

## “SPlasH! - Stop to plastic in H<sub>2</sub>O!” An EU Project to investigate the port environment: results on microlitter contamination in seawater, sediment, and biotic samples

**Anna Reboa<sup>1</sup>, Laura Cutroneo<sup>1</sup>, Giovanni Besio<sup>2</sup>, Arianna Malatesta<sup>1</sup>, Mario Petrillo<sup>1</sup>,  
Laura Canesi<sup>1</sup>, Irene Geneselli<sup>1</sup>, Alessandro Stocchino<sup>3</sup>, Marco Capello<sup>1</sup>**

<sup>1</sup> DISTAV, University of Genoa, 26 Corso Europa, I-16132, Genoa, Italy

Phone: +39-(0)-010-35338143

<sup>2</sup> DICCA, University of Genoa, 1 Via Montallegro, I-16145, Genoa, Italy

E-mail: anna.reboa@email.it

<sup>3</sup> PolyU, Hong Kong Polytechnic University, 11 Yuk Choi Rd, Hung Hom, Hong Kong

**Introduction:** Nowadays, plastic pollution is considered one of the major emerging issues for marine environment and a lot of effort is spent to assess and quantify plastic presence in our seas. In this context, ports are very useful areas to study, being strictly connected to anthropic sources of pollution. Furthermore, despite they are semi-closed environments, they are also directly connected with open waters, making them both potential collectors and sources of plastics. One of the goals of the European Interreg Italy-France 2014-2020 Maritime Project “SPlasH!” is to analyze the presence of microplastic (MP) pollution in the ports of Genoa (IT), Olbia (IT) and Toulon (FR). The project also provides for the construction of a prototype for MP sampling in water column and the use of shared dispersion models for the distribution of MPs. Here we present the results from the study of microlitter contamination in seawater, sediment and fish stomachal content samples, collected in the ports of Genoa and Toulon.

**Methods:** Seawater and sediment samples were collected in the ports of Genoa and Toulon, using a Niskin bottle and a Van Veen grab, respectively. The Port of Genoa was also selected for the collection of fish samples from the Family Mugilidae. The sampling of fish was also performed at a commercial fishing area in S’Ena Arrubia (Sardinia, IT), to compare areas differently affected by anthropic activities. Samples underwent microfiltration and density separation, and items extracted have been analyzed and classified under optical microscope (Fig.1). The analysis of polymers was carried out on 20 % of the items for each sample using the micro-Raman to characterize MPs (Fig.1).



**Fig. 1:** A red fiber of polyester analyzed by optical microscope (left) and micro-Raman (right)

**Results:** Items extracted have been classified by shape, color and dimension by optical analysis, revealing a prevalence of filament and fragment

shapes and a higher presence of particles in the dimensional range 63-500  $\mu\text{m}$ . Polymer characterization shows the presence of MP in most of the samples. The main polymer found in all the three matrices is polyethylene (PE); in addition, a prevalent presence of polyester (PS) can be highlighted both in water and fish samples, while sediment samples show a major content of polypropylene (PP) particles.

**Discussion:** Water samples show a higher MP frequency compared to sediment samples. This is probably due to the NaCl in the density separation process for extracting MPs, which allows only less dense MPs to float, such as PE, PP and PS [1]. The use of this salt does not make possible the extraction of denser MPs, such as PET and PVC, which are more likely to sink and accumulate in the sediment. Stomachs of fish from S’Ena Arrubia, compared to the ones from Genoa Port, were almost empty in terms of organic matter, but both revealed the presence of items, meaning that items have been retained in stomachs of fish from S’Ena Arrubia after digestion. A relevant part of those items is sediment particles but MPs correspond to an average of 11% of the analyzed items both in Genoa and in S’Ena Arrubia, showing that MPs can be retained in the stomach as for sediment particles [2], and so they can be potentially accumulated in the stomach. The Project “SPlasH!” has been very useful to better understand contamination by MPs in port areas and the results, combined with the use of dispersion models, can be exploited by Port Authorities to improve the management of this emerging environmental issue.

**Acknowledgements:** The present study was funded by the European Interreg Italy-France 2014-2020 Maritime Project SPLasH! "Stop alle Plastiche in H<sub>2</sub>O!" (CUP: D31I18000620007).

**References:** [1] Correia Prata et al. (2019) *Trends in Analytical Chemistry* **110**:150-159; [2] Almeida (2013) *Estuarine, Coastal and Shelf Science* **57**: 313-323