The Rapids

US EPA's Trash Free Waters Monthly Update

December 2024

epa.gov/trash-free-waters

Introduction

Hello all,

I am thrilled to announce the publication of the National Strategy to Prevent Plastic Pollution: Part Three in a Series on Building a Circular Economy for All! In the strategy, the EPA identifies actions that businesses; academia; industry; nongovernmental organizations; federal, Tribal, state, local and territorial governments; and consumers can take in the United States to eliminate the release of plastic waste into the environment, including our waterways and the ocean. The EPA also outlines interventions across the entire plastic life cycle to reduce the U.S. contribution to plastic pollution, including actions that stakeholders safeguarding water resources can help implement. Please share the announcement with your networks as appropriate. Read the EPA's Press Release announcing the strategy.

In addition, the Environmental Law Institute and the Monterey Bay Aquarium recently updated a report, Existing U.S. Federal Authorities to Address Plastic Pollution: A Synopsis for Decision Makers. The report provides a comprehensive overview of the existing legal authorities the U.S. federal government can leverage to achieve the national goal of eliminating plastic release into the environment by 2040 while safeguarding human health and the environment. Building on the legal framework established by a Congressionally-mandated report from the National Academies of Science, Engineering, and Medicine, the report categorizes federal authorities—spanning executive orders, legislation, regulations, and associated programs—into specific "intervention areas" across the plastic life cycle. The report arrays these intervention areas alongside relevant authorities and their implementing agencies.

Also, the National Oceanic and Atmospheric Administration Ocean Guardian Youth Ambassador Program is now open for applications. The program is committed to building and strengthening efforts to share the agency's mission with youth through outreach and education programs to increase awareness of NOAA careers and opportunities. The NOAA Ocean Guardian Youth Ambassador Program will allow the Office of National Marine Sanctuaries to cultivate, connect, and activate youth changemakers between the ages of 13-18 that support a thriving sanctuary system that protects our nation's underwater treasures and inspires momentum for a healthy ocean. The application for Cohort 3 is open. The deadline to apply is January 5, 2025.

Upstream has created a United States and Canada Reuse Incentives and Grants Tracker dedicated to monitoring incentives and grants offered by municipalities, states/provinces, federal governments and private sources that could be used to support projects related to source reduction of disposable packaging and foodware. While the tracker primarily highlights funding opportunities specifically for waste reduction and reuse, they also include funding programs that encompass broader initiatives aimed at promoting environmental stewardship, environmental projects, or waste management. By collecting these diverse opportunities, they hope to expand the options available to those seeking funding for reuse.

Finally, several guides have been developed to reduce plastic and waste during the holiday season. Beyond Plastics has created a Plastic Free Holiday Meals Guide complete with tips and recipes as well as a Plastic-Free Holiday Gift Guide. Also, NOAA has several blog posts about the issue including: Creative Ways to Reduce Waste This Holiday Season, Zero Waste Holiday Parties and Decorations, Zero Waste Gifts and Gift Wrapping, Holiday Travel Plans and finally a post for New Year, New Goals, Less Waste.

Please share any upcoming events with me at nandi.romell@epa.gov so that the Trash Free Waters Team can advertise these opportunities.

Romell Nandi
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Trash Free Waters National Program Lead

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EPA Announcements

The EPA Compendium of Tools and Methods to Estimate Environmental Benefits for Nature-based Solutions

The EPA has released *A Compendium of Tools and Methods to Estimate Environmental Benefits for Nature-Based Solutions*. Nature-based solutions are actions that protect, conserve, restore and sustainably manage natural or modified ecosystems. Nature-based solutions use natural features or processes to address public health and environmental challenges while providing multiple benefits to people and nature. The compendium identifies methods and tools for quantifying the environmental benefit related to water quantity, climate mitigation, air quality, ambient air temperature reductions and habitat management.

The EPA Issues Advance Notice of Proposed Rulemaking to Protect Salmon from Chemical Used in Rubber Products

The EPA is issuing an advance notice of proposed rulemaking (ANPRM) under Section 6 of the Toxic Substances Control Act to gather information on the potential risks associated with N-(1,3-Dimethylbutyl)-N′-phenyl-p-phenylenediamine (6PPD) and its transformation product, 6PPD-quinone, a substance often found in tire-rubber particles. In August 2023, the Yurok Tribe, the Port Gamble S'Klallam Tribe and the Puyallup Tribe of Indians submitted a petition under TSCA Section 21 asking EPA to establish regulations under TSCA Section 6 prohibiting the manufacturing, processing, use and distribution of 6PPD in tires. The EPA granted this petition in November 2023 and committed to publishing an ANPRM by Fall 2024 in order to gather more information that could be used to inform a subsequent regulatory action. The EPA will accept written comments on the ANPRM for 60 days following publication via the docket at Regulations.gov.

Funding Opportunities

The EPA Solid Waste Infrastructure for Recycling and Recycling Education and Outreach Grant Programs

The EPA recently announced it is making $117 million available for three separate funding opportunities to advance recycling infrastructure and boost food waste prevention education across the country. Two of the notices are for Solid Waste Infrastructure for Recycling grants – one funding opportunity for Tribes and intertribal consortia and another for communities (such as cities, counties and parishes) across the country. Applications are due for SWIFR grants for Tribes by **March 14, 2025**, and for communities by **December 20, 2024.** The third notice is for the EPA's Recycling Education and Outreach grant program which is focused on food waste prevention and composting. Applications are due for the REO grants by **December 20, 2024**.

Marine Debris Removal and Interception Technologies Grants Fiscal Year 2025

NOAA's Marine Debris Program is pleased to announce two Notices of Funding Opportunity for Marine Debris Removal and Interception Technologies under the Bipartisan Infrastructure Law. NOAA will award up to $54 million to support impactful, large marine debris removal projects, as well as the installation of proven marine debris interception technologies, throughout the coastal United States, Great Lakes, United States territories and Freely Associated States. For more information, please visit the Removal and Interception Technologies opportunities on Grants.gov and the NOAA Marine Debris Program's website.

Stormwater Filtration System Grant

The Council of the Great Lakes Region is offering a grant to help communities purchase, install and monitor innovative stormwater filtration systems. When in place, these devices, such as the LittaTrap™ and the Gutter Bin®, help prevent land-based plastic litter, oil and sediment from entering our waterways and ultimately the Great Lakes.

The EPA Environmental Justice Thriving Communities Grantmaking Program

The EPA has selected 11 Environmental Justice Thriving Communities Grantmakers that will receive $600 million to serve as pass-through entities nationwide through the Environmental Justice Thriving Communities Grantmaking Program cooperative agreements. Projects can focus on addressing climate change, pollution, and environmental stressors in frontline communities, among others. Opportunities are open now for several of the EPA Regions including Regions 2, 3, 8 and 10. Application deadlines vary.

Upcoming Events

Pollution Prevention Project Webinar Series: Construction Foam

December 3, 2024, (12 pm ET), virtual

The University of Toronto Trash Team is hosting a webinar to discuss construction foam. They will discuss the problem of foam insulation and other materials leaking from construction sites into our local ecosystems and share findings from In Pursuit of Polystyrene, including a pilot working with local industries to reduce pollution at the source.

Addressing Overconsumption through Consumer Education and Circular Business Models

December 4, 2024, (8 am ET), virtual

Be Waste Wise is hosting a webinar focused on how we realistically approach the issue of overconsumption at all times, but brought into sharp focus at this time of year. The panel will explore how we might adopt more circular business models and be more creative in how and what we spend our money on to reduce the impact of consumption around gifting and clothing. What have we learned from pilots to date? What is good practice, and how can we maximize the outcomes from this type of work? What products are best to start with to have the highest impact on waste and carbon? The webinar will be moderated by Emma Burlow, Founder, Lighthouse Sustainability with speakers including Charlotte Morley, Founder and CEO, *thelittleloop* and Jen Gale from Sustainable(ish).

SPARKS 2024

December 9 -10, 2024, Seattle, WA

Sponsored by the Pacific Northwest Social Marketing Association, SPARKS is an annual social marketing conference, covering two days of insights and instruction from prominent voices in the field. The event features more than a dozen social marketing experts speaking on behavior change related to some of the most urgent issues we face, including public health, injury prevention, environmental health and protection, and community well-being in the Pacific Northwest.

Perspectives on Plastic Lifecycle: Plastics Use and Demand

December 10, 2024, (10 am – 12 pm ET), virtual

The National Academies of Sciences, Engineering, and Medicine is hosting a webinar discussion featuring leading experts who will delve into the crucial issues in plastic markets, the demand for recycled content, and the environmental and health impacts of plastic while in use. The event will include three introductory presentations by Crystal Bayliss on the various uses of plastics, examining where they are essential, and exploring opportunities for reuse; Kate Bailey on policies to incentivize recycling and the general availability of recycled content and their current and future markets; and Dr. Leonardo Trasande on the health effects of plastics while in use, particularly focused on endocrine disrupting substances and potential hazardous chemical concerns associated with plastic (and recycled plastic) products. It will culminate in a dynamic panel discussion to explore these issues in depth.

The EPA Trash Free Waters Webinar: Exploring the Escaped Trash Risk Map

December 10, 2024, (1 pm ET), virtual

In October, the EPA's Trash Free Waters program unveiled the new Escaped Trash Risk Map. The map displays

estimated escaped trash density in the United States at the 1km² scale and shows where trash is at high risk of getting into waterways. The most common item types and the percentage breakdown of escaped trash materials are also available at the major river basin scale. In addition, microplastics data is displayed for select waterbodies. We will walk through the genesis of the map, how it was developed, how it can be used and how we plan to update it going forward. The panelists include: Romell Nandi, Trash Free Waters National Program Lead, US EPA; Jenna Jambeck, Georgia Athletic Association Distinguished Professor of Environmental Engineering, University of Georgia; Kathryn Youngblood, Senior Research Engineer, University of Georgia; Kara Lavender Law, Research Professor of Oceanography, Sea Education Association.

From Gear to Ghost: Reeling in the Problem

December 10, 2024, (3 pm ET), virtual

Tropical Islands Partnering on Solutions for Marine Debris is a bimonthly online webinar series hosted by the NOAA Marine Debris Program. The goal of the series is to help island communities connect and share perspectives from across the tropics on common marine debris issues and proposed solutions. This webinar will feature presentations from various organizations who engage in abandoned, lost or otherwise discarded fishing gear mitigation efforts. Presenters will speak to prevention and removal initiatives aimed to "reel in the problem."

State of the Science: Shaping a Global Plastics Treaty

December 11, 2024, (12 pm ET), virtual

Following the final negotiating session for a Global Plastics Treaty in Busan, Korea, join 5 Gyres and leading researchers for a dynamic conversation about the role of science in shaping the treaty. Members of the Scientists' Coalition for an Effective Plastics Treaty will share their perspectives from INC-5, insights from key research, and discuss what's next as we look to the future. Speakers include: Dr. Lisa Erdle, Director of Science and Innovation, 5 Gyres Institute; Dr. Bethanie Carney Almroth, Professor of Ecotoxicology, University of Gothenburg; Dr. Marcus Eriksen, Co-founder and Researcher, 5 Gyres Institute; Patricia Villarrubia-Gomez, PhD Candidate, Stockholm University; and Paulita Bennett-Martin, Senior Strategist of Policy Initiatives, 5 Gyres Institute.

Global Treaty Dialogues: INC-5 Digest

December 12, 2024, (10 – 11:30 am ET), virtual

The Ocean Plastics Leadership Network is hosting a 90-minute session dedicated to discussing the reflections and key insights from INC-5 in Busan, Korea (November 2024).

Fibre Fragmentation and Climate Change Webinar

December 12, 2024, (11 am ET), virtual

The Microfibre Consortium is hosting a webinar in part of its 'Triple Planetary Impact' series to do a deep dive into fibre fragmentation and climate change. Industry specialists will discuss the latest research developments and the importance of making fibre fragmentation a part of material strategies. This webinar is intended to support industry understanding of the issue from a climate change standpoint, so that organizations can act urgently.

Tracking Plastic Laws After Global Treaty Negotiations

December 12, 2025, (5 – 6:15 pm ET), virtual

After two years of intense negotiations, the fifth and final planned session to agree on a United Nations Plastic Treaty is scheduled to conclude on December 1, 2024. The Treaty, once agreed, will have widespread implications for plastic laws around the world, as well as for the businesses, activists, journalists, lawyers, and many others working on plastic pollution issues. Join Plastic Pollution Coalition on December 12, 2024, for a discussion with legislative, advocacy, and media experts about the UN Plastic Treaty, and the importance of continuing to advance and track plastic policy at all levels. One critical tool to monitor progress and

implementation is the Global Plastic Laws database and resource center, which they will also present. Joining the discussion will be Dr. Jamala Djinn, Science/Policy Advisor, Break Free From Plastic; Jennifer Gleason, Law Program Director, Environmental Law Alliance Worldwide; Shane Trimmer, District Director at the U.S. House of Representatives – Office of Rep. Jared Huffman (CA-02); and Joseph Winters, Staff Writer, Grist. The webinar will be moderated by Madison Dennis, Project Manager, Plastic Pollution Coalition.

Save the Date for Future Months...

Virginia Marine Debris Summit

March 18-20, 2025, Norfolk, VA

Save the date for the 2025 Virginia Marine Debris Summit to be held on March 18-20, 2025 at the Norfolk Botanical Garden.

Circularity 25

Apr 29, 2025 - May 01, 2025, Denver, CO

Circularity offers thought-provoking keynotes, actionable breakouts, a solutions-oriented expo and networking opportunities for leaders implementing circular solutions. Join the growing community of visionaries and practitioners to move beyond incremental action, catalyze systems change and accelerate the circular economy.

National Marine Educators Association Conference

June 29 – July 3, 2025, Lafayette, Louisiana

This conference will bring together hundreds of professional educators dedicated to teaching about marine, coastal and aquatic environments. More information coming soon.

In Case You Missed It…

Trash Free Waters Webinar: Microfibers are a Macro Issue: Interagency Report on Microfiber Pollution

In July 2024, the Trash Free Waters program and the National Oceanic and Atmospheric Administration's Marine Debris Division – on behalf of the Interagency Marine Debris Coordinating Committee - released the Interagency Marine Debris Coordinating Committee Report on Microfiber Pollution. This Report to Congress was mandated by Section 132 of the Save Our Seas 2.0 Act of 2020. This webinar covered the details in the report as well as some of the ongoing efforts in the United States and beyond that are addressing microfiber pollution.

Reducing Runoff and Improving Water Quality with the Justice 40 Initiative

Stormwater University held a webinar to review various site planning and design techniques, approaches, principles, successes, pitfalls and roadblocks to designing, establishing and maintaining Green Infrastructure systems and how these landscapes can integrate with well-designed environments. The village of Jonestown in Caroline County, Maryland, has poorly draining soils and stormwater related flooding. The predominantly African-American community was established by free African Americans before the Civil War; and about 60% of its homes date back 50-100 years and many of the families have lived there for generations. Through federal funding from the Justice40 Initiative, the community is implementing stormwater runoff reduction and water quality improvement projects on private properties, the county owned community park, and on county roads. The project includes capacity building and education for community members. The presentation will include a discussion on the specific stormwater improvements including bioretention areas, grass swale, conservation landscaping and tree planting.

Charting the Course Towards Producer Responsibility for Marine Flares and Boat Wrap

The Stewardship Action Foundation and the Minnesota Pollution Control Agency hosted a webinar focused on the issues surrounding end-of-life management of pyrotechnic marine flares and boat wrap, and solutions

including legislation that passed or was introduced in 2024. Speakers include Senator Catherine Blakespear, (CA D-38, D); Representative Larry Kraft, (MN 46A, DFL); Annika Bergen, Minnesota Pollution Control Agency; Leslie Lukacs, Zero Waste Sonoma; Heidi Sanborn, National Stewardship Action Council; and Raj Bagaria, GDB Circular.

2024 Sea Grant Marine Debris Symposium

The NOAA Sea Grant hosted a marine debris conference to bring together grantees, researchers, community members and other partners to share updates on Marine Debris Challenge and Community Action Coalitions Competition projects, discuss marine debris prevention and removal, and create a network of peer support for current and future work.

Fibre Fragmentation & Biodiversity Loss Webinar

The Microfibre Consortium hosted a webinar as part of its 'Triple Planetary Impact' series, to discuss fibre fragmentation and biodiversity loss. Industry specialists discussed latest research developments and the need to embed fibre fragmentation as an integral part of broader environmental sustainability, and more focused material strategies. This webinar was intended to support industry understanding of the issue from a biodiversity loss standpoint so organizations can act to address the issue with urgency.

The Pollution Prevention Project Webinar Series: Single-use Foodware

The University of Toronto Trash Team hosted a webinar to share findings from their Ditching Disposables pilot study with Toronto-based foodservice businesses focused on implementing and promoting reusable practices, including overview of potential outcomes from waste reduction policies and actions in foodservice establishments. Speakers included Mehtap Merdogan, Co-founder, At Origin Coffee; Jyoti Kapil, Founder, Bindia Indian Bistro; Megan Takeda-Tully, Founder and CEO, Suppli; and Emily Alfred, Senior Campaigner, Toronto Environmental Alliance.

The Pollution Prevention Project Webinar Series: Pre-Production Pellets

The University of Toronto Trash Team hosted a webinar to discuss the problem of pre-production plastic pellet leakage into our local aquatic ecosystems and shared findings from Operation Sweep the Creek, including a pilot installing pellet traps on the lots of local industries to divert pellets from aquatic ecosystems. Speakers included Eden Hataley, Mike Hannah, Co-founder and Technical Director, Enviropod International; Shannon Laszlo, Governance and Member Relations, Chemical Industry Association of Canada, Plastics Division; and Angela Noakes, Plastics Policy Analyst, Ocean Conservancy.

The Pollution Prevention Project Webinar Series: Wet Wipes

The University of Toronto Trash Team hosted a webinar to discuss wet wipes. They discussed the problem of plastic wet wipe leakage and associated microplastics into our local aquatic ecosystems and shared findings from Wipes vs Pipes, including research estimating the amount of wet wipe pollution in our local rivers and synthesizing potential solutions based on interviews with stakeholders.

Unveiling Ghost Farms: A Hidden Threat to Our Seas From Coastal Pollution to Microplastics – Collaborative Efforts to Tackle Ghost Farms and Their Impact

The Healthy Seas Foundation hosted a webinar to dive into the hidden world of ghost farms—abandoned aquaculture facilities that are wreaking havoc on marine ecosystems. Participants discovered how these derelict farms not only contribute to plastic pollution but also foster the spread of microplastics in our oceans, affecting coastal areas worldwide. Speakers included: Veronika Mikos, Director, Healthy Seas Foundation; Christina Zantioti, PhD. Candidate; and Anastasios Filippides, Executive Director, Ozon Non-governmental Organization.

U.S. Authorities and Considerations for the Global Plastics Agreement

The Environmental Law Institute hosted a webinar on international environmental law and the Global Plastics Agreement. The webinar also discussed the negotiations and key provisions at issue, U.S. authorities and approaches to international agreements, and opportunities for the U.S. with respect to the Global Plastics Agreement. This presentation followed the recent presentation and report published by ELI and the Monterey Bay Aquarium on existing legal authorities the U.S. federal government can leverage to achieve the national goal

of addressing plastic pollution while safeguarding human health and the environment. Speakers included: Alexandra R. Harrington, Lecturer in Law (Environment), Lancaster University Law School and Chair, The International Union for Conservation of Nature and Natural Resources (IUCN) World Commission on Environmental Law Agreement on Plastic Pollution Task Force; David A. Wirth, Professor of Law and Dean's Distinguished Scholar, Boston College Law School; Jamala Djinn, Ph.D., Policy Advisor, Break Free From Plastics-US; and Margaret Spring, Chief Conservation and Science Officer, Monterey Bay Aquarium.

BOTTLE Consortium – Using Analysis to Guide Plastic Circularity

The U.S. Department of Energy Bio-Optimized Technologies to keep Thermoplastics out of Landfills and the Environment (BOTTLE™) consortium held a webinar to discuss how the consortium uses analysis to guide research activities. BOTTLE, funded by DOE's Bioenergy Technologies Office and Advanced Materials & Manufacturing Technologies Office conducts analysis-guided research and development to change the way we recycle plastics. During the webinar, BOTTLE Analysis Co-Lead Dr. Taylor Uekert, a researcher with the National Renewable Energy Laboratory, introduced key analysis techniques such as techno-economic analysis, life cycle assessment and environmental justice evaluation. She provided examples from the BOTTLE portfolio demonstrating their use in benchmarking and optimizing the costs and environmental impacts of new innovations in plastic redesign and recycling.

Toxics in Packaging Clearinghouse Open House

The Toxics in Packaging Clearinghouse held an open house to provide an introduction to the history and structure of TPCH, how it has helped Minnesota, Connecticut and New Jersey implement toxics in packaging laws, and ways it benefits industry group members.

The Petrochemical Investor Statement: A Call to Action Ahead of the Global Plastics Treaty

Planet Tracker explored key insights for financial institutions on the Global Plastics Treaty and how supporting the petrochemical investor statement can drive action to end plastic pollution.

Pricing Transparency in the Recycled Plastics Supply Chain

Be Waste Wise and The Circulate Initiative hosted a webinar focused on the recycled plastic supply chain. Recycled plastics markets in India and Southeast Asia face multiple demand-and-supply linked bottlenecks along the value chain, including a lack of transparency in the pricing of plastic waste feedstock and recycled plastics. This opacity results in fluctuating demand and supply, poor capacity utilization at recycling facilities, and, ultimately, challenges for brand owners to meet commitments to using recycled content in plastic packaging. A 2023 study by The Circulate Initiative "Pricing Transparency in the Recycled Plastics Supply Chain in India, Indonesia, Thailand, and Vietnam," sheds light on how pricing transparency can unlock demand for recycled plastics and support stakeholders across the value chain to understand the market opportunity better and make more informed decisions to drive positive change in the sector. Pricing transparency refers to the degree to which information on the prices of plastic waste and the finished products at each point in the recycled plastics supply chain is available to all buyers and sellers in each market. This webinar discussed the need for transparency in the pricing of recycled plastics and aimed to help participants understand the benefits, challenges, and steps that can be taken to improve pricing transparency.

The Microplastics Breakdown

ANIMAL EXPOSURE TO MICROPLASTICS AND POTENTIAL IMPACTS

Why are Whales Eating Plastic Bags? They May 'Sound' Like Dinner: Deep-diving Toothed Whales Wash up Dead with Stomachs Full of Plastic and Prey Alike. Their Built-in Sonar Likely Can't Tell the Difference.

Sean Cummings

This article described a recent study conducted in North Carolina and published in October 2024 in the Marine Pollution Bulletin that suggested that from the perspective of whales, certain plastic debris like shopping bags appear remarkably similar to squids. This was determined to be likely due to some combination of their shape, size, degree of weathering and chemical composition. According to this article, plastic bags have been found in the guts of marine mammals across hundreds of reported cases, damaging their stomach tissues and causing

infection, suffocation and malnutrition to the point of starvation. Additionally, washed-up whales across the world carry tens of pounds of plastic trash in their stomachs. The author described how whales identify prey: "[t]he animals vibrate phonic lips below their blowholes to generate sound, then project it through a fatty organ in their foreheads called the melon. As the sound bounces off objects in the dark, fats in the whales' lower jaws direct it to their inner ears, allowing them to pinpoint prey several hundred feet away." The research team strung together nine plastic items: bags, balloons and other common trash found in whale guts from North Carolina beaches to a rig underneath their research boat and hit them with sound waves at frequencies that toothed whales use to hunt. The team then repeated the process on five dead squid bodies provided by the University of North Carolina at Chapel Hill, as well as five squid beaks taken from a stranded sperm whale's stomach.

HUMAN EXPOSURE TO MICROPLASTICS AND POTENTIAL HEALTH IMPACTS

Chronic Exposure to Polystyrene Microplastics Induces Renal Fibrosis Via Ferroptosis

Runyang Hong, Yujie Shi, Zhencheng Fan, Yajie Gao, Hao Chen, Chun Pan

This in vitro study investigated nephrotoxicity associated with microplastics (MPs), with a specific focus on polystyrene MPs. The authors observed that although previous studies have documented the nephrotoxic effects associated with short-term exposure to MPs, the mechanisms of kidney toxicity caused by chronic long-term exposure to MPs remain unclear. In this study, mice were exposed to MPs via drinking water over a period of six months. The concentrations of MPs used were the same levels at which humans were thought to be exposed. The authors described their findings as indicating that MPs can induce renal fibrosis by facilitating the onset of inflammation and accumulation of a substantial number of inflammatory cells. Long-term exposure to MPs (60 µg/mL) was found to have induced ferroptosis in renal tubular epithelial cells, leading to renal fibroblast activation. The researchers asserted that their study identified a novel mechanism for renal fibrosis induced by MPs exposure, which offered new insights into the detrimental effects of environmental MPs on human health.

Human Exposure to Microplastics: A Review on Exposure Routes and Public Health Impacts

Asim Nawab, Mushtaq Ahmad, Muhammad Tariq Khan, Mohammad Nafees, Imran Khan, I. Ihsanullah

This literature review explored the existing knowledge about the effects of MPs in human body parts, sources and the potential exposure pathways. While the literature demonstrated that humans are exposed to MPs potentially through several routes such as ingestion, inhalation and dermal contact, the exact routes for MPs entering the body remain unclear. While a wide range of health impacts associated with MPs such as oxidative stress, inflammatory responses, endocrine disruption and potential genotoxicity have been identified, the cellular and molecular mechanisms underlying these effects are not well understood. They highlighted that additional research is needed to enhance epidemiological studies to establish the link between MP exposure and health impacts in large populations. They asserted that this knowledge will be crucial for developing effective strategies to safeguard both environmental and public health from the detrimental effects of MPs. Additionally, they asserted that the challenges associated with detecting and quantifying MPs in different body parts demand standardized and validated methodology.

Indoor Airborne Microplastics: Human Health Importance and Effects of Air Filtration and Turbulence

Christine C. Gaylarde, José Antonio Baptista Neto, Estefan M. da Fonseca

The authors of this literature review observed that there are high levels of microplastics in indoor environments, where human beings spend most of their time, with most of the particles being fibers produced from textiles. Indoor airborne particles were described as posing a greater potential danger to humans than microplastics ingested in food and drink. These particles, which are small enough to remain substantially suspended in the air column, are available for assimilation by human beings through respiration, potentially producing various health problems. They noted that microplastics can carry microorganisms and micropollutants adsorbed to their surfaces and observed that indoor airborne microplastics could potentially convey these microorganisms and micropollutants into human respiratory systems, reaching the alveoli of the lungs and finally entering the circulatory system and other tissues. Their review indicated that airborne microplastics may cause various metabolic disorders and may also carry chemical pollutants and viruses into the tissues, exacerbating the effects of viruses by interfering with the body's immune reactions. They found that both the size and levels of microplastics indoors are determined to a large extent by the activities in the room. Activities that agitate the air (e.g., air conditioners, human exercise and vacuum cleaning) are thought to potentially increase the

concentration of microplastics and to decrease their size. Opening windows was mentioned as potential method of reducing the levels of microplastics indoors but the authors noted that there is no evidence that this is an effective control method, observing that outdoor air can also bring in other pollutants from highways and local industries. A considerable amount of research, they asserted, is still necessary to increase knowledge about the levels, effects and potential control of indoor air microplastics.

Microplastics in Maternal Blood, Fetal Appendages and Umbilical Vein Blood

Hanxiang Sun, Xiujuan Su, Jing Mao, Yang Liu, Guohua Li, Qiaoling Du

The study described in this article focused on some research topics that the authors observed were previously unexplored: whether MPs are present in the fetal membrane and umbilical cord (fetal appendages) as well as umbilical vein blood. Additionally, their study also investigated whether MPs in maternal blood are associated with those in umbilical vein blood and the fetal appendages. The study participants were twelve full-term pregnant people who had delivered their babies by cesarean section. Using laser direct infrared (LDIR), sixteen kinds of MPs were found in the maternal blood, fetal appendages and umbilical vein blood. The researchers found that polyamide accounted for the highest proportion of MPs, followed by polyurethane. More than 90% of MPs measured between 20 and 100 µm in diameter. MPs abundance in amniotic fluid was found to increase with the increase in maternal age and body mass index before pregnancy. No statistically significant association was found between lifestyle factors and MPs abundance. The authors concluded that their study results emphasized the need for further research to understand the impact of microplastics on maternal and fetal health, contributing to the broader discourse on environmental pollutants and their effects on human health. They recommended further studies to clarify the exposure routes of MPs so that the exposure or intake of MPs could ultimately be reduced by improving or avoiding these routes.

MICROPLASTICS POLLUTION MITIGATION

Microplastics Removal from Hospital Laundry Wastewater Combining Ceramic Membranes and A Photocatalytic Membrane Reactor: Fouling Mitigation, Water Reuse and Cost Estimation

Fabricio Eduardo Bortot Coelho, Sandra Isabella Sohn, Victor M. Candelario, Nanna Isabella Bloch Hartmann, Claus Hélix-Nielsen, Wenjing Zhang

This article reported that 35% of global emissions of microplastics are released into the environment through industrial laundry wastewater. The researchers described their study as the first to evaluate and perform a cost estimation of the removal of microplastics from hospital laundry wastewater using a combination of ceramic membranes and a pilot-scale photocatalytic membrane reactor (PMR). The study was conducted using hospital laundry wastewater from Bispebjerg Hospital in Copenhagen, Denmark, where an estimated 20 tons a day of bed linen and clothing from patients and workers are washed at 60 °C in automated tunnel washers. The wastewater was found to contain polyethylene terephthalate (PET) ranging from 100 to 200 µm in size. The wastewater was subject to two treatment steps: pre-treatment via ceramic membrane filtration in a crossflow pilot unit using an ultrafiltration membrane and a filtration in a photocatalytic membrane reactor. The ultrafiltration membrane was found to have successfully removed 96% of the microplastics and over 98% of suspended solids and turbidity. The second stage was found to be effective and minimized the need for chemical cleaning. Based on their findings, the researchers concluded that their treatment strategy offered a sustainable and cost-effective solution for hospital laundry wastewater management that not only reduced water consumption by enabling water reuse in the hospital laundry but also advances towards achieving net-zero liquid discharge and contributing to the Goal 6 and Goal 1 of the United Nations Sustainable Development Goals for clean water.

MICROPLASTIC POLLUTION - POLICY AND LEGAL APPROACHES

How a Retailers' Environment Fund is Restoring Nature at Scale Through a Small Fee for Plastic Bags

Brita Staal and Vilma Havas

This article highlighted that plastic circularity and the possibility of achieving zero plastic pollution by 2040 are estimated to create twice as much value to the global society than maintaining the linear business-as-usual system. The authors described a Norwegian system implemented by the Norwegian Retailers' Environment Fund

(Handelens Miljøfond) that has been in place since 2017, which they described as scalable and based on the concept of double dividends. The Fund charges a membership fee ($0.26) per plastic bag sold by its retail members for excessive plastic products while investing the revenue in nature restoration and circular economy projects. The plastic bag fee was implemented to meet the European Union Plastic Bags Directive and it was found to contribute to a 50% reduction in plastic bag consumption from 2016 levels. As described, the Fund invests in innovation and research projects aimed at identifying sustainable alternatives to a range of consumer behaviors related to plastics. Thus far, the equivalent of more than $1.8M has been provided to projects. Furthermore, they asserted that the Fund has become a cornerstone of nature restoration in Norway and is the main contributor to removing marine litter from the Norwegian coast through financing systematic, knowledge-based cleanups. In total, the Fund has financed the cleanup of 5,600 tons of marine litter, the removal of 10,400 discarded leisure boats from nature and the retrieval of 20,700 units of abandoned fishing gear. According to the authors, this initiative has become a key driver of circular innovation and business development, responsible for an ecosystem of viable businesses now growing within this space and serves as a global driver of circular innovation and sustainable business development.

Los Angeles County Files Lawsuit Against Coca-Cola and Pepsi Over Plastic Pollution

Lily Dallow

This online news article reported that on October 30, 2024 Los Angeles County filed a complaint in Los Angeles Superior Court by the County Counsel on behalf of the People of the State of California against PepsiCo and Coca-Cola. A link to and several quotes from the County's press release were included. One such quote was: "[t]he lawsuit alleges that Coca-Cola and PepsiCo have mispresented the environmental impact of plastic beverage containers, claiming that they are 'recyclable' despite knowing that plastics cannot be readily disposed of without associated environmental impacts." The article also highlighted the County's assertion that plastic bottles can mostly be recycled once, if at all, thus making their promises of a 'circular economy' impossible. It reported that the County's complaint also alleged that greenhouse gas emissions from the production of the bottles have negatively impacted and threatened all county residents and requested restitution on behalf of consumers and civil penalties of up to $2,500 per violation.

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