ENVIRONMENT

# Tire wear and tear revealed as a major contributor to waterway pollution

By Paul McClure
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*A study has found that tire wear and tear contributes to urban waterway pollution* Depositphotos

Australian researchers have found that tire wear and tear is a major contributor to urban waterway pollution, producing particulate matter that includes microplastics. But, they also found that there are effective ways of reducing this type of pollution, which can affect the health of the environment and us.

Many people would think – understandably due to it being the focus of much recent research – that when it comes to cars, the biggest cause of pollution is exhaust. But, in fact, wear and tear on tires has been shown to produce more particle pollution by mass.

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According to a February 2023 briefing paper by a team of experts at Imperial College London, tire wear in cities could pose up to a four-fold greater risk to the environment than other microplastics. Particulate matter from tire wear is a significant source of microplastics in waterways, migrating via road runoff during rain. In a new study, researchers from Australia's Griffith University examined the amount and type of tire wear particles (TWPs) found in urban stormwater runoff and looked at ways it could be reduced.

"Pollution of our waterways by microplastics is an emerging environmental concern due to their persistence and accumulation in aquatic organisms and ecosystems," said Shima Ziajahromi, lead author of the study. "Stormwater runoff, which contains a mixture of sediment, chemical, organic and physical pollutants, is a critical pathway for microplastics washed off from urban environments during rain and into local aquatic habitats."

As tires break down, they release a range of particles varying in size from visible rubber pieces to microparticles. Globally, 6.6 million tons (6 million tonnes) of TWPs are released each year. Tire waste doesn't naturally degrade and builds up in the environment where it may interact with other pollutants and biological organisms.

The researchers collected 25 stormwater samples from car parks and road sites across Queensland during 11 storm events in 2020. To minimize background contamination during sampling, the sample jars were kept closed at all times, and no plastic material was used to collect the samples. A field control sample (an open glass jar) was also used to monitor possible microplastic contamination from airborne microplastics.

Suspected microplastics were inspected using a stereo microscope and counted. In addition, the researchers classified the suspected microplastics by their morphology – fiber, fragment, and bead – and color. The majority (85%) of suspected microplastics in stormwater samples were identified as plastic polymers, in other words, microplastics. The amount of microplastics in the samples ranged from 3.8 to 59 particles per liter, with TWPs alone accounting for 2.5 to 58 particles per liter of total microplastics. The researchers say their findings demonstrate that stormwater runoff can contribute significantly to the number of microplastics found in waterways.

Wetlands and retention ponds have been put forward as a way of reducing the amount of microplastics being released into waterways. Sediment samples collected by the researchers from the inlet and outlet of a constructed stormwater wetland contained between 1,450 and 4,740 particles for every kilogram (2.2 lb) of sediment, with more microplastics observed in the sediment at the inlet, indicating the wetland's ability to remove them from stormwater.

“Microplastics that enter constructed wetlands for stormwater drainage systems settle in the sediment and form a biofilm, leading to their accumulation over time, removing them from stormwater runoff,” said Ziajahromi.

In addition to constructed wetlands, the researchers assessed the effectiveness of a stormwater treatment device designed to remove contaminants from stormwater.

“The device is a bag made of 0.2-millimeter mesh, which can be retrofitted to stormwater drains,” said Fred Leusch, one of the study’s co-authors. “Although originally designed to capture gross pollutants, sediment, litter and oil and grease, it significantly reduced microplastics in the sediment, removing it from stormwater runoff.”

Both strategies, the researchers say, offer a means of mitigating the accumulation of microplastics in our waterways.

“Our findings show that both constructed wetlands and the stormwater capture device are strategies that could be potentially used to prevent or at least decrease the amount of microplastics [and] tire wear particles being transported from stormwater into our waterways,” Ziajahromi said.

The impact of TWPs on human health is an area of increasing concern. During the manufacturing process, chemicals are combined to produce high-endurance rubber which is cast into a tire. Ingredients include polyaromatic hydrocarbons (PAHs), benzothiazoles, isoprene, and heavy metals such as zinc and lead. Research has shown that ambient

microparticles, which include TWPs, negatively affect cardiopulmonary, developmental, reproductive and cancer outcomes.

As with the current study, the aforementioned Imperial College paper stresses the importance of prioritizing addressing the potentially harmful effects of TWPs on human health and the environment instead of focusing only on reducing fuel emissions.

“Electric vehicles are a crucial step forward to decarbonize transport, but we need to look at the big picture too,” said Mary Ryan, co-author of the paper. “Some are concerned that electric vehicles tend to be heavier, which might increase tire wear. This is exactly why Imperial College is driving a holistic, joined-up approach to sustainability challenges.”

The study was published in the journal *Environmental Science & Technology*.

Source: Griffith University via Scimex

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Before realizing his writing passion, Paul worked as an intensive care nurse and a criminal defense lawyer for many years. He has a keen interest in mental health and addiction, chronic illness, and medical technology. After graduating with a Bachelor of Arts in journalism and creative writing in 2022, Paul joined New Atlas in 2023. Before starting with New Atlas, Paul had written for several online publications in the areas of health and well-being, parenting, entertainment, and popular culture.