

EEB COMMENTS TO THE ANNEX XV RESTRICTION REPORT PROPOSAL FOR A RESTRICTION OF INTENTIONALLY ADDED MICROPLASTICS

May, 20th, 2019

GENERAL COMMENTS

The EEB supports the dossier submitter's conclusion according to which the risks arising from the releases to the environment of intentionally used microplastics are not adequately controlled. We therefore we support the need for a restriction.

Although scientific uncertainties remain regarding the impacts of microplastics to ecosystems and human health, the existing scientific evidence already shows toxic effects on a wide range of organisms along food chains, as well as trophic transfer and bioaccumulation. Available scientific evidence shows also the widespread presence of microplastics in terrestrial and aquatic environments, in biota, in rainwater, air and snow in Europe. There is evidence that at present, microplastics represent a high risk to the environment in several locations

Available industry data shows increasing trends in plastics (and microplastic) production and use in Europe that will result in the inevitable release of microplastics to the environment, despite the future potential adoption of risk management measures for some uses. We fully support the Dossier Submitter conclusion that intentionally added microplastics should be treated as non threshold substances. As stated by the Restriction proposal, the extreme persistence in the environment of micro and nano plastic leads to an increasing and irreversible environmental stock, with unpredictable negative consequences to our ecosystems, warranting the need for regulatory action to reduce environmental releases of microplastics to the environment.

The EEB would like to contribute to support the restriction by:

- Providing recent scientific evidence on:
 - Adverse ecotoxicological effects and trophic transfer.
 - Risks of nanoplastics resulting from the degradation/ transformation of microplastics
 - Biomagnification and bioaccumulation
 - Synergetic effects with other environmental pollutants
 - Exposure of European ecosystems.
- Providing comments on the need to expand the scope to microbeads used in synthetic turf
- Providing comments on the need to improve the proposed biodegradation criteria.

Further, we would like to stress the need for ECHA's Committees to assess, in their opinions, if the proposed derogations are properly supported justified and supported by evidence and their impacts on the environment have been properly quantified.



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Recent scientific evidence not included in the Annex XV proposal submitted by ECHA

ADVERSE ECOTOXICOLOGICAL EFFECTS AND TROPHIC TRANSFER

Z.L.R. Botterell et al. Bioavailability and effects of microplastics on marine zooplankton: A review. *Environmental Pollution* 245 (2019) 98e110

This review highlights the wide-ranging effects that microplastics can have on zooplankton, covering studies investigating microplastic ingestion in 28 taxonomic orders, including 29 holoplanktonic and 10 meroplanktonic species. Negative effects on feeding behaviour, reproduction, growth, development and lifespan were all reported. Several factors have been identified that could influence the bioavailability of microplastics to zooplankton; they include concentration, shape, size and age. Further lab-based studies are needed to better understand the effects that microplastic exposure can have on organisms near the base of the marine food web and there is a need to determine the risk of microplastics not just in the individual but also at the population level and the wider ecosystem.

Nelms E. et al. Investigating microplastic trophic transfer in marine top predators. *Environmental Pollution* 238 (2018) 999e1007. <https://doi.org/10.1016/j.envpol.2018.02.016>

These authors analysed sub-samples of scat from captive grey seals (*Halichoerus grypus*) and whole digestive tracts of the wild-caught Atlantic mackerel (*Scomber scombrus*) they are fed upon. Approximately half of scat subsamples (48%; n=15) and a third of fish (32%; n=10) contained 1-4 microplastics. Particles were mainly black, clear, red and blue in colour. Mean lengths were 1.5 mm and 2 mm in scats and fish respectively. Ethylene propylene was the most frequently detected polymer type in both. Their findings suggest that trophic transfer represents an indirect, yet potentially major, pathway of microplastic ingestion for any species whose feeding ecology involves the consumption of whole prey, including humans.

The authors present empirical evidence that microplastic particles can be transferred across trophic levels, from fish to a marine mammal top predator. Their findings suggest that trophic transfer represents an indirect, yet potentially major, pathway of microplastic ingestion for any species whose feeding ecology involves the consumption of whole prey.

RISKS OF NANOPLASTICS RESULTING FROM THE DEGRADATION/ TRANSFORMATION OF MICROPLASTICS

Triebkorn, R. Relevance of nano- and microplastics for freshwater ecosystems: A critical review. *Trends in Analytical Chemistry* 110 (2019) 375e392

Within the scope of the project “MiWa e Microplastics in the Water Cycle”, six sites along the German 538.5 km long stretch of the Elbe River were sampled. The authors conclude that based on available environmental concentration and existing toxicity data the risk posed by larger MP to cause harm to biota may be rather low. Much higher putative risk has to be allocated to small MP with a diameter of just few micrometers and NP, because (1) their environmental concentrations are expected to be much higher than currently known and (2) smaller particles run a higher risk of uptake into cells and tissues. In addition, NP have a much higher surface area ready to sorb and desorb a range of chemicals, and thus, as they can more easily enter cells, adverse effects in organisms by NP are more

likely. For these small particles, however, scientific knowledge is fragmentary at best. In this context, comparing the toxicity of plastic and naturally occurring particles is recommended as a key to better understand the hazard posed by MP and NP to freshwater organisms.

BIOMAGNIFICATION AND BIOACCUMULATION

Microplastic Bioaccumulation in Invertebrates, Fish, and Cormorants in Lake Champlain. Student Researchers: Chad Hammer and Hope VanBrocklin Faculty Mentor: Danielle Garneau, Ph.D. (SUNY Plattsburgh). Center for Earth and Environmental Science. SUNY Plattsburgh, Plattsburgh,

To survey and characterize microplastics found within the digestive tracts of aquatic organisms: double crested cormorants (*Phalacrocorax auritus*), rainbow smelt (*Osmerus mordax*), largemouth bass (*Micropterus salmoides*), bluegill sunfish (*Lepomis macrochirus*), slimy sculpin (*Cottus cognatus*), amphipods (*Gammarus fasciatus*), mysid shrimp (*Hemimysis anomala*), zebra mussels (*Dreissena polymorpha*), alewife (*Alosa pseudoharengus*), and various aquatic insects. All species were found to contain microplastics with the exception of terrestrial isopods and zebra mussels. Presence of microplastics was noted in many of the fish and cormorant specimens, as well as in organisms lower in the food web. Results indicate that microplastic bioaccumulation is occurring, as other research has noted (Wright et al. 2013).

SYNERGETIC EFFECTS WITH OTHER ENVIRONMENTAL POLLUTANTS

Prata et al. Influence of microplastics on the toxicity of the pharmaceuticals procainamide and doxycycline on the marine microalgae *Tetraselmis chuii*. Aquatic Toxicology Volume 197, April 2018, Pages 143-152

The goal of this study was to investigate if the presence of microplastics (1–5 µm diameter) influences the toxicity of the pharmaceuticals procainamide and doxycycline to the marine microalga *Tetraselmis chuii*. Bioassays (96 h) to investigate the toxicity of those substances individually and in mixtures (i.e. microplastics-procainamide mixtures and microplastics-doxycycline mixtures) were carried out. Both procainamide and doxycycline were toxic to *T.*

chuii at concentrations in the low ppm range. Microplastics-procainamide and microplastics-doxycycline mixtures were more toxic than each of the substances tested alone. Evidences of microplastics and pharmaceuticals interactions in test media and toxicological interactions were found, and both likely contributed to the toxic effects. The concentrations of microplastics, procainamide and doxycycline that induced toxic effects on *T. chuii* (low ppm range) are higher than those that have been found in the most part of natural marine waters investigated (generally \leq 100,000 particles/m³ for microplastics and ppb or ppt ranges for pharmaceuticals). However, in the wild, natural populations are often exposed for generations to mixtures of environmental contaminants, such as several types of microplastics and pharmaceuticals, toxicological interactions increasing the adverse effects may occur, and some of these substances may be accumulated by the biota.

Barboza LGA et al. Microplastics cause neurotoxicity, oxidative damage and energy-related changes and interact with the bioaccumulation of mercury in the European seabass, *Dicentrarchus labrax* (Linnaeus, 1758). Aquatic Toxicology 195 (2018) 49–57

This study investigated toxic effects of microplastics and mercury in the European seabass (*Dicentrarchus labrax*), a marine fish widely used as food for humans. A short-term (96 h) laboratory bioassay was done by exposing juvenile fish to microplastics (0.26 and 0.69 mg/L), mercury (0.010 and 0.016 mg/L) and binary mixtures of the two substances using the same concentrations, through test media. Overall, their results indicate that: microplastics influence the bioaccumulation of mercury by *D. labrax* juveniles; microplastics, mercury and their mixtures (ppb range concentrations) cause neurotoxicity, oxidative stress and damage, and changes in the activities of energy-related enzymes in juveniles of this species; mixtures with the lowest and highest concentrations of their components induced different effects on some biomarkers. These findings and other published in the literature raise concern regarding high level predators and humans consuming fish being exposed to microplastics and heavy metals, and highlight the need of more research on the topic.

EXPOSURE

Windsor, F.M. et al. Microplastic ingestion by riverine macroinvertebrates. *Science of the Total Environment* 646 (2019) 68–74

The authors quantified the presence of microplastic particles (MPs) in river organisms upstream and downstream of five UK Wastewater Treatment Works (WWTWs). MPs were identified in approximately 50% of macroinvertebrate samples collected (Baetidae, Heptageniidae and Hydropsychidae) at concentrations up to 0.14 MP mg tissue⁻¹ and they occurred at all sites. MP abundance was associated with macroinvertebrate biomass and taxonomic family, but MPs occurred independently of feeding guild and biological traits such as habitat affinity and ecological niche. There was no increase in plastic ingestion downstream of WWTW discharges averaged across sites, but MP abundance in macroinvertebrates marginally increased where effluent discharges contributed more to total runoff and declined with increasing river discharge. The ubiquity of microplastics within macroinvertebrates in this case study reveals a potential risk from MPs entering riverine food webs through at least two pathways, involving detritivory and filter-feeding, and we recommend closer attention to freshwater ecosystems in future research.

Allen, S. et al. Atmospheric transport and deposition of microplastics in a remote mountain catchment. *Nature Geoscience* April 2019. <https://doi.org/10.1038/s41561-019-0335-5>

This study reports the atmospheric deposition of MPs in a remote Pyrenean mountain location. The research shows the monitored site received large numbers of MP particles (365 m⁻² d⁻¹) in atmospheric deposition collectors over the winter period of 2017–2018. The presented research illustrates the presence of MPs in a non-urban atmospheric fallout. Analysis for this single site suggests a tentative but possibly important link between precipitation (rain and/or snow), wind speed and wind direction to the MP deposition. Initial local MP trajectory assessment indicates an MP source area that extends to 95 km from the site, reaching several towns (populations <25,000) but not the city MP emission sources, such as Toulouse or Zaragoza. The data cannot prove long-range transport; however, air mass trajectory, MP transport and settling considerations suggest the MP emission sources to at least be regional (>100 km) given the population density within this local area.

RISK ASSESSMENT

SAPEA, Science Advice for Policy by European Academies. (2019). A Scientific Perspective on Microplastics in Nature and Society. Berlin: SAPEA. <https://doi.org/10.26356/microplastics>. <https://www.sapea.info/topics/microplastics/>

This working group has concluded that:

"The evidence described above in Chapter 2, and later in Chapter 3 and Chapter 4, supports the position that, even though 'high quality' risk assessment is not yet feasible, action to reduce, prevent and mitigate pollution with NMP is suggested to be needed."

SPECIFIC INFORMATION REQUESTS

Granular infill material used in synthetic turf

The quantity of microplastics used as synthetic turf infill material in individual Member States or the EU/EEA (Tonnes/yr).Hanns et al. (2018) Investigating options for reducing releases in the aquatic environment of microplastics emitted by (but not intentionally added in) products. Final Report. ICF and Eunomia. <https://www.eunomia.co.uk/reports-tools/investigating-options-for-reducing-releases-in-the-aquatic-environment-of-microplastics-emitted-by-products/>)

The report by Hans et al (2018) estimates that a total of 51,616 pitches exist in Europe with an installed area of 112 million square meters. Using the infill density of 16.1 kg/m² the total infill estimated to be installed in Europe is 1.8 million tonnes.

The quantity of microplastics released to the environment (Tonnes/yr, all relevant compartments), and an assessment of the different pathways by which microplastics can be released into the environment and an evaluation of their relative importance.

The report by Hans et al (2018) estimates the infill loss to the total installed infill in Europe between 18,000 and 72,000 tonnes per year. Polymeric infill from artificial sports turf can be inadvertently removed by players (when attached to their clothing or footwear), and also through maintenance activities such as snow clearance in some countries. It may then enter drains, soil, or surface water, or be removed as part of waste collection.

Examples of 'best practice' operational conditions (OCs) and risk management measures (RMMs) to prevent or minimise the release of infill material to the environment, including an estimate of their effectiveness.

The report by Hans et al (2018) highlight that although the majority of the market uses rubber crumb from recycled tyres—often referred to simply as SBR (styrene-butadiene rubber), performance infill

can be made from organic alternatives such as cork and coconut husk, which are available in the EU market.

A report by the Earthwatch Institute (2019) offers guidance on key actions to reduce losses of microplastics used as turf infill, including:

- Install or plan appropriate measures to adequately mitigate release of infill into the environment. **Organic infill such as cork**, if appropriate for the installation, will completely mitigate the microplastics issue for artificial turf.
- Investigate infill loss mitigation measures that can be built in from the beginning:
 - appropriate inside storage for infill used for top-ups
 - handling procedures to reduce loss when moving infill around
 - changing room cleaning procedures such as the correct disposal of infill when cleaned up
 - filters in drains in changing rooms and in local rain water drains, including regular emptying
 - player education and designated 'shake-off' zones where infill is removed from clothing.
 - Special attention should be paid to these sites including buffers to prevent migration of the infill by wind and rain towards water courses (<50M).

Earthwatch Institute (2019) MICROPLASTICS: HOW SHOULD BUSINESS RESPOND?

<https://microplastics.earthwatch.org.uk/>

Need to improve the proposed biodegradation criteria.

Existing biodegradability criteria today should ALL be improved to be more ambitious and present no adverse environmental effects. Since there is no sufficiently ambitious standard available today, ECHA should take a precautionary approach and not include biodegradable polymers as an exemption.

ECHA should take a precautionary approach and be consistent: a so-called biodegradable polymer/polymer mixture that is added to a product is still a plastic. There are naturally occurring alternatives for most functions performed by plastics in products (e.g. scrub in the scrubbing agents could very well be clay, why would it need to be plastic?).

Existing biodegradability criteria in standards and test methods do not work for different environmental matrixes. A polymer that is soil biodegradable, will not necessarily biodegrade in other environmental matrixes such as water, or may persist much longer and biodegrade (if at all) after a much longer time.

Existing biodegradability criteria today should all be improved to be more ambitious and present no adverse environmental effects. Since there is no sufficiently ambitious standard available today, ECHA should take a precautionary approach and not include biodegradable polymers as an exemption.

If biodegradable polymers are finally exempted, this exemption should cover only products that have a low likelihood of entering other environmental compartments and the proposed criteria should be improved according to the considerations outlined in ECOS submission to this public consultation.



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