Paul:
Studies have shown that discharges from water companies can contain a cocktail of chemical pollutants. From toxic nutrients to illicit drugs. All of which affect river life and water quality. The problem is, how to gather evidence in a river which, by definition carries their troubles away. Jamie.
Jamie:
Paul. Nice to meet you. Thanks very much for coming,
Paul:
Thank you. It's a little bit daunting coming back into an academic institution.
Jamie:
I'm sure you'll fit in perfectly.
Paul:
Jamie Woodward is a professor of physical geography at the University of Manchester.
He and his team have been testing waters across the region, including Chris's section of the Tame, focusing on the presence of microplastics and what that can say about the river's health.
Jamie:
The scientific definition of a microplastic particle is a piece of plastic smaller than five millimetres. The microplastics that we find on these riverbeds, most of them are smaller than one millimeter and, actually, many of them are smaller than half a millimetre.
So that's about half the size of the end of a ballpoint pen. This is the River Tame catchment, East Manchester.
We've taken samples along the whole length of the river and we found very very high concentrations of microplastics.
In fact, just downstream of one of these treatment plants at Duckenfield, we found the highest concentration of microplastics that we've seen on any river bed in this area and I haven't seen a value higher than that anywhere else in the world.
Paul:
In the world?
Jamie:
In terms of the concentration of microplastics on a riverbed, I haven't seen a figure higher than this.
Paul:
That's extraordinary. I mean, let's just repeat that. The highest concentration of microplastics in the world, depending on how you collate your data, was found in the River Tame just there?
Jamie:
Site 8, near Dunkenfield. That's the highest concentration of microplastics has recorded on any riverbed.

Paul:
It's a dubious honour, isn't it? That the Tame has.
Jamie:
For every kilogram of sand spread out across that river bed, you'd find 130 thousand micro plastic particles, so that is what we call an acute contamination hotspot.
Paul:
There's no getting away from the fact that plastics play a huge role in our lives. Most of the equipment here is plastic.
The last time I checked our rivers, didn't have much need for them. So their presence is down to human contamination.
Jamie:
You're looking at a sample of microbeads there, from the River Tame. There's still a little bit of sediment attached to them as well.
Paul:
Oh, is that what those little bits is, right.
Jamie:
They're used in a process called shot-blasting or bead-blasting, removing paint and rust and coatings that you want to get rid of and then at the end of the day they just get washed down the grid and end up in our drainage system.
And if we look at this image here, you've got a whole range of microplastic types here. And these all come from the riverbed of the River Tame.
Paul:
I mean, we can see these. They're so uniform, aren't they?
Jamie:
Well, absolutely. And the presence of microbeads is really important because the microbeads must have come in from the wastewater system.
Paul:
Right.
Jamie:
Whereas these fragments, theoretically, could have broken down from larger pieces of plastic in the river.
But when you find them in the assemblages like this, fibres, fragments, beads. We know they've all come into the river together. They've all come into the wastewater system. So we can link the microplastics problem with the wastewater, the sewage problem.
Paul:
Hm, very clever.
Jamie:
Now, the interesting thing about these plastics, because they come from the wastewater system, is they're marinated in sewage.
Paul:
Nice.

Jamie:
And we know that fish ingest plastic.
Paul:
That's practically Michelin two stars, isn't it?
Jamie:
Absolutely. Some of these sharp plastic fragments can scratch the intestinal wall for example, some of the larger fragments can get stuck in the gut, there could be obstructions.
Paul:
And as you say, they're toxic already.
Jamie:
Yeah, so it's what we call the Trojan horse effect. These plastics will be coated with those materials and they will be taken into the gut of fish and then they'll start to break down.
And we are only starting to really begin to think about what those consequences might be. Now, microplastics will come into the rivers during flood events, during exceptional flow events, washed off streets, washed off roads.
And we know, our research has shown well those microplastics get washed downstream, we never see those. Because rivers and floods will wash the microplastics away.
So the very presence of these microplastics at high concentrations and all these different types on the riverbed proves that they must be coming in to discharge into still waters.
Paul:
Right.
Jamie:
For the fact for them to settle out.
Paul:
So they're discharging wastewater in times of low flow because if they did it in times of high flow, these would all be washed way.
Jamie:
Absolutely. Now, of course, the water companies, whether it's United Utilities or Thames or Severn Trent, whoever, they don't want another big problem put on their doorstop.
Paul:
No
Jamie:
This is a new tool that we've developed that, basically, can identify poor wastewater practice. Of course, the water companies don't like that.
Paul:
I still find it astonishing that water companies would put untreated sewage into our rivers. I can't, sort of, begin to rationalise it on any level.
Jamie:

There's lots of research that's shown that existing wastewater treatment practices are actually very very good at removing microplastics.
Often up to 99 percent of the micro plastic load and certainly very good at removing microbeads. So when we see microbeads in the river, that is significant because it means the wastewater treatment process, isn't happening.
Paul:
Given that we can remove up to 99 percent of these microplastics using existing waste strategies, why don't, why don't we?
Jamie:
Well treating wastewater is expensive. You can tackle the sewage problem and tackle a big part of the microplastic problem at the same time by, by treating the wastewater.
And that requires investment to make sure you've got sufficient capacity to treat that wastewater but absolutely, it also means that don't discharge wastewater into low flow rivers because that's illegal.
And it's ecologically reprehensible.
Paul:
Yeah.
In response to criticism surrounding microplastics United Utilities told us:
'Wastewater systems are not designed to treat plastics on microplastics. We're working hard with customers and regulators to minimise the amount of plastic ending up in our sewers.
We understand people's concerns about storm overflows, we have invested to deliver 100 percent monitoring of overflow operation along the River Tame. We are also working with community and environmental groups and supporting independent scientific research in North Manchester to better understand the sources of microplastic pollution.'