Steffen Foss Hansen

Mikroplast: Vand, Grundvand, Jord og Regulering

Der skrives meget om mikroplast

Sosialnytt

SISTE

NYHETER KJENDIS FRA LIVET HELSE NYTTIG FAMILIE VIRALT MENINGER

Nyheter

Ny undersøkelse: Mikroplast funnet i hele Norge – også på Svalbard

av Anne C. Olsen · januar 20, 2023, 9:18 am

FACEBOOK TWITTER

Mikroplast finnes i kystvann, innsjøer, luft og nedbør i hele Norge, også i fjerne strøk som Svalbard, viser ny undersøkelse.

Der skrives meget om mikroplast

DR

VIDEN KROPPEN KLIMA TEKNOLOGI **NATUR** SAMMEN I BEVÆGELSE

NATURVIDENSKAB

Der er mikroplast overalt i vores omgivelser

Derfor er det også vanskeligt at fastslå, hvor mikroplast kommer fra, når vi finder det i øl, honning og drikkevand. I stedet bør vi fokusere på, at det er et generelt problem, at plasten er overalt, siger forsker.

LÆS OP ORDBOG TEKST

AF
Kim Rathcke Jensen og Maria Lise Behrendt

19. SEP 2017 | MERE END 30 DAGE GAMMEL

https://www.dr.dk/nyheder/viden/naturvidenskab/der-er-mikroplast-overalt-i-vores-omgivelser

For første gang er der fundet mikroplast i levende menneskers lunger – eksperter er bekymrede

11. apr 2022 kl. 22.10

I et studie havde 11 ud af 13 personer mikroplast i lungerne. Foto: Mads Claus Rasmussen / Ritzau Scanpix

af Maja Langberg

Mikroplast er tidligere blevet fundet i menneskers afføring og blod.

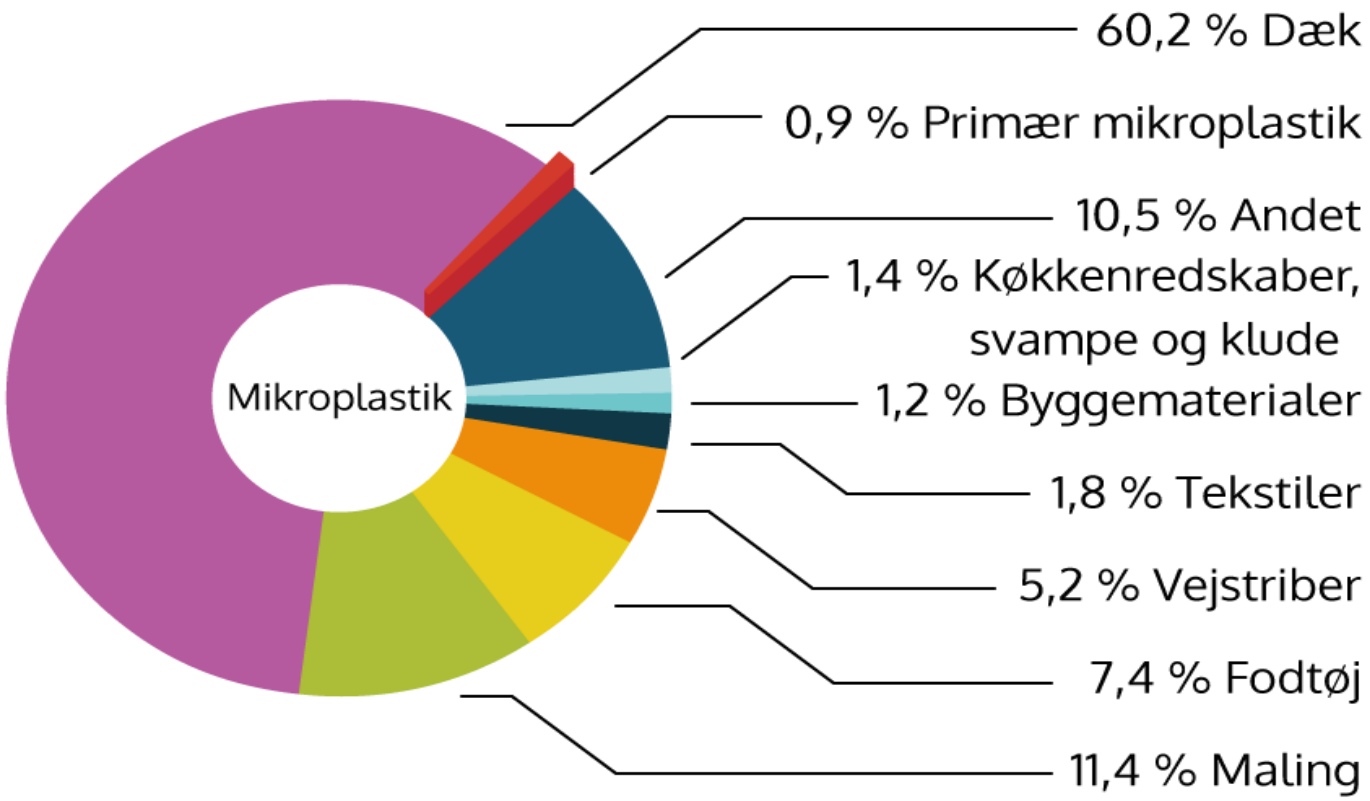
KROPPEN

For første gang finder forskere mikroplast i fire kvinders moderkage

Ekspert understreger, at vi ikke ved, om det skadeligt.

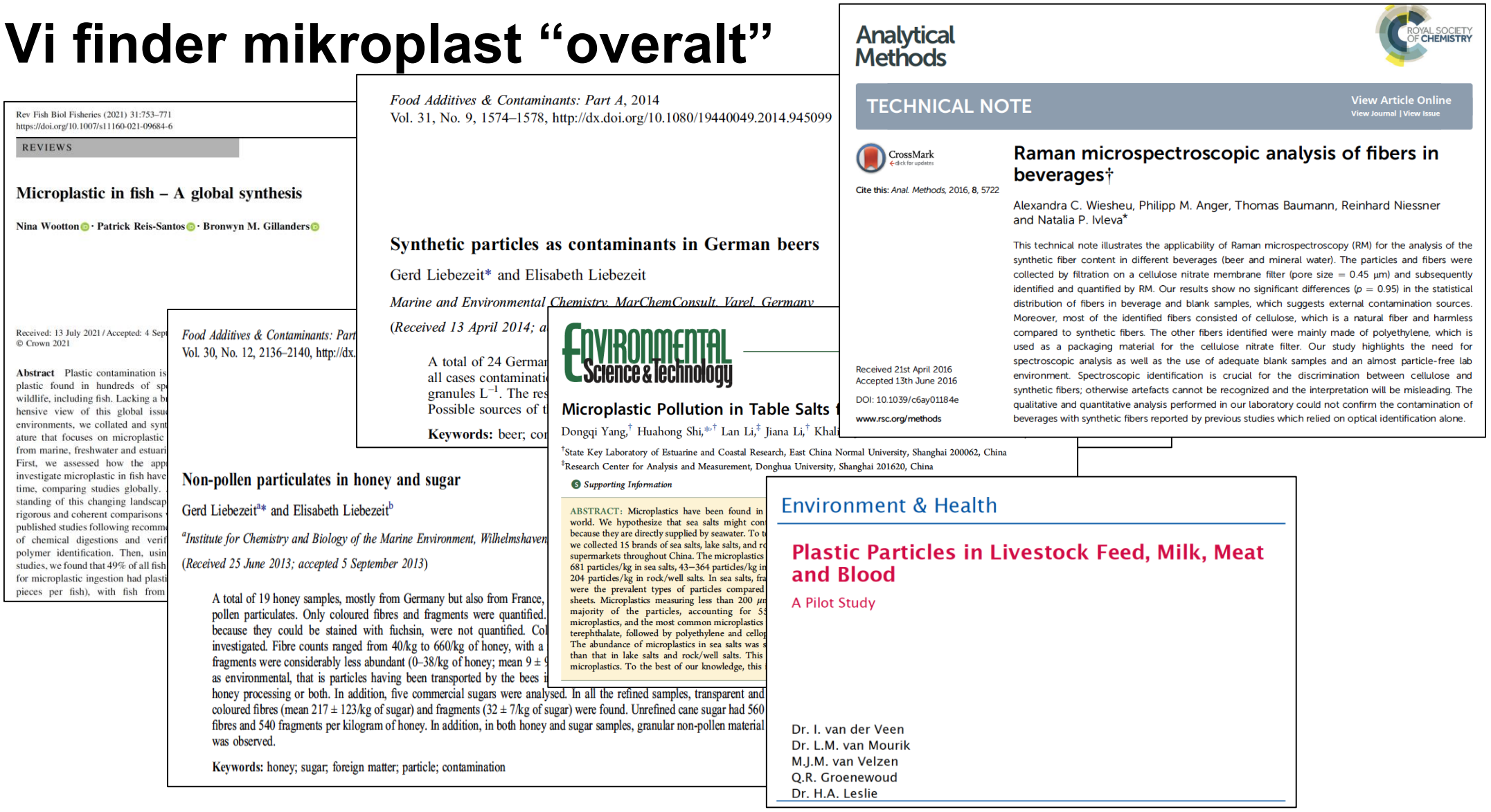
LÆS OP ORDBOG TEKST

Hvor kommer mikroplast fra?



Lassen et al. 2015 https://www2.mst.dk/Udgiv/publications/2015/10/978-87-93352-80-3.pdf

Vi finder mikroplast "overalt"



Rev Fish Biol Fisheries (2021) 31:753–771
https://doi.org/10.1007/s11160-021-09684-6

REVIEWS

Microplastic in fish – A global synthesis

Nina Wootton · Patrick Reis-Santos · Bronwyn M. Gillanders

Received: 13 July 2021 / Accepted: 4 Sept
© Crown 2021

Abstract Plastic contamination is
plastic found in hundreds of sp
wildlife, including fish. Lacking a b
hensive view of this global issu
environments, we collated and synt
ature that focuses on microplastic
from marine, freshwater and estuari
First, we assessed how the app
investigate microplastic in fish have
time, comparing studies globally.
standing of this changing landscap
rigorous and coherent comparisons
published studies following recomm
of chemical digestions and verif
polymer identification. Then, usin
studies, we found that 49% of all fish
for microplastic ingestion had plasti
pieces per fish), with fish from

Food Additives & Contaminants: Part A, 2014
Vol. 31, No. 9, 1574–1578, http://dx.doi.org/10.1080/19440049.2014.945099

Synthetic particles as contaminants in German beers

Gerd Liebezeit* and Elisabeth Liebezeit

Marine and Environmental Chemistry, MarChemConsult, Varel, Germany

(*Received 13 April 2014; a*

A total of 24 Germa
all cases contaminati
granules L^{-1}. The res
Possible sources of t

Keywords: beer; co

Food Additives & Contaminants: Part
Vol. 30, No. 12, 2136–2140, http://dx.

Non-pollen particulates in honey and sugar

Gerd Liebezeit[a]* and Elisabeth Liebezeit[b]

[a]*Institute for Chemistry and Biology of the Marine Environment, Wilhelmshaven*

(*Received 25 June 2013; accepted 5 September 2013*)

A total of 19 honey samples, mostly from Germany but also from France,
pollen particulates. Only coloured fibres and fragments were quantified.
because they could be stained with fuchsin, were not quantified. Col
investigated. Fibre counts ranged from 40/kg to 660/kg of honey, with a
fragments were considerably less abundant (0–38/kg of honey; mean 9 ± 9
as environmental, that is particles having been transported by the bees i
honey processing or both. In addition, five commercial sugars were analysed. In all the refined samples, transparent and
coloured fibres (mean 217 ± 123/kg of sugar) and fragments (32 ± 7/kg of sugar) were found. Unrefined cane sugar had 560
fibres and 540 fragments per kilogram of honey. In addition, in both honey and sugar samples, granular non-pollen material
was observed.

Keywords: honey; sugar; foreign matter; particle; contamination

ENVIRONMENTAL Science & Technology

Microplastic Pollution in Table Salts f

Dongqi Yang,[†] Huahong Shi,[*,†] Lan Li,[‡] Jiana Li,[†] Khali

[†]State Key Laboratory of Estuarine and Coastal Research, East China Normal University, Shanghai 200062, China
[‡]Research Center for Analysis and Measurement, Donghua University, Shanghai 201620, China

Supporting Information

ABSTRACT: Microplastics have been found in
world. We hypothesize that sea salts might con
because they are directly supplied by seawater. To t
we collected 15 brands of sea salts, lake salts, and r
supermarkets throughout China. The microplastics
681 particles/kg in sea salts, 43–364 particles/kg in
204 particles/kg in rock/well salts. In sea salts, fra
were the prevalent types of particles compared
sheets. Microplastics measuring less than 200 μ
majority of the particles, accounting for 5
microplastics, and the most common microplastics
terephthalate, followed by polyethylene and cellog
The abundance of microplastics in sea salts was s
than that in lake salts and rock/well salts. This
microplastics. To the best of our knowledge, this

Analytical Methods

ROYAL SOCIETY OF CHEMISTRY

TECHNICAL NOTE

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Cite this: *Anal. Methods*, 2016, **8**, 5722

Raman microspectroscopic analysis of fibers in beverages†

Alexandra C. Wiesheu, Philipp M. Anger, Thomas Baumann, Reinhard Niessner and Natalia P. Ivleva*

This technical note illustrates the applicability of Raman microspectroscopy (RM) for the analysis of the synthetic fiber content in different beverages (beer and mineral water). The particles and fibers were collected by filtration on a cellulose nitrate membrane filter (pore size = 0.45 μm) and subsequently identified and quantified by RM. Our results show no significant differences ($p = 0.95$) in the statistical distribution of fibers in beverage and blank samples, which suggests external contamination sources. Moreover, most of the identified fibers consisted of cellulose, which is a natural fiber and harmless compared to synthetic fibers. The other fibers identified were mainly made of polyethylene, which is used as a packaging material for the cellulose nitrate filter. Our study highlights the need for spectroscopic analysis as well as the use of adequate blank samples and an almost particle-free lab environment. Spectroscopic identification is crucial for the discrimination between cellulose and synthetic fibers; otherwise artefacts cannot be recognized and the interpretation will be misleading. The qualitative and quantitative analysis performed in our laboratory could not confirm the contamination of beverages with synthetic fibers reported by previous studies which relied on optical identification alone.

Received 21st April 2016
Accepted 13th June 2016

DOI: 10.1039/c6ay01184e

www.rsc.org/methods

Environment & Health

Plastic Particles in Livestock Feed, Milk, Meat and Blood

A Pilot Study

Dr. I. van der Veen
Dr. L.M. van Mourik
M.J.M. van Velzen
Q.R. Groenewoud
Dr. H.A. Leslie

Vi indtager mikroplast hele tiden

- 0,1-5 gram per uge

Journal of Hazardous Materials 404 (2021) 124004

Contents lists available at ScienceDirect

Journal of Hazardous Materials

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

Research paper

Estimation of the mass of microplastics ingested – A pivotal first step towards human health risk assessment

Kala Senathirajah [a], Simon Attwood [b], Geetika Bhagwat [c], Maddison Carbery [c], Scott Wilson [d], Thava Palanisami [a,*]

[a] Global Innovative Centre for Advanced Nanomaterials(GICAN), Faculty of Engineering and Built Environment, The University of Newcastle, Callaghan, NSW 2308, Australia
[b] The World Wide Fund for Nature (WWF), 354 Tanglin Road, Singapore, Singapore
[c] School of Environmental and Life Sciences, The University of Newcastle, Callaghan, NSW 2308, Australia
[d] Department of Environmental Science, Macquarie University, Sydney, Australia

ARTICLE INFO

Keywords:
Exposure pathways
Human health
Ingestion
Microplastics
Plastic pollution
Risk

ABSTRACT

The ubiquitous presence of microplastics in the food web has been established. However, the mass of microplastics exposure to humans is not defined, impeding the human health risk assessment. Our objectives were to extract the data from the available evidence on the number and mass of microplastics from various sources, to determine the uncertainties in the existing data, to set future research directions, and derive a global average rate of microplastic ingestion to assist in the development of human health risk assessments and effective management and policy options. To enable the comparison of microplastics exposure across a range of sources, data extraction and standardization was coupled with the adoption of conservative assumptions. Following the analysis of data from fifty-nine publications, an average mass for individual microplastics in the 0–1 mm size range was calculated. Subsequently, we estimated that globally on average, humans may ingest 0.1–5 g of microplastics weekly through various exposure pathways. This was the first attempt to transform microplastic counts into a mass value relevant to human toxicology. The determination of an ingestion rate is fundamental to assess the human health risks of microplastic ingestion. These findings will contribute to future human health risk assessment frameworks.

Table 2
Estimated average number of microplastic particles ingested ($ANMP_{ingested}$) per person per year.

Source of particles	The estimated average number of particles/person/year		Sample size
	Minimum	Maximum	n
Shellfish	2602	16,288	24
Fish	339	3005	6
Salt	41	1088	13
Honey	57	107	2
Sugar	0.1	8211	1
Beer	177	869	6
Tap water	16,265	68,331	12
Bottled water	346	292,251	10
Drinking water[a]	9029	174,959	22

[a] Drinking water includes both tap water and bottled water to provide a global representation of water ingested.

Senathirajah et al. 2021 Journal of Hazardous Materials 404 (2021) 124004

MILJØ

Mikroplast fundet i drikkevand i flere lande

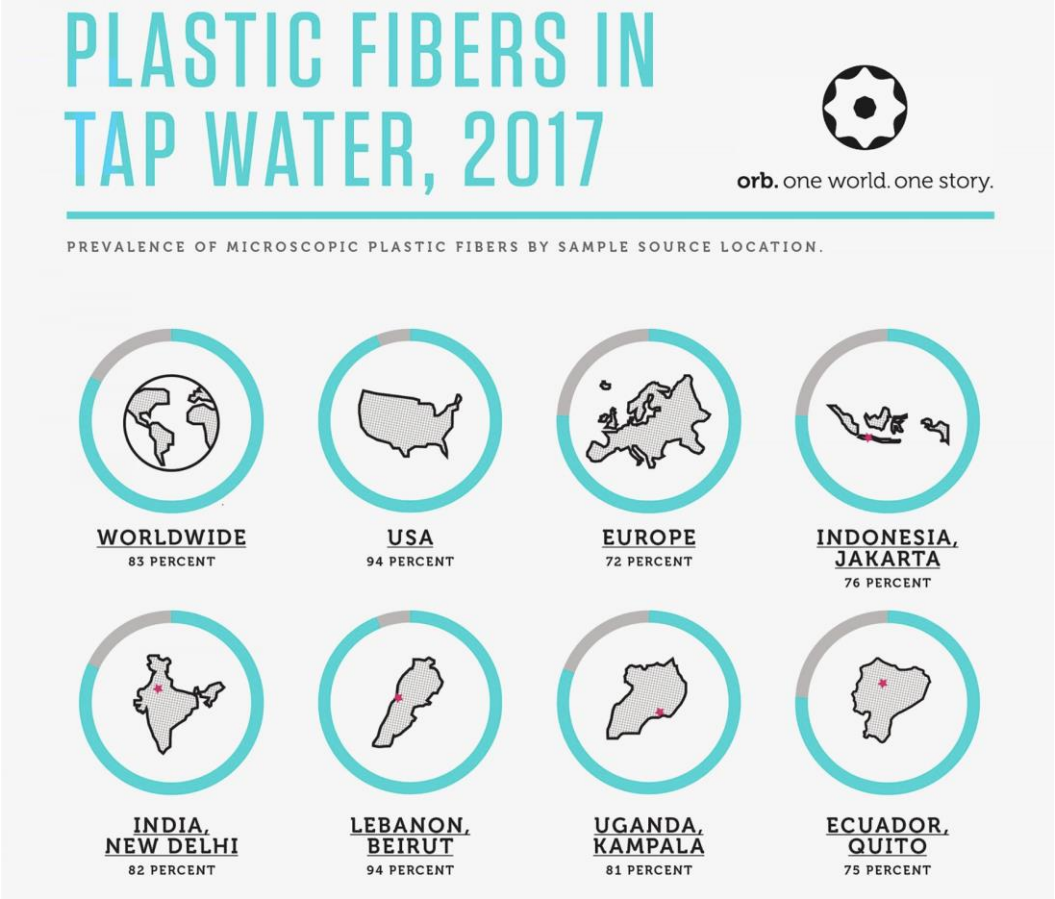
Ingen ved, om der også er mikroplast i det danske grundvand og drikkevand.

LÆS OP ORDBOG TEKST

AF
Kim Rathcke Jensen 7. SEP 2017 | OPDATERET 7. SEP 2017 | MERE END 30 DAGE GAMMEL

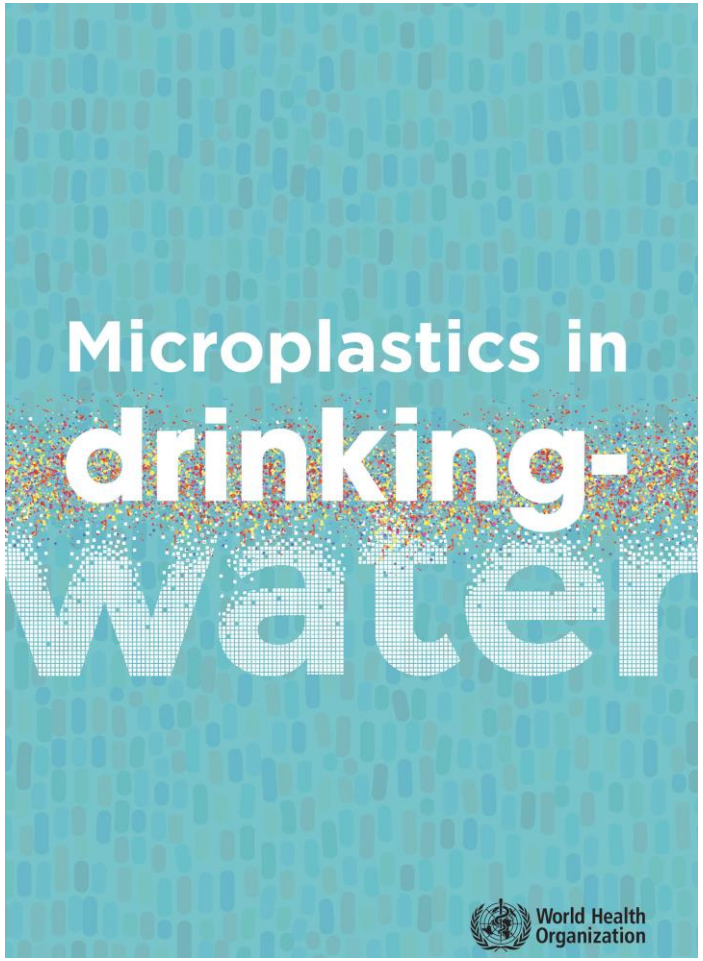
https://www.dr.dk/nyheder/viden/miljoe/mikroplast-fundet-i-drikkevand-i-flere-lande

Orb Media og University of Minnesota



https://orbmedia.org/the-invisibles

WHO - Videns huller



https://www.who.int/publications/i/item/9789241516198

- Exposure
  - Mere viden om samlet eksponering fra forskellige medier og fødevarer
  - Forståelse af MP karakteriska og opførelse gennem hele forsyningskæden (antal, form, størrelse, sammensætning, kilder, rensningsteknologier)
- Effekter
  - Toksikologiske studier af høj kvalitet for de mest relevante typer af plastik
  - Optag og fordeling af MP i kroppen

Water Research 155 (2019) 410–422

Contents lists available at ScienceDirect

Water Research

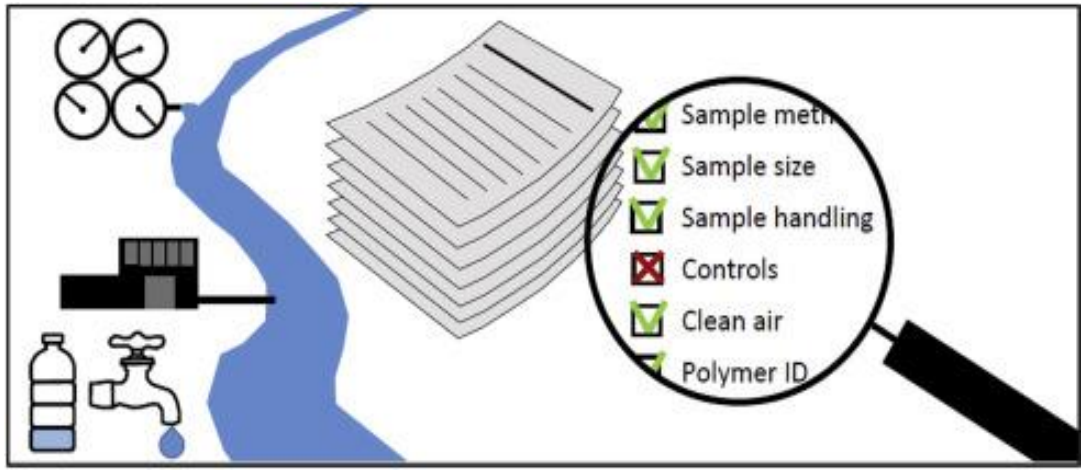
journal homepage: www.elsevier.com/locate/watres

Review

Microplastics in freshwaters and drinking water: Critical review and assessment of data quality

Albert A. Koelmans [a, *], Nur Hazimah Mohamed Nor [a], Enya Hermsen [a], Merel Kooi [a], Svenja M. Mintenig [b, c], Jennifer De France [d, **]

[a] Aquatic Ecology and Water Quality Management Group, Wageningen University, the Netherlands
[b] Copernicus Institute of Sustainable Development, Utrecht University, the Netherlands
[c] KWR Watercycle Research Institute, Nieuwegein, the Netherlands
[d] World Health Organisation (WHO), Avenue Appia 20, 1211, Geneva, Switzerland



Highlights

- Fifty studies on microplastics in drinking water and freshwater were reviewed.
- This included lake water, groundwater, tap water and bottled drinking water.
- The quality of the studies was quantitatively assessed.
- **Four out of fifty studies scored positive on all quality criteria.**
- To understand human health implications, more high quality data is needed.

DR

VIDEN KROPPEN KLIMA TEKNOLOGI NATUR SAMMEN I BEVÆGELSE

MILJØ

Mikroplast fundet i dansk drikkevand

Politikere vil have undersøgt, hvor meget mikroplast der er i det danske drikkevand.

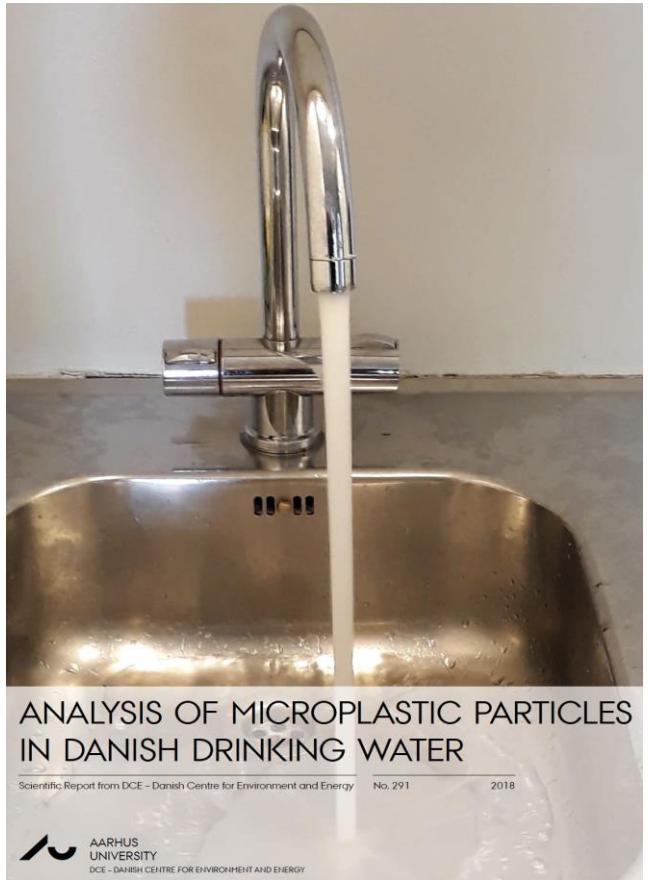
LÆS OP ORDBOG TEKST

AF
Kim Rathcke Jensen

19. SEP 2017 | MERE END 30 DAGE GAMMEL

- Cphbusiness Laboratorie og Miljø
- 16 husstande
- Københavnsområdet
- 18 stykker mikroplast per liter drikkevand

Miljøstyrelsen, AU og DTU

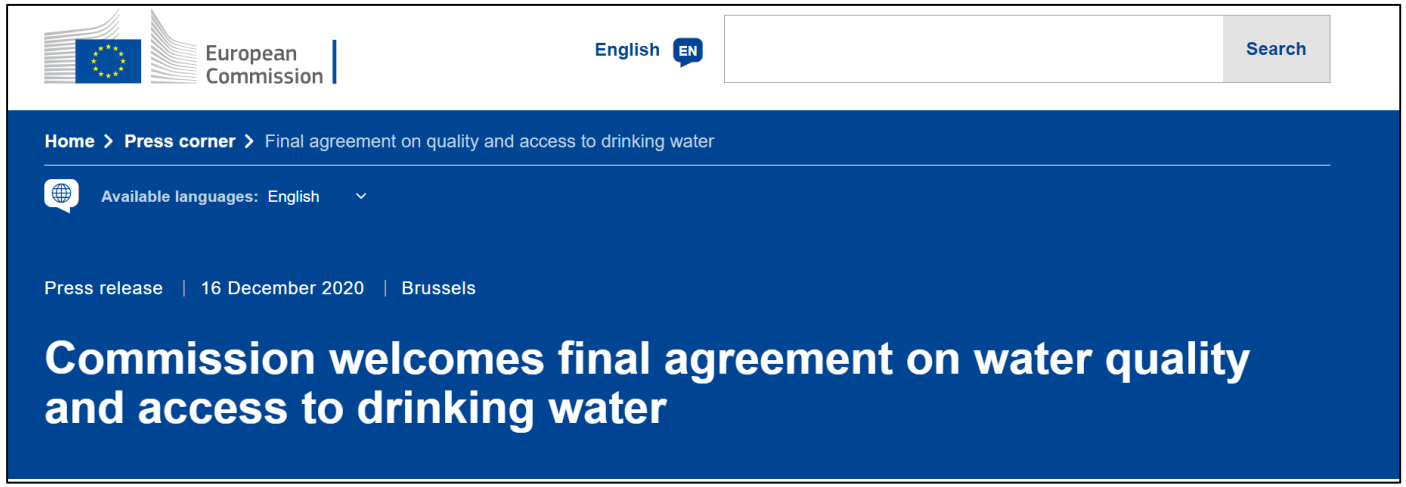


https://dce2.au.dk/pub/SR291.pdf

- 17 forskellige steder i Danmark
- Lukket rustfrit filtersystem for at forhindre kontaminering
- 16 ud af 17 prøver MP under detektionsgrænsen på 29 per 50 L

Revideret EU-drikkevandsdirektiv

- Vedtaget i december 2020
- Håndterer nye forurenende stoffer, såsom mikroplastik og hormonforstyrrende stoffer
- Forpligter medlemsstaterne til at forbedre eller opretholde adgangen til rent drikkevand for alle



DIREKTIV (EU) 2020/2184 Artikel 13 (6)

- “Kommissionen vedtager ***senest den 12. januar 2024*** delegerede retsakter i overensstemmelse med artikel 21 for at supplere dette direktiv ***ved at vedtage en metode til måling af mikroplast*** med henblik på at opføre dem på observationslisten omhandlet i nærværende artikels stk. 8, når betingelserne i nærværende stykke er opfyldt.”

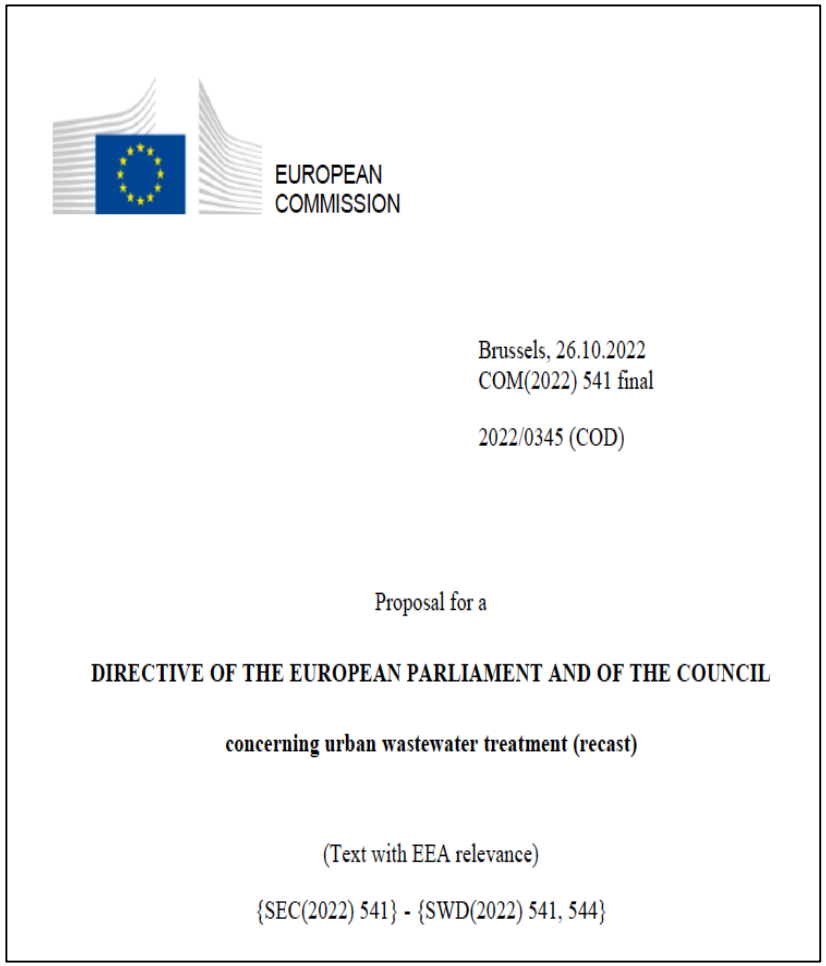
Standardisering af målemetoder

- Kontakt Nanna Hartmann
  - nibh@dtu.dk
  - https://orbit.dtu.dk/en/persons/nanna-b-hartmann

- Study on ‘Microplastics in drinking water - Definitions, monitoring and potential effects on human health’ commissioned by the Joint Research Centre (JRC) of the European Commission. Final version August 2022.

Nyt Kommissionsforslag ang. spildevand og slam

- Artikel 21: "…Member States shall monitor, at the inlets and outlets of urban wastewater treatment plants, the concentration and loads in the urban wastewater…
- (c) **the presence of micro-plastics**.
- …shall monitor the **presence of micro-plastics in the sludge**



EUROPEAN
COMMISSION

Brussels, 26.10.2022
COM(2022) 541 final

2022/0345 (COD)

Proposal for a

DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

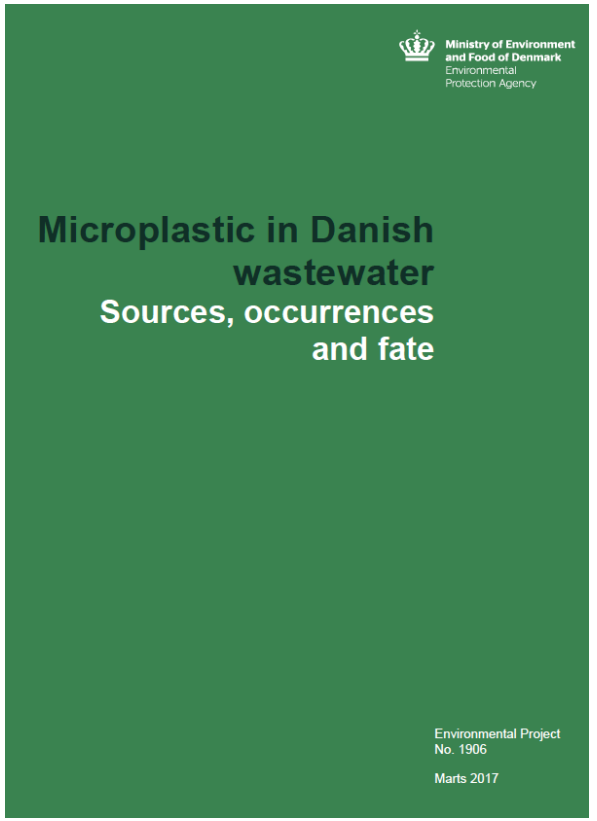
concerning urban wastewater treatment (recast)

(Text with EEA relevance)

{SEC(2022) 541} - {SWD(2022) 541, 544}

Undersøgeslser af MP i Dansk Spildevand

- Prøver fra 10 renseanlæg (indløbs- og renset spildevand)
- Slam fra 5 af disse renseanlæg
- 5 jorde som har fået tilført slam som gødskning
- 5 jorde, som ikke har fået tilført slam
- Fourier Transformeret Infrarød Spektroskopi billedbehandling med Focal Plane Array, FT-IR



https://www2.mst.dk/Udgiv/publications/2017/03/978-87-93529-44-1.pdf

Table 2. Plastic mass in raw and treated wastewater. Average and median of 10 treatment plants as well as the 25th and 75th percentile of the dataset.

	Average	Median	25th percentile	75th percentile
Raw wastewater [mg/L]	8.0	5.9	2.2	10
Treated wastewater [mg/L]	0.034	0.016	0.0047	0.037

Table 3. Plastic particle numbers in raw and treated wastewater. Average and median of 10 treatment plants as well as the 25th and 75th percentile of the dataset.

	Average	Median	25th percentile	75th percentile
Raw wastewater [no./L]	127,000	86,000	70,000	130,000
Treated wastewater [no./L]	5,800	6,400	4,400	8,000

https://www2.mst.dk/Udgiv/publications/2017/03/978-87-93529-44-1.pdf

Table 6. Plastic mass in farmland soils. Average and median of 25 soils as well as the 5th and 75th percentile of the dataset.

	Average	Median	25th percentile	75th percentile
Soils with sludge [mg/kg]	6.2	5.8	1.4	7.6
Soils without sludge [mg/kg]	51	12	4. 4	15

Table 7. Plastic particle numbers in farmland soils. Average and median of 5 soils as well as the 25th and 75th percentile of the dataset.

	Average	Median	25th percentile	75th percentile
Soils with sludge [no./kg]	82,000	71,000	29,000	143,000
Soils without sludge [no./kg]	236,000	145,000	53,000	436,000

https://www2.mst.dk/Udgiv/publications/2017/03/978-87-93529-44-1.pdf

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Article | Open Access | Published: 16 April 2022

Investigating the dispersal of macro- and microplastics on agricultural fields 30 years after sewage sludge application

Collin J. Weber, Alexander Santowski & Peter Chifflard

Scientific Reports **12**, Article number: 6401 (2022) | Cite this article

3760 Accesses | **5** Citations | **111** Altmetric | Metrics

- “Past sewage sludge application led to a still high density of macroplastics (637.12 items per hectare) on agricultural soil surfaces.
- Microplastic concentration, measured down to 90 cm depth, ranged from 0.00 to 56.18 particles per kg of dry soil weight”

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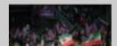
Plastics are piling up in soil across the world warns UN environment agency

© World Bank/Dominic Chavez | Fruit and vegetables grow in a greenhouse outside Bamako in Mali.

17 October 2022 | Climate and Environment

Plastics used in farming activities are accumulating in agricultural soil worldwide at an alarming rate, a new report by the UN Environment Programme (UNEP) published on Monday reveals.

RELATED STORIES



Killings and detentions of

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Conclusion and outlook

COMMENT

Check for updates

Early warning signs applied to plastic

Freja Lund Paulsen[1], Maria Bille Nielsen[1], Yvonne Shashoua[2], Kristian Syberg[3] and Steffen Foss Hansen[1]

The European Environmental Agency (EEA) has formulated five early warning signs to be considered by regulators when it comes to materials and substances. These warning signs reflect many concerns raised about plastics and are thus worth considering during the design and regulation of new and established polymeric materials.

Plastics are important in all areas of our daily lives and are based on approximately 50 different polymer types. These polymers can be designed for specific applications by adding functional additives (for example, plasticizers), fillers (for example, calcium carbonate), colour (for example, pigments) and reinforcements (for example, carbon fibres). However, since the 1980s, plastics have been acknowledged as a growing environmental concern.

Based on an in-depth analyses of historical cases, such as asbestos, chlorofluorocarbons, non-ionizing radiation and mad cow disease, in 2001 the European Environmental Agency (EEA) formulated five early warning signs that regulators should be alert to when evaluating and regulating new and unknown substances for potential risk[1]. These early warning signs question whether the chemical, material or technology is novel, persistent, readily dispersed, bioaccumulates or causes potentially irreversible harm to human health and/or the environment. These signs reflect the concerns raised about plastics and are worth bearing in mind when considering the development of new and the regulation of existing plastic types. In this Comment, we explore these five early warning signs in the context of different plastic types.

Novelty

Defining novelty is not trivial. The UK Royal Commission on Environmental Pollution (RCEP)[2] distinguishes between new materials hitherto unused, new forms of existing materials, new applications of existing materials and new pathways for known materials.

Bakelite (phenol formaldehyde) was the first entirely synthetic plastic, patented in 1909 as 'the material of a thousand uses'. Compared with natural polymers, such as wood, which had inspired its development, Bakelite could be rapidly moulded to produce complex forms. Bakelite was revolutionary in its extraordinarily high resistance to electricity and heat as well as its chemical stability and was soon widely used to insulate electrical devices (for example, light switches and radio housings) and in high-end products (for example, novelty jewellery and chess pieces).

As the world's first synthetic plastic, Bakelite would fall into RCEP's category of new materials hitherto unused. The synthetic plastics most used today include polyvinyl chloride (PVC), polypropylene (PP), polyethylene (PE), polystyrene (PS), polyethylene terephthalate (PET) and polyurethane (PUR), which were commercialized in the 1930s to the 1950s. Therefore, it could be argued that they fall into RCEP's second category of new forms of existing materials. Similar to other chemicals reviewed by the EEA, such as halocarbons, polychlorinated biphenyls (PCBs) and methyl tert-butyl ether (MTBE), the novelty of plastics also refers to the rapid pace at which they were commercialized after the Second World War and released post-use into the environment.

Persistency

Plastics are designed to be durable, and they have a half-life in marine water >60 days, confirmed by environmental observations, which is the criteria for identifying a chemical as persistent according to Annex XIII of the European Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). In 2019, plastic bottles were found on a Kenyan beach that dated back to March 1986, of which PE bottles were more broken, bitten or badly worn than those comprising PET[3]. PET is reported as moderately stable when exposed to a marine environment, whereas PS, PVC, PUR, PE and PP exhibit less resistance to degradation[4]. Chemical stability is largely determined by whether the polymer consists solely of a C–C backbone, as is the case for PS, PVC, PE and PP, or whether heteroatoms are also present, as in PET and PUR. In the first case, rapid reaction with oxygen, accelerated by UV light, is the primary cause of degradation and results in discolouration, brittleness and fragmentation. In polymeric materials that contain heteroatoms, slower reaction with water (hydrolysis) is usually the initiating step. Antiaging additives further protect plastic products from degradation during use but are subsequently exhausted.

Fragmentation is also affected by salinity, oxidative conditions, fluctuating temperature, microbial

[1]Department of Environmental Engineering, Technical University of Denmark, Lyngby, Denmark. [2]Environmental Archaeology and Materials Science, National Museum of Denmark, Copenhagen, Denmark. [3]Department of Science and Environment, Roskilde University, Roskilde, Denmark. ✉e-mail: sfha@env.dtu.dk

https://doi.org/10.1038/s41578-021-00317-9

Nat Rev Mater (2021). https://doi.org/10.1038/s41578-021-00317-9

CUSP Workshop #1 of 3 on February 7, 2023

CUSP

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December 21, 2022 CUSP news

CUSP workshop series on Human Risk Assessment of MNPs

Three online thematic workshops to take place in the spring of 2023; first will be on Tuesday, February 7th and focus on regulatory insights and knowledge gaps

As part of CUSP's aim to investigate and discuss the applicability of existing risk assessment frameworks related to micro- and nanoplastics (MNPs), the **CUSP Working Group on Risk Assessment** (WG5), together with the CUSP member projects, is organizing a series of online thematic workshops in the Spring of 2023 under the theme "Human Risk assessment of Micro- and Nanoplastics (MNPs)".

The first workshop, organized by WG5 and PlasticHeal, will focus on regulatory insights and knowledge gaps and will take place on Tuesday, February 7th, from 9:00-14:00 CET. The second workshop within the series will be about risk assessment frameworks on March 14th and will be organized by WG5 and PolyRisk. The third workshop, organized by WG5 and PlasticsFatE, will take place on April 21st and will focus on data and information gaps.

Registration

Interested stakeholders can use the **Eventbrite page** to register for Workshop #1: Regulatory insights and knowledge gaps. This event is free of charge and open to all interested stakeholders including researchers, those involved in policy-making, and professionals interested in the risk assessment of MNPs. The meeting will take place virtually via Zoom, and a meeting link will be sent to you automatically upon registration.

CATEGORIES

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External news (1)
From CUSP projects (6)

https://cusp-research.eu/cusp-workshop-series-on-human-risk-assessment-of-mnps/

Thank you for your attention!

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