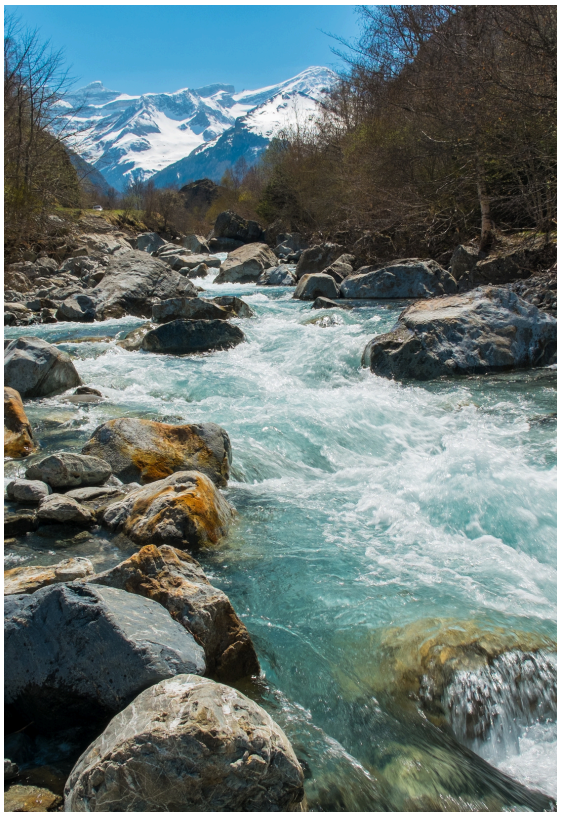
Honoring World Rivers Day

Rivers are the lifeblood of our planet. They sustain communities, nourish ecosystems, and connect landscapes from mountaintops to the sea. Yet today, rivers are also under threat. They have become major conduits for plastic pollution, carrying tiny fragments—microplastics—through watersheds and across continents. It is estimated that globally between 0.8 million and 2.7 million metric tons of plastic enter the ocean via rivers each year. On World Rivers Day, we recognize not only the beauty and importance of our rivers but also the urgent challenge of protecting them from the tides of plastics.



The Microplastics Problem

Microplastics are particles less than 5mm in size that come from two primary sources:

- Primary microplastics manufactured at that size, such as microbeads or industrial pellets.
- Secondary microplastics formed when larger plastic items like bottles, bags, or packaging break down.

Every year, millions of tons of plastic enter rivers and streams. Microplastics are shed from car tires, synthetic clothing, single-use packaging, and countless other sources. Once in waterways, they are nearly impossible to remove. Studies have found microplastics everywhere—from Arctic snow to the deepest ocean trenches—and rivers are the key pathways delivering them there.

Pathways of Plastics

Rivers collect plastics from urban runoff, wastewater, stormwater, roadside litter, tire wear, etc., transporting them downstream. Many plastics (both macro- and micro-) are retained along the way—caught in sediments, vegetation, riverbanks—acting as reservoirs. Only a portion makes it all the way to the sea. The impacts along this journey are significant. Fish and wildlife mistake microplastics for food. Agricultural fields irrigated with contaminated water receive plastic particles that may enter soils and crops. And humans ingest microplastics daily through food, air, and water—with unknown long-term health effects.

Urban/Land Based

Plastics enter waterways through littering, mismanaged waste, stormwater runoff, tire wear, washing of synthetic clothing, etc.

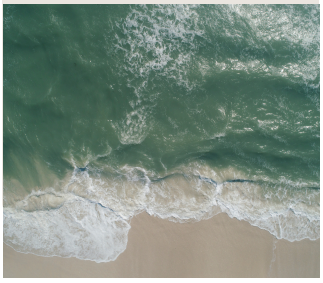
Streams/Tributaries

Streams and tributaries carry particles downstream; during floods, pulses of plastics may be transported.

Wetlands/Estuaries

Act as natural filtration and retention areas, but can also become sinks for accumulated microplastics.

Marine Environments



Plastics that reach coasts and oceans contribute to marine pollution, impacting aquatic life, food webs, and human health.

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Global Relevance and Need for Action

The magnitude of microplastics in river systems means that small changes upstream can have outsized effects downstream and in marine ecosystems. Effective interventions include: improving waste management (especially in high emission river basins), implementing policies like extended producer responsibility, reducing single-use plastics, designing better filtration systems, and restoring/using nature-based infrastructure (e.g., wetlands, riparian buffers). Protecting rivers is not just an environmental issue; it is about safeguarding human health, food security, and resilience.

Spotlight: 5 Gyres Institute – Microplastics in Wetlands

5 Gyres is a research and advocacy organization focused on reducing plastic pollution through science, education, and policy. Their work spans measuring microplastic pollution, raising public awareness, and pioneering nature-based and policy-oriented solutions. The organization recently conducted a groundbreaking study examining the role of wetlands in microplastic pollution. Wetlands are often celebrated as the "kidneys of the planet," filtering pollutants and improving water quality.

Key Findings from the Wetlands Research

- Wetlands capture significant amounts of microplastics carried by rivers and runoff, in some locations trapping 10 times more microplastics than nearby non-vegetated areas.
- Instead of being flushed downstream, many particles become trapped in sediments and vegetation.
- A 5 Gyres scientist found that Rhode Island salt marshes have been accumulating microplastics at increasing rates since the 1950s, and today may be trapping microplastics at rates up to 100,000 microplastic particles per square meter of marsh annually.
- This accumulation threatens wetland biodiversity—plants, birds, and aquatic organisms can all be affected.
- Long-term buildup may compromise wetlands' ability to deliver ecosystem services like water filtration and flood control.

Why It Matters

The wetland studies support that protecting and restoring wetlands isn't just conservation—it's plastic pollution mitigation. Preserving wetlands can reduce the flow of microplastics to rivers and oceans. 5 Gyres' research helps identify how nature-based interventions (e.g. restoring wetlands, floating wetland filtration systems) can be designed and implemented. Man-made floating wetlands have been used to filter contaminants such as excess nutrients and heavy metals in ponds and lakes, and 5 Gyres is studying if the same concept could be applied to the filtration and removal of microplastics from coastal waters. Their field studies aim to quantify plastic trapping efficacy, persistence, risks to organisms, and optimally integrate with policy/regulation.

A Call Forward

5 Gyres encourages everyone to embrace a "leave no trace" lifestyle when enjoying their rivers, streams, and oceans to limit the amount of waste escaping into our environment via these waterways. You can also support the continuation of studies like these + the implementation of this green infrastructure project in other wetlands around the country by donating to 5 Gyres at: https://www.5gyres.org/donate.

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