River research reveals scale of macroplastic pollution

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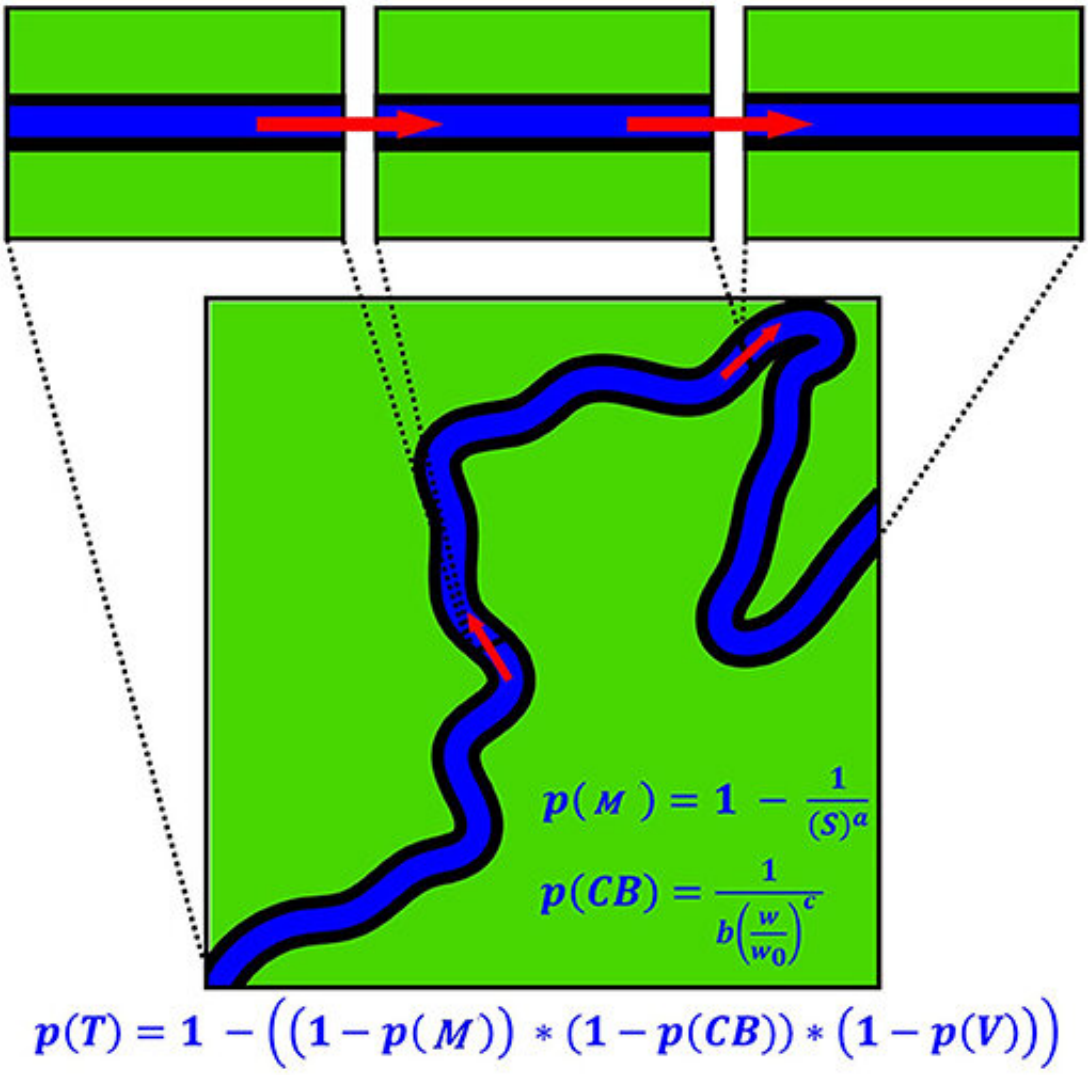

Schematic illustration of the transfer of macroplastic debris downstream from cell to cell. Also shown are the equations used to calculate the combined probability of trapping, p(T), probability of trapping along meander bends, p(M), and probability of trapping along channel banks, p(CB). Credit: DOI:

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Plastic pollution clogs river systems for considerably longer than previously thought, new research from the University of Leicester shows.

Macroplastics—or plastic litter more than 5mm in size—travel much slower through river systems than previously believed, at an average speed of less than 0.01 km per hour, and can remain in place for significant periods of time.

If not removed, not only may this pollution eventually emerge in the ocean, but it is also likely to negatively impact marine wildlife and human uses of river systems. Polyethylene terephthalate (PET), a common material for single-use plastic bottles, requires UV light to break down over more than 450 years.

A proof of concept study, believed to be one of the first studies of its kind, was led by Robert Newbould, a Ph.D. researcher within the School of Geography, Geology and the Environment at Leicester, alongside Dr. Mark Powell and Professor Mick Whelan.

The study involved tracking 90 PET sample plastic bottle 'tracers' released into a tributary of the River Soar near Wistow, Leicester. The average travel distance for each tracer was 231m in 24 hours, with the furthest distance recorded at just under 1.1km.

Robert said: "We were surprised at how easily the plastic bottles were trapped and their relatively low travel distances.

"Our work supports other research that existing estimates of riverine

plastic flux to the ocean may have been overestimated, but more research is needed to confirm this."

Researchers recovered 96% of plastic tracers from the river system at the conclusion of the experiment, and also retrieved other litter to ensure a net reduction in macroplastic pollution.

The study was completed while Robert completed an MPhil in Physical Geography. His Ph.D. is supported by the Central England NERC Training Alliance (CENTA), a consortium of six research-intensive Universities and research institutes working within the remit of the Natural Environment Research Council (NERC).

The University of Leicester is also home to the Centre for Landscape and Climate Research, which carries out discovery-led and applied research to address pressing global challenges, often in collaboration with industrial partners.

Research themes include Earth Observation methods for better ecosystem monitoring, understanding human interactions with the environment, plus water and carbon cycle connections.

"Macroplastic Debris Transfer in Rivers: A Travel Distance Approach" is published in *Frontiers in Water*.

More information: Robert A. Newbould et al, Macroplastic Debris Transfer in Rivers: A Travel Distance Approach, *Frontiers in Water* (2021). DOI: 10.3389/frwa.2021.724596

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