

# Most river plastic does not flow into the ocean

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## Why river plastics are important

Plastic pollution threatens ecosystem health and human livelihood. In contrast to what is often assumed, most macroplastics (>0.5 cm) that leak into the environment never make it into ocean. We present an overview of (1) main sources, (2) transport processes over land, through rivers, and into the sea, and (3) sinks where plastics can be retained for long periods.

## Plastic sources

- **Mismanaged plastic waste:** Plastics that are (un)intentionally leaked into the environment.
- **Leakage from industry:** Pellets are lost in each step of production, handling, transport, processing and recycling.
- **Direct littering:** The majority of cigarette butts are released into the environment. Next to direct harm, they also contain toxic additives.

## Transport processes

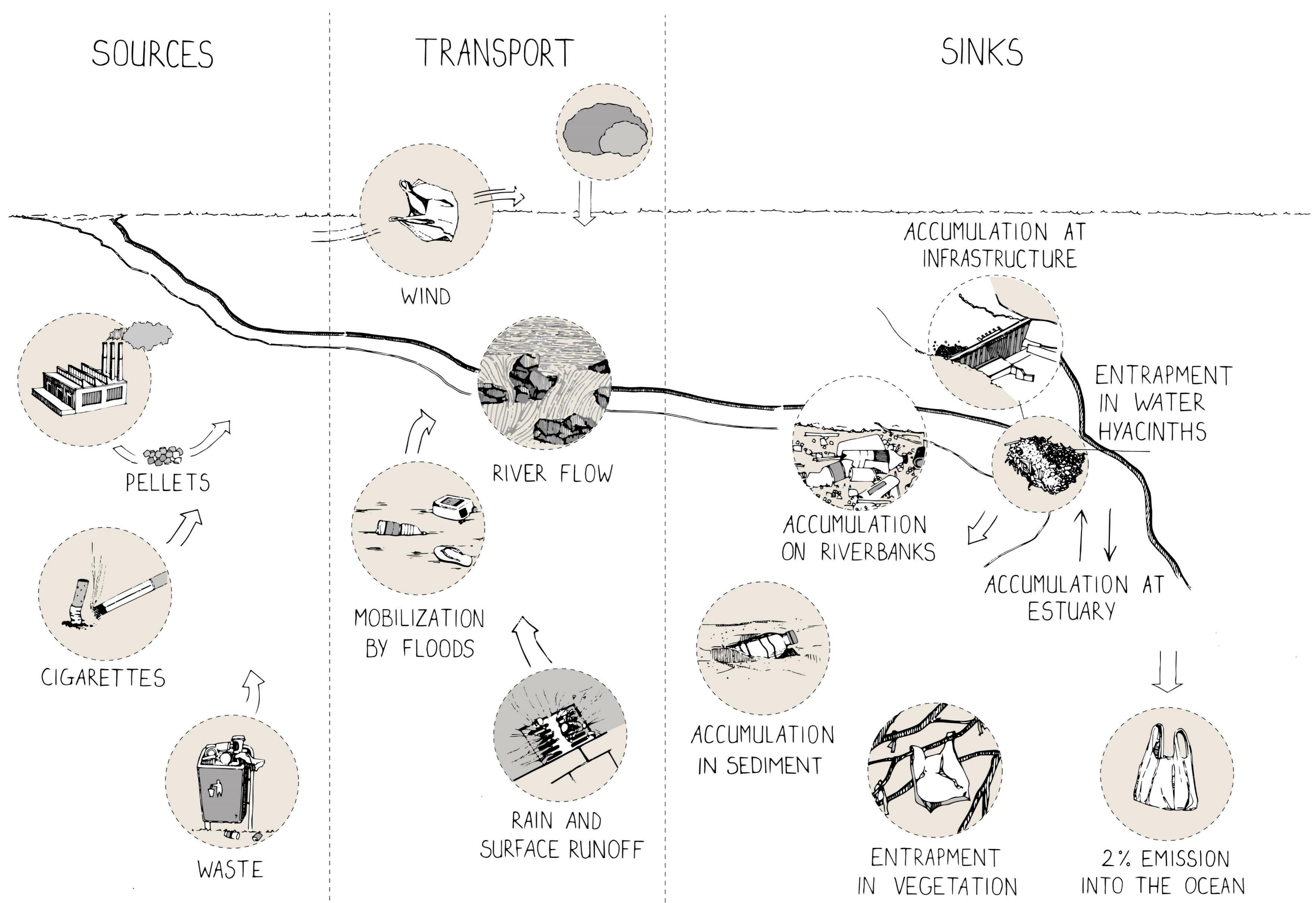
- **Wind and rain:** Can drive transport, but do not always explain observed variability.
- **Hydrology:** Transport and mobilization can be correlated to river dynamics.
- **Extreme events:** Floods multiply (re)mobilization of plastics in rivers.

## Sinks

- **Riverbanks:** Plastics are deposited on riverbanks and floodplains, where they can be retained for decades and potentially centuries.
- **Vegetation:** Both riparian and aquatic plants entrap plastics. Trees catch plastics after floods (Christmas tree effect), floating vegetation such as water hyacinths can contain up to 80% of the total floating macroplastics.
- **Infrastructure:** Dams, urban drainage works, litter traps, groynes block, clog and entrap plastics.
- **Estuaries:** Due to tidal dynamics plastics experience bidirectional flow, and diurnally varying water levels. This increases the likelihood of entrapment on riverbanks, in sediment and in vegetation.

## Conclusion

Recent estimates suggest that globally, **less than 2%** of the total amount of plastics leaked into the environment **flow into the sea**. Field studies suggest that **plastics are retained** in various parts of river systems. Future research should focus on finding out what happens to the rest, and improve the fundamental understanding of what factors determine the location, duration, and fate of plastics **accumulated within rivers**.



Link to research team information and further research

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Link to paper

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