Additional educational and recreational activities for the Sail in History project

Clean the Sea Activity on Microplastics

Sail in History

Co-funded by the European Maritime and Fisheries Fund

www.sailinhistory.eu

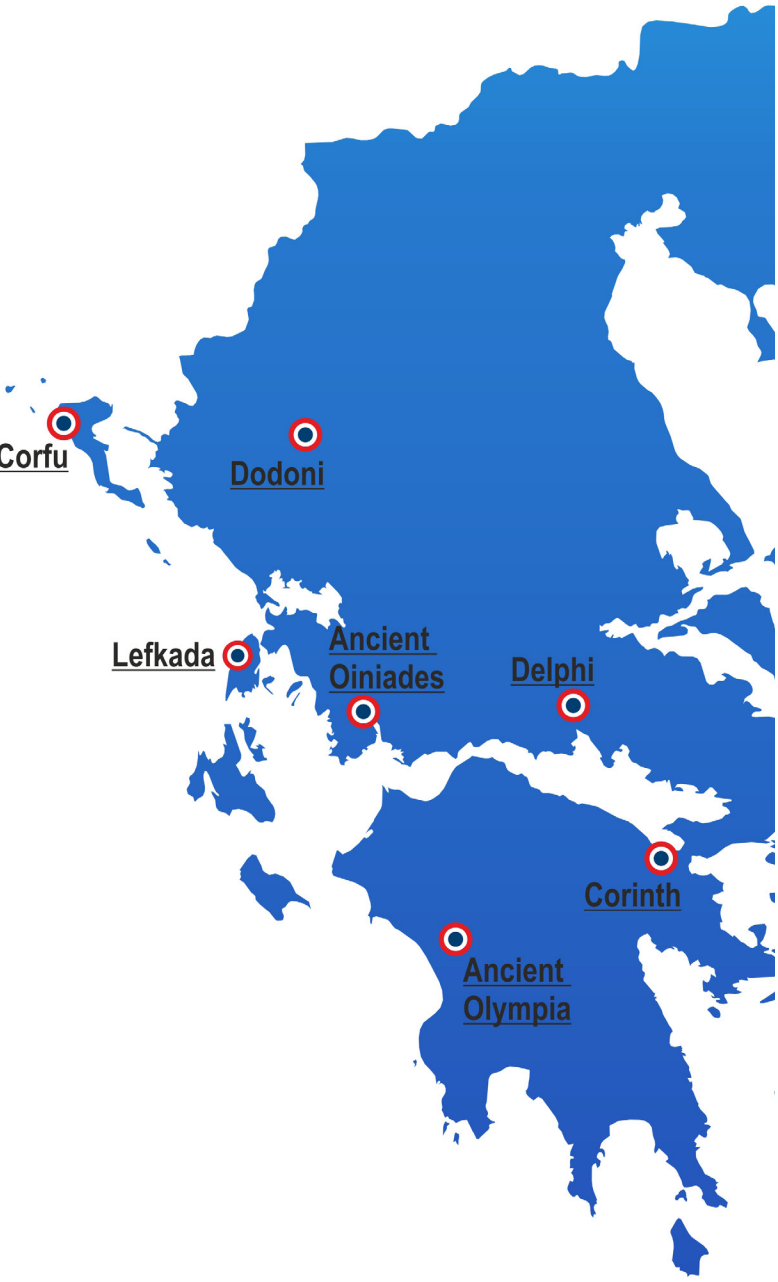
In the framework of the "Sail in History" project some additional educational and recreational activities will be carried out on-board.

ACTIVITY ON MICROPLASTICS

Following a standard procedure you will sample the water sea with a bin. Then take some samples of sea water often apparently clear and sieve it. After the preparation on a Petri dish, observe under microscope the microplastics invisible at naked-eye discovering the many kinds of microlitter present in the seawater.

This activity will increase awareness about this emergency making a direct experience of this pollution in the sea.


Punta Scifo
Capo Colonna
Le Castella
Caulonia
Locri Epizephyrii
Reggio Calabria



MICROPLASTICS

IN THE MEDITERRANEAN SEA

DID YOU KNOW

The Mediterranean region has been noted to contain the sixth-largest accumulation of plastic debris on the planet, with densities of floating plastics comparable to those found in the five major sub-tropical ocean gyres, including the Great Pacific Trash Vortex. Debris in the forms of both macroplastic pieces (>5mm) and microplastic particles (<5mm) threaten the unique biodiversity of the Mediterranean sea, which hosts around 10% of all marine species despite covering less than 1% of the global ocean area. Given the ecological and socioeconomic importance of this region, plastic pollution brings serious threats to both marine and human life.

Microplastics, were do they came from ?

Today we are surrounded by plastic, many objects we currently use are made of it. Plastic is so widespread in our daily life that we don't notice of the amount of wastes produced and of the consequences on the environment.

Through physical, chemical and biological processes, large plastic debris fragments can degrades into micro-sized plastic commonly referred to as **Microplastics**. Microplastics are a specific plastic particles with size from 1 nanometer up to 5 millimeters according to the U.S. National Oceanic and Atmospheric Administration (NOAA) and have been detected in all levels of the marine environment.

These very small pieces of plastic are defined **primary microplastics** if there are directly released into the environment as such (microfibers, microbeads, nurdles) and **secondary microplastics** if are generated from the degradation of larger plastic products once they enter the environment through natural weathering processes.

Microplastics debris pollute all environments and are particularly profuse and dangerous in the marine environment with adverse impacts on marine biota, biodiversity as well as human health. Microplastics have been found in the stomachs of many marine organisms from plankton species to whales. They can also accumulate toxic substances on their surface therefore represent a potential concentrated source of environmental pollution or act as a vector of toxic pollutants in the food web with some severe health implications.

The microplastics concentration in the ocean is exponentially increased in the last few years as a result of increased plastic production, use and inefficient waste disposal management.

For an accurate evaluation of the presence and the effects of microplastics in the marine habitat, it is necessary to use standardized sampling and quantification methods and common units. A number of sampling techniques have been developed and designed to assess the presence of microplastics in the marine matrices (water, sediment and biota) trough reproducible analytical methods, with low technology and cost effective, to improve characterization, identification and quantification of plastic fragments.

PLASTIC POLLUTION *is a global environmental issue and its major aspect is the presence of microplastics in the aquatic ecosystems.*

You Can Help. Here's How.

Do these six pain-free things, and you'll help reduce the impact plastic is having on oceans and other waterways around the world.

How long does it really take to degrade Plastic?

In a world that can seem overwhelmed by potentially eternal plastic waste, are biodegradables the ultimate solution?

Plastics vary in composition and strength and break down over different timeframes. Harsh environmental conditions accelerate the decomposition process and break plastics into smaller pieces. However it is these small pieces which will remain in the environment for hundreds of years and thus cause harm to organisms

In 2015 the United Nations Environment Programme wrote off biodegradables as an unrealistic solution that will neither reduce the amount of plastic flowing into the oceans nor prevent potential chemical or physical harm to marine life. It concluded that the label "biodegradable" may actually encourage littering.

Things You Can Do

1. Give up plastic bags. Take your own reusable ones to the store. Denmark passed the first bag tax in 1993. Now, the average Dane goes through four single-use bags per year.

2. Skip straws. Unless you have medical needs, and even then you could use paper ones.

3. Pass up plastic bottles. Invest in a refillable water bottle. Some come with filters if you're worried about water quality. A handful of cities, including Bundanoon, Australia, and San Francisco, have banned or partially banned bottled water. But around the world, nearly a million plastic beverage bottles are sold every minute.

4. Avoid plastic packaging. Buy bar soap instead of liquid. Avoid produce sheathed in plastic. And while you're at it, give up plastic plates and cups. The French are (partially) banning the stuff.

5. Recycle what you can. Even in rich countries, recycling rates are low. Globally, 18 percent of all plastic is recycled. Europe manages 30 percent, China 25—the United States only 9.

6. Don't litter.

The Ocean Conservancy has run beach cleanups for 30 years. Of the top 10 types of trash they find, the only nonplastic item is glass bottles. Worldwide, **73 %** of beach litter is **plastic**: cigarette butts (the filters), bottles and caps, food wrappers, grocery bags, polystyrene containers. In 2016 the conservancy collected 9.200 tons of trash in 112 countries—around a thousandth of what enters the ocean each year.

MICROPLASTIC ACTIVITY

SCIENTIFIC APPROACH

The first step is the *Sampling on the sea surface by manta net:* start the sampling by manta net in one straight direction at 4 m distance from the boat for 30 min with a speed of approx. 2 - 3 knots; raise the manta net out of the water and rinse the outside of the net with seawater; remove the cod end and sieve (300 µm size) the sample; rinse the sieve into a glass jar using 70 % ethanol and keep refrigerated.

The second step is the Separation by visual identification using a stereomicroscope Visual sorting under microscope is necessary to separate the microplastic fragments from non-plastic particles. Each plastic piece could be picked up with forceps and placed in graduated dish to be counted, measured, photographed and classified. Digital photography enhances the morphological parameters and surface of substantial plastic particles to be computed automatically.

Electron probe micro-analyzer (EPMA) allows a more detailed observation of microplastics morphology and distribution in the sample.

Identification by fourier transform infrared (FTIR) spectroscopy: Fourier-transform infrared (FTIR) spectroscopy offers the possibility of accurate identification of plastic polymer particles according to their characteristic IR spectra.

HOW WE WILL PROCEED

Now let's try as true biologists to understand how much plastic is under our feet.

We will take 50 liters of sea water and we will pour 1 liter at a time into a glass beaker. Then we will filter the water slowly by the means of a 300 micrometer sieve (the size of the microplastics). After that we will take any fragments left in the sieve and separate the plastics from other materials. Put the plastic fragments with the tweezers in the Petri dish.

Proceed with observation at the stereomicroscope: (count the fragments present, describe the fragments: size, color, shape (rounded, fibrous, elongated, irregular, film, flake, etc.)

Take a picture of the fragments under the microscope.

Keep the fragments in the glass jar and sign it with the permanent marker writing the date, the name of the sample (the name could be relative the locality of sampling) and also the name of the child present aboard (to do a nice thing).

After this, you can repeat the procedure for the all water in the bin, or you can repeat the sampling in sea in other points filling again the bin.

Glass beaker and petri dishes

Examples of some of the types of microplastic that are proliferating our oceans

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ON THE ROUTE FROM GREECE TO MAGNA GRAECIA

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