

# The Rapids: US EPA's Trash Free Waters Monthly Update March 2021

<https://www.epa.gov/trash-free-waters>

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## Introduction

Hello all,

As always, the world of Trash Free Waters was quite busy over the last few weeks. I recently had the honor of presenting on the Trash Free Waters program for the National Academy of Sciences, Engineering, and Medicine's [Committee on US Contribution to Global Ocean Plastic Waste](#). That Committee is charged by the [Save Our Seas 2.0 Act](#), among other requirements, to evaluate US contributions to global ocean plastic waste (including types, sources, and geographic variations) and to make recommendations to reduce US plastic waste entering our oceans. We are looking forward to seeing what the Committee comes up with.

A few weeks ago, more than 250 national and grassroots environmental groups put forth a "Plastic Free President" plan urging the Biden Administration to robustly address the plastic pollution crisis. Among the recommendations are \$500 million to EPA to support improved Material Recovery Facilities across the country for non-plastic recyclables; \$50 million for EPA to improve its data collection on waste reduction, recycling, and composting rates and to bolster regulation of the plastics industry; \$50 million to EPA to study the occurrence of microplastics in drinking water and sewage treatment plant effluent; and \$20 million to EPA's Clean Water State Revolving Fund to go toward stormwater, trash, and debris capture systems and green infrastructure design. Read more about the plan [here](#).

Please continue to share any upcoming events with Layne Marshall ([marshall.layne@epa.gov](mailto:marshall.layne@epa.gov)) so that the Trash Free Waters team can advertise these opportunities with all of you on the first Monday of each month.

Thanks,  
Romell Nandi  
US EPA  
Trash Free Waters Program Lead

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## EPA Announcements

### Single-Use Plastics Discussed During Regan Hearing

A confirmation hearing for Michael Regan, President Biden's nominee for new EPA Administrator, was held on February 3rd. During the hearing, Regan responded to Senator Merkley's concern about plastics by stating, "I do agree that it's a significant challenge to look at the role of plastics, especially the impacts that we've seen with our marine life and our coastal communities." Watch the hearing [here](#).

### **Trash Traps Installed in St. Louis, MO**

EPA Region 7 is collaborating with the Wichita State University Environmental Finance Center, Missouri Confluence Waterkeeper, and several other community partners in the St. Louis region to implement the Trash Free St. Louis Trash Capture Project. The TFW program provided \$25,000 to support the project in 2020, which was supplemented by an additional \$10,000 from the region. Project partners have installed trash capture devices in three sites: a “trash trout” in Deer Creek, a “litter gitter” in the River Des Peres, and a “B2B Beaver” in Mackenzie Creek. Read a news release about the project [here](#).

### **Urban Waters Progress Report Highlights Trash Removal**

The recently released Urban Waters Federal Partnership (UWFP) Progress Report states that 23,139 pounds of trash and 106 pounds of recycling have been collected in the past year thanks to Urban Waters efforts across the nation. The publication goes on to highlight several UW-supported initiatives with an emphasis on addressing single-use plastics and removing trash from the environment through stream cleanup events and in-stream trash capture devices. Read the full report [here](#).

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## **Funding Opportunities**

### **Chesapeake Bay Watershed Education and Training Grant Program (B-WET)**

Chesapeake B-WET is a competitive grant program that supports existing, high-quality environmental education programs and fosters the growth of new, innovative programs. The Chesapeake B-WET Program funds locally relevant, authentic experiential learning for K-12 audiences through Meaningful Watershed Educational Experiences (MWEEs) throughout the watershed. The goal is to increase understanding and stewardship of the Chesapeake Bay and its local watersheds, including the rivers, upland streams, and natural habitats found throughout the region. Apply by March 1, via Grants.gov [here](#).

### **Sarasota Bay Estuary Program 2021 Partners Grants**

The Sarasota Bay Estuary Program is accepting applications for Sarasota Bay Partners Grants to support an environmental restoration or education projects focused on restoring Sarasota-Manatee bays and engaging communities. These grants for up to \$4,000 are available to groups that have projects within the NEP study area which focus on restoration, water quality, bay-related environmental education, and community stewardship. The deadline for applications is March 1. Submit application materials [here](#).

### **Great Lakes Research Consortium Small Grants RFP**

The Great Lakes Research Consortium, the New York State Department of Environmental Conservation, and the New York Great Lakes Basin Advisory Council have opened this program to provide seed funding for new, cooperative projects that improve understanding of, and/or management of, New York's Great Lakes basin. The program supports collaborative projects and grant awards that can be used for basic or applied research and project planning that will lead to larger projects. To learn more about funding criteria and to submit a proposal by March 1, click [here](#).

### **Indiana Community Recycling Grant Program**

The Indiana Department of Environmental Management has grant funding available for educating and promoting recycling and household hazardous waste collection and disposal. Counties, municipalities, solid waste management districts, schools, and nonprofit organizations in Indiana are eligible to submit an application requesting \$500 to \$100,000 in funding. Applications will be accepted through March 1, [here](#).

### **Great Lakes Restoration Initiative TFW RFA**

EPA announced that it is seeking a second round of applications under the Great Lakes Restoration Initiative (GLRI) grant program focused on keeping trash out of the Great Lakes. Approximately \$5 million is available through the Trash-Free Waters Great Lakes program to fund approximately 10 large-scale projects to remove trash from Great Lakes harbors, river mouths, and waterfronts. The minimum award is \$300,000 and the maximum award is \$1,000,000. The deadline for applications is March 5. To learn more about the request for applications, click [here](#).

### **Keep America Beautiful's Community Grant Program**

Keep America Beautiful has announced the launch of a new comprehensive national grant program to support communities in preventing littering, promoting recycling, and building clean, green, and beautiful neighborhoods. Funding is available independently or collectively to promote public space recycling collection infrastructure, prevent cigarette litter, and collect debris via Seabins, a trash collection device. The application deadline for the above grant programs is March 19. Apply by filling out the survey form [here](#).

### **NOAA 2021 Fishing for Energy Program**

The National Fish and Wildlife Foundation (NFWF), in partnership with the NOAA Marine Debris Program, Covanta, and Schnitzer Steel Industries, is now soliciting proposals under the [2021 Fishing for Energy Program RFA](#). Priority will be given to projects that assist fishing communities in disposing of old, derelict, or unusable fishing gear and/or develop the capacity for logistics for port communities interested in implementing a long-term derelict gear collection program. Applicants can register for an informational webinar about the opportunity, scheduled to take place on March 2 from 3:30-4:30 pm EDT, [here](#). Full proposals must be submitted through NFWF's Easygrants system no later than March 30, [here](#).

### **The Recycling Partnership's Polypropylene Recycling Grant Program RFP**

The purpose of the Polypropylene Recycling Grant Program is to facilitate Material Recovery Facility (MRF) processing, sortation, and marketing of polypropylene packaging to ensure the widest possible access to polypropylene recycling in the community recycling collection programs in the United States. Publicly, privately and non-profit owned and operated U.S. MRFs are eligible for funding under this grant program. The next round of grant proposals is due by March 31. Learn more about this funding [here](#).

### **Coral Reef and Natural Resources Program 2021**

The DOI's Coral Reef and Natural Resources Initiative provides grant funding for the management and protection of coral reefs and to combat invasive species in the U.S. insular areas. These funds have been used in previous years to combat land-based pollution and illegal dumping. Apply by April 1, via Grants.gov [here](#).

### **2021 Ocean Solutions Accelerator Program**

Inviting all entrepreneurs with for-profit, market-driven ocean solutions to apply to the Sustainable Ocean Alliance Ocean Solutions Accelerator Program. Solutions must relate to the targets and outcomes of UN SDG 14. Historically, key impact areas we focus on include aquaculture & fisheries, new materials, packaging, and ocean data. Applications will be reviewed on a rolling basis now through April 12. Read more about the program, benefits, expectations, and what we look for in our participating companies [here](#).

### **Healthy, Resilient and Sustainable Communities Grants in EPA Region 10/PNW**

This grant program will support Region 10 communities (Alaska, Idaho, Oregon, and Washington) as they develop and implement pollution prevention and/or sustainable materials

management systems that help make their communities safer, healthier, and more resilient. The region anticipates awarding approximately \$120,000 total under this announcement in the form of 2-4 grants. The deadline to submit an application is April 30, via Grants.gov [here](#).

### **BoatUS Foundation and Berkley Recast & Recycle Contest**

The BoatUS Foundation for Boating Safety and Clean Water and Berkley have teamed up to seek out new ideas and improvements to the discarded fishing line and soft bait disposal process, new recycled product ideas, or offer a technology breakthrough for the current process that will increase the volume of line and soft baits that are recycled. A total of \$30,000 in prize money is at stake for any boater, angler, armchair technologist, team, student, or anyone willing to submit a contest entry now through May 14. Learn more about this funding [here](#).

### **2021 Ocean Awareness Contest**

Bow Seat Ocean Awareness Programs invites students ages 11-18 to create visual art, film, music, poetry, web-based media, dance, music, or creative writing that explores their connection to water and creatively communicates the need to protect this vital resource. Students may earn cash awards of up to \$1,500, and student work becomes part of a global art collection that is helping to raise awareness and inspire the protection of our oceans. Bow Seat also offers \$750 Educator Innovation Awards to teachers who use the 2021 Ocean Awareness Contest in their physical or virtual classroom. The contest is free to enter. For more information and classroom resources and to submit an application online by June 14, click [here](#).

### **Protecting Marinas and Inland Waterways Via Stormwater Tech**

Thanks to a new grant program sponsored by Dart Container Corporation and UltraTech International, Inc. Dart will provide up to \$100,000 in grants (\$4,000 per qualifying organization) for the purchase and installation of UltraTech's patented Ultra-Drain Guard stormwater management products, which prevent litter, oil, and sediment from entering waterways via storm drains. Apply for this rolling funding opportunity via a form [here](#).

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## **Save the Dates/Calendar**

### **March 1<sup>st</sup>-5<sup>th</sup>: Eighth Annual World Ocean Summit Virtual Week**

This week-long event will feature more than 60 sessions and 130 speakers discussing how to create a sustainable ocean economy. One industry track will focus on changing the course of plastic pollution from source to sea, discussing the role of the consumer-goods sector to minimize plastic use, and covering opportunities for waste collection infrastructure and management. Register for free [here](#).

### **March 1<sup>st</sup>: Pick Up Pennsylvania 2021 Kick-Off Date**

From March 1 through May 31, thousands of Pennsylvanians will participate in Pick Up Pennsylvania. You can join in by cleaning up litter along our roadsides, streams, beaches, parks, and neighborhoods, by holding recycling events for hard-to-dispose of items like tires and appliances, and by creating or enhancing green areas. Keep Pennsylvania Beautiful partners with PennDOT, the Pennsylvania DEP, and Keep America Beautiful to provide free trash bags, gloves, and safety vests to registered participants, as supplies last. Register [here](#).

### **March 2<sup>nd</sup>-4<sup>th</sup>: International Symposium on Plastics in the Arctic**

Hosted by the government of Iceland, this conference will cover a range of topics including everything from sources and transport of plastics in the region to insight on research

methodologies and a deep-dive on the ecotoxicological impacts of plastic pollution on Arctic habitats. Read the agenda and learn more about the event [here](#).

### **March 4<sup>th</sup>-5<sup>th</sup>: Third Annual Texas Plastic Pollution Symposium**

The 3rd Annual Texas Plastic Pollution Symposium will take place both virtually and on South Padre Island, TX. The research symposium and poster session will be held on the first day, and workshops and a beach cleanup will be held the following day. Poster presentations will cover a wide range of topics, including 1) Monitoring, 2) Policy and Urban Communities, 3) Chemistry of Plastic Pollution, 4) to Fish and Wildlife, and 5) Solutions. Registration will cap at 150 people, so remember to register for free [here](#). The call for abstracts is open and closes on February 4, 2021. Submit your abstract [here](#).

### **March 11<sup>th</sup> (10AM EDT): MICROFIBERS - Key Facts and Solutions for This Invisible Threat**

Save the date for a new episode of the Race for Water's "Meet the experts" webinar series, featuring the CEO and founder and Co-founder and Chief Scientist of Planet Care. Planet Care offers an effective and affordable filter solution to address microfiber pollution produced while washing clothing. Register for the webinar [here](#).

### **March 11<sup>th</sup> (1PM EDT): EPA TFW Webinar – New Reuse Models as Part of the Solution to the Global Plastic Pollution Crisis**

Please join us on March 11 for the fifth installment in the Trash Free Waters Webinar Series. Innovative reuse and refill systems are creating opportunities for consumers to reduce the amount of plastic packaging waste they generate by making it easier to purchase goods in reusable containers. In this webinar, we will explore two very different types of reuse and refill models, explain why reuse models can be an important part of the solution to the global plastic pollution problem, and discuss the major challenges and opportunities for launching, maintaining, and scaling up reuse systems. Register [here](#).

### **March 16<sup>th</sup> (9AM-12PM EDT): SETAC Virtual Seminars - State of the Science**

First in the seminar series "What We Know and What We Need to Know: The Analysis, Monitoring, and Effects of Microplastics in Humans and the Environment," hosted by the Society of Environmental Toxicology and Chemistry (SETAC). This seminar will feature several SETAC representatives and serve as an introduction to the series. Learn more about the series [here](#).

### **March 18<sup>th</sup> (9AM-12PM EDT): SETAC Virtual Seminars- Finding the Needle in the Haystack: Sampling, Extraction and Analysis of Microplastics**

Second in the seminar series "What We Know and What We Need to Know: The Analysis, Monitoring, and Effects of Microplastics in Humans and the Environment," hosted by SETAC. This seminar will feature Jennifer Lynch of the National Institute of Standards and Technology as well as a number of presenters from universities and research institutions and will cover microplastic sampling and analysis methodology. Learn more about the series [here](#).

### **March 23<sup>rd</sup> (9AM-12PM EDT): SETAC Virtual Seminars- Towards the Harmonized Identification of Microplastics**

Third in the seminar series "What We Know and What We Need to Know: The Analysis, Monitoring, and Effects of Microplastics in Humans and the Environment," hosted by SETAC. This seminar will provide an overview of ongoing processes and projects to overcome limitations caused by the variety of extraction and analytical methods in the microplastics field. Learn more about the series [here](#).

**March 24<sup>th</sup>-March 25<sup>th</sup> (1-4:30 PM EDT): Trapping Trash and Diverting it From Waterways Workshop**

The University of Toronto Trash Team, led by researcher Chelsea Rochman, PortsToronto and Ocean Conservancy are hosting a 2-day virtual workshop to build capacity for trapping trash as a solution to the global issue of plastic pollution. We would like to inspire others to trap trash on their waterfronts and to quantify this impact as part of the International Coastal Cleanup. This workshop will gather stakeholders from across North America who could work together to use trash traps to divert litter from their waterfront, collect data and increase awareness in their communities. Learn more about the workshop [here](#). Register in advance [here](#).

**March 24<sup>th</sup> (3PM EDT): Salvaging Solutions- Weathering Stormy Waters**

Join for NOAA Marine Debris Program's online webinar series, Salvaging Solutions to Abandoned and Derelict Vessels Webinar: Weathering Stormy Waters. Matthew Bethel & Niki Pace from Louisiana Sea Grant, Michele Jacobi from NOAA's Assessment and Restoration Division, and Nilda Jimenez, PhD from the Puerto Rico Department of Natural and Environmental Resources (DNER) will be presenting on common issues arising from abandoned and derelict vessels. Join the webinar via Adobe Connect [here](#).

**March 25<sup>th</sup> (9AM-12PM EDT): SETAC Virtual Seminars- Modelling of Microplastics in the Environment – Policy or Regulatory Implications**

Fourth in the seminar series "What We Know and What We Need to Know: The Analysis, Monitoring, and Effects of Microplastics in Humans and the Environment," hosted by SETAC. This seminar will feature a range of experts in the microplastics field and aims at coupling our understanding of how environmental processes combine to influence the environmental fate and transport of microplastic in diverse systems such as in air, water, sediment, and soil. Learn more about the series [here](#).

**March 30<sup>th</sup> (9AM-12PM EDT): SETAC Virtual Seminars- The Problem May Get Smaller: Nanoplastics**

Fifth in the seminar series "What We Know and What We Need to Know: The Analysis, Monitoring, and Effects of Microplastics in Humans and the Environment," hosted by SETAC. This seminar will feature a range of European experts and provide insight on the latest developments in nanoplastics research despite regulatory, analytical, and experimental challenges. Learn more about the series [here](#).

*[Save the dates for future months...](#)*

**April 1<sup>st</sup> (9AM-12PM EDT): SETAC Virtual Seminars- Effects and Risks of Microplastics Within the Environment**

Sixth in the seminar series "What We Know and What We Need to Know: The Analysis, Monitoring, and Effects of Microplastics in Humans and the Environment," hosted by SETAC. The goals of this session will be to discuss recent findings related to the ecological risks associated with microplastics and consider the quality criteria necessary to produce comparable data across laboratories. Learn more about the series [here](#).

**April 6<sup>th</sup> (9AM-12PM EDT): SETAC Virtual Seminars- Effects of Microplastics On Human Health**

Seventh in the seminar series "What We Know and What We Need to Know: The Analysis, Monitoring, and Effects of Microplastics in Humans and the Environment," hosted by SETAC. In this session, speakers will reflect on the evidence of humans exposed to microplastics, the

potential effects and risks of microplastics on human health, and consider the relation between evidence and public perception of microplastics risk. Learn more about the series [here](#).

**April 22<sup>nd</sup> (2:30PM EDT): NOAA's Marine Debris Monitoring and Assessment Project**

Third in the California Trash Monitoring Webinar Series, this webinar will feature presenters Sherry Lippiatt, California Regional Coordinator at the NOAA Marine Debris Program, and Hillary Burgess, Monitoring Coordinator at NOAA. The event will cover the Trash Monitoring and Assessment Protocol (MDMAP), a citizen science initiative engaging citizens to survey and record the amount and types of marine debris found on shorelines. View how to participate in the webinar [here](#).

**April 28<sup>th</sup> (3PM EDT): Salvaging Solutions- During Fair Winds and Following Seas**

Join for the third webinar in the NOAA Marine Debris Program's series, Salvaging Solutions to Abandoned and Derelict Vessels Webinar: During Fair Winds and Following Seas. Topic and presenters TBD. Join the webinar via Adobe Connect [here](#).

**May 20<sup>th</sup> (2:30PM EDT): Taking Out the Trash- Trash Capture and Compliance**

Fourth in the California Trash Monitoring Webinar Series, this webinar will feature presenter Chris Sommers, Vice President at EOA, Inc. The event will explore how Municipal Separate Storm Sewer Systems (MS4s) are achieving compliance and improving our environment by reducing the amount of trash discharged from stormwater conveyances. View how to participate in the webinar [here](#).

**May 26<sup>th</sup> (3PM EDT): Salvaging Solutions- Funding the Issue**

Join for the fourth webinar in the NOAA Marine Debris Program's series, Salvaging Solutions to Abandoned and Derelict Vessels Webinar: Funding the Issue. Topic and presenters TBD. Join the webinar via Adobe Connect [here](#).

*[In case you missed it...](#)*

**China Environment Forum and Science and Technology Innovation Program Archived Webinars**

These archived webinars, made possible by the Wilson Center, were originally hosted on February 10<sup>th</sup> and 24<sup>th</sup>. "From Sea to See: How Satellites Can Help Identify and Combat Marine Debris" included a discussion on the impact of the latest advances in remote sensing satellites and AI to enable continuous, near real-time global monitoring of plastic pollution on land and at sea. The webcast is available for viewing [here](#). Presenters in "Rethinking Plastic Waste Solutions: Extended Producer Responsibility and Corporate Innovation in the U.S. and Southeast Asia" discussed growing trends in EPR policy and corporate action. Access this archived webinar [here](#).

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**The Microplastics Breakdown**

**MICROPLASTICS FATE AND TRANSPORT**

**Modeling the Accumulation and Transport of Microplastics by Sea Ice**

*A. S. Mountford and M. A. Morales Maqueda*

The authors identified the presence and transportation of microplastics in sea ice as an emerging area of research, particularly in the Southern Ocean. According to the authors, existing empirical and modeling evidence suggests that both Arctic and Southern Ocean sea ice are seasonal sinks for microplastic pollution. This study used numerical modeling to explore the accumulation and transport of microplastics in both the Arctic and Southern Ocean sea ice. Positively buoyant (floating) microplastics were found to dominate in Arctic sea ice, whereas in the Southern Ocean, neutrally buoyant (passive) plastics, which arrive in the region through deep-water transport, appeared to be dominant. The overall distribution of microplastics in the Arctic was found to be consistent with the current literature. The authors also found that their study results suggest that the levels of microplastic pollution in the Southern Ocean might be comparable to those in less pristine areas of the global ocean. Read the full abstract [here](#).

### **Sequestration of Microfibers and Other Microplastics by Green Algae, *Cladophora*, in the US Great Lakes**

*Julie Peller, Meredith B. Nevers, Muruleedhara Byappanahalli, Cassie Nelson, Bharath Ganesh Babu, Mary Anne Evans, Eddie Kostelnik, Morgan Keller, Jenna Johnston, Sarah Shidler*

This study examined the presence of synthetic microfibers in the submerged biomass of *Cladophora*, a kind of green algae, in the Great Lakes. Samples of *Cladophora*, were collected from Lakes Erie and Michigan at multiple depths in the spring and summer of 2018. After rinsing and processing the algae, associated synthetic microfibers were quantified. The authors concluded that the data from this study indicated that synthetic microfibers are highly sequestered by Great Lakes algae. They assert that in contact with *Cladophora*, and other submerged aquatic vegetation, microplastics readily bio-adsorb, possibly for an extended period of time. Additionally, when the algae undergo seasonal decomposition, the non-biodegradable microplastics either deposit in the sediment or resuspend in the water. The algae are an ecosystem that provides a habitat for a variety of biological communities from microbes to small fish species, and the presence and concentration of microplastic pollutants might affect these trophic interactions. Read the full abstract [here](#).

## **MICROPLASTICS AND ECOSYSTEM IMPACTS**

### **Microplastics in Fisheries and Aquaculture: Implications to Food Sustainability and Safety**

*Vázquez-Rowe Diana Ita-Nagy Ramzy Kahhat*

The authors analyzed the effects of microplastics on fishing and aquaculture, identifying the links with food safety and sustainability. They point out that existing research has identified multiple potentially damaging effects of microplastics on marine biota, mainly at lower trophic levels, and assert that it is plausible to assume that fishing stocks and aquaculture systems will suffer setbacks due to these damages. However, they note that additional research is needed to understand the potential effects on human health, especially considering that smaller microplastics and nanoplastics, for which data is very scarce, are the particles most likely to be absorbed by human tissues. The authors also conclude that additional data and research are necessary to determine the levels of exposure and the potential damage that these pollutants exert on ecosystem quality and human health. The authors recommend the promotion of preventive measures such as improved waste and wastewater management and circularity to mitigate the entry of microplastics into the environment. Read the full abstract [here](#).

### **Microplastics on the Growth of Plants and Seed Germination in Aquatic and Terrestrial Ecosystems**

*Y.S.K. De Silva, U.M. Rajagopalan, H. Kadono*

In this review, the individual and the combined effects of microplastics on the growth of plants and seed germination in both aquatic and terrestrial ecosystems are explored. Limited research

studies were found for the effects on terrestrial plants compared to that for aquatic ecosystems. Therefore, the authors suggested that more research studies need to be implemented to examine the effect of microplastics on the growth of terrestrial plants. An interesting finding that they made based on their review, was that recent research indicates that the combined effect of microplastics with different persistent organic pollutants (POPs) that contain pharmaceutical, chemical, and heavy metal can more greatly affect plant growth when compared with the effect of microplastics alone. They suggest several areas for needed future research, including the examination of the effect of microplastics on the growth of terrestrial plants; monitoring of effects of microplastics on biota, and effects on edible plant growth, biomass accumulation, and crop yield. Read the full abstract [here](#).

## **MICROPLASTICS AND HUMAN HEALTH**

### **Microplastics and Human Health**

*Dick Vethaak and Juliette Legler*

This article explores the possible risks of microplastics to human health. The authors point out that microplastics may enter the human body through both inhalation and ingestion. The article emphasizes the need for adequate analytical tools to sample, isolate, detect, quantify, and characterize small microplastics (<10 µm), especially nanosized plastic particles. On a related note, the article points out a comprehensive exposure assessment is hampered by the limited and highly variable data on external exposure to mainly large particles. The authors assert that it is crucial to understand the role of microplastics and their contribution to total ambient particle exposure to evaluate their potential contribution to global disease burdens. Through their review of existing research, they found that pressing microplastic-related health issues such as internal exposure; interaction with the immune system; whether nanosized plastics can affect the placenta, fetus, and brain; and how environmental microplastics differ from other ambient natural and engineered nanoparticles are largely unexplored. The authors suggest that multidisciplinary research efforts, involving scientists from environmental and medical sectors as well as polymer scientists, are needed. Read the full abstract [here](#).

### **Pathways of human exposure to microplastics, and estimation of the total burden**

*Josefa Domenech and Ricard Marcos*

This article reviews recently published data regarding human exposure to microplastics and nanoplastics (MNPLs). Existing literature was found to demonstrate that despite ingestion being the most studied route of exposure, other routes of contact with MNPLs should not be underestimated, e.g., dermal contact. Their review indicated that polyethylene, polyethylene terephthalate, propylene, styrene, polyvinyl chloride, nylon, and polyamides were the most often detected plastics in water and soils. There was a range of variation in the detected morphologies, ranging from granules, fragments, microbeads, fibers, to foams. Some studies were found to be reporting toxic effects of MNPLs both in in vivo and in vitro systems, as well as the ability of MNPLs to cross biological barriers. The authors noted that all of the exposure quantification studies are carried out in a specific context, by analyzing an exposure route in a given environment, and this makes it difficult to estimate the overall total exposure to humans anywhere in the world. A significant research gap that was identified in this review was the lack of human biomonitoring studies, which limits the determination of both the real intake of MNPLs and its potentially harmful effects. Read the full abstract [here](#).

## **MICROPLASTICS TOXICITY**

### **Incubation in Wastewater Reduces the Multigenerational Effects of Microplastics in *Daphnia magna***

*Christoph Schür, Carolin Weil, Marlene Baum, Jonas Wallraff, Michael Schreier, Jörg Oehlmann, and Martin Wagner*

This study focused on how the sorption of a mixture of freshwater pollutants affects the toxicity of microplastics. The authors incubated irregular polystyrene particles ( $\leq 63 \mu\text{m}$ ) in either wastewater or ultrapure water. They exposed *Daphnia magna*, a species of the water flea, to the aged microplastics and their pristine counterparts over four generations using food limitation as an additional, environmentally realistic stressor. Both particle types were found to affect survival, reproduction, adult and neonate body lengths, and growth. Exposure to pristine microplastics resulted in the extinction of the third generation of daphnids. In contrast, exposure to wastewater-incubated particles was found to have induced lower mortality. The authors noted that incubation with wastewater does not change the microplastics' size, surface charge, and structure. The authors assumed that the adsorption of dissolved organic matter is a key aging process that reduces the toxicity of microplastics. Consequently, they concluded that toxicity testing using pristine microplastics may overestimate the effects of plastic particles in nature. Read the full abstract [here](#).

### **SAMPLING AND MONITORING METHODS**

#### **Collection and Separation of Microplastics**

*João Pinto da Costa, Armando C. Duarte, Mónica Costa*

This is a chapter in the *Handbook of Microplastics*. The authors ascribe the fact that the exact prevalence and mechanisms of microplastics distribution are largely unknown and inaccurate, stemming from the lack of standardized sampling and monitoring methods. They point out that the lack of standardized methodologies significantly impairs data comparison and subsequent toxicological assessments, rendering the gathered data of limited utility. This chapter provides an overview of existing methods for sampling and separating microplastics from different environmental matrices. The authors also discuss the associated advantages and limitations and some of the most critical limitations in the currently available scientific literature. Lastly, some of the strategies to assess data quality are suggested, as well as methodological steps that may assist in the generation of better data. Read the full abstract [here](#).

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