

NET4mPLASTIC PROJECT

WP2 – Act. 2.3 Preparation/update of website, e-forum, public events organization and scientific papers publishing

D 2.3.5

Scientific papers n.2, it will contain the final project results, and will be published in open access journals for dissemination.

August, 2022 - Version Final

Project Acronym	NET4mPLASTIC
Project ID Number	10046722
Project Title	New Technologies for macro and Microplastic Detection and Analysis in the Adriatic Basin
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Partner in Charge	PP1 – University of Trieste (UNITS)
Partners involved	LP – University of Ferrara (UNIFE)
Status	Final
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CONTRIBUTING PARTNERS	UNIFE
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Data	Vers	Prep	Resp	Appr	Rev	Comment
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1 Introduction

Main activities related to WP2 during the entire Project have been: 1. Start-up activities, 2. Communication, dissemination and promotion campaign, 3. Website, e-forum, public events organization and scientific papers publishing.

The NET4mPLASTIC Project Application Form provided for the Activity 2.3 the following activities.

This activity consists in creating an informal dialogue environment within partnership as well as with ecofriendly consumers to stimulate the general public, interested in sustainability related issues. This activity consists also in creating an Eforum to stimulate all the public interested in sustainability related issues and to discuss the evolution of project vision. Therefore the project will largely take advantage of INTERREG web platforms. The website will contain the questionnaire for evaluating the communication activities and all the documents realized within NET4mPlastic. This activity also aims at the organization of events and demonstration sessions at different levels concerning plastic and MP issues. A final public event transmitted on streaming will be held in Trieste with the participation of all partners during which final results and future improvements of project's activities will be discussed. At least two scientific papers will be submitted in open access journals.

At the end of the Project, regarding the preparation of website, e-forum, public events organization and scientific papers publishing, the official website has been updated few times, but UniTS encountered several problems with the publication of news and updates, so it was preferable using the social pages of the Project. On the official website is also available the NET4mPLASTIC public questionnaire. Many PPs disseminated the Project news and updates on their official websites, like Marche Region, IZSAM, UNIFE, RERA. Regarding events and demonstration sessions, UniTS organized three webinars in December 2020, and then collected all the presentations abstract for creating videos posted on YouTube Project Channel. An important demonstration event was performed in autumn 2021, within the marine drone campaign at Po Delta and Rijeka and Split. Three newsletters have been prepared during the Project, in collaboration with several PPs. Regarding Scientific papers, UniTS published two papers in 2021 (Marine Pollution Bulletin, Environmental Pollution and Sustainable Materials and Technologies), UNIFE published two papers in 2021 (Environmental Pollution and Drones). LP performed a Special Issue of Microplastics (Microplastics in the Marine Environment), that is currently open, with already 3 accepted papers (one from IZSAM group).

All the 4 target groups programmed to be reached during the Project have been reached and exceeded. Several educational activities have been carried out during the 4-year Project, by UNIFE, UniTS, IZSAM, TIPH. NET4mPLASTIC was presented at several national and international conferences by some PPs, as well as at many online meeting and workshops with other Projects institutions and stakeholders, also collaborating with other Interreg, LIFE, MED Project. After the conferences several abstract and short papers were published by some PPs. As an ultimate communication activity, an in presence and online workshop was organized by UniTS in collaboration with UNIFE during the European Maritime Day in Ravenna in May 2022.

2 Scientific papers

Pizzurro, F.; Recchi, S.; Nerone, E.; Salini, R.; Barile, N.B. Accumulation Evaluation of Potential Microplastic Particles in *Mytilus galloprovincialis* from the Goro Sacca (Adriatic Sea, Italy). *Microplastics* 2022, 1, 303-318. <https://doi.org/10.3390/microplastics1020022> (ANNEX I - open access)

Caniato, M., Cozzarini, L., Schmid, C. et al. A sustainable acoustic customization of open porous materials using recycled plastics. *Sci Rep* 12, 10955 (2022). <https://doi.org/10.1038/s41598-022-14009-z> (ANNEX II - open access)

Conti I, Simioni C, Varano G, Brenna C, Costanzi E, Neri LM, Legislation to limit the environmental plastic and microplastic pollution and their influence on human exposure., *Environ Pollut.* (2021), 288:117708, <https://doi.org/10.1016/j.envpol.2021.117708>

Taddia, Y.; Corbau, C.; Buoninsegni, J.; Simeoni, U.; Pellegrinelli, A. UAV Approach for Detecting Plastic Marine Debris on the Beach: A Case Study in the Po River Delta (Italy). *Drones* (2021), 5, 140. <https://doi.org/10.3390/drones5040140> (ANNEX III - open access)

Chiara Schmid, Luca Cozzarini, Elena Zambello, A critical review on marine litter in the Adriatic Sea: Focus on plastic pollution. *Environmental Pollution* Volume 273, (2021), 116430, <https://doi.org/10.1016/j.envpol.2021.116430> (ANNEX IV - open access)

Marco Caniato, Luca Cozzarini, Chiara Schmid, Andrea Gasparella, Acoustic and thermal characterization of a novel sustainable material incorporating recycled microplastic waste. *Sustainable Materials and Technologies* 28 (2021) e00274, <https://doi.org/10.1016/j.susmat.2021.e00274> (ANNEX V - open access)



Chiara Schmid, Luca Cozzarini, Elena Zambello, Microplastic's story. *Marine Pollution Bulletin* Volume 162, (2021), 111820, <https://doi.org/10.1016/j.marpolbul.2020.111820>

ANNEX I



Article

Accumulation Evaluation of Potential Microplastic Particles in *Mytilus galloprovincialis* from the Goro Sacca (Adriatic Sea, Italy)

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Abstract: Microplastics (MPs; <5 mm) are present throughout the marine environment and are recognized as an emerging threat to aquatic ecosystems. Filter feeding organisms, such as mussels, are considered as bioindicators of MP pollution and are useful to evaluate the potential risks of MPs to human health. The work presented shows data on potential MPs found in *Mytilus galloprovincialis* samples collected from the Adriatic Sea during two sampling sections (1st sampling: December 2019 and 2nd sampling: May 2020). The mussels were subjected to digestion with H₂O₂ individually and filtered and the MP elements found were observed using a stereomicroscope and ultimately categorized by shape, size class and color, with the aid of a digital camera and data acquisition software. The highest MP concentrations were observed in the mussels collected in December 2019 (1.11 microplastic items per gram wet weight of mussels' tissue), highlighting the possible influence of the following two main factors: greater river discharges following adverse weather events and higher river water pollution due to industrial activities. Indeed, the second sampling was performed after the Italian lockdown, due to the COVID-19 emergency. MP fibers (50–80%) were the most abundant type of MPs identified, followed by fragments (10–40%), granules (1.5–2.5%), non-categorized shape (1–2%) and foam (<1%). The color black (50–70%) and sizes smaller than 500 µm were the most dominant characteristics recorded both in the 1st sampling (50–70%) and the 2nd survey (30–50%). These data could be overestimated, due to the lack of polymer identification. The results of this study provide further data on the importance of bivalves as environmental bioindicators with regard to the pollution of MPs in the Adriatic Sea, supporting their instrumental role as environmental bioindicators for MP pollution.



Citation: Pizzurro, F.; Recchi, S.; Nerone, E.; Salini, R.; Barile, N.B. Accumulation Evaluation of Potential Microplastic Particles in *Mytilus galloprovincialis* from the Goro Sacca (Adriatic Sea, Italy). *Microplastics* **2022**, *1*, 303–318. <https://doi.org/10.3390/microplastics1020022>

Academic Editors: Corinne Corbau

Received: 12 April 2022

Accepted: 9 June 2022

Keywords: bio-monitoring; mussels; microplastics; Adriatic Sea

ANNEX II

scientific reports

 Check for updates

OPEN

A sustainable acoustic customization of open porous materials using recycled plastics

Marco Caniato^{1,✉}, Luca Cozzarini², Chiara Schmid² & Andrea Gasparella¹

Foams are commonly used as sound absorbers and thermal insulators for many industrial and construction applications. The insulating materials market is currently dominated by inorganic fibres like glass and mineral wool, as well as plastic foams. However, worldwide plastics consumption produces huge amounts of waste, generating concerns about soil, air and especially seawater pollution. Hence, new methods for recycling marine microplastic litter according to cleaner production criteria are being sought. This paper presents a novel, sustainable and eco-friendly foamy material made of microplastic waste, namely polyethylene terephthalate (PET) and polystyrene (PS), incorporated into a bio-based matrix. Samples with different compositions were prepared and then characterized for sound absorption properties. Evidence is presented of very good acoustic performances and of how the acoustic characteristics of the end product can be customized using different microplastic content and type. This allows envisioning many industrial and civil applications for this novel open-cell material.



Contents lists available at [ScienceDirect](#)

Environmental Pollution

journal homepage: www.elsevier.com/locate/envpol



Legislation to limit the environmental plastic and microplastic pollution and their influence on human exposure[☆]

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ARTICLE INFO

Keywords:

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Microplastic
Additives
Environmental pollutants
Legislation
Seafood consumption
Human health




ABSTRACT

Plastic pollution is an emerging problem and is a consequence of the post-consumer plastic waste accumulation in the environment coupled to mismanaged waste programmes. Countries are counteracting the continuous growth of plastic litter with different strategies: introducing bans and limits on both plastic items and materials, promoting plastic recycling and recovery strategies and encouraging voluntary clean up actions, as well as raising public awareness. However, the toxicity of plastics to the environment and organisms is not only related to their polymer chains, but also to the fact that plastic materials contain hazardous additives and can adsorb environmental pollutants (i.e. heavy metals and persistent organic contaminants, respectively). The plastic/additives/pollutants combination may be ingested by marine organisms and then enter in the food chain. Therefore, legislation for additives and contaminants is crucial both to reduce environmental pollution and their toxic effects on organisms, which of course includes humans. In this review, the current policies on plastics and related contaminants are described focusing on current laws. Moreover, recommendations for seafood consumption are suggested, since each fish or mollusc eaten may potentially result in plastic particles, additives or contaminants ingestion.



Article

UAV Approach for Detecting Plastic Marine Debris on the Beach: A Case Study in the Po River Delta (Italy)

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Abstract: Anthropogenic marine debris (AMD) represent a global threat for aquatic environments. It is important to locate and monitor the distribution and presence of macroplastics along beaches to prevent degradation into microplastics (MP), which are potentially more harmful and more difficult to remove. UAV imaging represents a quick method for acquiring pictures with a ground spatial resolution of a few centimeters. In this work, we investigate strategies for AMD mapping on beaches with different ground resolutions and with elevation and multispectral data in support of RGB orthomosaics. Operators with varying levels of expertise and knowledge of the coastal environment map the AMD on four to five transects manually, using a range of photogrammetric tools. The initial survey was repeated after one year; in both surveys, beach litter was collected and further analyzed in the laboratory. Operators assign three levels of confidence when recognizing and describing AMD. Preliminary validation of results shows that items identified with high confidence were almost always classified properly. Approaching the detected items in terms of surface instead of a simple count increased the percentage of mapped litter significantly when compared to those collected. Multispectral data in near-infrared (NIR) wavelengths and digital surface models (DSMs) did not significantly improve the efficiency of manual mapping, even if vegetation features were removed using NDVI maps. In conclusion, this research shows that a good solution for performing beach AMD mapping can be represented by using RGB imagery with a spatial resolution of about 200 pix/m for detecting macroplastics and, in particular, focusing on the largest items. From the point of view of assessing and monitoring potential sources of MP, this approach is not only feasible but also quick, practical, and sustainable.

Keywords: unmanned aerial vehicle (UAV); anthropogenic marine debris (AMD); marine litter; macroplastics; microplastics; multispectral camera



Citation: Taddia, Y.; Corbau, C.; Buoninsegni, J.; Simeoni, U.; Pellegrinelli, A. UAV Approach for Detecting Plastic Marine Debris on the Beach: A Case Study in the Po River Delta (Italy). *Drones* **2021**, *5*, 140. <https://doi.org/10.3390/drones5040140>

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ANNEX IV

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Review

A critical review on marine litter in the Adriatic Sea: Focus on plastic pollution



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A R T I C L E I N F O

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Microplastic
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Review

A B S T R A C T

Marine litter affects various habitats across the world. This review focuses on the Adriatic region, considering the presence of marine litter as well as microplastics (mPs) and macroplastics (MPs) in different environments (water, beach, seabed and biota). Data from 53 scientific papers were critically analysed, providing a snapshot of this type of contamination, and evidencing critical issues. The final part of the review provides considerations on spatial and temporal trends, comparing data with the available information provided by transport forecasting models. It emerges that the most investigated areas are those most subjected to the contribution of rivers, tourism or have the greatest relevance to nature conservation. Our analysis also reveals that, even though many international research projects have played a fundamental role in the creation of shared methods and protocols, currently available data are difficult to compare. Nevertheless, our results enhance knowledge of the state of the art in the research carried out so far, and on the situation regarding pollution due to the marine litter in the Adriatic Sea, as well as highlighting avenues for future investigation.

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ANNEX V

Sustainable Materials and Technologies 28 (2021) e00274

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Sustainable Materials and Technologies

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Acoustic and thermal characterization of a novel sustainable material incorporating recycled microplastic waste



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ARTICLE INFO

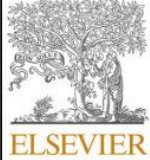
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Received in revised form 5 March 2021
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Keywords:
Microplastics
Sustainable material
Thermal modelling
Acoustic modelling
Plastic recycling

ABSTRACT

Worldwide, high plastic consumption leads to huge waste production. Macro and microplastic litter affects habitats everywhere, but especially marine environments. Unfortunately, plastic is particularly difficult to retrieve from the sea, since it tends to break up into smaller pieces due to wind, water movement and solar irradiation. Hence, its end-of-life handling and management has become a major issue. Most of the time recovered plastic waste is landfilled or burnt, since it is composed of an assortment of different polymers and/or has been polluted by salt or other marine substances. For these reasons, new recycling methods for marine litter, pursuing cleaner production criteria, are urgently required. This article presents a brand-new sustainable material, an eco-friendly foam made of waste microplastics incorporated into a bio-matrix. This novel open-cell material can be used as acoustic and thermal insulation for industrial, civil and maritime applications. Thus, an in-depth characterization is depicted, providing evidence of very good insulation properties and revealing how microplastics can be used to customize final acoustic and thermal performances.

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Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Marine Pollution Bulletin

journal homepage: www.elsevier.com/locate/marpolbul



Review

Microplastic's story

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ARTICLE INFO

Keywords:

Microplastics
Chemical characterization
Plastic degradation
Risk
Pollution

ABSTRACT

The problem of microplastic pollution is now the order of the day in front of everyone's eyes affecting the environment and the health of leaving creature. This work aims to retrace the history of microplastics in a critical way through a substantial bibliographic collection, defining the points still unresolved and those that can be resolved. Presence of marine litter in different environments is reviewed on a global scale, focusing in particular on micro and macro plastics definition, classification and characterization techniques.

3 Proceedings

Olivo, Buoninsegni, Vaccaro, Simeoni, Corbau (2021) "Preliminary Assessment Method of micro and macro plastics sources origin", 3rd EMCEI, June 2021

Bettarello, Cozzarini, Schmid (2021) "The use of sustainable sound absorbing foam re-cycling microplastics in sound insulation", ICSV, July 2021

Bettarello (2021) "Indoor sound field control by using a new sustainable material", ICSV, July 2021

Calore, Olivo, Corbau (2021), "Innovative integrated system for microplastic detection in the Adriatic Sea", Sealogy 2021, November 2021

Bettarello, Cozzarini, Lughì, Caniato (2022), "Un nuovo materiale fonoassorbente prodotto dal riciclo di microplastiche", 48th National Congress of Acoustic, May 2022

Buoninsegni, Olivo, Paletta, Vaccaro, Corbau (2022) "Marine litter surveys on Boccasette beach (Rovigo, Italy)" 9th International Symposium Monitoring of Mediterranean Coastal Areas: Problems and Measurement Techniques, Livorno, June 2022

Nicoli, Corbau, Marrocchino, Vaccaro (2022) "Studying ecosustainable management and environmental impact in the technological era of plastic", Geosciences Center 2022 conference, raw materials and sustainability, June 2022

Conti, Brenna, Neri (2022) "Microplastic uptake within human cells is time and dose dependent and displays a specific intracellular distribution", 16th International Congress of Histochemistry and Cytochemistry, August 2022

Olivo, Buoninsegni, Vaccaro, Corbau (2022) "Plastic path and destination: a qualitative assessment method for sources evaluation", 16th International Conference Littoral22, September 2022

1. Preliminary Assessment Method of micro and macro plastics sources origin

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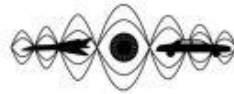
Abstract.

Identifying the micro and macro plastic sources, transport vectors and the plastic litter path to the sea is currently a difficult and crucial issue, given the coexistence of multiple variables. With this preliminary study we intend to develop a methodology that can be applied on a large scale in future studies. For each of the four types of main urbanized scenarios (industrial / harbour / fluvial / remote area) a series of variables have been identified, integrated with a weighted approach (assigning a different weight to each variable), highlighting the specific site characteristics. This methodology will allow the creation of predictive maps of vulnerability in future selected Mediterranean test sites.

Keywords: Plastic Litter, Predictive Maps, Plastic Sources, Coastal Zone, Vulnerability

**27th International Congress
on Sound and Vibration**

The annual congress of
the International Institute
of Acoustics and Vibration (IIAV)



11-16 July, 2021

IIAV27

Annual Congress of the International Institute of Acoustics and Vibration (IIAV)

**THE USE OF SUSTAINABLE SOUND ABSORBING FOAM RE-
CYCLING MICROPLASTICS IN SOUND INSULATION**

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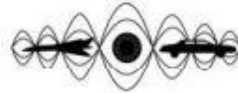
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Today, reducing the negative impact produced by human activities, has become a primary need. To this end, an innovative foam process production has been developed including the reuse of waste elements in order to obtain thermal and acoustic insulating foams. The determination of the acoustic parameters carried out by laboratory tests (sound absorption coefficient, tortuosity, characteristic viscous length, characteristic thermal length, porosity and flow resistivity) have enabled the implementation of calculation methods designed to predict the transmission loss of building partitions that internally contain this product. Analyses show interesting results that can be achieved with reduced thicknesses and, above all, gains in terms of creating eco-sustainable buildings.

Keywords: Building acoustics, Sound reduction index, Foam, Transfer matrix method

**27th International Congress
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of Acoustics and Vibration (IIAV)



11-16 July, 2021

ICSV27

Annual Congress of the International Institute of Acoustics and Vibration (IIAV)

INDOOR SOUND FIELD CONTROL BY USING A NEW SUSTAINABLE MATERIAL

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An innovative foam product based on waste recycling (such as plastic, composites, ceramics, construction materials) permits the reuse of waste for insulating purposes in sustainable buildings.

The manifold proprieties of this foam have led to the implementation of multiple applications for the product: in the cavity of partition walls to exploit their thermal and sound-insulating properties and inside rooms that need to be acoustically treated to exploit their sound-absorbing properties.

In particular, the combination in the mixture of waste elements of different nature and size gives the product aesthetic qualities that make the material looks nice for "visible" applications. Integration between architectural aspects and indoor sound field control is investigated as a function of their nature and loading of waste powders and their effects on the microstructure and visual properties.

Results in terms of possible applications for internal reverberation correction in a virtual environment are reported.

Keywords: Building acoustics, Sound-absorbing, Foam, Sustainable buildings

MARINE LITTER SURVEYS ON BOCCASSETTE BEACH (ROVIGO, ITALY)

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Abstract – This study aims to evaluate the abundance and accumulation of the beach marine litter in relation to the main human activities and during some different meteorological conditions. Five surveys were performed along Boccasette spit, in the Veneto Regional Park of Po Delta (northern Adriatic Sea), adapting the DeFishGear protocol for beach litter. The debris was collected and analysed, and the beach cleanliness was evaluated applying the Clean Coast Index. Boccasette beach can be classified as moderately clean from late summer to winter and as clean during spring and summer. The main litter macro-category is represented by artificial polymer materials (96%), while the others macro-categories represent the 4% of collected items. The main sources of the marine litter have been attributed to improper waste disposal and fishing/aquaculture activities. Our results suggest that specific management approaches are needed to minimize the impacts of river's flooding events. Finally, involvement activities of fishermen and fish-farmers should be performed in order to reduce the release of new marine litter and to implement the awareness regarding the plastic pollution.

GEOSCIENCES CENTER 2022 CONFERENCE

RAW MATERIALS AND SUSTAINABILITY

20-21 JUNE, 2022

CGeo Researchers Projects

Responsible researcher: Maria Nicoli (Collaborator)

Project title: *STUDYING ECOSUSTAINABLE MANAGEMENT AND ENVIRONMENTAL IMPACT IN THE TECHNOLOGICAL ERA OF PLASTIC.*

University/Institution: University of Ferrara, Department of Environmental and Prevention Sciences (ITALY)

Other researchers (not CGEO members) who collaborate with the project (with Institution): Corinne Sabine Corbau, Elena Marrocchino, Carmela Vaccaro from the University of Ferrara.

Institutions involved: University of Ferrara

Agenda 2030 goals: 14, 12, 6

Conference Session: **Session 1** – Geosciences and the 2030 Agenda; **OR Session 2** – Management of raw materials and circular economy.

Abstract: From the prehistoric period onwards, humans have started an interaction with the surrounding environment aimed also at the transformation of raw materials into tools or at their transformation into new materials, as happened with ceramic production during the neolithic revolution and afterward. Transformation processes have been, and still are, at the base of the human technological evolution. However, it is of a great importance to understand the impact those processes can have on the environmental change, other than on the technological improvement.

Type of presentation: N/A

Microplastic uptake within human cells is time and dose dependent and displays a specific intracellular distribution

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Plastic pollution is a nowadays concern due to the ubiquitous plastic items leakage across the ecosystems. Large plastic objects and plastic particles smaller than 5 mm, i.e. microplastic (MPs), have been detected in marine environment, soil, fresh water and atmosphere [1]. Hence, people is potentially daily exposed to plastic although the exposure risk has not been fully clarified. Inhalation and food consumption have been established as the two main routes of MPs intake by humans [2]. Moreover, recent researches have described the presence of MPs in human blood, placenta and stool [3-5]. However, the few in vitro and in vivo studies showed contradictory results regarding the accumulation and toxicity of plastic as consequence of MPs uptake.

In our study, we investigated the internalization of polystyrene (PS) beads in Mahlavu Human Hepatocarcinoma (HCC) cell line. The uptake of fluorescent labelled 1 µm-diameter PS-beads at different concentrations and exposure time was evaluated at single-cell level by light microscopy. The first results showed that PS-beads were internalized in HCC Mahlavu cells in a dose- and time-dependent manner, as also demonstrated by confocal microscopy. Beads were localized in the interior part of the cells and in the perinuclear region.

Further studies are needed to explore MPs uptake in cells of different human apparatus and MPs disturbance of cellular fitness.

Littoral Conference 2022, Costa da Caparica, 12-15 Settembre 2022

Plastic path and destination: a qualitative assessment method for sources evaluation

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Introduction:

Plastics in natural and man-made environments are a serious current problem. Many studies define possible sources, and many projects concern the acquisition of real data on plastics composition and distribution in coastal/marine environments (Cheshire et al., 2009; Cole et al., 2011; Galgani et al., 2015; Asensio Montesinos et al., 2019; Schmid et al., 2021). The relation between these two environments is hard to achieve; the prediction of plastics amount that potentially reach coastal zones becomes a difficult and uncertain task (GESAMP, 2016; OSPAR, 2017).

Plastics can be classified according to their origin as land-based and sea-based plastics (UNEP, 2009) and may originate from rivers and industries, agriculture and farming, landfills, transport infrastructures (land), ports (land/sea) and fishing and maritime infrastructures (sea). In addition, several modes of plastic transport have been identified in the literature, but water transportation results the predominant mode (Jambeck et al., 2015).

The identification of potential accumulation zones appears essential to define cleaning strategies or to intercept plastic litter before they reach the coastal/marine environment. The development of a method to identify marine and terrestrial areas potentially affected by plastic litter may be a first step to realize predictive accumulation risk maps (Haarr et al., 2018). Defining the various plastics sources and their weight would also guarantee greater accuracy in the elaboration of models of waste accumulation and dispersion in the coastal/marine environment (Atwood et al., 2019). In this view, our study aims to develop an assessment method to identify possible plastics sources, evaluating different hazards for human being and establishing the related risk level. This procedure can be applied in Mediterranean sites, like the Interreg IT-HR NET4mPLASTIC pilot sites, in order to create vulnerability maps.

4 Special Issue

Special Issue "Microplastics in Marine Environment" of MDPI Microplastic (2022) opened in March 2022 and will remain open till the end of December 2022. Six papers are published for now, of which one has been published by NET4mPLASTIC PP IZSAM (see papers section).



microplastics

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Microplastics in Marine Environment

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Message from the Guest Editors

The lack of technologies/procedures equipped to efficiently determine the quantitative and qualitative aspects of microplastics in the marine environment is a problem that could be engaged with via the following approaches:

- characterization of micro- and macroplastic sources in marine and coastal area, including biota;
- development of dedicated transport/diffusion mathematical models for the microparticles;
- development of innovative instrumentation relying on optical analysis for in situ detection of microplastics;
- tuning and validation of the innovative technologies with standard laboratory analyses;
- identification of alarm thresholds of microplastic concentration;
- definition of procedures to generate early warnings to fishing farms to reduce health risks.

Therefore, the present Special Issue aims to cover two main aspects, as follows:

- the characterization of micro- and macroplastic (MP) sources in marine and coastal areas, including biota;
- the development of innovative technologies and approaches for tackling plastic marine litter, including monitoring, modelling and alert systems.

Special Issue

5 ANNEXES

- D.2.3.5 - ANNEX I_Pizzurro et al. (2022)
- D.2.3.5 - ANNEX II_Caniato et al. (2022)
- D.2.3.5 - ANNEX III_Taddia et al. (2021)
- D.2.3.5 - ANNEX IV_Schmid et al. (2021)
- D.2.3.5 - ANNEX V_Caniato et al. (2021)