



# Studies and management of microplastics The case of Lake Geneva

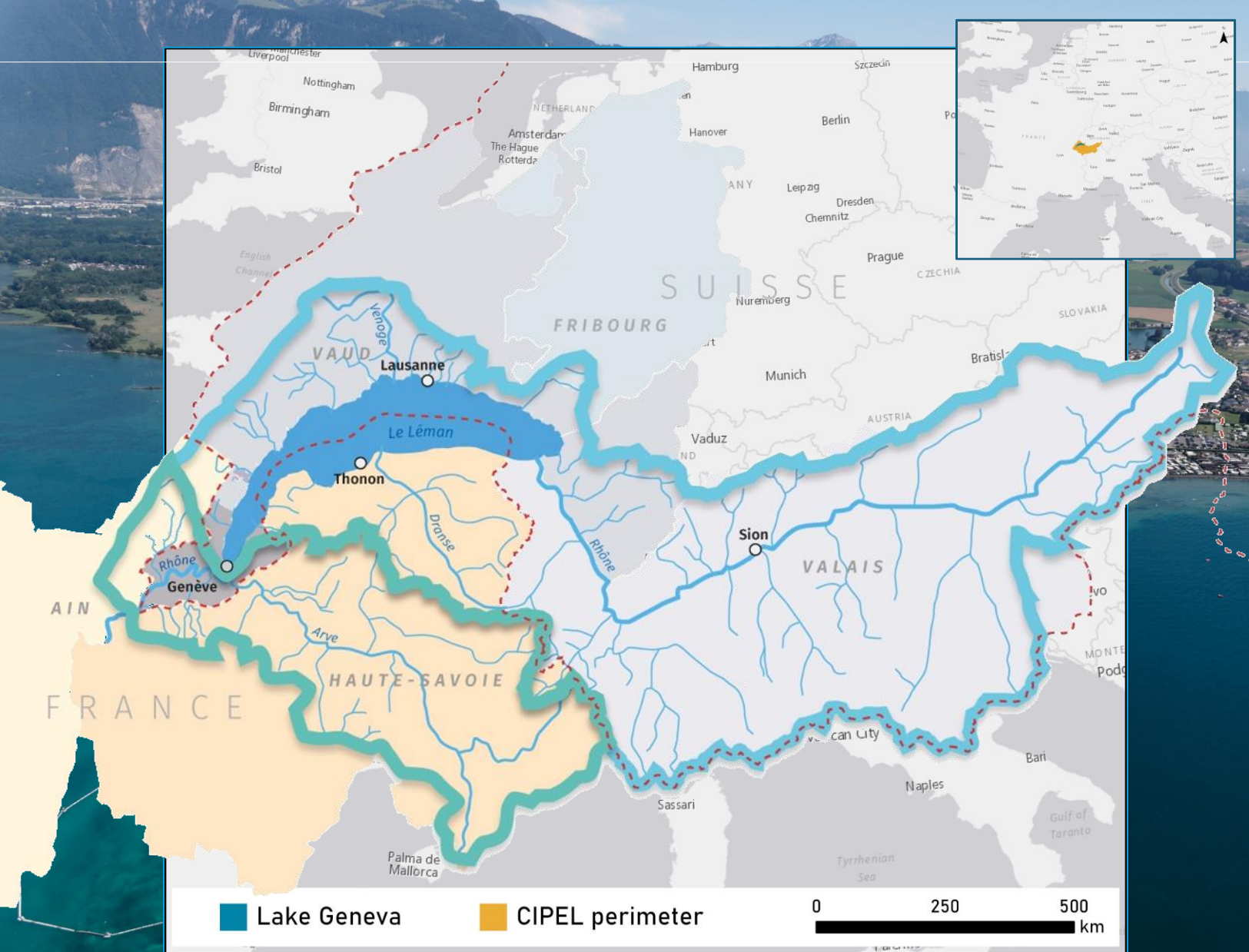
Workshop Microplastics in the River Rhine :  
Methods, Occurrence and Effects

Dr Nicole Gallina - General secretary

*Bonn - December, 11-12th, 2024*







## LAKE GENEVA

Area lake: **580 km<sup>2</sup>**

Volume: **89 billion m<sup>3</sup>** - Depth: **309m**

Main tributary: **Rhône river**

Flow rate: **182 m<sup>3</sup>/s**

## TERRITORY SHARED



**by Switzerland and France**

**2 countries**

**2 french departments:** Ain, Haute-Savoie

**3 swiss cantons:** Geneva, Vaud, Valais

**554 municipalities**

## CATCHMENT AREA

Surface area: **10 000 km<sup>2</sup>**

Population: **2.3 million**

Dinking water supply: **1 mio habitants**

# LOCATION AND TERRITORY

## ACTION PLAN 2021 - 2030

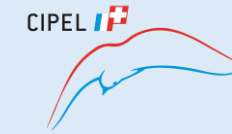
### Microplastics management

#### Objectives:

- Quantify the **presence of microplastics** in Lake Geneva and **identify their sources**
- Define a **coordinated monitoring strategy** at watershed level including potential impacts

#### Actions :

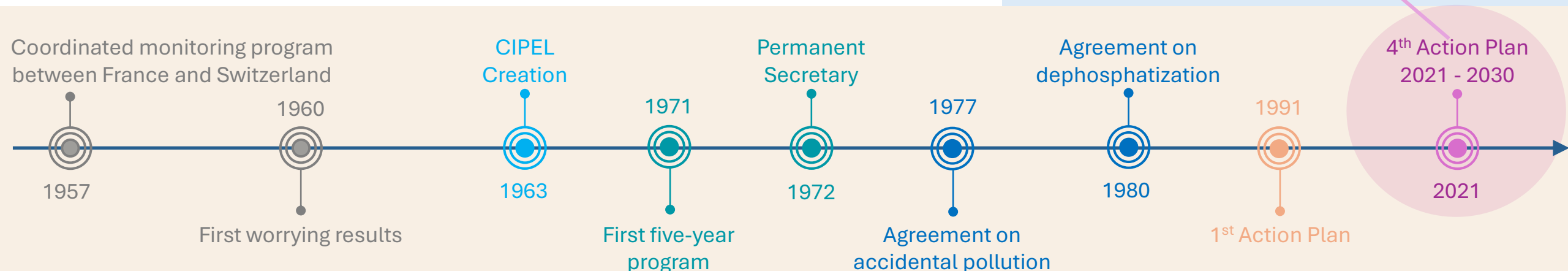
- Identification and categorization of pollution sources
- Monitoring the most significant sources
- Analysis of water column contamination
- Overall diagnosis
- Scientific watch and communication



COMMISSION  
INTERNATIONALE  
POUR LA PROTECTION  
DES EAUX DU LÉMAN

### About the CIPEL

**Objectives:** Maintain or restore the ecological quality of water and aquatic environments



# OVERVIEW OF MICROPLASTIC STUDIES IN LAKE GENEVA

## Completed studies

- ✓ Report on **Deep** Lake Geneva **Sediment** (2017)
- ✓ Report on **Microplastics** in Lake Geneva (2019)
- ✓ Study on **Microplastics in Fish** (2021-2022)
- ✓ Study Pla'Stock : **Microplastics** on Lake Geneva **beaches** (2022 - 2024)



## Upcoming studies

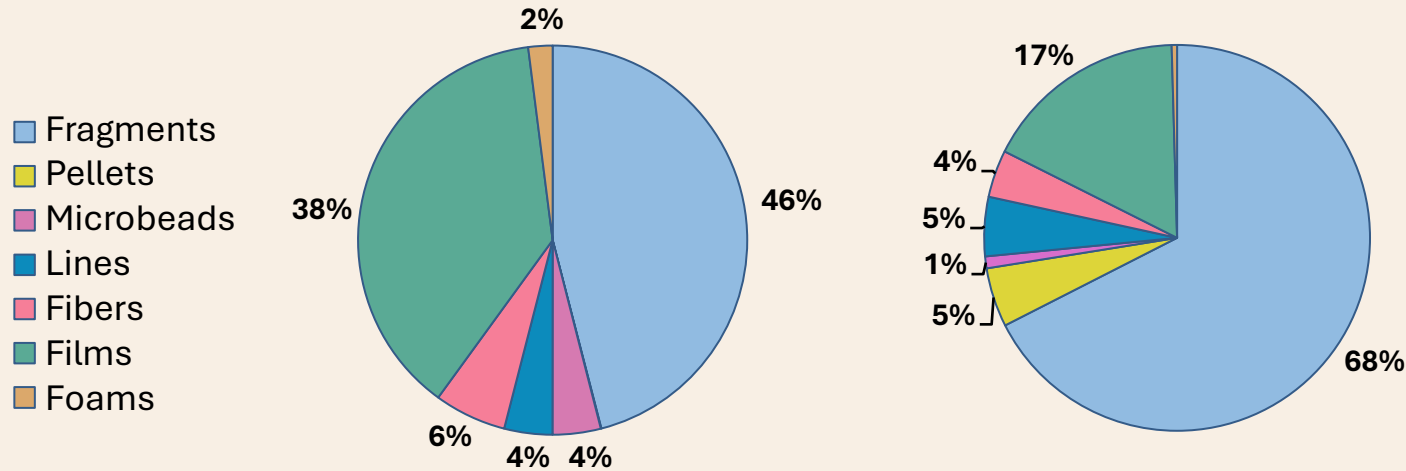
- Microplastics in sediments
- Microplastics in tributaries and WWTPs



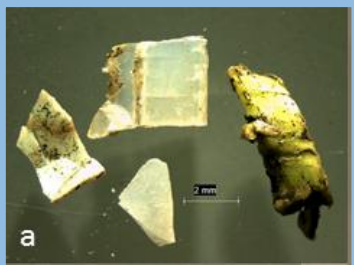
# COMPLETED AND UPCOMING STUDIES

# MICROPLASTICS IN DEEP SEDIMENTS (2017)

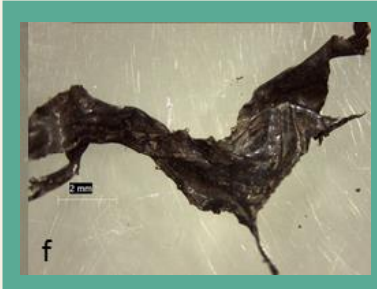
**Objective:** Identify the presence of microplastics in deep sediment



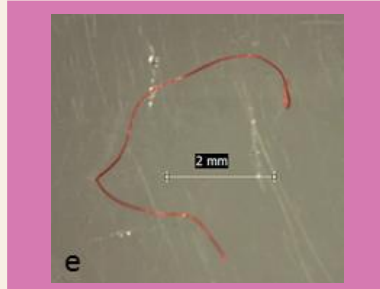
*Proportion of plastic types, by counts (left) and mass (right)*



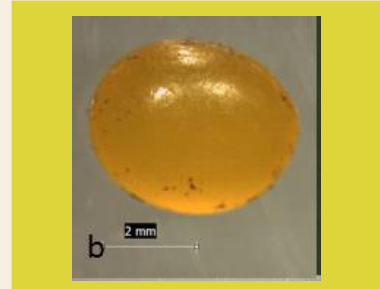
*Fragments*



*Film*



*Fiber*



*Pellet*

## Methodology

- **Visual identification** of particles, extraction, count and weigh.
- **Chemical analysis** by infrared spectroscopy (FT-IR ATR) to identify particle composition.

## Results

- **Plastic particles were detected in all sediment samples**
- Particles **originated from the degradation of plastic objects** (plastic bags and packaging).
- Main polymers identified: **PET** (polyethylene terephthalate), **PE** (polyethylene) and **PVC** (polyvinyl chloride).

## Conclusions

- **Widespread contamination of sediments** by microplastics
- Further research needed on larger-scale samples and **analysis of smaller particles**

**What is the potential impact of this pollution on the lake's ecosystem?**



# COMPLETED STUDIES

# MICROPLASTICS IN LAKE GENEVA (2019)

## Objective:

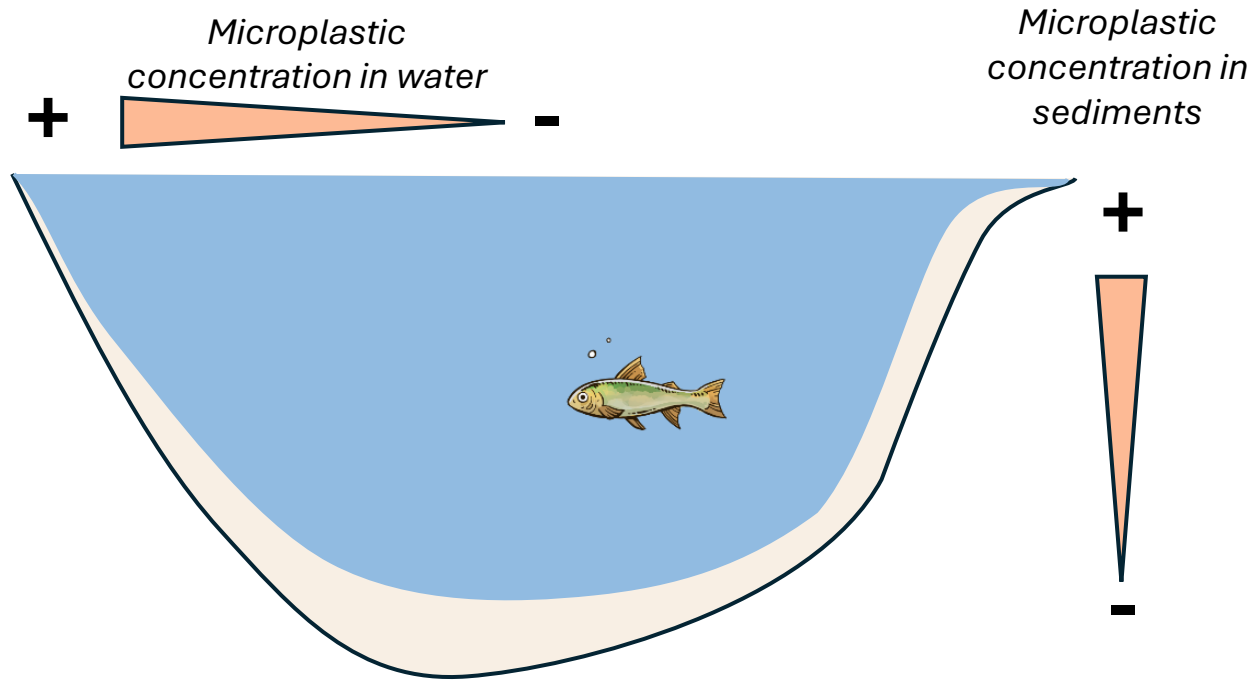
Explore the presence and distribution of microplastics in the waters and sediments



River mouth



Towns



## Methodology

- Water and sediment samples were taken from various areas of Lake Geneva.
- Microplastics were isolated by sieving and filtration.
- Analysis of chemical composition by infrared spectroscopy.

## Results

- **Wide distribution of microplastics in the lake**
- **High concentration** in areas close to towns and river mouths
- Main polymers identified : **PET, PE and PP** (polypropylene)
- Microplastics are most **abundant at the surface and in shallow sediments**

## Conclusions

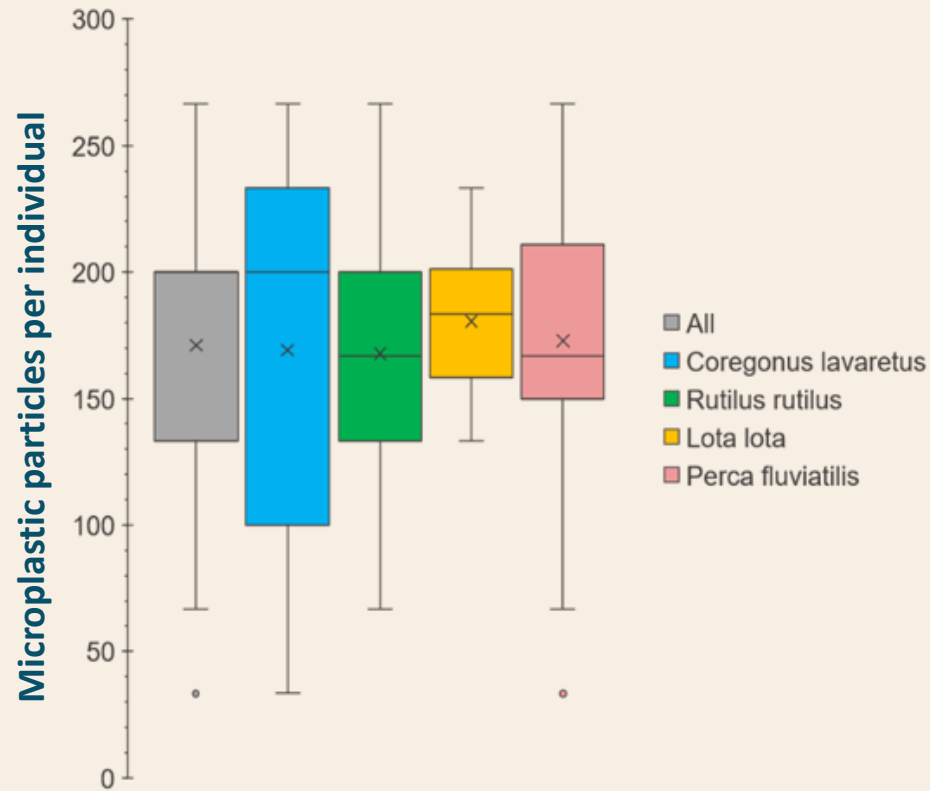
- **Significant microplastic pollution in Lake Geneva**
- Measures needed to **limit the input**
- Special attention and **improve preventive action**

# COMPLETED STUDIES



# MICROPLASTICS IN FISH (2021-2022)

**Objective:** Study microplastic ingestion by fish



*Variability in the number of microplastic particles per fish species*

## Methodology

- 89 fish digestive tracts
- Analysis using direct laser infrared imaging (LDIR)

## Results

- **Microplastics detected in 100% of the fish**
- **100 - 200 particles** per individual
- Size particle : **12 - 100  $\mu$ m**
- Main polymers: **polyamide, polycarbonate, PET** and **polyurethane**.

## Conclusions

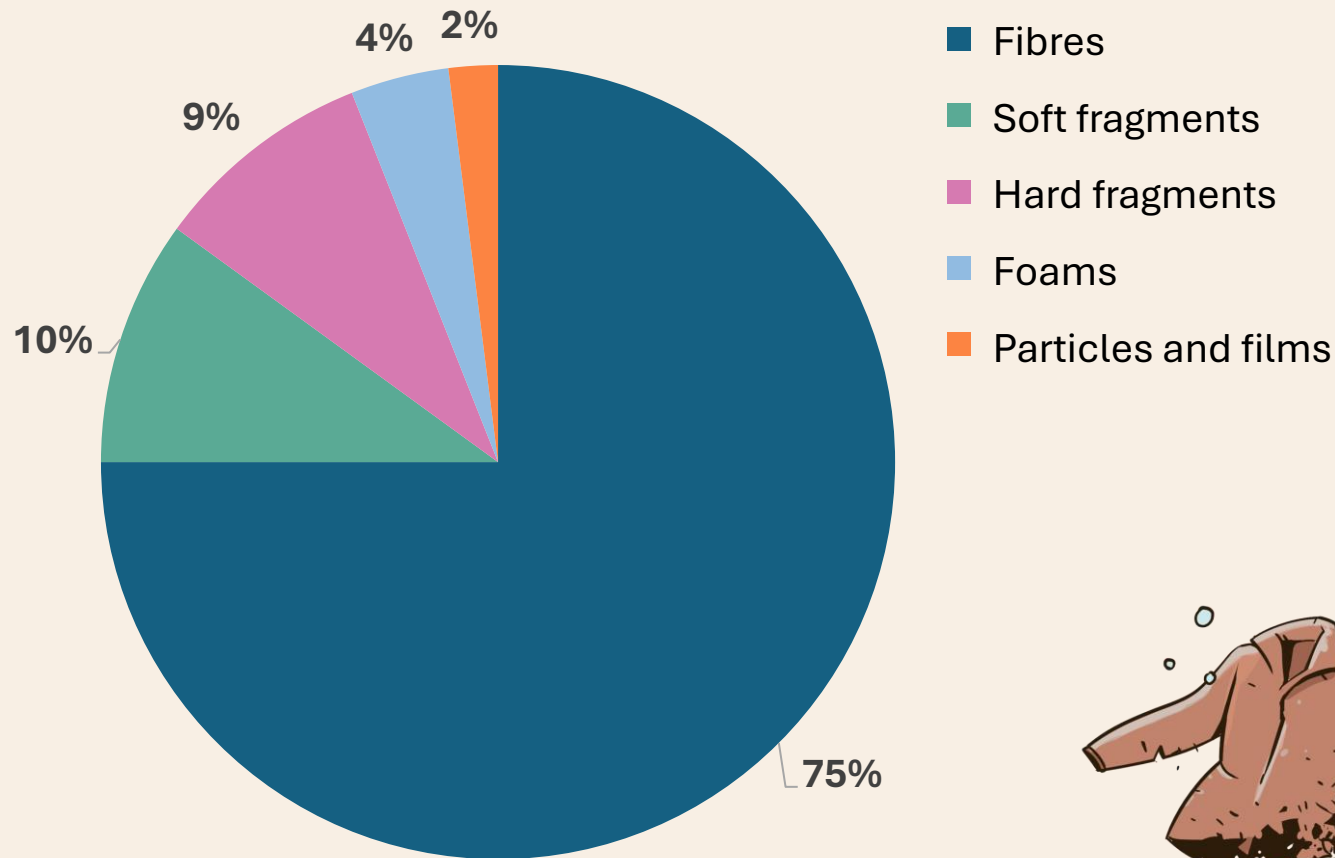
- **Widespread exposure of fish to microplastics**
- **Potential health risks** due to the physical and chemical effects of these particles.



# COMPLETED STUDIES

# PLA'STOCK : MICROPLASTIC ON LAKE GENEVA BEACHES (2022-2024)

**Objective:** Quantify plastic pollution on Lake Geneva beaches



## Methods

- 25 Swiss and French beaches sampled

## Results

- Microplastics: **7'600 particles / m<sup>2</sup>** (60% textile fibres)
- Macroplastics: **packaging, cigarette ends, pellets**
- **Communication to municipalities** in the Lake Geneva catchment area

## Conclusions

- **Widespread pollution on beaches**
- **Preventive measures needed** to limit plastic input



COMPLETED STUDIES



## PLA'STOCK : MICROPLASTIC ON LAKE GENEVA BEACHES (2022-2024)

### Communication to municipalites – 500 letters sent

#### 1. Strengthen Public Policies:

- Implement stricter regulations to reduce plastic pollution.

#### 2. Lead by Example:

- Adopt exemplary practices in public institutions.

#### 3. Train Local Teams:

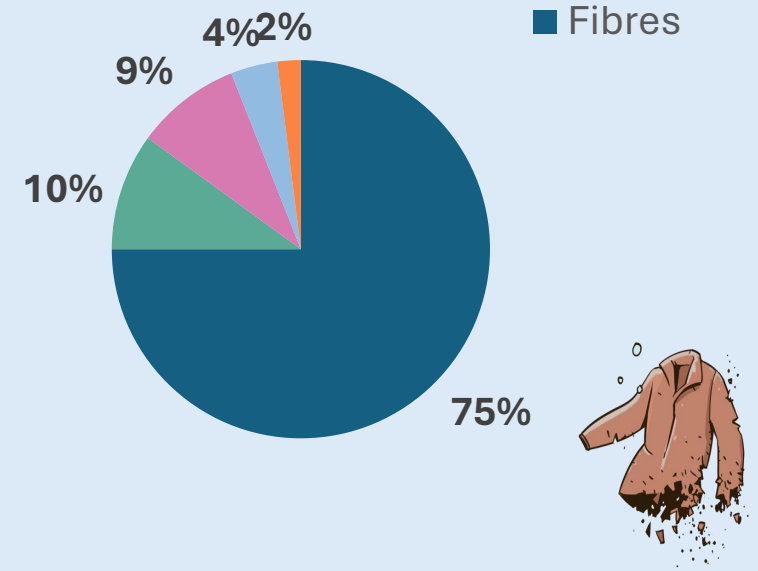
- Educate road maintenance teams on managing plastic waste on municipal worksites.

#### 4. Promote Responsible Practices:

- Recommend the use of reusable containers during events.
- Encourage local businesses to prevent leaks of industrial pellets and plastic fibers.

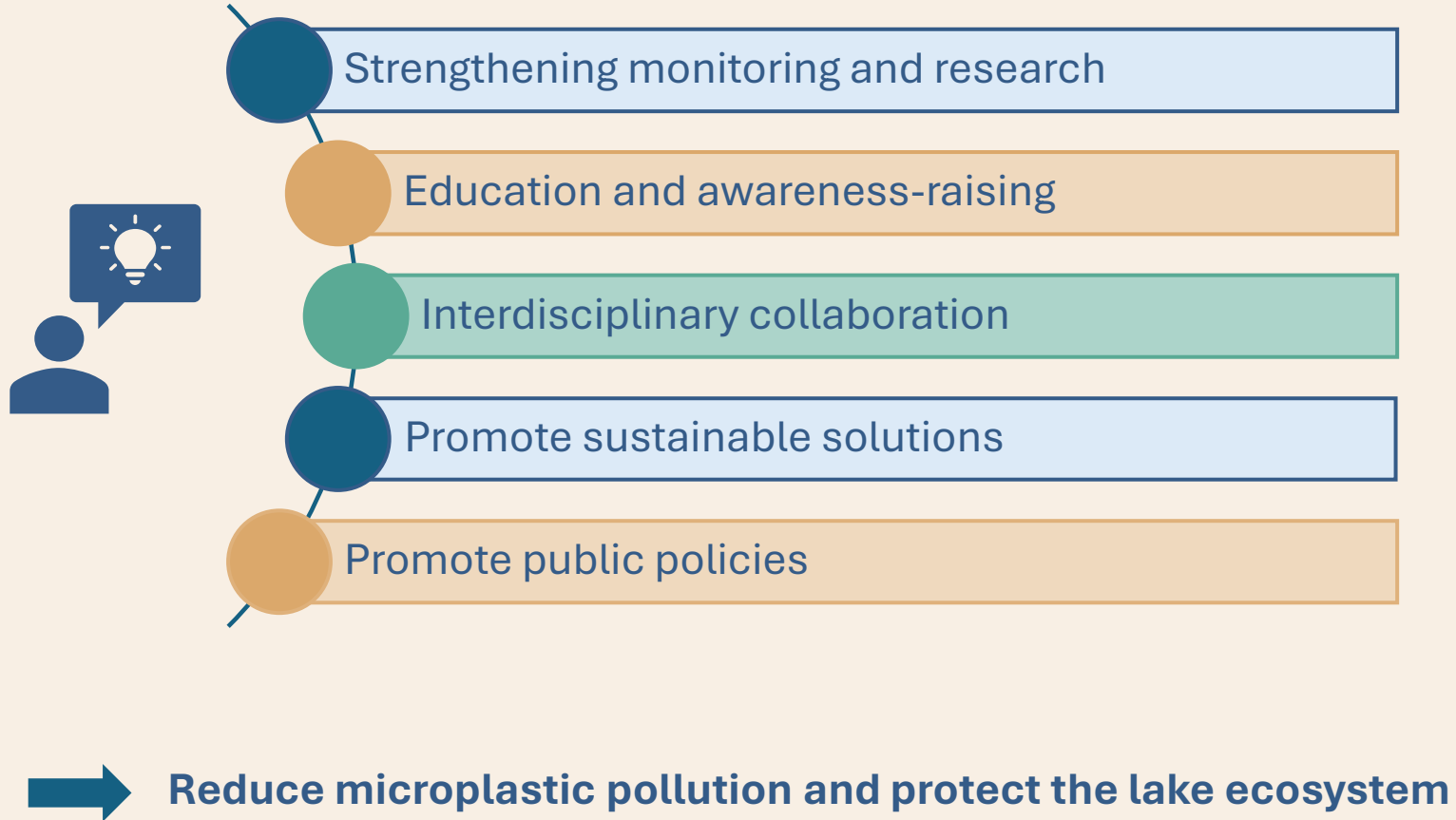
#### 5. Inform and Raise Citizen Awareness:

- Promote responsible behavior: avoid littering in nature, on beaches, roads, sidewalks, or in toilets.
- Raise awareness about plastics in clothing and promote the use of microfiber-catching laundry bags.



# COMPLETED STUDIES

## RECOMMENDATIONS AND FUTUR CHALLENGES



## FUTURE STUDIES AND RESEARCH

2025 { Microplastics in sediments  
Microplastics in tributaries  
and WWTPs



## RECOMMENDATION AND FUTUR CHALLENGES

CIPEL 



INTERNATIONAL COMMISSION FOR  
THE PROTECTION OF LAKE GENEVA

# Thank you for your attention

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