
The Rapids

US EPA's Trash Free Waters Monthly Update

September 2022

epa.gov/trash-free-waters

Introduction

Hello all,

The International Union for Conservation of Nature (IUCN) recently published a feature article titled "[The Plastic Pollution Crisis](#)" which outlines existing efforts to document and measure the extent of the problem as well as understand the origins, distribution, and leakage of plastic waste, with a focus on the Mediterranean.

I also encourage you to take a look at a new research article outlining "[The Fundamental Links Between Climate Change and Marine Plastic Pollution](#)."

In addition, Beyond Plastics published a practical guide earlier this summer titled "[Hold the Plastic, Please](#)," documenting how restaurants can reduce the amount of plastic used in daily operations.

Don't forget to participate in [International Coastal Cleanup Day](#) on September 17!

Please continue to share any upcoming events with Layne Marshall (marshall.layne@epa.gov) so that the Trash Free Waters team can advertise these opportunities.

Romell Nandi
US EPA
Trash Free Waters National Program Lead

EPA Announcements

[Trash Free Texas Recreational Litter Cleanup Toolkit](#)

A new Recreational Litter Cleanup Toolkit has been added to the Trash Free Texas website. This tool provides helpful resources to assist local and regional governments, nonprofit organizations, and other entities interested in hosting recreationally-driven litter cleanup events such as plogging, plalking, pliking, and pladdling, or creating educational campaigns to encourage these activities.

Funding Opportunities

**Grants.gov will be closed September 23rd-29th*

Environmental Justice Data Fund

The Environmental Justice Data Fund (EJDF or “the Fund”) is an \$8 million fund, created and seeded by Google.org, that aims to help frontline communities that have been historically underserved and disproportionately impacted by climate change and environmental injustice. The Fund will enable frontline communities in the United States to use data to unlock resources, increase their access to Justice40 benefits and federal infrastructure funding, and advocate for new policies that empower communities to address past environmental harm and pave the way to a more sustainable, climate-resilient future. **Applications are being accepted on a rolling basis, but the final deadline for submissions is September 16.**

San Francisco Bay Water Quality Improvement Fund (SFBWQIF)

EPA is currently accepting applications via two separate Requests for Applications (RFAs) for SFBWQIF. **EPA’s Bipartisan Infrastructure Law (BIL)-SFBWQIF RFA** aims to broaden the EPA’s reach to focus on inequities in the access to Federal funding and implementation of projects and climate resilience in underserved communities. The total estimated available FY22 funds are approximately \$5 million, and awards will range from approximately \$200,000 to \$1 million. The second opportunity, **EPA’s SFBWQIF RFA**, is accepting applications for approximately \$24 million to protect and restore San Francisco Bay watersheds and wetlands. Selected projects will receive between \$1 million and \$3 million to focus on water quality results, such as restoration of impaired waters and enhancement of wetland habitats. **The submission deadline for both opportunities is September 20.**

2022 EJ Thriving Communities Technical Assistance Centers RFA

This Request for Applications provides a total of up to \$50 million in funding for the establishment of 5-10 Environmental Justice Thriving Community Technical Assistance Centers across the nation to provide technical assistance, training, and capacity-building support to communities with environmental justice concerns and their partners. Funds per award will total approximately \$6 million depending on funding availability and other applicable considerations. Awards will be incrementally funded with periods of performance of three years. Awards will be issued as cooperative agreements and EPA will be substantially involved in the operation of the centers. **The deadline for submissions is October 4.**

FY22 NOAA Marine Debris Removal under the Infrastructure Investment and Jobs Act

The NOAA Marine Debris Program will award up to \$56 million through funding provided by the Bipartisan Infrastructure Law. This competition focuses on two priorities: removing large marine debris and using proven interception technologies to capture marine debris throughout the coastal United States, Great Lakes, territories, and Freely Associated States. These two priorities will be reviewed as separate, parallel tracks with different application requirements. Federal requests for Priority 1 must be between \$1 million to \$15 million. Federal requests for Priority 2 must be between \$100,000 to \$1 million. **The deadline for submissions has been extended to October 5.**

Coastal Habitat Restoration and Resilience Grants for Underserved Communities

The principal objective of this solicitation is to support opportunities for underserved communities, tribes, and/or tribal entities to meaningfully engage in coastal habitat restoration activities. Through this funding opportunity, NOAA intends to support capacity-building and restoration project activities that have the greatest potential to lead to habitat restoration that enhances the resilience of underserved communities in marine, estuarine, coastal, and Great Lakes areas. NOAA anticipates up to \$10 million will be available under this opportunity in FY22 and typical federal funding awards will range from \$250,000 to \$500,000 over three years. **The deadline for submissions has been extended to October 5.**

Research to Action: Assessing and Addressing Community Exposures to Environmental Contaminants

This National Institutes of Health Funding Opportunity Announcement encourages applications using community-engaged research methods to investigate the potential health risks of environmental exposures of concern to communities and to implement an environmental public health action plan based on research findings. The overall goal is to inform and support efforts to prevent or reduce exposure to harmful environmental exposures and improve community health. Researching the disproportionate impact of emerging and ongoing exposures like microplastics is an eligible topic. **The first deadline for submissions is October 5, with additional opportunities every 4 months until September 2025.**

FY2022 Tribal Wetland Program Development Grants (EPA-OW-OWOW-22-03)

Tribal Wetland Program Development Grants (WPDGs) assist tribal governments and intertribal consortia to develop or refine tribal programs which protect, manage, and restore wetlands. The primary focus of these grants is to develop/refine tribal wetland programs. The goals of EPA's wetland program include increasing the quantity and quality of wetlands in the U.S. by conserving and restoring wetland acreage and improving wetland conditions. In pursuing these goals, EPA seeks to develop the capacity of all levels of government to develop and refine effective, comprehensive programs for wetland protection and management. **The deadline for submissions is October 7.**

NOAA US IOOS FY 2023 Ocean Technology Transition (OTT) Funding Opportunity

The U.S. Integrated Ocean Observing System (IOOS) is soliciting proposals for the transition to operations of sensors, data management, and other technical capabilities that will improve our ability to monitor and forecast ocean, coastal, and Great Lakes environmental conditions with greater efficiency. In FY 2023-2024, it is estimated that up to \$7.5 million per year will be available. Awards are for up to \$400,000 per year for up to three years. Letters of Intent (LOI) are highly recommended but not required. **LOIs are due on October 21. Full proposals are due on January 17, 2023.**

PADI AWARE Mission Hub Community Grants

This grant is open to funding projects that align with PADI's Blueprint for Ocean Action, in direct support of the United Nations Decade of Science for Sustainable Development. Project proposals should focus on the following areas: Marine Debris, Vulnerable Species Protection, Coral Reefs, Climate Change, and Marine Protected Areas. Grantees will be selected based on conservation need, community feedback, and budget. The maximum grant amount is \$10,000. **The deadline for submissions is October 22.**

Upcoming Events

Turning Water Data into Public Information Webcast

September 7th (1:30-3:30PM ET), virtual

Join this Watershed Academy webcast to learn more about solutions to the challenges of turning data into information, from adopting standards and technologies and building applications that harness data from the Water Quality Portal to scoring data for public communication products. This event will present several examples of communities, states, and regions turning discrete water quality data into live public information.

Beyond Plastic Pollution Virtual Class – Fall 2022

September 7th - October 19th, virtual

This in-depth seven-week online masterclass on all things plastic pollution is offered by the founder and President of Beyond Plastic Pollution, Judith Enck, via Bennington College's Center for the Advancement of Public Action. The class is open to anyone, from high school students to concerned community members. The cost of enrollment is \$100. Advance registration is required.

Powering Up for Battery EPR

September 14th (12:30-2PM ET), virtual

Extended producer responsibility (EPR) for batteries is an effective solution to prevent fires and environmental contamination, recover valuable minerals, reduce greenhouse gases, and create recycling jobs. During this Product Stewardship Institute (PSI) webinar, we'll discuss successes and challenges related to the only single-use and rechargeable battery EPR law in the U.S. that also addresses battery-containing products, as well as how it compares to a long-standing battery EPR law in British Columbia, Canada. This webinar will also cover current practices and proposed revisions to the European Union Battery Directive.

Crafting Hollywood Storylines That Flip the Script on Plastics

September 14th (4:30-6PM ET), virtual

This Plastic Pollution Coalition webinar will be led by Kate Folb, Director of Hollywood, Health & Society, and include tips and tools to help scriptwriters seamlessly craft plastic-free and plastic-aware worlds in their narratives. Fishtown Films' Emily Gallagher & Austin Elston, the creative team behind the first ever zero-waste feature film "Citywide", and Scott Z. Burns, one of the producers of An Inconvenient Truth and the screenwriter behind Contagion and AppleTV+'s upcoming Extrapolation, will discuss the opportunities and challenges of going plastic free from the start - in the script. We'll also hear how audiences can learn to recognize and appreciate how media creators are incorporating this topic into film, and if they are not, how to encourage them to Flip the Script on Plastics.

International Coastal Cleanup Day

September 17th, worldwide

Join concerned citizens from around the world in celebrating International Coastal Cleanup 2022 by conducting a solo or small trash clean up in your community.

7th International Marine Debris Conference

September 18th - 23rd, Busan, Republic of Korea, and virtual

7IMDC will build on the momentum of past IMDCs by bringing together governments, industry, academia, civil society, and all relevant stakeholders, to discuss the latest science, strengthen collaborations, find solutions and catalyze action to address the urgent global problem of marine litter and plastic pollution. Technical session tracks range from monitoring and research to circularity and international collaboration.

International Solid Waste Association World Congress 2022

September 21st - 23rd, Marina Bay Sands, Singapore

The 2022 ISWA World Congress will be hosted by the Waste Management & Recycling Association of Singapore. The Congress has an overall theme of "Don't Waste Our Future" and will include keynote and plenary sessions by invited speakers, and concurrent sessions with oral and poster presentations by the participants. This will serve as an opportunity and platform for business leaders and entrepreneurs, technology developers, solutions providers, and policymakers to gather and discuss key trends and opportunities.

ICMPP 2022: International Conference on Microplastics and Plastic Pollution

September 22nd - 23rd, virtual

This conference aims to bring together leading academic scientists, researchers, and scholars to exchange and share their experiences and research results on all aspects of microplastics and plastic pollution. It also provides a premier interdisciplinary platform for researchers, practitioners, and educators to present and

discuss the most recent innovations, trends, and concerns as well as practical challenges encountered, and solutions adopted in the field.

Virtual Island Summit - VIS2022

September 26th - October 2nd, virtual

The theme of VIS2022 is “Sharing Knowledge For Resilient, Sustainable, and Prosperous Islands Worldwide.” Conference themes include Climate Action & Adaptation; Clean Energy: Blue Economy, Conservation & the Ocean; Agriculture & Food Security; Health, Education, Diversity & Inclusion; Circular Economy; Sustainable Tourism; and Blockchain & Cryptocurrency.

Virginia Marine Debris Summit 2022

September 27-28th, Virginia Beach, VA

The Virginia Coastal Zone Management Program and Clean Virginia Waterways will host the fourth Virginia Marine Debris Summit in September 2022 at the Virginia Aquarium and Marine Science Center. This summit will provide attendees with a face-to-face opportunity to build new partnerships and learn from the latest research in crafting successful behavior change campaigns, research about plastic pollution, and how to get involved in implementing actions found in the VA Marine Debris Reduction Plan.

California Senate Bill 54: The Path to Passage

September 28th (12-2PM ET), virtual

The National Stewardship Action Council is hosting a free, two-hour webinar with the stakeholders that negotiated “SB54: Solid waste – reporting, packaging, and plastic food service ware” and worked to get it signed into law. SB54 lead author Senator Ben Allen and staffer Tina Andolina will be joined by key stakeholders to share the details regarding the negotiation process, how an agreement was reached, and the timelines for implementation. Areas of discussion will be addressed by different stakeholder groups including environmental NGOs, waste haulers, producers and corporations, and local governments.

Aquaculture Europe Conference 2022

September 27-30th, Rimini, Italy

The theme of this year’s Aquaculture Europe Conference is “Innovative Solutions in a Changing World.” It will feature a Microplastics and Litter session to call attention to the importance of studying this issue, creating solutions, and implementing measures that help to tackle it.

Other Opportunities...

Inland Ocean Coalition's Inland Ocean Ambassador Program

The Inland Ocean Coalition (IOC) is a non-profit focused on building land-to-sea stewardship across the nation, is excited to announce that the application period for the eighth cohort of our Training has opened. The virtual Inland Ocean Ambassadors 5-week training covers the most pertinent ocean protection topics and features top minds in ocean conservation. The sessions, held each Thursday via Zoom from 5-7 pm MT beginning September 29 and ending October 27, are designed as intensive learning opportunities to engage with IOC’s staff and network. This network already boasts over 180 ocean ambassadors in 34 US states and 22 countries. **Applications close September 12.**

Save the dates for future months...

Reuse Minnesota's REUSE22 Conference

October 3-4th, Minneapolis, MN

REUSE22 educates, inspires, and connects professionals in the reuse, repair, and rental sectors. The event offers informative keynotes, breakout sessions, and networking opportunities geared toward strengthening and expanding the reuse economy. REUSE22 will bring together thought leaders and experts across multiple disciplines, including business professionals, nonprofit agencies, government workers, and students.

Sustainable Packaging Coalition Advance 2022

October 3-5th, Atlanta, GA

Sustainable Packaging Coalition's Advance 2022 Conference will feature collaboration examples from a range of leaders in environmental sustainability, showcasing better manufacturing practices, responsible sourcing, forest and water conservation, climate strategies, more efficient recovery and composting practices and systems and packaging technology and production. Workshop themes include reuse/refill systems, compostable packaging, flexible packaging and circularity, chemical recycling, and more.

North American Association for Environmental Education (NAAEE) Conference and Research Symposium

October 11-15th, Tucson, AZ and virtual

NAAEE's 2022 Conference (Oct 12-15) will focus on the powerful role education can play in creating healthier communities and tackling today's complex environmental and social issues. The conference will cover vital topics such as climate change education and climate justice, the benefits of connecting to nature, building a green workforce, protecting biodiversity, and centering equity in our work. This year's NAAEE Research Symposium (Oct 11-12) brings together new and experienced researchers from around the globe to explore the current state and future directions of environmental education research and advance the use of practices proven to be effective.

North Carolina Marine Debris Symposium

October 12-14th, Beaufort, NC and virtual

Coastal Carolina Riverwatch hosts this annual symposium that brings together marine debris and plastic pollution prevention stakeholders to discuss recent research, infrastructure, best management practices, policy development, removal projects, and advocacy that prevents plastic pollution. This year's event will take place at the Duke University Marine Lab on Pivers Island in Beaufort, but attendance will also be available virtually through live-stream access.

2022 Keep Florida Beautiful Annual Conference and Awards Social

October 19th-21st, New Port Richey, FL

Keep FL Beautiful is excited to be working alongside host affiliate Keep Pasco Beautiful to bring you an innovative and engaging conference experience. This conference is for affiliates, board members, community partners, local governments, state agencies, elected officials, businesses, and like-minded organizations. Conference sessions will include presentations on microplastics, reuse, sustainable tourism, and more.

Reusable Packaging Pavilion and Learning Center at PACK EXPO International

October 23rd-26th, Chicago, IL

The Reusable Packaging Association (RPA) Pavilion at Pack Expo International will welcome 47 RPA members who will be exhibiting the latest trends and innovations in reusable packaging. In addition to the Pavilion, RPA will also feature their Reusable Packaging Learning Center with 18 education sessions taking place over two days, including 4 panel discussions featuring the collective expertise of suppliers, technology providers, end users, and service providers in the reusable packaging industry.

17th Annual Chesapeake Watershed Forum

November 4-6th, Shepherdstown, WV

The Alliance for the Chesapeake Bay is hosting this 17th annual watershed forum, a watershed-wide event reaching over 400 restoration and protection practitioners to inspire and empower local action towards clean water. Attendees can expect to learn about successful tools and techniques from on-the-ground examples as well as how to build capacities of local organizations, foster partnerships, and incorporate new initiatives and emerging practices into their work.

74th Annual Gulf & Caribbean Fisheries Institute Conference

November 8-12th, virtual

The theme of this year's Gulf and Caribbean Fisheries Institute (GCFI) conference is "A Changing Time: Interactions between Science and Governance." The meeting will bring together regional stakeholders to share experiences and present success stories from around the Gulf and Caribbean. Several conference presentations will be dedicated to marine litter, including microplastics research and Abandoned, Lost and Discarded Fishing Gear (ALDFG).

Electronics Reuse Conference

November 14-16th, Denver, CO and virtual

Join the world's brightest minds in reuse to learn and connect. This conference will bring together more than 10 industries, consisting of hyper-focused speeches, panels, and live Q&A sessions to help take your business to the next level. The all-in-one repair, reuse, and refurbishing event will bring you closer to leading companies and brands than ever before in the mile-high city.

MICRO 2022, Atlas Edition: Plastic Pollution from Macro to Nano

November 14-18th, virtual

Questions about plastics have continued to multiply as the research community grows and public concern heightens. MICRO 2022 provides an opportunity to share what we know, fill in gaps, identify new questions and develop commitments to operationalize this knowledge into meaningful actions addressing plastic pollution from macro to nano.

Product Sustainability Summit USA 2022

November 15-16th, Arlington, VA and virtual

This conference will be held by ChemicalWatch and feature expert speakers to help explore how business can benefit from a sustainable product strategy. The building blocks for a sustainable product strategy start with responsible sourcing and supply chain transparency. This then leads on to circular economies, including compliance with laws in chemicals in products that are being made circular. Designing for sustainability is the next building block to be considered and this includes trends for 'Safe by Design' in the U.S. and EU. The final building block to be covered in this conference is sustainable packaging.

Restore America's Estuaries Coastal and Estuarine Summit

December 4-8th, New Orleans, LA and virtual

Restore America's Estuaries (RAE) proudly presents the 2022 Coastal & Estuarine Summit with support from Coalition to Restore Coastal Louisiana (CRCL). In its 11th year, the 2022 Summit will bring together the coastal restoration and management communities to explore issues, solutions, and lessons learned in their work. The Summit Program will address all aspects of coastal and estuarine restoration and management, including the Great Lakes and international locales. These topics are crucial as coastal communities pursue new, more robust strategies to effectively manage, protect, and restore their resources in a changing climate.

WasteCon 2022

December 5-8th, San Diego, CA

WASTECON is The Solid Waste Association of North America's (SWANA) executive leadership summit. The solid waste industry is going through exciting changes that bring both challenges and opportunities. With a mix of keynotes addressing the hot topics in the industry, development and learning sessions, and lots of networking time, this event will provide you and your team with what you need to best respond to change, seize opportunity, and keep stakeholders aligned and supportive.

In case you missed it...

Towards a Science-Policy Panel on Chemicals, Waste, and Pollution Prevention

This United Nations Environment Programme webinar introduced the new Science-Policy panel on Chemicals, Waste and Prevention of Pollution Prevention and the processes of the associated ad hoc open-ended working group (OEWG). The webinar provided a background on the panel process and discussed its scope and possible structure as well as highlighted several countries' priorities on chemicals, waste, and pollution.

How Design Standards & Guidelines Can Help Reuse Scale

This UPSTREAM webinar provided an overview of the guidelines, standards, and infrastructure required for an effective reuse economy. Amy Larkin and Claudette Juska of RESOLVE PR3 and Olga Kachooch of GreenBlue/Sustainable Packaging Coalition were featured as guest speakers.

TFW Webinar Recordings

Recordings of the seventh and eighth webinars in the TFW webinar series have been posted. The first webinar is titled "Using Clean Water Act Programs to Reduce Trash in Waterways" which covered the opportunities and limitations associated with various programmatic approaches to addressing trash loadings into waterways. The most recent TFW webinar, "Illegal Dumping - Best Practices to Address a Complex and Persistent Problem" featured a range of expert presenters who shared insights and lessons learned from their experiences researching the issue or implementing programs to mitigate illegal dumping.

The Microplastics Breakdown

HUMAN EXPOSURE AND POSSIBLE HEALTH RISKS

Microplastics in Food: Scoping Review on Health Effects, Occurrence, And Human Exposure

Bozidar Udovicki, Mirjana Andjelkovic, Tanja Cirkovic-Velickovic and Andreja Rajkovic

This review focused on the possible health effects of ingested microplastics (MPs), the occurrence, and levels of MP contamination in various foods. Potential toxic consequences from exposure to MPs through food were thought to arise from MPs themselves, diffused monomers, and additives but also from sorbed contaminants or microorganisms that colonize MPs. The authors' review of the literature indicated that there is widespread contamination of food by MPs. They found exposure assessments indicated humans ingest up to several hundred thousand MPs particles every year. According to the authors, the most accurate measure of human exposure can be estimated by body fluids analysis, but this method is scarcely used. This review included descriptions of a few specific significant study results, including research focused on the presence of MPs in human stool samples; all eight samples tested positive for MPs and confirmed the presence of MPs in the human placenta. The authors observed that MP exposure estimates

are insufficient in characterizing the risk to humans due to the lack of knowledge on possible effects which can be caused by the oral consumption of MPs particles. Future research suggested in this article included studies focused on the pathogenic potential of associated microorganisms and their toxins, as well as the role of MPs on the spread of antibiotic resistance in one health paradigm.

Microplastics in Air: A Hidden Public Health Threat

Kayra Koray Yilmaz

While MPs can be found on land, in the ocean, and even in the food we eat and the water we drink, this article emphasized that what is more dangerous is the presence of MPs in the air we breathe. The author cited research indicating that the MP abundance is more than 200 plastic particles in a day per m² as well as studies conducted on household dust in 12 countries detected very high levels (38-120,000 µg/g) of polycarbonate (PC) and polyethylene terephthalate (PET)-based MP particles. According to World Health Organization, 7 million premature deaths per year are associated with air pollution. Thus, the author asserted that the direct transfer of airborne MPs to the human body via inhalation also poses a critical risk for human health. Additionally, she highlighted that MP particles inhaled into the human body are a potential threat to trigger carcinogenesis. The author asserted that the formation of malignant tumors by uncontrollable proliferation as a result of genetic change in cells is a potential consequence of MPs in the human body, citing research that the inhalation of polystyrene (PS) can cause inflammatory and cytotoxic effects in human lung epithelial cells (BEAS-2B) by inducing the formation of reactive oxygens.

Should We Worry About the Accumulation of Microplastics in Human Organs?

Gabriele Sorci and Claire Loiseau

This article discusses some of the major questions and issues related to the exposure of humans to MPs and describes existing research. The authors observed that there is rapidly accumulating evidence demonstrating that we do ingest plastic particles daily, with recent research even suggesting this may represent thousands of particles per day. They pointed out that the view that MPs have no effect on the human body has been challenged by research findings because; 1) microplastics are not inert particles (e.g., they can release additives, plasticizers, and other toxic compounds) and can carry pathogenic microorganisms with antimicrobial resistance genes; and 2) MPs disrupt the integrity of the intestinal barrier and can be taken up into the bloodstream. Additionally, they noted that ingested and inhaled MPs have been found to be potentially trapped and accumulated in different tissues and organs, such as the lungs or placenta. An assessment by *Horvatits* of MP contamination in liver, spleen, and kidney samples which detected MPs in cirrhotic liver cells was described in this article along with several of the authors' resulting questions. The authors asserted that teasing apart the contribution of different geographic and socio-economic factors and establishing the role (if any) of MP pollution as a possible cause of human pathologies will be one of the challenges we will face in the upcoming years.

Microplastics in Freshly Fallen Snow: How May it Adversely Impact Human Health and Exacerbate the COVID-19 Crisis?

Ayesha Liaquat, Aleena Kashif, Sushma Rathi, and Alishba Raza

This article provided an overview of MPs in the environment and highlighted the potential role that they might play as vectors in disease transmission. The authors hypothesized that MPs might transmit viruses such as SARS-CoV-2. Recent studies were described as showing the presence of coronavirus RNA on particulate matter in the air, which also acts as a carrier for airborne MPs, thereby increasing the chances for the two to bind together. Additionally, the article observed that airborne MPs shed from contaminated personal protective equipment such as gloves, which they assert could also be expected to transport the virus to distant areas through airflow. In support of this point, the authors referenced a French field study that demonstrated that airborne MPs could be carried as far as 95 km away from the source through the wind. They pointed out that since coronavirus can survive approximately 72 hours on a plastic surface and only 3 hours in aerosol droplets, airborne MPs carrying coronavirus could be a way to transmit the virus

over a longer time and distance. As a result, the authors asserted that steps must be taken to address this threat to human health. They highlighted the importance of techniques to detect and identify MPs in the air and asserted that research was needed to improve these techniques.

PUBLIC POLICY AND ALTERNATIVES

Biodegradation of Microplastics by Microorganisms Isolated from Two Mature Landfill Leachates

Megga Ratnasari Pikoli, Puji Astuti, Festy Auliyaur Rahmah, Arina Findo Sari, and Nur Amaliah Solihat

In this study, MP degrading microorganisms (bacteria and fungi) were isolated from leachate from two large mature landfills on Java Island, Indonesia, and examined with the goal of determining their degrading ability while using it as a sole carbon source. The microorganisms were isolated via direct and indirect (enriched) methods. A total of 211 isolates were obtained, consisting of 74 bacteria and 137 fungi. Their ability to degrade polyethylene, polypropylene, and polystyrene was determined. Approximately one-third of these organisms were found to have the potential to degrade MPs. One of the assessed bacteria, *Bacillus paramycooides*, used all three types of MPs and demonstrated the highest ability to degrade polystyrene. The researchers suggested that future studies be conducted to further assess fungal and other potential isolates as a single culture or as a consortium.

Silk Offers an Alternative to Some Microplastics

Massachusetts Institute of Technology

This July 19 blog article describes a paper in *Small* focused on the work by a team of scientists to develop a material based on silk that could provide an inexpensive and easily manufactured substitute for certain MPs. According to the article, the silk protein used in the new alternative material is widely available and less expensive than plastic. This new method was described as being able to make use of low-grade silk that is unusable for fabrics, and large quantities of which are currently discarded because they have no significant uses. It can also employ used, discarded silk fabric, diverting that material from being disposed of in landfills. In contrast to the process for producing fabrics – which is described as requiring silkworm cocoons to be painstakingly unwound to produce the fine threads – non-textile-quality cocoons can be used in this new process and the silk fibers can simply be dissolved using a scalable water-based process. Further, the processing is described as simple and tunable such that the resulting material can be adapted to work on existing manufacturing equipment, potentially providing a simple “drop-in” solution using existing factories. The material can be hydrophobic (water-repelling) even though it is made and processed in a water solution, or it can be hydrophilic (water-attracting), or anywhere in between, and therefore made to match the characteristics of the material it is being used to replace. According to this post, the researchers demonstrated that their silk-based coating material could be used in existing, standard spray-based manufacturing equipment to make a standard water-soluble microencapsulated herbicide product, which was then tested in a greenhouse on a corn crop. The test showed that the product worked even better than an existing commercial product, inflicting less damage to the plants.

Microplastics in Personal Care Products: Exploring Public Intention of Usage by Extending the Theory of Planned Behaviour

Lingzhi Deng, Gen Li, Shengjing Peng, Jian Wu, and Yue Che

This study focused on obtaining an understanding of consumer perceptions and behaviors regarding personal care products, such as cosmetics and toothpaste, that contained MPs. The researchers used an expanded theory of planned behavior (TPB) model to analyze the factors and mechanisms of the public's behavioral intention to reduce the use of personal care and cosmetic products containing MPs. According to the authors, the TPB model suggests that behavior is determined by behavioral intention, which is in turn affected by attitude, subjective norms, and perceived behavioral control. The study was conducted via random face-to-face interviews with 496 respondents in Shanghai, China. The researchers described the

results as indicating that: (1) attitude has the most powerful positive influence on behavioral intention, followed by perceived behavioral control and environmental concern; and there is no significant direct influence of subjective norms, environmental education, and behavioral experience; (2) subjective norms have an indirect influence on behavioral intention through attitude and perceived behavioral control; and (3) environmental education and behavioral experience both have an indirect impact on behavioral intention through attitude. The research team determined that these study results have policy implications for government efforts to reduce MP pollution. They asserted that exploring people's perceptions and behaviors can help provide an understanding of the human dimensions around addressing microplastic pollution at the source.

ENVIRONMENTAL IMPACTS OF MICROPLASTICS

Macro-and/or Microplastics as an Emerging Threat Effect Crop Growth and Soil Health

Haihe Gao, Qin Liu, Changrong Yan, Karen Mancl, Daozhi Gong, Jiuxing He, and Xurong Mei

This literature review examined the effects of macro-and MPs on crop growth and soil health via a global meta-analysis, based on 2,226 paired field/ laboratory measurements from 141 papers published before December 2021. The results of this meta-analysis indicated that yield, water use efficiency, germination, root length, plant height and biomass of crops, reproduction, and survival of soil animals decreased to different degrees with increased macro-and/or MP contents, which the authors described as similar to the conclusion of several other studies. The researchers found that the response of crop growth and soil health to macro-and/or MPs was related to plastic content, plastic type, plastic size and crop/animal type variables. Further, the extent of impact was found to depend on crop/soil animal type, plastic-type, plastic size, and plastic content. Polyethylene MPs were found to have had the greatest influence on plant biomass and animal reproduction; polystyrene MPs were found to have the greatest influence on germination and root length; polycarbonate MPs had the greatest influence on crop height; and the greatest response of soil animal's survival and weight was from polypropylene MPs. Polyethylene MPs significantly decreased all crop-soil properties. The authors proposed specific future research and policy priorities: (1) increasing public awareness and action to reduce the use of disposable plastics; (2) assessing and formulating plastic policy and regulations; (3) exploring effective separation and detection methods of MPs in the soil; and (4) strengthening the recycling and treatment of plastic waste and the development of alternative materials.

**If you'd like to see your posting in this email, please email
Marshall.Layne@epa.gov with any suggestions!**

EPA Trash Free Waters Program | nandi.romell@epa.gov | epa.gov/trash-free-waters



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