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Eco-drifters for a dispersion experiment at the mouth of the River Arno: the citizen-science contribution

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From recent ISMAR Institute investigations a very high density of Antropogenic Marine Debries (AMD) has been assessed in the North Tirrenyan sea. Floating debris, both macro and micro, results to have very high concentrations, comparable or even higher than the one found in Pacific ocean and in the other identified “trash island” (Suaria et. al. 2016).
Parallel surveys performed along the coasts of Marine Protected Areas of the Pelagos Sanctuary, located in North Tyrrenian sea between Tuscany, Liguria and French, reveal an uneven distribution of beached marine litter: higher concentrations are in correspondence of river mouths, or related with fisheries and aquaculture activities. The most interesting outcome of this research is that trash densities are higher especially in those protected areas where access is forbidden to tourists (Giovacchini 2016). In these areas, according to preliminary data of a still ongoing investigation (Merlino 2016), the percentage of microplastics, too, seems to be higher than those of neighbouring areas outside the parks. The reason of these correlations can lie in the sporadic cleaning of non-touristy beaches, from which the resulting accumulation and fragmentation of the trash.
To study the mechanisms of transport and accumulation of AMDs in such areas we have devised a dispersion experiment to be carried out in March 2017 in San Rossore Regional Park, a strictly protected area (Pisa, Italy), located at the mouth of the Arno River, one of the major Italian rivers, running through the most densely populated and industrialized area of Tuscany. The experiment is unusual in that uses mini eco-drifters, devoid of transmission mechanisms and fully biodegradable. These eco-drifters are cork disks, self-made with the involvement of volunteers and high school students (citizenscience). These eco-drifters will be delivered at Arno’s mouth and followed by drones equipped with camera in the initial phase of their dispersion, and then recovered, some days after, by volunteers / students, in the large coastline around the mouth of Arno. Thus, pictures and movies taken by the drone cameras, together with records of spatial and temporal accumulation rates of the eco-drifters, shall give us information about the role of local currents in AMD deposition in the studied area. All collected information will be used to validate Lagrangian models describing local circulation. This is the first Italian dispersion experiment involving not only Research Centers (ISMAR and INGV), but also five Scholastic Institutes, two Educational Organizations (LABTER and TOSCIENCE) and a Regional Park. Citizenscience has a relevant scientific role in this experiment, starting from the eco-drifters construction to their recollection, but it represents also an effective way to raise young public awareness on the vulnerability of our coasts and marine environment. In the past years ISMAR has undertaken several marine litter monitoring programs supported by citizenscience (Merlino et al. 2015), also recounted through a Documentary (MARINE RUBBISH. A Challenge to share). This approach has proven to be very effective from the educational, social and scientific points of view.

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