NAT'L CTR. FOR POLICY ANALYSIS (Mar. 25, 2013), http://www.ncpa.org/pub/bg167 (arguing, in the context of opposing US ratification of the treaty, that UNCLOS Article 207 actually creates an obligation to enter into regional treaties to minimize pollution).

78. UNCLOS, *supra* note 54, art. 207; *see also* Tanaka, note 53 *supra*, at 543 (outlining UNCLOS's failure to specify the standards to which section 207 refers).

79. *See* Tanaka, *supra* note 53, at 543 (decrying the act's lack of compliance requirements in dealing with certain forms of pollution); *see*, *e.g.*, UNCLOS, *supra* note 54, art. 208 (States shall adopt law, regulations and measures which "shall be no less effective than international rules, standards and recommended practices and procedures").

80. *See supra* note 56 and accompanying text (outlining UNCLOS's general regulatory scheme of encouraging states to improve their own marine environmental law).

prevention of land-based pollution, the treaty fails to establish adequate criteria for what constitutes harmful substances from land-based sources to begin with.[81] Without some set framework for defining "harmful" within UNCLOS, we are not even assured that microbeads, primarily dangerous only at larger concentrations and lacking inherent toxicity, would even come within the purview of UNCLOS pollution provisions.[82]

Article 194(2), which prohibits one State from polluting or damaging the environment of another State, holds more promise towards forcing State regulation of microbeads given the inherently multinational nature of microbead-polluted seas and the ease with which the plastics may move across marine boundaries as a result of ocean currents.[83] However, proof of origin may become a complicating factor for microplastics under 194(2).[84] Not only would distinguishing the source industry and nation of a microscopic bead prove immensely difficult, but distinguishing primary microplastics (microbeads) from secondary microplastics makes the task nearly impossible.[85] If an affected nation were to identify microplastic

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81. *See* Tanaka, *supra* note 53, at 543 (positing that UNCLOS Part XII needs to establish a specific criterion States may use in identifying harmful substances from land-based pollution); Bradford Mank, *Can Plaintiffs Use Multinational Environmental Treaties as Customary International Law to Sue Under the Alien Tort Statute?*, 2007 UTAH L. REV. 1085, 1166 (2007) (describing UNCLOS's transnational pollution provisions contained in Part XII as "vague and difficult to apply").

82. *See supra* note 82 and accompanying text. If States are bound to regulate "harmful" substances under UNCLOS Part XII but we cannot say for certain what UNCLOS means by "harmful" substances, then we cannot be certain that plastic microbeads would qualify as a "harmful" substance and come under the control of UNCLOS.

83. *See* UNCLOS, *supra* note 54, art. 194(2) ("States shall take all measures necessary to ensure that activities under their jurisdiction . . . are so conducted as not to cause damage by pollution to other States and their environment, and that pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas where they exercise sovereign rights"); *see also supra* note 21 and accompanying text (discussing the tendency of microbeads to migrate extensively in the oceans and thus to not respect national boundaries). Given microbeads are prone to cross national boundaries once in oceans/international bodies of water, UNCLOS art. 194(2), which itself governs the potential for one nation's pollution to cause damage in another nation's territory, seems an appropriate countermeasure.

84. Because microbeads are already found in nearly every major body of water on the planet. *See* Woodall et al., *supra* note 20. States may have incredible difficulty tracing the presence of this ubiquitous pollutant back to a single producer.

85. Both microbeads and general microplastics (often resulting from the breakdown and weathering of larger plastic products) are defined as small plastic particles between 1 and 5mm in size and are as such often visually indistinguishable. *See Microbeads – A Science Summary*, *supra* note 8. Both are found in the world's oceans, but while microbeads are being introduced

pollution as the source of environmental degradation under 194(2), there would be next to no means of distinguishing between the two sources of microplastics to determine if the source of injury resulted from one State's inadequate microbead stop gaps or simply from the breakdown of plastics already present in the ocean.[86]

While the Law of the Seas Treaty may ultimately lack the specific authority required to address microbeads, the need for a sweeping and declaratory solution suggests the United Nations is still our most viable forum for international regulation.[87] To such an end, this Note proposes a UN treaty banning the use of microbeads.[88] UN treaties have historically been used to address the use of hazardous substances, and in light of the data available regarding the dangers inherent in down-the-drain microbeads, the plastics certainly seem hazardous enough to warrant regulation by treaty.[89] In terms of provisions, the proposed treaty should model, in spirit, the legislative action in the United States and Canada identifying microbeads as a hazardous substance and restricting their use in cosmetic and pharmaceutical products to curb their introduction into bodies of water.[90] Though microbeads from other sources may also enter the water stream, the utility of microbeads in certain contexts cannot be denied, and a UN ban must be cognizant of that fact.[91] Indeed, the

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directly as a result of the pollutant's presence in waste water, general microplastics form in the ocean as a result of the breakdown of plastic refuse already in the environment. *See supra* note 9 and accompanying text. Therefore, while the addition of microbeads could be halted, microplastics will continue to form in the oceans as a result of this inevitable breakdown of plastic pollution. Attempting to use UNCLOS Article 194(2) to hold States accountable for the release of microbeads into waters already filled with microplastics therefore runs aground on issues of proof. That is, there would be no means through which to discern the illegal release of microbeads against the background of a microplastic-laden ocean.

86. *See supra* note 85 and accompanying text (discussing in depth the practical limitations behind any attempt to distinguish most forms of microplastics from microbeads).

87. *See supra* note 21 and accompanying text (emphasizing the need for uniform action towards microbeads); *see also supra* note 52 for a discussion of the United Nations' power to institute more sweeping state-regulatory action.

88. *See infra* note 89 (discussing the advantages, desirability and precedence of using a United Nations treaty to address microbeads).

89. *See supra* note 14 and accompanying text (describing some of the dangers of microbeads); *see*, *e.g.*, *Minamata Convention*, *supra* note 53 (exemplifying the use of a treaty to regulate a hazardous substance with the treaty's regulation of mercury).

90. *See supra* Part I.A (discussing Canada's proposed Toxic Substances Designation); *supra* Part I.B (discussing the United States' recent decision to ban use of microbeads in rinse-off cosmetics).

91. *See supra* note 12 and accompanying text (noting the varied and potential uses for microbeads outside of down-the-drain cosmetic products).

grievance of this Note is not necessarily the potential dangers of microbeads *should* they enter the water stream, but that microbeads from certain products were being directly, certainly and unnecessarily added to the water supply.[92] The goal, then, of a UN treaty banning microbeads is to prevent the unnecessary introduction of an otherwise avoidable choice of substance into the water supply. Mindful of the fact that the proposed UN treaty cannot and indeed should not ban all uses of primary microplastics, and of the fact that the breakdown of plastics already in our waterways may lead to the continued introduction of secondary microplastics, this Note also advocates continued independent State action to improve water filtration technologies as is possible and practical.[93]

CONCLUSION

Microbeads are dangerous, and many States are beginning to realize this, but the pressing nature of the problem and the shared burden it presents to coastal nations calls for a more vocalized rule than a burgeoning presumption against the use of microbeads.[94] Once released, microbeads will remain in our environment almost indefinitely, and even one State left releasing the substances into the world's oceans will aggravate an already severe issue.[95] Those States that have already taken action have demonstrated a willingness to adapt regulation to their own systems of law, but on the level of

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92. *See supra* note 13 and accompanying text (discussing how rinse-off cosmetic uses of microbeads directly introduce the pollutants into the water supply); *see also supra* note 12 and accompanying text (discussing the primary reason for using microbeads as a replacement to natural exfoliates was cost-saving by cosmetic companies). Because use as exfoliates is an avoidable use of microbeads, an ideal regulation advocated for by this note would prohibit such a use.

93. *See supra* note 48 and accompanying text (describing Swiss action to improve wastewater filtration technologies to catch micropollutants generally). Improved water filtration/treatment technologies would not only stop any microbeads which may at any point enter a waste-water system, but would also help remove microplastics already present from the water supply. *See* Hillenbrand et al., *supra* note 47.

94. *See supra* note 21 and accompanying text (discussing the need for uniform action against the wide-migrating microbeads).

95. *See supra* note 21 and accompanying text (noting the tendency for microbeads to transcend national boundaries and advocating for a wide-reaching and uniform ban to counter this); Lisa Winter, *Ocean Plastic Mysteriously Disappears from Oceans*, IFL SCI. (July 2, 2014), http://www.iflscience.com/environment/microplastics-are-choking-our-oceans (discussing how microplastics can persist in the ocean for hundreds of years).

international regulation, we need a policy that directly addresses the root of these policies.[96]

Microbeads are a substance whose dangers, while perhaps not fully understood, are certain, and whose reach is not limited by the mechanics mitigating the spread and dangers of other sources of marine pollution.[97] They are not an oil spill, or a mining operation, or any other point-source whose effects and pollution can be directly seen and traced back to its origins.[98] Nor are they a chemical found naturally in the environment that only poses a danger at certain threshold concentrations.[99] We, therefore, cannot treat them as such, or expect the same forms of international law so adapted to general pollution governance to have a progressive effect on the matter where the specific dangers of the issue are certain: microbeads released into an environment will endanger biodiversity.[100] An issue as objective as the dangers of microbeads in marine environments needs a system of law equally as objective and straightforward to address them, and a United Nations treaty banning microbeads is our oceans' best option.[101]

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96. *See supra* Part I.

97. *See supra* note 14 and accompanying text (discussing some of the dangers of microbeads on marine organisms and humans); *supra* note 21 and accompanying text (discussing the tendency of microbeads to spread via ocean currents).

98. *See supra* notes 83 and 84 (discussing, together, the difficulties of attempting to distinguish microbeads as a direct source of pollution as differentiated from microplastics already found in the oceans).

99. *See supra* note 14 (discussing the dangers microbeads pose for wildlife, most notably bioaccumulation, which in theory is not dependent on a particular concentration of microbeads to pose a danger).

100. *See supra* note 6 and 14 (discussing together the inevitable tendency of microbeads to harm organisms in the environment, whether through choking, starvation, or poisoning).

101. *See supra* Part III (discussing the advantages of a United Nations treaty in banning select uses of microbeads).