The Rapids

US EPA's Trash Free Waters Monthly Update

March 2024

epa.gov/trash-free-waters

Introduction

Hello all,

The Center for Climate Integrity recently released a report entitled "The Fraud of Plastic Recycling". The report describes technical and economic limitations of plastic recycling as well as the plastic industry's campaigns to promote plastic recycling in response to backlash while continuing to sell plastic. The authors argue that petrochemical companies and their trade associations and interest groups should be held accountable for the plastics crisis in the same way that tobacco, opioid and toxic chemical producers have been forced to face the consequences of their "campaigns of deception".

Upcoming in March are several workshops and webinars, including one from the University of Rhode Island's Land to Sea program on the impacts, removal and repurposing of plastic marine debris. See the Upcoming Events section for more information on this and other learning opportunities.

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

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Trash Free Waters National Program Lead

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EPA Announcements

Biden-Harris Administration Announces $5.8 billion from President Biden's Investing in America Agenda for Drinking Water, Wastewater and Stormwater Infrastructure Upgrades
On February 20, Vice President Kamala Harris and U.S. EPA Administrator Michael S. Regan announced over $5.8 billion from President Biden's Investing in America agenda for states, Tribes and territories to invest in drinking water and clean water infrastructure upgrades to protect public health and the environment. Some funding will be used to upgrade stormwater infrastructure to effectively manage flood impacts.

EPA Administrator Regan Wraps up Successful Mission to Africa, Reaffirms Commitment to Partnerships in Mozambique and Ghana
Administrator Michael Regan recently visited Mozambique and Ghana, where he reinforced the EPA's commitment to partnering with leaders, young people and advocates to address environmental challenges. While in Mozambique, Administrator Regan met with a wide range of local advocates working on pollution prevention. Efforts included beach trash cleanups, a "Glass House" made of beach litter to help educate children on the impact of marine litter, the repurposing of trash found on beaches into custom prosthetics, and bricks and other methods of addressing pollution challenges from plastics and waste.

Funding Opportunities

Regional Source Reduction Assistance Grants

U.S. EPA Regions 3, 4, 5, 7, 8, 9 and 10 are accepting applications for projects that promote practical source reduction practices, tools and training on pollution prevention to improve human and environmental health. The Regions have identified the following project *priority areas*: prevention of greenhouse gas emissions, hazardous materials source reduction, innovative approaches to conservation of materials, and resources and environmental justice through pollution prevention actions. The EPA expects to distribute up to $1,500,000, with individual awards ranging from $40,000 to $240,000. Eligible applicants include states; local, interstate and intrastate government agencies; federally recognized Tribes; intertribal consortia; and non-profit organizations. The projects must take place within the designated regions. **Applications are due April 15, 2024.**

Upcoming Events

Marine Debris with Purpose: "Empowering Plastics Solutions"

March 7, 2024 (5:30-7 pm ET), Kingston, RI + virtual

University of Rhode Island's Plastics: Land to Sea program is hosting a talk on the impacts, removal and repurposing of plastic marine debris. Laura Ludwig, the director of the Center for Coastal Studies' Marine Debris and Plastic Program will present, drawing on her vast experience organizing shoreline cleanups, collecting marine debris data, facilitating at-sea fishing gear removal and recycling programs, and providing marine debris to craftsmen and artists for repurposing.

Clean Virginia Waterways Stormwater and Plastic Pollution Workshop

March 13, 2024, Chesapeake, VA + virtual

Clean Virginia Waterways is hosting its 7th annual Stormwater and Plastic Pollution Workshop. Stormwater, plastic pollution and litter-prevention professionals are encouraged to attend. The workshop will feature presentations from the Fairfax County Department of Public Works, Clean Fairfax, Clean Virginia Waterways and Virginia Beach Public Works. Participants may attend in-person or virtually, although virtual attendees may not take part in the "Setting Priorities for Updating the Virginia Marine Debris Reduction Plan" session.

Tackling Tire Waste: Extended Producer Responsibility (EPR) Solutions and Success Stories

March 20, 2024 (1 – 2:30 ET), virtual

As momentum for tire EPR continues to grow in the U.S., an expert panel will speak on lessons learned and insights on best practices for scrap tire management. The panel includes Product Stewardship Institute's Director of Policy and Programs, Dr. Suna Bayrakal, who has developed and analyzed tire EPR programs for over a decade. Tom Metzner, EPR lead for the Connecticut Department of Energy and Environmental Protection, will share how the state developed, enacted and is now implementing its landmark EPR law. Barry Takallou of Crumb Rubber Manufacturers will provide insights into the business benefits of tire EPR laws. Lastly, Steve Meldrum, CEO of eTracks Tire Management Systems, will offer his perspective on the success factors behind Canadian tire EPR programs.

What You Need to Know about Microplastics in Our Waters

March 20, 2024 (1-2 pm ET), virtual

This American Water Resources Association webinar will discuss current and pending microplastics legislation; microplastic monitoring challenges and how to interpret and compare studies in microplastics literature; and compare microplastic concentrations and characteristics in wastewater, stormwater and surface water. Speakers include Nicole Fahrenfeld, Associate Professor of Civil & Environmental Engineering at Rutgers University, and Brent Alspach, the Director of Applied Research at Arcadis.

Save the date for future months…

36th Annual Potomac Cleanup and Open House

April 6, 2024, Accokeek, MD

The Alice Ferguson Foundation is hosting the 36th Annual Potomac River Watershed Cleanup and Open House. The event will include an open house of the Foundation's uniquely sustainable, net-zero, solar- and geothermal-powered Living Building where participants can learn more about their STEM-focused environmental education programs for kids. There'll also be opportunities to look at macroinvertebrates and touch animal artifacts such as skulls, turtle shells and snakeskins!

Circularity 24: Accelerating the Circular Economy

May 22-24, 2024, Chicago, IL

The 2024 Circularity conference will convene thought leaders and practitioners across industries and value chains who are working to build the circular economy. The conference will feature keynotes, breakouts, an expo and networking opportunities. It will focus on the following tracks: Business Innovation & Strategy, Enabling Policies, Materials Revolution, Next-Gen Products & Packaging, Stakeholders & Social Impacts and Supply Chain Transformation.

2024 StormCon

August 27-29, 2024, Reno, NV

StormCon is a conference and exhibition focused on stormwater and surface water quality. This year, the conference will feature presentations and discussions on: green infrastructure; flood modeling and mitigation; programs, permits and compliance; transportation and construction stormwater; BMP monitoring; industrial stormwater management; and erosion control.

In case you missed it…

Microplastics? Macro Problems: Human and Environmental Health Impacts of Microplastics

This webinar was part of the City of Sunnyvale's Sustainability Speaker Series. Dr. Imari Walker-Franklin, research scientist at Research Triangle International and an expert on microplastics, discussed how microplastics impact the environment and human health.

Creating, Operating and Maintaining a Standardized Monitoring Collaborative Network

This webinar, hosted by the National Water Quality Monitoring Council, discussed the tangible and intangible elements that one must consider in creating, supporting and standardizing a monitoring collaborative to generate collective impact. Barb Horn and Max Herzog of the Cleveland Water Alliances Lake Erie Volunteer Science Network discussed their experience using this strategy.

From the Frontline: Petrochemicals, Plastics and Cancer Alley

This webinar, hosted by Plastic Pollution Coalition, will feature a conversation with four frontline activists from communities of color within industrial plastic and petrochemical corridors across the United States. Dr. Robert Bullard of the Bullard Center for Environmental & Climate Justice, Shamyra Lavigne of RISE St. James Louisiana, and Reverend Lennox Yearwood of Hip Hop Caucus, will discuss the actions they are taking against pollution and injustice. Erica Cirino, author of Thicker Than Water: The Quest for Solutions to the Plastic Crisis, will moderate the conversation.

Indisposable Live: Defining "Reuse" for Policymakers

Upstream's livestream series, Indisposable Live, kicked off 2024 with this webinar on reuse policy. Nathan Dufour from Zero Waste Europe, Matt Littlejohn from Oceana, and Sydney Harris from Upstream had a conversation on how to properly define reusable packaging in the policy context. They discussed the problems of vague definitions as well as recommendations and best practices for helping pass effective reuse policy.

The Microplastics Breakdown

HUMAN EXPOSURE TO MICROPLASTICS

Human Exposure to Ambient Atmospheric Microplastics in a Megacity: Spatiotemporal Variation and Associated Microorganism-Related Health Risk

Libo Xu, Xinyi Bai, Kang Li, Guangbao Zhang, Mengjun Zhang, Min Hu, and Yi Huang

The authors observed that existing research has analyzed indoor and occupational exposure to microplastics. However, they asserted that long-term monitoring of ambient atmospheric microplastics (AMPs), especially in highly polluted urban regions, needed further investigation. This study explored human environmental exposure to AMPs by considering inhalation, dust ingestion and dermal exposure in three urban zones within Beijing, which the article described as "a megacity." The researchers found significant spatiotemporal differences in the characteristics of AMPs that humans were exposed to, with wind speed and rainfall frequency mainly driving these changes. Significant spatiotemporal differences in AMP characteristics and correlations between wind speed, rainfall frequency and AMP characteristics were discovered. The researchers recommended the reduction of outdoor activities in urban green spaces, except in plant-growing seasons. According to this article, the study results verified the relationship between AMP characteristics and the relative abundance of pathogenic gene families of bacterial communities in the ambient atmosphere. This is a novel public health research field that warrants further investigation, especially in Beijing, where residents are susceptible to immune mediated diseases**[1]**. **Read the full abstract here**: https://pubs.acs.org/doi/full/10.1021/acs.est.3c09271

[1] Immune-Mediated Inflammatory Diseases (IMIDs) are a group of unrelated conditions that share common inflammatory pathways with immune dysregulation and imbalance in inflammatory cytokines. The etiology of these conditions is unknown. IMIDs encompassing disorders as diverse as asthma, type 1 and 2 diabetes mellitus, inflammatory bowel diseases (IBD) Crohn disease and ulcerative colitis, rheumatoid arthritis (RA), ankylosing spondylitis (AS), psoriasis (Ps), psoriatic arthritis (PsA), uveitis, juvenile idiopathic arthritis (JIA). https://pubmed.ncbi.nlm.nih.gov/27941197/#:~:text=IMIDs%20encompassing%20disorders%20as%20diverse,juvenile%20idiopathic%20arthritis%20(JIA).

IMPACTS OF MICROPLASTIC POLLUTION

A Review of the Influence of Environmental Pollutants Microplastics, Pesticides, Antibiotics, Air Pollutants, Viruses and Bacteria on Animal Viruses

Tong Li, Ruiheng Liu, Qian Wang, Jiaqian Rao, Yuanjia Liu, Zhenkai Dai, Ravi Gooneratne, Jun Wang, Qingmei Xie, Xinheng Zhang

This review explored the range of impacts of environmental contaminants on viruses, including identifying the sources of environmental contaminants, the interactions between contaminants and viruses, and mitigation methods. According to the authors, studies on animal viruses have only focused on the virus itself, and the influence of environmentally co-occurring contaminants on animal viruses has rarely been studied. Plastispheres, consisting of plastic particles sorbed or colonized by microorganisms that form a microbial biofilm, are widely distributed mostly in the aquatic environment. Chemical contaminants were found to potentially facilitate viral adsorption—the entry and replication of animal viruses—which would promote the spread, transmission and infectivity of viruses. Additionally, results indicated the contaminants helped the animal viruses survive longer, spread farther in the environment, and infect more hosts. The authors concluded that chemical and biological contaminants pose a serious threat to animal husbandry, ecosystem harmony and human health. Several areas of future study were suggested, for example, the exploration of the mechanics of how contaminants act on animal viruses and the development of interventions to prevent interaction of contaminants with animal viruses. **Read the full abstract here:** https://www.sciencedirect.com/science/article/abs/pii/S0304389424004102

Microplastics Alter Soil Structure and Microbial Community Composition

Lanfang Han, Liying Chen, Yanfang Feng, Yakov Kuzyakov, Qi'ang Chen, Sibo Zhang, Liang Chao, Yanpeng Cai, Chuanxin Ma, Ke Sun, Matthias C. Rillig

This study investigated the effects of conventional and biodegradable microplastics on the distribution and microbial community composition in soils collected from paddy fields located in Nanjing, Jiangsu Province, China. Polyethylene (PE) and polylactic acid (PLA) microplastics with increasing size (50, 150, and 300 μm) were mixed with the soil in a rice–wheat rotation system in a greenhouse for one year. Soils were divided into five size classes: >2 mm (large macroaggregates), 1–2 mm (intermediate macroaggregates), 0.25–1 mm (small macroaggregates), 0.053–0.25 mm (large microaggregates) and <0.053 mm (small microaggregates). The effects on aggregation, bacterial communities and their co-occurrence networks were investigated as a function of microplastic aggregate size. Conventional and biodegradable microplastics generally had similar effects on soil aggregation and bacterial

communities. Microplastic type and amount was found to have strongly affected the bacterial community structure. According to the researchers, because of less bioavailable organics, the bacterial community composition within microaggregates was more sensitive to the addition of microplastics as compared to macroaggregates. Microplastics were found to have increased competition among bacteria and the complexity of bacterial networks. Such effects were stronger for PE than PLA microplastics and this difference was attributed to the higher persistence of PE in soils. Overall, both conventional and biodegradable microplastics were found to have reduced the portion of large and stable aggregates, altering bacterial community structures and keystone taxa and, consequently, the functions. **Read the full abstract here:**
https://www.sciencedirect.com/science/article/pii/S0160412024000941

MICROPLASTICS FATE AND TRANSPORT

Do Tidal Fluctuations Affect Microplastics Distribution and Composition in Coastal Waters?

Gabriel Pasquier, Périne Doyen, Iseline Chaïb, Rachid Amara

According to the researchers, the hydro-meteorological conditions in marine environments are known to have a major impact on the transport and dispersion of microplastics but their precise effects are poorly understood. Their study investigated the effects of tidal fluctuations on microplastic abundance and composition in a harbor located at Boulogne-Sur-Mer along France's eastern English Channel at the mouth of the Liane River. Water samples were collected every ninety minutes over the course of two complete tidal cycles – one during spring tide and another during neap tide**[2]**. Their findings indicated that in mega-tidal coastal regions, tidal coefficients, whether spring or neap tides, minimally impact surface water microplastic abundance and characteristics. During spring tides, microplastic abundance was found to peak at low tide, probably due to particles resuspended on the bottom in shallow water. During neap tides, microplastic abundance were found to slightly peak at high tide, with less pronounced variations. The researchers asserted that microplastic abundance and characteristics (morphology, size and polymer types) can be influenced over the course of a complete tidal cycle due to the impact of tidal currents and water height. The authors concluded their results highlight the need to consider the fluctuations of the tidal cycle when planning in-situ surveys to better assess microplastic pollution in coastal environments. They also recommended sampling microplastics throughout the water column and collecting environmental data. The monitoring and study of these dynamics, they asserted, may enhance knowledge on microplastics distribution and provide insights into the sources and fate of microplastics in coastal environments. They suggested that such knowledge is essential to preserving marine ecosystems and addressing the challenges posed by microplastic pollution in coastal areas. **Read the full abstract here:**
https://www.sciencedirect.com/science/article/pii/S0025326X24001437

[2] A neap tide occurs seven days after a spring tide (popularly know as a "King Tide"-refers to the 'springing forth' of the tide during new and full moon) refers to a period of moderate tides when the sun and moon are at right angles to each other. National Ocean Services, NOAA.

MICROPLASTIC POLLUTION PREVENTION AND REDUCTION

Microplastic Pollution: Understanding Microbial Degradation and Strategies for Pollutant Reduction

Rajul Jain, Ashish Gaur, Renuka Suravajhala, Uttra Chauhan, Manu Pant, Vishal Tripathi, Gaurav Pant

This review paper explored microplastics, including the impacts of microplastic pollution on the microbiome and microbial communities and the interactions between microplastics and microbial ecosystems. The authors also discussed the microbial degradation of microplastics. They described understanding the mechanisms underlying the degradation of microplastics by microorganisms is a crucial pursuit in addressing the global issue of plastic pollution**.** According to them, these mechanisms include a range of enzymatic processes, encompassing hydrolysis, oxidation, reduction and esterification, all contributing to the cleavage of polymer bonds or modification of polymer functional groups. They observed that these processes are pivotal in breaking down plastic polymer chains into smaller molecules that can serve as carbon and energy sources for microorganisms. The article described some of the enzymes with the ability to break down microplastics. For example, enzymes sourced from microorganisms like Ideonella sakaiensis and Rhodococcus species that can breakdown of polyethylene terephthalate (PET), one of the most prevalent plastics and thus offer a promising avenue for PET plastic waste management. The paper included a discussion of future challenges and emphasized the need for international collaboration, research advancements and public engagement. **Read the full abstract here:**
https://www.sciencedirect.com/science/article/pii/S004896972305725X

Study: Replacing Plastics with Biodegradable Alternatives would Lead to Significant Carbon Emissions Reduction

This article detailed a study that was published in *Engineering*. The study evaluated carbon emissions associated with both traditional plastic products and biodegradable plastic products (BPPs) over the four stages of their life cycles. These stages were: raw materials acquisition, plastic production, product manufacturing and waste disposal. The researchers analyzed 1000 plastic products used in daily life: plastic bags, lunch boxes and cups. They found that the carbon emissions ranged from 52.09 to 150.36 kg CO_2eq. In contrast, 1000 similar BPP items emitted only 21.06 to 56.86 kg CO_2eq, which they observed represented a remarkable reduction of 13.53% to 62.19%. Plastic production and waste disposal stages were found to have the most significant impact on carbon emissions for both traditional plastics and BPPs. BPPs were found to have had substantial carbon reduction potential at the raw material acquisition stage. When considering waste disposal methods for BPPs, composting and anaerobic digestion**[3]** emerged as the preferable options due to their positive environmental impact. Based on the researchers' calculations, the adoption of BPPs in China, replacing traditional plastic products like bags, meal boxes, and straws, could significantly lead to a reduction of 1.03×10^6 to 1.10×10^8 kg CO_2eq of carbon emissions annually. The article observed that the high cost of biodegradable plastics poses a challenge for their widespread adoption. While the study highlighted the environmental benefits of BPPs, the study also emphasized the need for more economical production technologies and waste disposal methods to enhance the sustainability of biodegradable plastics. **Read the full abstract here:** https://phys.org/news/2024-02-plastics-biodegradable-alternatives-significant-carbon.html

[3] Anaerobic digestion is a process through which bacteria break down organic matter—such as animal manure, wastewater biosolids, and food wastes—in the absence of oxygen. https://www.epa.gov/agstar/how-does-anaerobic-digestion-work

'They Lied': Plastics Producers Deceived Public about Recycling, Report Reveals: Companies Knew for Decades Recycling was not Viable but Promoted it Regardless, Center for Climate Integrity Study Finds

This news article centered on the results of a Center for Climate Integrity (CCI) report drawn from previous investigations as well as newly revealed internal documents. This organization reported that plastic producers have known for more than 30 years that recycling is not an economically or technically feasible plastic waste management solution. The article also highlighted some of the challenges associated with recycling plastic, which is made from oil and gas. For example, it requires meticulous sorting because there are thousands of chemically distinct varieties of plastic which cannot be recycled together; plastic materials degrade each time they are reused, which means they can generally only be reused once or twice. As described, the CCI reported that the plastic industry obscured information about the recycling challenges in its marketing campaigns. Some of the historical background of recycling was outlined. For example, the article described the development of single use plastics in the 1950's, which producers hoped would ensure a continually growing market for their products because of its disposability. It was asserted that in the 1980s, as municipalities began considering bans on grocery bags and other plastic products, the industry began promoting recycling instead of the previous recommended disposal methods of incineration, yes behind closed doors, industry leaders maintained that recycling was not a real solution. According to the article, the industry's misinformation has continued, citing its promotion of chemical recycling, which breaks plastic polymers down into tiny molecules to make new plastics, synthetic fuels and other products but also creates pollution and is even more energy intensive than traditional plastic recycling. **Read the full abstract here:** https://www.theguardian.com/us-news/2024/feb/15/recycling-plastics-producers-report?CMP=oth_b-aplnews_d-1

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