

JAN - DEC 2018 ISSUE NO. 03

ECOTOXICOLOGICAL EFFECTS OF MICROPLASTICS IN MARINE ECOSYSTEMS

EPHEMARE

INSIDE THIS ISSUE

- 02 Workshops
- 03 Conferences and Talks
- 04 Education and Outreach
- 05 JPI Oceans Final Projects Meeting
- 05 Final Project Meeting
- 06 Project Bibliography

CONNECT WITH US



<u>@ephemare_</u>



facebook.com/ephemare

jpi-oceans.eu/ephemare

HAPPY HOLIDAYS FROM EPHEMARE!



Happy Holidays from us to you!

As the final year of the EPHEMARE project, 2018 proved to be a busy and productive year with fruitful results on a range of project initiatives. This newsletter provides a snapshot of our activities over 2018, from oureach to research to stakeholder workshops.

Wrapping up the EPHEMARE project will be bittersweet as we take time to reflect upon all the work achieved together over the past 3 years. We'd like to thank you for following along, and if you find yourself wanting more information about what EPHEMARE has accomplished and questions we have for the future, we've got you covered: simply visit our website or connect with us on social media via the links to the left.

We wish you a wonderful 2019!

The EPHEMARE Team





WORKSHOPS

OVERVIEW OF 2018 ACTIVITIES

Ephemare partners held a number of workshops & meetings in 2018, all geared at raising awareness about project deliverables and their relation to combating the problem of microplastics in the marine environment.

Ephemare Stakeholder Workshop

Ephemare hosted a stakeholder workshop in February at the University of Antwerp with attendees from research, policy, industry, and regulatory backgrounds. The workshop was designed to facilitate knowledge exchange between stakeholders, while collectively working towards identifying future research areas and potential solutions to the negative impacts of microplastics.

The workshop included a series of presentations by experts in the microplastics field, followed by group work on solutions to microplastic problems and a vote on which solutions were the most effective and most implementable. The workshop concluded with an expertled panel discussion and was a resounding success, and surveys conducted before and after the workshop information showing project was successfully disseminated.

La Festa del Mare

EPHEMARE researchers from CNR-ISMAR attended La Festa del Mare in Rapallo, Italy from 8-11 August, 2018 with an educational laboratory on the life cycle of plastic. The workshop highlighted ways to re-use and recycle plastic, while promoting responsible use.

EuroMarine Foresight Workshop

EPHEMARE researchers attended and presented at the EuroMarine Foresight Workshop in April on Modelling Ocean Plastics Litter in a Changing Climate: Challenges and Mitigations. The workshop provided a forum of debate regarding the issue of plastic pollution, with discussion on challenges and solutions being developed by scientists to help predict the effects of plastics in marine ecosystems.

Microplastics & Medusae

EPHEMARE researchers Jerome Cachot and Xavier Cousin joined artist Roman Kroke to host a student workshop titled "Microplastics and Medusae: expeditions into H_2O ." The workshop connected students with knowledge about plastic pollution, and students were encouraged to take an active and creative role in the creation of experimental repurposed plastics.



A student creates art from plastic at "Microplastics & Medusae".



Between hosting workshops, doing research in the lab, and conducting outreach activities, time is scarce for EPHEMARE researchers. However, partners still found the time to showcase their hard work at conferences over the year. Here's a small selection of the many conferences attended over the course of this year.

Polymères & Océans 2018

Ephemare researchers delivered two presentations on the results of lab research at PO2018 over 14-17 January. They discussed both microplastic toxicity on the early stage development of the medaka, a model fish; as well as the toxic effects of industrial primary microplastics spiked with model pollutants on zebrafish.

Plastic Pollution in Our Oceans Talks

Partners from the University of Antwerp were invited to speak and join the panel at a series of talks at the Brussels Royal Museum for Natural Sciences. After the presentations, there was a lively discussion with the audience; in this instance the public seemed particularly interested in policy, from what citizens can do to influence their representatives, to lobbying from plastic companies, to EU policy and member state implementation.

SEARICA Mission Ocean

Ephemare researchers attended the SEARICA conference at the European Parliament to discuss the theme of "Science and Innovation for a Healthy Ocean." The conference focused on the issue of marine plastic pollution.

PolyTalk2018

PolyTalk acts as a forum for Plastics Europe to engage with stakeholders in dialogue about preventing marine litter around the world. Ephemare was present in a panel discussion on 'Improving resource efficiency and accelerating innovation to increase circularity - research and innovation' and engaged with Mr. Karmenu Vella, the European Commissioner for Environment, Maritime Affairs and Fisheries, who outlined future European strategies to combat marine litter.

ECOBIM & SETAC

In May, Ephemare researchers presented their research in several talks at both ECOBIM2018 in Talence and SETAC Europe's 28th Annual Meeting in Rome.

Made of Plastic

Ephemare researchers helped organise a conference on World Environment Day called "Made of Plastic." The accompanying event aimed to attract people to the problem of plastic pollution and included talks from several project partners.

MICRO2018

The year of conferences came to a close at MICRO2018, where our hard-working researchers gave a grand total of eight presentations on project results over the course of the week.

In 2018, Ephemare contributed to:

\bullet	
16+	CONFERENCES
8+	WORKSHOPS
14+	PUBLICATIONS
15+	OUTREACH
	ACTIVITIES



UNESCO World Oceans Day

UNESCO, the IOC, and the Surfrider Foundation organised a stellar event for World Oceans Day on 8 June. Over 200 students attended this conference on marine litter and microplastics. EPHEMARE representative Camilla Carteny gave a presentation to middle and high-schoolers demonstrating what microplastics are and how they can affect the marine environment.

Calblanque Regional Parkof Plastics?

EPHEMARE researchers at the Spanish Oceanographic Institute spoke to locals about the problem of plastics in the Calblanque Regional Park on 30 June, 2018. After the presentation, a practical session was held at the beach on the collection and analysis of plastics found in the sand.

Care for Some Ephemarinaras?

Members of the Ephemare team delivered a round of fun and charming "gastro-scientific" presentations for The Oceanographic Center of Murcia's Friday 'tapas' series, which were designed to disseminate current research to science and beer lovers.

Ephemare On TV & In Print

Ephemare was featured in the regional newspaper La Verdad on January 23, where our scientists spoke about metal pollution in the Mediterranean and their research on the role of microplastics as heavy metal transporters. In April, an Ephemare team member spoke on a local Spanish TV programme about on how plastics are affecting marine fauna.

EDUCATION & OUTREACH

Ocean Plastics Lab

Ephemare contributed a series of images from the IMPACT2017 photo competition to the Ocean Plastics Lab, which exhibited in front of the European Parliament from 9-19 April, 2018. Our researchers not only had the chance to visit and explore the hands-on educational lab, but directly engage with public visitors on the problem of plastics in the ocean.



Top: researchers show the public how to collect and analyse microplastics. Bottom: the Ocean Plastics Lab.

Final Project Meeting in Lanzarote, Spain

19 Nov 2018

To unpack a year's worth of results, EPHEMARE project partners met in November for the final time in beautiful Lanzarote, Spain. The meeting took place just before the JPI Oceans final microplastics conference and concurrently with the MICRO2018 International Conference on the Fate and Impacts of Microplastics: Knowledge, Actions and Solutions. Presenters from each work package discussed the results of their 2018 research, including project milestones and deliverables. The meeting was a valuable opportunity for cross-work package discussion on project findings and accomplishments.



Above: Project partners discuss the latest project activities in Lanzarote, Spain.

Final Meeting of JPI Oceans Microplastic Projects 20 Nov 2018

Unfortunately, all good things must come to an end. Following Ephemare's project meeting, JPI Oceans' four microplastic projects met for the final time to discuss their work. Researchers from EPHEMARE, Plastox, Weather-Mic, and BASEMAN presented their hard-earned findings from the past three years, sharing both challenges and successes. There were some fascinating topics discussed with plenty of questions for future research, from nanoplastics to microplastic classification. To find out more, check out our Twitter feed, where we live-blogged each presentation @ephemare_.

THANK YOU TO OUR FUNDERS

We'd like to extend our sincerest thanks to the national funding agencies that supported this JPI Oceans project: Belgium: Belgian Federal Science Policy Office (BELSPO) and the Research Foundation – Flanders (FWO); France: The French National Research Agency (ANR); Germany: Federal Ministry of Education and Research; Ireland: Marine Institute; Italy: Ministero dell'Istruzione, dell'Università e della Ricerca (MIUR); Norway: The Research Council of Norway (RCN); Portugal: Portuguese national funding agency for science, research and technology (FCT); Spain: Ministry of Economy and Competitiveness (MINECO) and Sweden: the Swedish Research Council for Environment.



2018 JPIO Joint Call

On 20 November, JPI Oceans presented their 2018 Joint Call for Proposals on Microplastics in the Marine Environment. The opportunity composes 9.2M in environment includes reference to nanoplastics - a frequently mentioned topic over the course of the week. EPHEMARE researchers are delighted microplastics and nanoplastics have remained global research priorities and will be examining opportunities future research.

EPHEMARE PROJECT BIBLIOGRAPHY

- Abel, S. (2017). Occurrence and characterization of microplastics in marine organisms from Adriatic coast. *Master Thesis: Polytechnic University of Marche*. Master's Degree in Marine Biology and Ecology. Tutor: Gorbi Stefania.
- Amorello, S. (2017). Analysis of the presence and characterization of microplastics in marine organisms sampled in northern Adriatic. *Master Thesis: Polytechnic University of Marche*. Master's Degree in Marine Biology and Ecology. Tutor: Regoli Francesco.
- Avio, C.G., Cardelli, L.R., Gorbi, S., Pellegrini, D., Regoli F. (2017). Microplastics pollution after the removal of the Costa Concordia wreck: First evidences from a biomonitoring case study. *Environmental Pollution* 227, 207-214.
- Avio, C.G., Gorbi, S., and Regoli, F. (2017). Plastics and microplastics in the oceans: from emerging pollutants to emerged threat. *Marine Environmental Research, Blue Growth and Marine Environmental Safety*, 128, 2–11.
- Barreiro, J.A. Microplasticos como vectores de contaminantes en el media marino (Microplastics as vectors of pollutants in the marine environment). (2017) *Master Thesis: University of Murcia*. Master's Degree in Forensic sciences. Tutor: Albentosa, M.
- Batel, A., Borchert, F., Reinwald. H., Erdinger, L., Braunbeck, T. (2018). Microplastic accumulation patters and transfer of benzo[a]pyrene to adult zebrafish (*Danis rerio*) gills and zebrafish embryos. *Environmental Pollution* 235, 918-930.
- Batel, A., Linti, F., Scherer, M., Erdinger, L., Braunbeck, T. (2016). Transfer of benzo [a] pyrene from microplastics to *Artemia nauplii* and further to zebrafish via a trophic food web experiment: CYP1A induction and visual tracking of persistent organic pollutants. *Environmental Toxicology and Chemistry* 37:7, 1656-16666.
- Beiras, R. (2018). 'Plastics and other solid wastes', in *Marine Pollution: Sources, Fate and Effects of Pollutants in Coastal Ecosystems*. Elsevier: 1st ed.
- Beiras, R., Bellas, J., Cachot, J., Cormier, B., Cousin, X., Endwall, M., Gambardella, C., Garaventa, G., Keiter, S., Le Bihanic, F., López-Ibáñez, S., Piazza, V., Rial, D., Tato, T. Vidal-Liñán, L. (2018). Ingestion and contact with polyethylene microplastics does not cause acute toxicity on marine zooplankton. *Journal of Hazardous Materials* 360, 452-460.
- Beiras, R., and Tato, T. (2018). Marine environmental risk assessment and acute water quality criterion for pentachlorophenol in coastal waters. *Ecotoxicology* 27, 803-808.
- Beiras, R., Tato, T., López-Ibáñez, S. (2018). Two-tier standard method to test the toxicity of microplastics in marine water using *Paracentrotus lividus* and *Acartia clausi* larvae. *Environmental Toxicology & Chemistry*.

- Bour, A., Avio, C.G., Gorbi, S., Regoli, F., Hylland, K. (2018). Presence of microplastics in benthic and epibenthic organisms: influence of habitat, feeding mode and trophic level. *Environmental Pollution* 243, 1217-1225.
- Bour, A., Haarr, A., Keiter, S., Hylland, K. (2018). Environmentally relevant microplastic exposure affects sediment-dwelling bivalves. *Environmental Pollution* 236, 652-660.
- Bringer A. (2016) Développement d'un modèle téléostéen pour évaluer la neurotoxicité de polluants organiques en milieu marin littoral. Master Coastal oceanography, University of La Rochelle. Tutor: Bégout M.-L.
- Costa, E. (2018). Investigating the potential of ephyrae jellyfish (Cnidarian) as model organism in ecotoxicology for sea water quality assessment. *PhD Thesis: University of Genoa, Italy*. PhD in Science and Technologies for the Environment and the Territory. 209 pages.
- Durán, I., and Beiras, R. (2017). Acute water quality criteria for polycyclic aromatic hydrocarbons, pesticides, plastic additives, and 4-Nonylphenol in seawater. *Environmental Pollution* 224, 384-391.
- Espinosa, C., García Beltrán, J. M., Esteban, M. A., Cuesta, A. (2018). In vitro effects of virgin microplastics on fish-head kidney leucocyte activities. *Environmental Pollution* 235, 30-38.
- Espinosa, C., Cuesta, A., Esteban, M. A. (2017). Effects of dietary polyvinylchloride microparticles on general health, immune status and expression of several genes related to stress in gilthead seabream (*Sparus aurata* L.). *Fish & Shellfish Immunology* 68, 251-259.
- Espinosa, C., Esteban, M. A., Cuesta, A. (2016). 'Microplastics in aquatic environments and their toxicological implications for fish,' in: S. Soloneski and M. Larramendy, (eds.), *Toxicology New Aspects to This Scientific Conundrum*, 1st ed. InTech. Chapter 6.
- Fernández, B. and Albentosa, M. (2019). Insights into the uptake, elimination and accumulation of microplastics in mussels. Submitted to Environmental Pollution.
- Fonte, E., Ferreira, P., Guilhermino, L. (2016). Temperature rise and microplastics interact with the toxicity of the antibiotic cefalexin to juveniles of the common goby (*Pomatoschistus microps*): Post-exposure predatory behaviour, acetylcholinesterase activity and lipid peroxidation. *Aquatic Toxicology* 180, 173-185.
- Garrido, S., Linares, M., Campillo, J. A., Albentosa, M. *Effect of microplastics on the toxicity* of chlorpyrifos to the microalgae Isochrysis galbana, clone t-ISO. Submitted to Aquatic Toxicology.
- Gambardella, C., Morgana, S., Bramini, M., Rotini, A., Manfra, L., Migliore, L., Piazza, V., Garaventa, F., and Faimali, M. (2018). Ecotoxicological effects of polystyrene microbeads in a battery of marine organisms belonging to different trophic levels. *Marine Environmental Research* 141, 313–21.

- Gambardella, C., Piazza, V., Albentosa, M., Bebianno, M. J., Cardoso, C., Faimali, M., Garaventa, F., Garrido, S., González, S., Pérez, S., Sendra, M., Beiras, R. (2018). Are traditional ecotoxicological endpoints sensitive enough to assess the effects of microplastics on the first levels of the marine trophic chain? To be submitted.
- Giraldo, A., Montes, R., Rodil, R., Quintana, J. B., Vidal-Liñan, L., Beiras, R. (2017). Ecotoxicological evaluation of the UV filters ethylhexyl dimethyl p-aminobenzoic acid and octocrylene using marine organisms *Isochrysis galbana, Mytilus galloprovincialis* and *Paracentrotus lividus. Arch Environ Contam Toxicol* 72, 606–611.
- Heinrich, P. and Braunbeck, T. (2018). Genetically engineered zebrafish liver (ZF-L) cells as an in vitro source for zebrafish acetylcholinesterase (zfAChE) for the use in AChE inhibition assays. *Toxicology in Vitro* 52, 52-59.
- Heinrich, P. and Braunbeck, T. (2019). Microplastic testing in vitro: Realistic loading of pollutants, surfactant-free solid surface-dosing and bioanalytical detection using a sensitivity-optimized EROD assay. *Toxicology in Vitro* 54, 194-201.
- Linares, M. (2017). Efecto del polietileno sobre la toxicidad del clorpirifós en la microalga Isochrysis galbana, clon t-ISO (Effect of polyethylene on the toxicity of chlorpyrifos in the microalga Isochrysis galbana, clone t-ISO). Master Thesis: University of Murcia. Master's Degree in Wildlife Management. Tutor: Albentosa, M.
- Lopes, A. P. (2016). Ecotoxicological effects of gold nanoparticles and microplastics in Daphnia magna. Master Thesis of the Integrated Master of Bioengineering, FEUP and ICBAS: University of Porto, Portugal. Supervisor: Guilhermino, L.
- Marino, G. (2018). Presence and characterization of microplastics in marine organisms from the southern Adriatic Sea. *Master Thesis: Polytechnic University of Marche*. Master's Degree in Marine Biology and Ecology. Tutor: Gorbi Stefania.
- Morante, M. (2018). Evaluación del papel de los microplásticos como vectores de mercurio en mejillones de la especie *Mytilus galloprovincialis* (Evaluation of the role of microplastics as mercury vectors in mussels of the species *Mytilus galloprovincialis*). *Master Thesis: University of Murcia.* Master's Degree in Wildlife Management. Tutor: Albentosa, M.
- Morcillo, P., Chaves-Pozo, E., Meseguer, J., Esteban, M. J., Cuesta, A. (2017). Establishment of a new teleost brain cell line (DLB-1) from the European sea bass and its use to study metal toxicology. *Toxicology in Vitro* 38, 91–100.
- Mykytka, R. (2018). Feeding behavior of the mussel *Mytilus galloprovincialis* exposed to microplastics. *Master Thesis: University of Murcia*. Master's Degree in Wildlife Management. Tutor: Fernández, B.
- Michelangeli, M. E. (2018). Ecotoxicological effects of microplastics on mussels: transfer of pollutants and cellular responses. *Master Thesis: Polytechnic University of Marche*. Master's Degree in Marin Biology and Ecology. Tutor: Regoli Francesco.

- O'Donovan, S., Mestre, N. C., Abel, S., Fonseca, T.G., Carteny, C. C., Cormier, B., Keiter, S. H., Bebianno, M. J. (2018). Ecotoxicological effects of chemical contaminants adsorbed to microplastics in the clam *Scrobicularia plana*. *Frontiers in Marine Science* 5.
- Pacheco, A., Martins, A., Guilhermino, L. (2018). Toxicological interactions induced by chronic exposure to gold nanoparticles and microplastics mixtures in *Daphnia magna*. *Science of the Total Environment* 628-629, 474-483.
- Pittura, L. (2018). Ecotoxicological approach as a tool to suggest strategies for risk management of microplastics in the marine environment. *PhD Thesis: Polytechnic University of Marche*. PhD in Life and Environmental Sciences. Tutor: Regoli Francesco.
- Pittura, L., Avio, C.G., Giuliani, M.E., d'Errico, G., Keiter, S., Cormier, B., Gorbi, S., Regoli, F. (2018). Microplastics as vehicles of environmental PAHs to marine organisms: combined chemical and physical hazards to the Mediterranean mussel, *Mytilus galloprovincialis*. *Front. Mar. Sci.* 5, 103.
- Prata, J. C. (2016) Avaliação da toxicidade do antibiótico doxiciclina isoladamente e na presença de microplásticos na microalga marinha *Tetraselmis chuii* (Assessment of the toxicity of the antibiotic doxycycline alone and in the presence of microplastics to the marine microalgae *Tetraselmis chuii*). *Masters Thesis: Institute of Biomedical Sciences of Abel Salazar of the University of Porto*. Supervisor: Guilhermino, L.
- Prata, J. C., Lavorante, B. R. B. O., Montenegro, M. C. B. S. M., Guilhermino, L. (2018). Influence of microplastics on the toxicity of the pharmaceuticals procainamide and doxycycline on the marine microalgae *Tetraselmis chuii*. *Aquatic Toxicology 197*: 143-152.
- Ribeiro, F., Garcia, A. R., Pereira B. R., Fonseca, M., Mestre, N. C., Fonseca, T. G., Ilharco, L. M., Bebianno, M. J. (2017). Microplastics effects in *Scrobicularia Plana*. *Marine Pollution Bulletin* 122 (1), 379–91.
- Sánchez-Marín, P., Fernández-González, L. E., Mantilla-Aldana, L., Diz, A. P., Beiras, R. (2017). Shotgun proteomics analysis discards alkali labile phosphate as a reliable method to assess vitellogenin levels in *Mytilus galloprovincialis. Environmental Science & Technology* 224, 384-391.
- Santos de los Ríos, P. (2018). Ingestión y eliminación de Hg adsorbido a microplásticos en mejillón silvestre (*Mytilus galloprovincialis*) (Ingestion and elimination of Hg adsorbed to microplastics in wild mussel (*Mytilus galloprovincialis*)). *Master Thesis: University of Murcia*. Master's Degree in Wildlife Management. Tutor: Santos-Echeandía, J.
- Town, R. M., van Leeuwen, H. P., Blust, R. (2018). Biochemodynamic features of metal ions bound by micro- and nanoplastics in aquatic media. *Frontiers in Chemistry* 6: 627.