

# Mikroplastics in the river Rhine

Impressions and ideas

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# Question posed

- Issue of microplastics in inland waters is attracting increasing attention from scientists, politicians and the general public
- LANUV has been involved in studies in rivers since 2015
- From 2020 onwards: various reports, particularly on pellets and beads found in the river rhine and on the banks
  
- Where do these pellets and beads come from?
  - Primary objective: Development of a sampling technique for wastewaters
  - Furthermore: Source identification

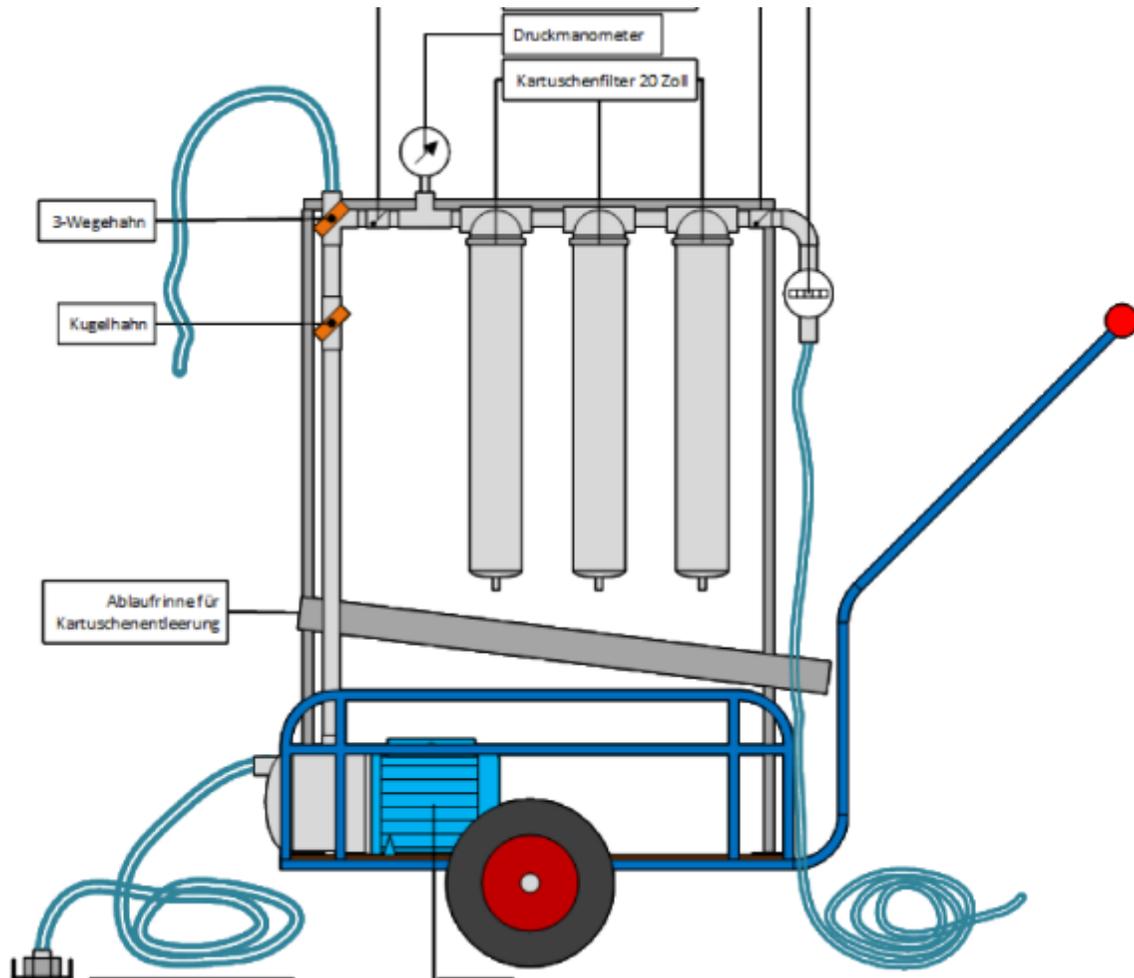


# Sampling of wastewater inlets

- In official wastewater monitoring, an average of 1-5 litres of sample is taken, but a much larger quantity must be taken and filtered to test for beads
- Measuring points for official wastewater monitoring are well known, but: sampling requirements for microplastics testing differ significantly from the requirements for wastewater sampling
  - joint site inspections with the operators
- This resulted in 2 different techniques
  1. Bypass systems with a permanently installed sampling tap (operation of the sampling system by the operator) - the cascade system is operated with the pressure prevailing in the pipe
  2. Manholes or open channels - the wastewater is pumped through the cascade system using an additional external pump



# Development of a sampling technique



- No standardised/proven method yet available for sampling microplastics in wastewater  
→ Development of a cascade system with three cartridge filters with mesh sizes of 500µm, 300µm and 100µm



# Investigations in the river Rhine

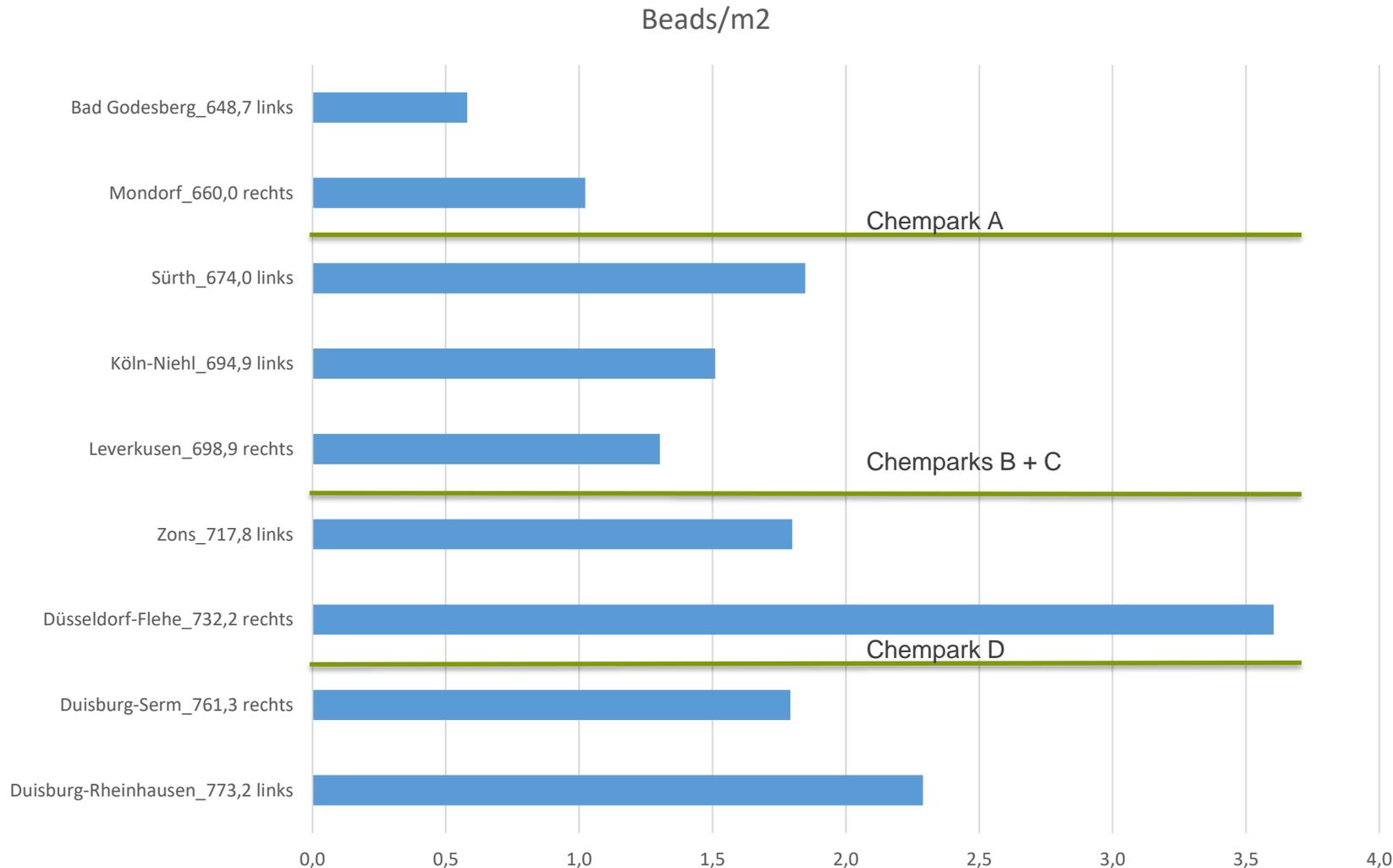
- 9 measuring points along the relevant discharges from Rhine km 773.2 (left) to 648.7 (left)
- Sampling by manta trawl from the laboratory vessel “Max Prüss”



Probenahmestelle	Rheinkilometer
Duisburg-Rheinhausen	773,2 links
Duisburg-Serm	761,3 rechts
Düsseldorf-Flehe	732,2 rechts
Zons	717,8 links
Leverkusen	698,9 rechts
Köln-Niehl	694,9 links
Sürth	674,0 links
Mondorf	660,0 rechts
Bad Godesberg	648,7 links

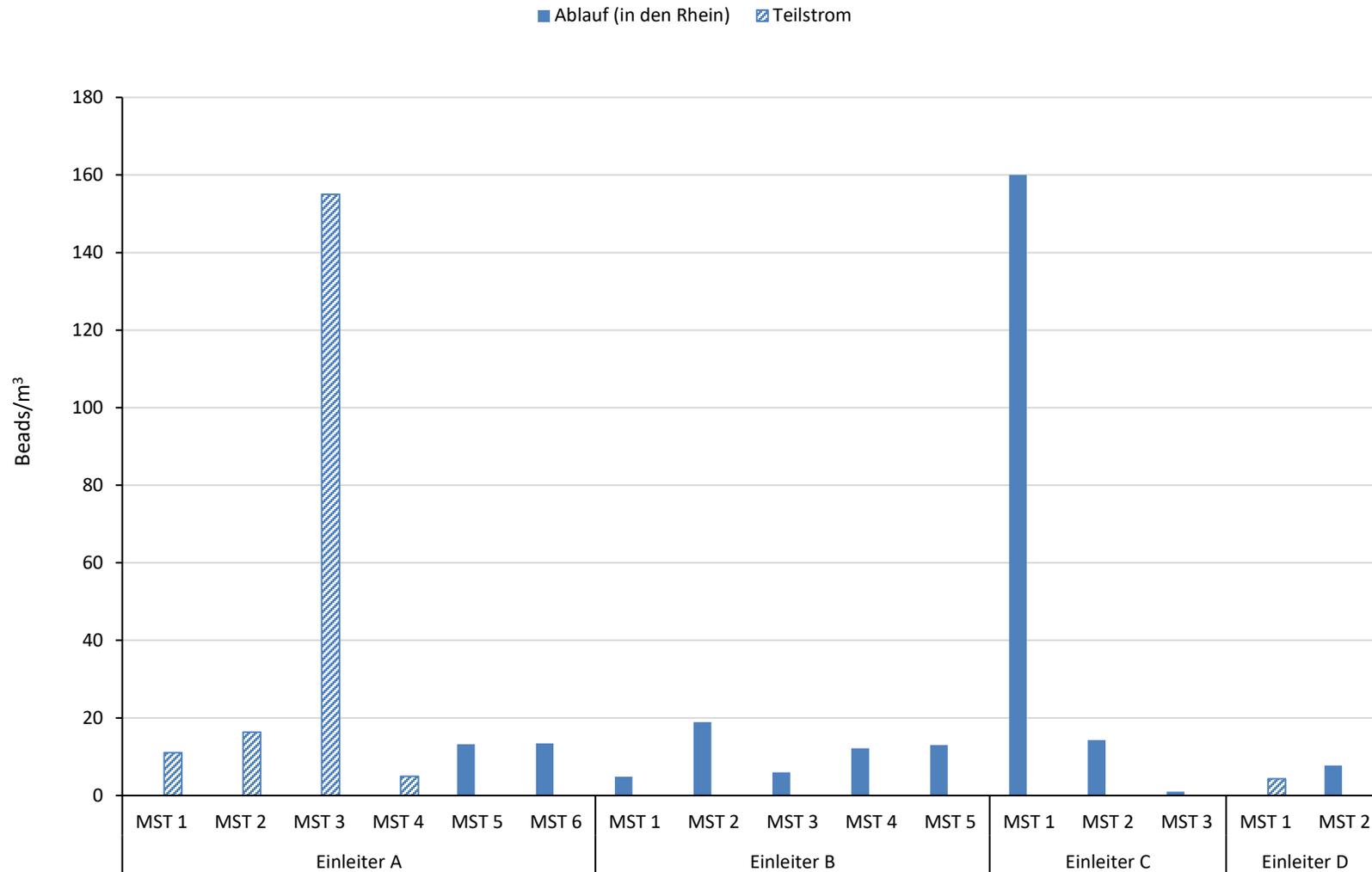


# Surface water results



- Increase in beads/m<sup>3</sup> recognisable within the course in NRW
- Findings between 0.6 - 3.6 beads/m<sup>3</sup>
- Here, too, only a single examination
- Comparatively higher findings in Düsseldorf-Flehe  
→ Snapshot!



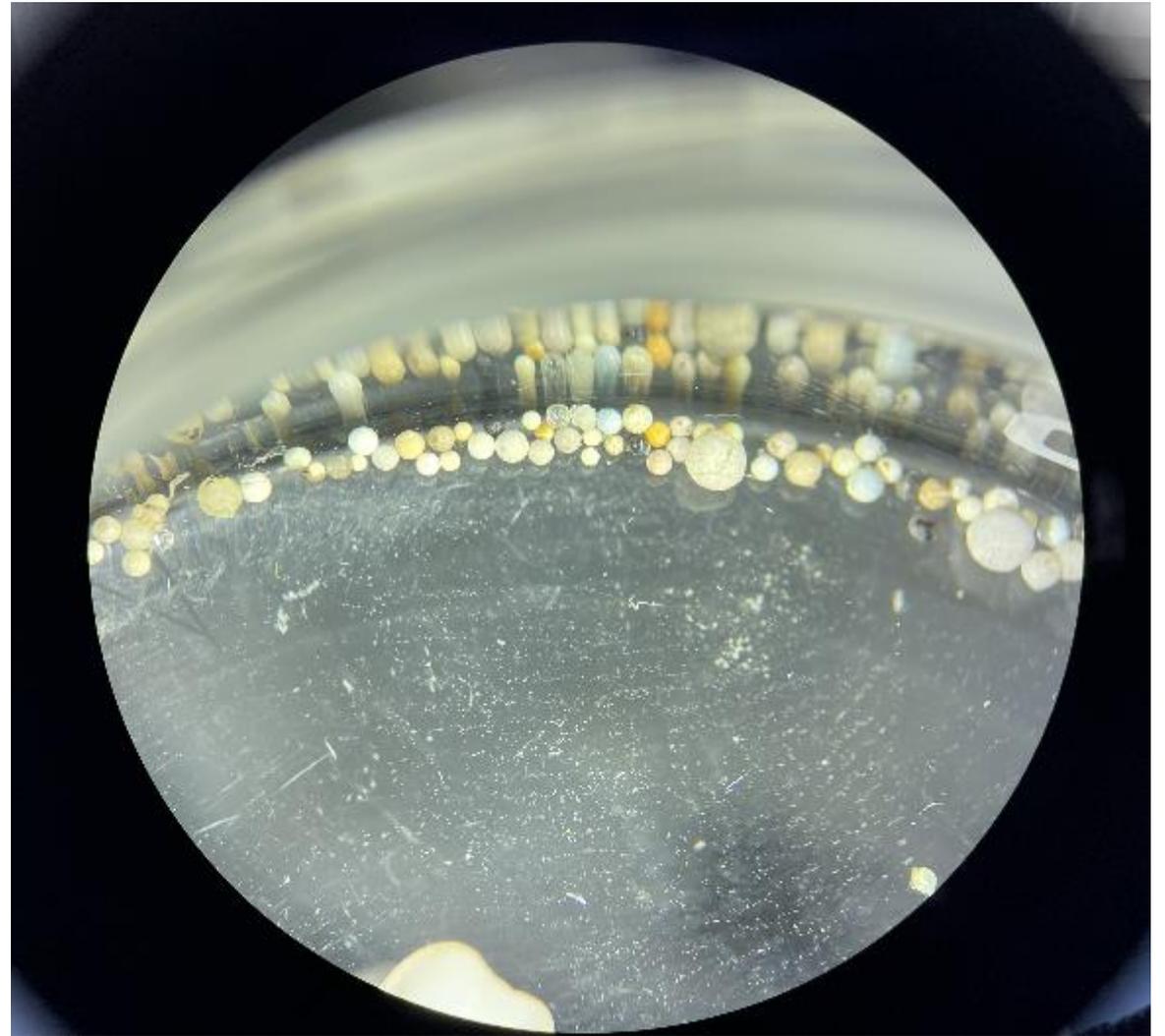


# Wastewater results

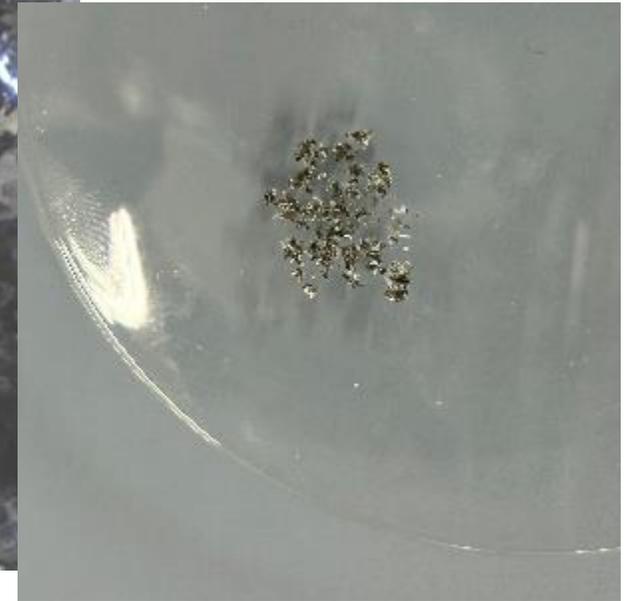
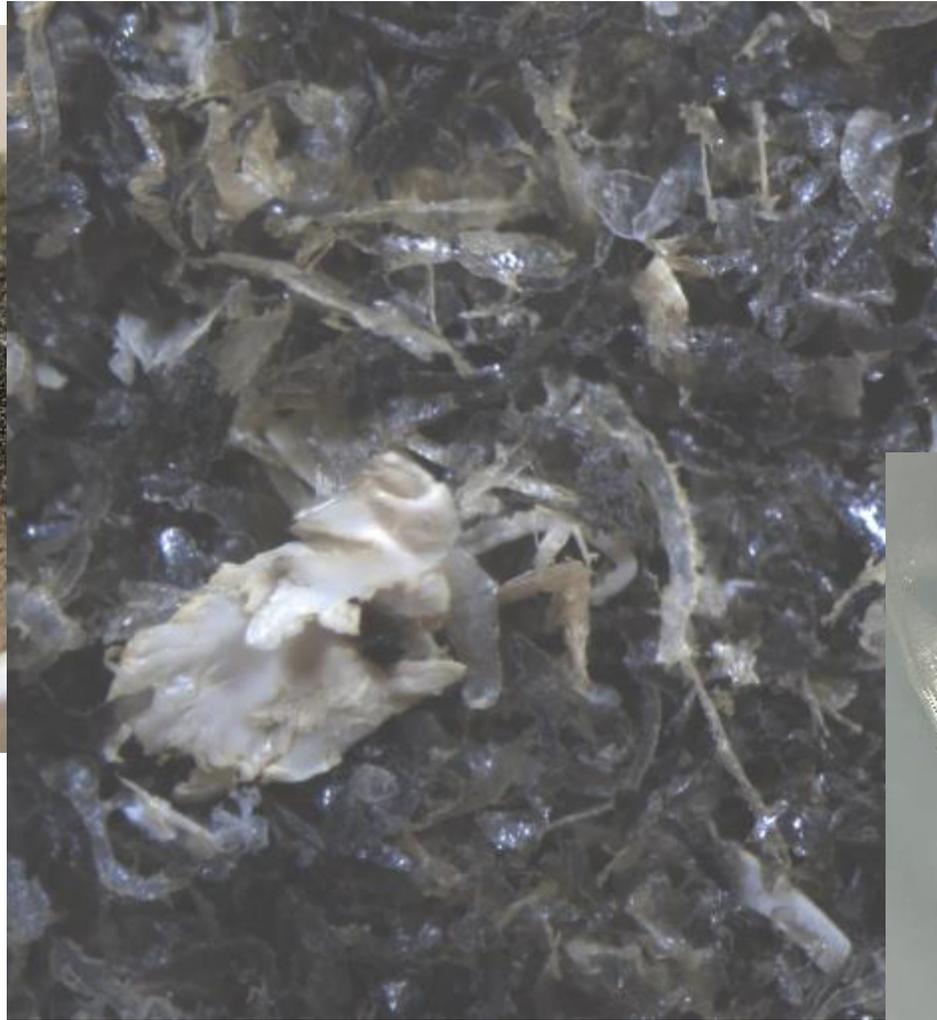
- Findings between 1 and > 160 beads/m<sup>3</sup>
- The sampled volume was between 1.4 - 14.6 m<sup>3</sup>
- Here too, only a single analysis: these provide indications of possible sources, but further analyses are absolutely necessary



# Surface water...



# Wastewater...



# Conclusion and next steps

- The inspection of the measuring points showed that it can be assumed that primary microplastics are not only introduced via the wastewater pathway
- Losses during packaging, loading and transport
  - Input through drifting or via rainwater runoff
- The results represent a snapshot, but provide good agreement with the number of beads/m<sup>3</sup> found by other investigations
  - Statements can only be made about the upper layers of the watercourse
  - The method is very labour-intensive and therefore cost-intensive, not (yet) suitable for routine use
  
- The results must be confirmed by repeating the measurements at selected measuring points
- Further investigations planned along the river Rhine

