The Rapids

US EPA's Trash Free Waters Monthly Update
September 2023

epa.gov/trash-free-waters

Introduction

Hello everyone,

Many of you may be interested in perusing the **International Knowledge Hub Against Plastic Pollution**. IKHAPP's mission is to "collect, critically analyze and disseminate scientific knowledge to support effective policies and actions to fight plastic pollution globally." Content for the hub is developed by an international community of scientists that work to understand the determinants, drivers and consequences of plastic pollution as well as the effectiveness of different measures to curb it.

Keep Pennsylvania Beautiful (KPB) is looking for cleanup coordinators to organize local cleanups or volunteers to help with existing events. Existing events can be found on their **Calendar of Events**.

Thanks,
Romell Nandi
US EPA Trash Free Waters National Program Lead

EPA Announcements

Biden-Harris Administration Announces $50 Million in Available Grants to Upgrade Stormwater and Sewer Infrastructure
A $50 million grant has been made available by the EPA to address stormwater and sewer infrastructure needs. States can apply for funding for projects that will help strengthen stormwater collection systems that will ultimately prevent contaminants (including trash) from polluting waterways.

EPA Awards Wyoming Over $200,000 To Improve Stormwater and Sewage Collection Systems
The EPA's funding will help improve stormwater and sewage collection systems to reduce water pollution.

Funding Opportunities

Environmental Justice Thriving Communities Technical Assistance Center
EPA's Region 1 is offering up to $10 million to help communities and other environmental justice stakeholders in the New England states access federal assistance to address environmental and energy justice concerns. EPA Region 1 includes the states of Maine, Vermont, New Hampshire, Massachusetts, Rhode Island and Connecticut, as well as 10 Tribal Nations. **Applications are accepted until September 29th.**

NOAA Marine Debris Removal under the Bipartisan Infrastructure Law
The National Oceanic and Atmospheric Administration announced this Fiscal Year 2024 Notice of Funding Opportunity for the development of large-scale marine debris removal projects. These removal projects should focus on large marine debris, including abandoned and derelict vessels, derelict fishing gear, and other debris that is generally unable to be collected by hand. **Applicants may submit letters of intent from August 28 to October 27, 2023**. An **applicant webinar** will be offered on September 12, 2023, at 3:00pm Eastern Time.

NOAA Marine Debris Interception Technologies under the Bipartisan Infrastructure Law
The National Oceanic and Atmospheric Administration announced this Fiscal Year 2024 Notice of Funding Opportunity for the installation, monitoring, and maintenance of proven marine debris interception technologies that will capture marine debris at or close to known marine debris sources or pathways. These proven technologies may include litter traps, shoreline removal technologies, booms, skimmers, conveyors, floating collection devices, and other technologies that do not require additional research and development. **Applicants may submit letters of intent from August 28 to November 15, 2023**. An **applicant webinar** will be offered on September 13, 2023, at 3:00pm Eastern Time.

NSF Critical Aspects of Sustainability (CAS): Micro- and Nanoplastics (MNP)
This grant funds research that helps improve the understanding of the characterization, behavior, and reactivity with the environment of micro- and nanoplastics, as well as research on the removal of microplastics from the environment and their impacts on human and animal health. **Applications are accepted year-round.**

USDA Water and Waste Disposal Loan and Grant Program
This program provides funding for clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and stormwater drainage to households and businesses in eligible rural areas. Solid waste collection, disposal and closure and stormwater collection, transmission and disposal are among the types of projects this program can fund. Most state and local governments, private nonprofits, and federally recognized tribes are eligible applicants. The loans available are long-term and low-interest. Additionally, a grant and a loan can be provided in tandem if funding allows. **Applications are accepted year-round.**

Upcoming Events

2023 U.S. Product Stewardship Forum - Product Stewardship Institute
September 11-14, Oregon
The Product Stewardship Forum conference will focus on Extended Producer Responsibility (EPR). Stakeholders from around the globe will gather to discuss product stewardship. There will also be discussions on previously enacted and anticipated packaging EPR laws.

Chesapeake Studies Conference
September 15-16, Salisbury, Maryland
This interdisciplinary conference will bring together people from different backgrounds to discuss various environmental concerns related to Chesapeake restoration and water quality.

NERC Material Reuse Forum 4: Creating Policies that Support Reuse
September 20, 1:30-3:00 EST, virtual
This forum will discuss different building reuse policies in Portland, Oregon and San Antonio, Texas. Topics will include policy details, program management, San Antonio's Deconstruction Ordinance, and Portland's Deconstruction Program.

Waste and Recycling Expo
September 26-27, Toronto, Canada
This exposition brings together various parties involved in recycling and waste management. The expo is intended to serve as an educational opportunity. Effective compost and sustainable solutions will be discussed to create a

more environmentally friendly community that produced less waste.

Save the dates for future months...

Residential Food Waste Regulatory Strategies
October 4, 1:30-3:00 EST, Virtual
This webinar will discuss the regulations by California and Vermont on residential food waste diversion. This discussion will cover the food waste recycling requirements for California residents as well as the food scraps ban in Vermont.

National Zero Waste Conference
October 25-26, virtual
Hosted by Zero Waste USA, zero waste businesses and institutions will be attending to share information about their materials. There will be discussions regarding zero-waste lifestyles and ocean plastics, as well as information on recycling correctly and World Cleanup Day.

3rd Global Symposium on Waste Plastic
November 2-4, virtual
In this symposium, experts from a variety of engineering disciplines will share their knowledge in areas that can contribute to the accelerated development of alternative plastics and mitigate the effects of traditional plastics in our environments.

Interstate Technology and Regulatory Council Microplastic Webinar
November 7, 1:00-3:15 EST, Virtual
This webinar will discuss the role that microplastics play in modern life as well as the dangerous pollution that microplastics cause. Discussions will include the environmental distribution, human and environmental health impacts, and regulations of microplastics.

Microplastics Workshop for Early Career Researchers
November 12-17, Ascona, Switzerland
This six-day workshop will allow researchers to present their microplastic research, discuss career paths for microplastic researchers, and network with global experts. Attendees are required to be present for all six days of the workshop.

In case you missed it...

International Conference on Wastewater
August 10, New York, US
This conference, hosted by World Academy of Science, Engineering and Technology, discussed the proper treatment of polluted wastewater. The conference included a discussion on potential solutions on removal of pollutants to maximize water reuse.

Plastic Free Back to School
August 17, 5 pm EST, Virtual
This webinar, led by the Plastic Pollution Coalition, provided information on how to minimize plastic use in back-to-school purchases. Many clothing items contain microfibers, lunch containers are often made of plastic, and school supplies can contain plastics. This webinar provided information on avoiding these products as well as the implications plastics have on children's health.

International Conference on Water Pollution, Measurement, Modeling and Assessment
August 16-17, Istanbul, Turkey
This conference, hosted by World Academy of Science, Engineering and Technology, discussed various topics regarding water pollution including point source pollution, nonpoint source pollution, and groundwater pollution. The conference emphasized the environmental impacts of water pollution as well as potential solutions to prevent water pollution and urban runoff.

International Research Conference's Conference on Microplastic and Plastic Pollution Studies
August 19-20, London, UK
Experts on microplastic pollution from around the world gathered to discuss various research on the issues related to microplastic pollution as well as potential solutions.

12th SETAC Young Environmental Scientists Meeting
August 28-September 1, Landau, Germany
This meeting provided young environmental scientists with the opportunity to practice presenting their research. Training courses and workshops were included. Career Talks were held by established environmental scientists to provide the young audience with career development advice.

The Microplastics Breakdown

MICROPLASTICS FATE AND TRANSPORT

Oceans Polluted with Plastic
This CNN story centered on the non-profit, **Ocean Clean-Up**'s attempt to clean up the Great Pacific Garbage Patch and their goal to remove 90% of it by 2040. The organization recently removed over 70,000 pounds of garbage, most of which was plastic, from the Great Pacific Garbage Patch in the ocean between California and Hawaii. **Watch the entire story here**: **https://www.cnn.com/videos/world/2023/08/28/exp-pacific-garbage-patch-dubois-intv-082812a-seg2- cnni-world.cnn and additional information is available here**: **https://www.instagram.com/reel/CwakgbOKi9Z/?igshid=MzRlODBiNWFlZA%3D%3D**

Global Mass of Buoyant Marine Plastics Dominated by Large Long-Lived Debris
Mikael L. A. Kaandorp, Delphine Lobelle, Christian Kehl, Henk A. Dijkstra & Erik van Sebille
The study described in this article examined an identified discrepancy between reported estimates of the oceanic input of plastic and the amount measured floating at the surface: the estimated ocean input was one to two orders of magnitude larger than the amount measured floating at the surface. The researchers developed a 3D global marine mass budget of buoyant plastics by assimilating observational data from different marine reservoirs, including coastlines, the ocean surface, and the deep ocean, into a numerical model, considering particle sizes of 0.1–1,600.0 mm and timescales on the order of decades (1980–2020). The researchers asserted that the sinking of plastic particles could serve an important role in removing plastic mass from the surface water with initially buoyant items starting to sink due to the growth of biofilm on their surface, on timescales of weeks to months. They considered various biofouling scenarios, including fouling–defouling cycle. As described, they also considered model studies, which suggested that most plastics reside on beaches or in coastal waters up to 10 km offshore. Their study results indicated that larger plastics (>25 mm) comprised more than 95% of the buoyant marine plastic mass in 2020: 3,100 out of 3,200 kilotonnes. The total amount of buoyant marine plastic litter was found to be much higher than previous estimates, which the researchers attributed to their model better representing large plastic object masses. Notably, their model also estimated an ocean plastic input of about 500 kilotonnes per year, which the authors described as being less than previous estimates. The researchers asserted that their mass budget estimate is consistent with observed plastic concentrations in different marine reservoirs and with the latest understanding of the processes removing plastic particles from the surface ocean, such as biofouling and sedimentation, beaching, fragmentation and mixing. They observed that their finding of a lower plastic input into the marine environment and a higher standing stock means that the residence time of plastics in the marine environment is much higher than previously estimated. The authors concluded that their study results support longer residence times of plastics in the marine environment compared with previous model studies. Long-lived plastic pollution in the world's oceans, which the authors observed that their model suggested is continuing to increase, they pointed out could negatively impact ecosystems without countermeasures and prevention strategies. **Read the full abstract here: https://www.nature.com/articles/s41561-023-01216-0**

Trends in the Occurrence and Accumulation of Microplastics in Urban Soil of Nanjing and their Policy Implications

Yujie Zhou, Teng Wang, Mengmeng Zou, Qiqi Yin b, Zhenyi Jia, Bo Su, Qi Zhang, Long Chen, Shenglu Zhou
This article centered on the analysis of microplastics (MP) accumulation in soils in Nanjing, a large city in eastern China. The researchers employed a decision tree and time series network, which they described as being based in part on soil attributes and human activity factors such as urban industrial structure, transportation, and water use. A research framework was established for simulating the historical spatial and temporal trends of MPs. Their findings included that the decomposition and disintegration of plastics into microplastics and the accumulation of MPs are related to the properties of the soil. Additionally, the accumulation of microplastics in the soil was found to be related to emission sources linked to human activities. The article also included an evaluation of the impact of plastic policy interventions. According to the authors, over the past 15 years, microplastics in the soil in Nanjing have gradually increased and highly polluted areas have also grown. They observed that the accumulation of MPs was influenced by changing factors related to increasing urbanization. With urbanization in the early 21st century, they asserted, the factors influencing microplastic accumulation shifted from residential areas to public transport and domestic water consumption. As described in the article, the analysis conducted indicated that recent plastic intervention policies have helped ameliorate the increase in MPs. That said, they also found that MP abundance could still increase due to the rise in disposable plastic bag consumption and the continued decomposition of unrecycled plastics in the environment. The management of the sources of MPs in the environment (e.g., tire particles) was identified as warranting improvement. The authors described the results of the study as suggesting that controlling urban soil microplastics regionally could enhance the management of potential plastic emissions from both sources and sinks, particularly from sources such as clothing fibers (manufacturing, shedding, and washing) and cosmetics. They suggested that the entire **life cycle management** of plastics should be considered with early-stage product recycling design and diverse control measures to combat **plastic pollution**. **Read the full abstract here:** https://www.sciencedirect.com/science/article/pii/S0048969723047691

MICROPLASTICS POLICY

The Toughest Plastic Bag Ban is Failing: A Tale of Smugglers, Dumps and Dying Goats
Lillian Scovian
This article focused on recent developments related to the 2017 ban on single-use plastic bags in Kenya. As described by the author, the law included penalties; businesses and consumers who violated the ban faced the possibility of fines of up to $28,000 or a jail term of up to four years. Furthermore, the ban resulted in Kenya's bag manufacturers ending the production of bags. The article briefly described the implementation of these requirements, which were described as effective, with 18 vendors and other businesspeople who pleaded guilty to violating the ban in 2018 being fined $300 or sentenced to eight months in jail. Since that time, the author reported, single-use plastic bags have been smuggled into the country from Ethiopia and Uganda and are observed in landfills and in the environment. The recent proliferation of bags was described as affecting livestock (cows and goats) that inadvertently eat plastic bags, which cause blockages in the animals' stomachs and eventually results in death. **Read the full article here:** https://www.npr.org/sections/goatsandsoda/2023/08/09/1190211814/the-toughest-plastic-bag-ban-is-failing-a-tale-of-smugglers-dumps-and-dying-goat

MICROPLASTICS IN ORGANISMS

Microplastics in Gastrointestinal Tracts of Gentoo Penguin (Pygoscelis papua) Chicks on King George Island, Antarctica
Youmin Kim, Hankyu Kim, Min-Su Jeong, Dowoon Kim, Juyang Kim, Jaehak Jung, Hae-Min Seo, Hyun-Jin Han, Woo-Shin Lee & Chang-Yong Choi
This study focused on microplastics in penguins in Antarctica, a region described as being relatively free from anthropogenic disturbance and pollution because human activities are restricted by the Antarctic Treaty and the Madrid Protocol. Researchers examined the stomach and upper intestines of 14 dead gentoo penguin chicks collected on King George Island, which was described as having a high level of human activities. Microplastics were found in all the chicks with a total of 378 microplastics identified. The authors observed that the number of microplastics found per chick was not associated with the mass of penguin chicks. This finding suggested to them that there was no permanent accumulation of microplastics. But they reported that the concentration of

microplastics was much higher per individual within the size range of 100–5000 μm than previously reported concentrations in the penguin feces, and a greater number of smaller microplastics were found. Marine debris surveys near the breeding colony found various plastics to be the most frequent kind of beached debris, which suggested to the authors that local sources of marine plastic waste could have contributed to microplastic contamination of penguin chicks being fed by parents that forage in nearby seas. This finding, the authors asserted, confirmed the presence of microplastics in an Antarctic ecosystem and they concluded, suggested the need for stronger waste management in Antarctica as well as a standardized approach to microplastic monitoring in this geographic area. **Read the full abstract here:** https://www.nature.com/articles/s41598-023-39844-6

HUMAN EXPOSURE TO MICROPLASTICS

The Adsorption of PAHs on Microplastics and Desorption in the Simulated Human Digestive System
Guoqing Hou a b c, Xiaoli Zhao b c, Tianhui Zhao b, Xiaowei Wu b, Shengyan Pu a, Zhi Tang b, Fengchang Wu
This article explored the hypothesis that since microplastics (MPs) can bind to other pollutants when ingested by people, they could serve as the carriers of pollutants into the human body, and potentially affect human health. This study focused on the adsorption of 15 EPA priority pollutant polycyclic aromatic hydrocarbons (PAHs) on the plastics polyethylene (PE) and polymethyl methacrylate (PMMA) and the desorption behavior in a simulated human digestive system. The study results indicated that PAHs with higher molecular weight were more easily adsorbed on MPs, and the adsorption efficiency of PAHs on PE was 1.4–3.8 times higher than PMMA. The desorption experiments conducted in simulated gastrointestinal fluid demonstrated that the activity of enzymes directly affected the desorption of PAHs. The enzymes in the digestive fluid were found to influence the interaction between MPs and PAHs, which the researchers found to result in substantial desorption of PAHs from the surfaces of MPs. The desorption of PAHs from the surfaces of PMMA was found to be significantly higher than PE. The authors observed that characteristics such as the surface structure, specific surface area, and crystallinity can greatly affect the adsorption of pollutants on the surfaces of MPs. PE and PMMA particles were found to be spherical, but the PE particles exhibited irregular shapes, rough surfaces, and many cracks, wrinkles and pores; PMMA was regular and spherical with a smooth surface. The specific surface area, pore volume and pore diameter of PE were much larger compared to PMMA and the surface area of PE was higher than that of PMMA. Based on these and other related characteristics, the researchers concluded that PE may provide more adsorption sites for pollutants than PMMA. As reported in the study, the risk assessment they conducted demonstrated that the carcinogenic risk of PAHs desorption from PMMA was higher than PE. The authors asserted that their study results revealed the transfer of PAHs to human digestion with different types of microplastics and the attendant potential risks to human health. **Read the full abstract here:** https://www.sciencedirect.com/science/article/pii/S1385894723038883

Detection of Various Microplastics in Patients Undergoing Cardiac Surgery
Yunxiao Yang, Enzehua Xie, Zhiyong Du, Zhan Peng, Zhongyi Han, LinyiLi, Rui Zhao, Yanwen Qin, Mianqi Xue, Fengwang Li, Kun Hua, and Xiubin Yang
Participants in this study were cardiac surgery patients who had gone through surgery at Beijing's Anzhen Hospital between February 2021 and October 2022. Tissue samples were taken during the surgical procedures and blood samples were taken both pre and post-operations. The exclusion criteria were described as: the need for emergency cardiac operation and refusal to participate. In total, 15 patients consented to contribute their tissue samples for this study. Of these, seven also agreed to provide both tissue and blood samples. Microplastics were detected in all the tissue samples and the most prevalent type was found to be PET. The study results indicated that there was variation in the quantities of MPs from each of the patient's tissues. Additionally, tissue samples were found to have contained more MPs than the corresponding blood samples from the same person. The researchers reported that eight types of microplastics were detected in the post-surgery blood samples, while six types were found pre-surgery. Notably, they also found a size difference when comparing the pre and post-surgery samples; the samples taken post-surgery contained much smaller-sized particles than the pre-surgery samples. These study results were thought to indicate that there is the potential for bioaccumulation of microplastics as well as the possibility of the distribution of these particles in organs throughout the human body. The authors acknowledged the limitations of their study, which might affect the generalizability of their results; these included the small sample size, their failure to examine the fate of the microplastics in the post-surgery blood or the possible influence of the microplastics on long-term outcomes after surgery. **Read the full abstract**

here: https://pubs.acs.org/doi/full/10.1021/acs.est.2c07179

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