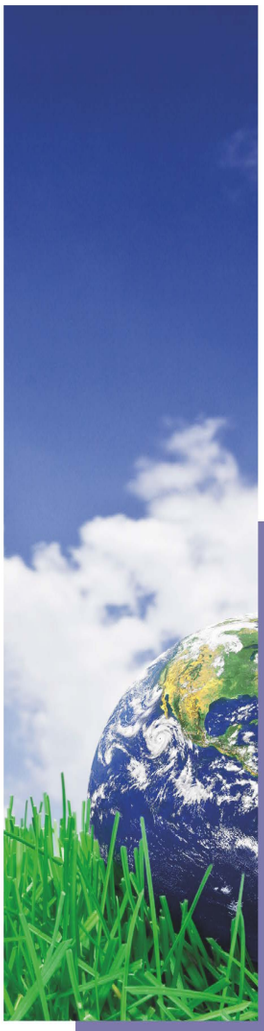
European Parliament

DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT A
ECONOMIC AND SCIENTIFIC POLICY



Economic and Monetary Affairs

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Internal Market and Consumer Protection

EU Action to Combat Marine Litter

Study for the ENVI Committee

EN

2017

EU Action to Combat Marine Litter

DIRECTORATE GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

WORKSHOP

EU Action to Combat Marine Litter

Brussels, Wednesday 3 May 2017

PROCEEDINGS

Abstract

This report summarises four presentations by experts and discussions which took place at the workshop 'EU Action to Combat Marine Litter' held on 3rd May 2017 in the European Parliament in Brussels.

The aim was to provide background information to the ENVI Committee's Members and contribute to their understanding of the need to tackle marine litter and the challenges involved. The Circular Economy Action Plan and Plastics Strategy are recognised as policy windows in addressing this form of pollution.

The workshop and this report has been commissioned by Policy Department A at the request of the Committee on Environment, Public Health and Food Safety (ENVI) of the European Parliament.

IP/A/ENVI/2017-02
PE 602.059

May 2017
EN

This document was requested by the European Parliament's Committee on Environment, Public Health and Food Safety.

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Manuscript completed in May 2017.
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LINGUISTIC VERSION

Original: EN

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EXECUTIVE SUMMARY

On Wednesday 3 May 2017, the European Parliament Committee on the Environment, Public Health and Food Safety (ENVI) held a workshop on "EU Action to Combat Marine Litter". The workshop was chaired by Simona Bonafè, ENVI Rapporteur on the circular economy package.

Workshop attendees, including Committee members and experts on marine litter and the circular economy, discussed the need for comprehensive and preventative action on marine litter. It was stressed that an emphasis should be placed on upstream and circular economy measures before clean-up activities.

Marine Litter in the context of European and global commitments

- Ms Bonafè recognised that the workshop could support European and global objectives to address marine litter.
- At the European level, the ongoing development of the Circular Economy Action Plan would provide the main instrument to do this – including targets on recycling for municipal waste, packaging and reducing landfilling, as well as specific targets on reducing marine litter.
- The European Commission's Plastics Strategy will be published at the end of 2017 and will provide a "specific vehicle" for addressing marine litter.
- At the global level, the United Nations 2030 Sustainable Development Goals, particularly Target 14.1 on the prevention of marine pollution, suggests the need for action. The United Nations Conference on Oceans in June will provide an international forum to support action on reducing the flow of litter into the sea.

The global context for marine litter and insights from the Mediterranean (*François Galgani*)

- Vast amounts of plastic are entering the oceans. An estimated 700 tonnes of plastic enter the Mediterranean alone each day. Once in the oceans, plastic waste travels across continents, with high concentrations close to sources and linked to hydrodynamics (convergence zones).
- Marine litter has negative impacts on biodiversity with over 700 species affected. In some parts of the Mediterranean 100% of sea turtles have ingested plastics.
- Sources of marine litter are complex and diverse, necessitating comprehensive global and European action. Clean-up is not seen to be a solution, particularly in the oceanic gyres.
- Important knowledge gaps exist about trophic transfer with micro-plastics as well as the rafting of invasive alien species.

Ocean clean-up – prevention better than cure (*Dustin Benton*)

- The fragmentation and dynamic transportation of marine litter make clean-up difficult. In the ocean, plastic breaks down into fragments and only an estimated 6% float on the surface.
- The size of the oceans and the dispersal of litter over decades brings into question the economics of ocean clean-up activities. Floating buoys in oceanic gyres are seen to be ineffective as they only address a small proportion of the problem. Locating clean-up activities closer to sources may be more effective.

- Other innovative or popular solutions (e.g. plastic eating worms) are in practice very complicated to scale up and may have unforeseen risks.
- Four strategies were suggested: placing an emphasis on banning products which are likely to pollute (e.g. microbeads, polystyrene); redesigning products to avoid accidental leakages; preventing industrial pollution from nurdles; and taking action as close to the source as possible.

Measures to address marine litter and the circular economy (*Patrick ten Brink*)

- Plastics are an element of the economy, nested within society and the terrestrial and marine environments. Within this system there are flows of materials, particularly fossil-based plastics, with a number of leakage points leading to marine litter. Each leakage point has a range of impacts, both socio-economic and environmental.
- It is possible to target key intervention points in different economic sectors. For different sectors (e.g. retail, fisheries, tourism) it is possible to identify responsibilities (i.e. where the sector drives marine litter) and self-interest (i.e. where the sector is impacted by marine litter so can benefit from action), creating a dialogue for collective action.
- A waste hierarchy should be applied to marine litter which prioritises measures based on preventing and reducing the sources of marine litter. Lessons can be learnt from strong policy making across the globe including the Irish plastic bag tax and the USA ban on microbeads in cosmetics.

Messages from a marine litter scientist (*Heather Leslie)*

- Marine litter is an example of market and system failure, and like other environmental challenges policy intervention should play a central role. Citizens alone cannot be expected to change consumption patterns to reduce marine litter.
- The conclusions of the EU FP7 project CleanSea suggest that policy to address marine litter should focus on prevention. Promoting clean-up activities distracts from opportunities for innovative and sustainable production systems. Additionally, recycling alone cannot solve the problem, as many products need to be redesigned.
- There are important knowledge gaps on the health impacts from plastic particulates, with the potential to generate symptoms comparable to particulate matter in air pollution.

Workshop discussion outcomes

- Eco-design – can provide a powerful tool for addressing marine litter. Key elements include material transparency, designing for reparability and re-use, and removing harmful additives.
- Stakeholder engagement – there is a need to engage wider policy makers in the marine litter issue, including those working on finance and trade.
- Bio-plastics – a distinction should be made between bio-based and bio-degradable plastics, neither of which provide a significant solution to marine litter or its impacts.
- EU funding and MS action – the EU Cohesion fund can help to improve waste management infrastructure. The Environmental Implementation Review and Greening the European Semester provide opportunities to promote action amongst the member states.

WORKSHOP PROCEEDINGS

Opening Remarks

Simona Bonafè MEP

In her opening statement, Ms Bonafè introduced the workshop as a contribution to addressing marine litter in the context of the EU Circular Economy Action Plan and looking towards the United Nations Conference on Oceans taking place from 5-9 June in New York.

The MEP outlined the complexity of the marine litter issue describing it as "one of the fastest growing threats to the world's seas". As well as an environmental challenge, marine litter also drives economic losses to citizens and a range of economic sectors. An estimated EUR 630 million are spent each year on coastal and beach cleaning across the EU.

She recognised however that clean-up activities are not an effective or economically viable solution to address marine litter. Industrial objectives outlined in the circular economy can be matched with environmental objectives, so that plastics are recovered rather than lost from the economy.

Forthcoming actions in the European Commission's Action Plan on the Circular Economy provide a timely policy window, notably the Plastics Strategy which should be "an important vehicle for addressing marine litter, including specific action on microplastics and implementation of 2030 Sustainable Development Goals targets on marine litter".

Waste legislation, which was voted on in March by the Parliament, pays particular attention to marine litter. The legislation restores higher targets for recycling: 70% for municipal waste, 80% for packaging, and a reduction to 5% landfill by 2030. Additionally, there are specific targets for reducing marine litter: a reduction of 30% by 2025 and 50% by 2030. A common methodology for monitoring and verification of marine litter will be adopted by the Commission by 31 December 2017.

Presentation 1: The Global Context for the Marine Litter issue

François Galgani, IFREMER (French Research Institute for the Exploitation of the Sea)

Dr Galgani's presentation provided up to date estimates on the flow of plastics entering the ocean, as well as major sources, their global distribution, and their impacts on marine life.

An estimated 8 million tonnes of plastic are entering the oceans each year and an estimated 5 trillion particles of plastic are already in the oceans. The Mediterranean Sea has one of the highest concentrations of marine litter globally, with an estimated 700 tonnes entering the Mediterranean per day - illustrating the European relevance of the issue.

Plastic waste moves in the oceans as a result of hydrodynamics. There are areas of higher concentration (convergence zones), in relation to oceanic gyres. However, the areas of highest concentration remain in coastal areas close to sources. It is a common misconception that clean-up activities in oceanic gyres can solve marine litter. Plastics have also been found in ice sheets, and some small particles can be transported atmospherically.

Impacts on marine biodiversity are significant and widespread. Sea birds that have ingested more plastic than is considered to be beyond the level of "good environmental status" are found across the globe. In the Mediterranean, in some places 100% of sea turtles have been shown to have ingested marine litter.

In terms of assessing marine litter there are a number of challenges. Data gathering needs to be more precise, and the observation and understanding of the impacts of small particles needs to be improved. There remain unknown impacts linked to trophic transfer between species, and the rafting of invasive alien species between continents.

The European institutions can play a key role in addressing marine litter, including through activities linked to the Circular Economy Action Plan, as well as existing legislation such as the Port Facilities Directive (2000/59/EC). Other useful actions include the Regional Seas Conventions, the Global Partnership on Marine Litter (GPML), the activities of the G7 and potentially the G20. Furthermore, there are a range of local and regional activities around the world. For marine litter specifically, the central role of NGOs in driving policies should not be understated.

Presentation 2: Ocean clean-up? Why prevention is better than cure

Dustin Benton, Green Alliance

Mr Benton's presentation focused on the limitations of clean-up activities as an instrument to address marine litter, with an emphasis on what is practically and socio-economically viable.

By illustrating the scale of the world's oceans and the marine litter problem, he argued that clean-up activities can help, but long-term preventative measures should be the focus for policy makers. The transportation - both vertically and horizontally in ocean columns - and fragmentation of plastic waste in the oceans means that seemingly innovative clean-up solutions, such as ocean buoys and plastic eating bugs, are likely to be inefficient in both practical and economic terms.

A study by Imperial College London illustrates that most of the marine litter generated in the United Kingdom is not transported to oceanic gyres but towards the North and Arctic Sea. Additionally, this process takes place over a decadal time scale, stressing the need for long term solutions over a "quick-fix".

Further analysis by Imperial College London examines the potential effectiveness of floating buoys in collecting marine litter. The study shows that in order to maximise effectiveness, clean-up activities should be located next to sources in coastal areas such as the Mediterranean and East Asia (rather than in oceanic gyres). However, even optimum placement of clean-up activities is predicted to be able to collect just 31% of the 6% of plastic which is floating (~2% of the total of marine litter) – and consequently clean-up alone does not represent a solution.

Similar limitations can be seen in other "innovative" clean-up solutions. The example of the plastic eating larvae of the Greater Wax Moth has been widely covered in the media as research has shown it can eat polyethylene. However, scaling up this approach highlights clear limitations. In order to address the 2 million tonnes of plastic discarded in the UK alone each year an estimated 2.7 billion Greater Wax Moth caterpillars would be needed. Additionally, this moth is already a pest in the USA, where it causes USD 5 million of damage to commercial apiaries each year.

Mr Benton suggested that policy makers ought to focus on four key strategies to increase the valorisation of plastics in the economy:

1. Ban products which are designed to pollute – this includes microbeads and polystyrene. Whilst products like these are available, even discerning consumers will find it difficult to avoid causing pollution. In addition, alternative materials exist which can minimise economic side effects.

2. Eco-design – eco-design can help to ensure materials are ready to be recycled, or prevent pollution in those items which are unlikely to be recycled (e.g. cotton bud sticks, and cigarette filters). Design can also prevent accidental leakages, e.g. by tethering the lids of drinks bottles which might otherwise be lost.
3. Prevent industrial pollution – industrial spillages of the feedstock to the plastic sector (nurdles) should be treated as industrial pollution. Nurdles still occur on 70% of beaches in the UK.
4. Get close to the source – policies to address marine litter shouldn't wait for it to enter waterways and oceans before acting. Useful policies include deposit refund schemes (commonly used for beverage bottles), and investment in waste water treatment facilities.

Presentation 3: Measure to address Marine Litter

Patrick ten Brink, Institute for European Environmental Policy (IEEP)

Mr ten Brink, of the Institute for European Environment Policy (IEEP), examined circular economy measures to address marine litter – i.e. to keep plastic and its value in the economy and out of the oceans.

He framed marine litter within the context of plastics and the wider economy to identify major flows and leakages of plastics and locate where different preventative measures might be best applied. The 300 million tonnes of plastic produced each year provides an input to a range of economic sectors, as well as consumer products.

Within the linear economy there are significant flows of waste and leakages to the environment. However, the transition to a circular economy would see increasingly circular flows of plastics which in theory would simultaneously reduce the leakage points which drive marine litter.

Looking at different sectors, including waste management, fisheries and tourism, he identified a range of impacts and actions:

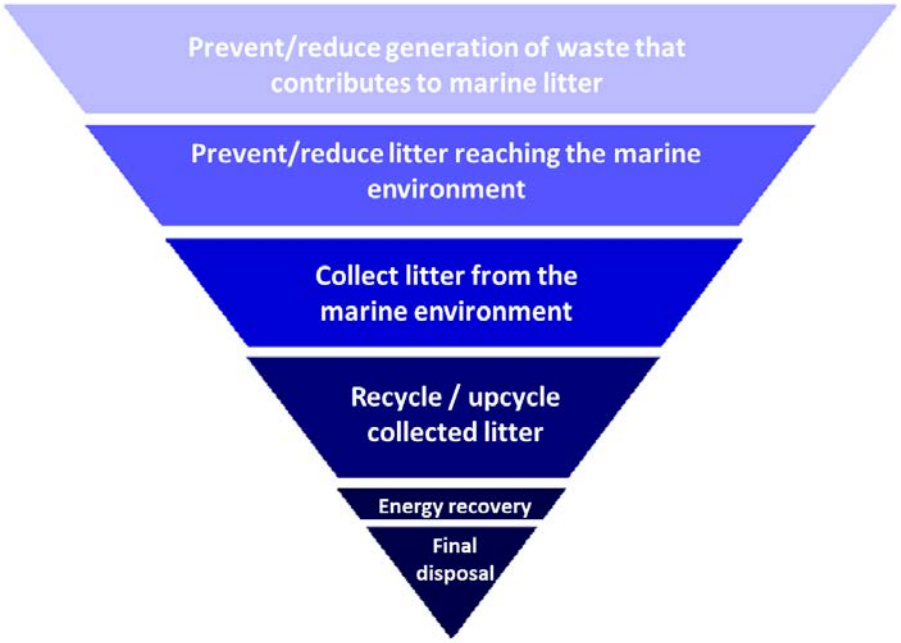
- Producer responsibility and consumer action – both producers and citizens have responsibility to act. In Europe alone 400 tonnes of plastic enter the ocean each year from personal care and cosmetic products. Other sources include food and beverage packaging and fibres from laundry. All leakages have health, safety, food chain and wellbeing impacts.
- Waste management – investments in waste management and waste water treatment infrastructure can help to address marine litter, particularly at the municipal level. In maritime sectors, improved port reception facilities are an important tool.
- Clean-up and trash for treasure – collecting marine plastics and turning them into new products provides a useful awareness raising tool, but such initiatives are not effective when scaled up.
- Fishing and aquaculture – nets, buoys and gear are all major sources of marine litter, both discarded accidentally and deliberately. There are also impacts on the sector including vessel damage, loss of catches as a result of "ghost fishing" by lost nets, and the reduced value of catches due to pollution.
- Tourism – this sector is a major source of marine litter, including recreational boating, hotels, cruise ships, and inadequate infrastructure to deal with seasonal

influxes of tourists. Impacts to the sector include loss of aesthetic value, health and safety risks, loss of income and reduction in tourist numbers.

Overall, it can be seen that different sectors are simultaneously major sources of marine litter and also burdened by this form of pollution, meaning they have both a responsibility and a self-interest to act.

He concluded by promoting the waste hierarchy as a tool for prioritising action (see Figure 1 below), underlining that preventing plastic waste is likely to be more cost-effective than clean up.

Figure 1. A suggested hierarchy for marine litter management



Source: adapted from Watkins et al (forthcoming, 2017)

Presentation 4: Messages from a marine litter scientist

Dr Heather Leslie, Vrije Universiteit Amsterdam

Dr Leslie called for "political leadership and decisiveness" on marine litter, arguing that the issue represented a systemic market failure in the economy. Heather Leslie was the coordinator of the CleanSea Project, a major EU wide initiative on marine litter funded by the 7th Framework Programme for Research and Innovation. The outcomes of the project highlighted the limitations of clean-up activities and what possible policies could be.

She stressed that there should not be a reliance on citizens to address marine litter alone. Recognising the difficulties which governments themselves face in implementing green public procurement policies, she questioned how consumer choice alone can effectively reduce littering. Like other major environmental challenges, there is a need for "courageous" intervention by policy makers, arguing that "no environmental problem has ever been solved without a strong policy framework".

She argued that clean-up was a distraction from "production which is cool, innovative and profitable. I don't want to affirm the system which is making a mess". Preventative measures save money and can support business innovation, and this needs to start at the design phase.

Many products are releasing plastics into the environment unknowingly. This includes tyre wear, and even the brushes on street cleaners. Looking to the future, this highlights the need for systemic redesign.

There are open questions about how this transition can be financed. There is also a lack of engagement of representatives from government ministries working on trade and finance. However, it is clear that the costs of inaction are too high.

The health costs from plastic pollution remain unknown. Drawing on research in eco-toxicology and immunology, Dr Leslie has concerns over the health impacts of plastic particulates – which could be comparable to particulate matter found in air pollution. This highlights the need for transparency in the material composition of plastic products.

Panel discussion and conclusion

The following questions were addressed to the panel from the chair and members of the audience:

Question 1 from Simona Bonafè MEP: The question noted that EU eco-design legislation does not currently take into account resource efficiency, however the European Commission is in the process of considering different options to do so. What concrete actions linked to eco-design could help to tackle marine litter?

Question 2 from Ricardo Serrão Santos MEP: The Member thanked the panel and the organisers reiterating the need for the workshop. He also called for better engagement of policy makers working in trade and finance on the issue, and highlighted some knowledge gaps including seafood sector impacts and health impacts of toxins. His question related to the issue of bioplastics which was not covered in depth within the presentations.

Question 3 from Marion Solletty (Politico): The environmental reporter invited the panel to give specific policy recommendations to be included in the Plastics Strategy that will be published by the European Commission later this year.

The speakers responded as follows to the questions:

Dr Leslie: The marine scientist stressed the need for financing to support action on marine litter. She argued that if “it is not financeable it is not doable”. She hoped aspects of financing would be included in future policies.

Mr ten Brink: He responded to each question sequentially. Firstly, he argued that transparency in material content and reparability could be supported by eco-design legislation, as well as prolonged warrantees and guarantees. He also pointed to the power of take back requirements linked to extended producer responsibility (EPR).

Bioplastics should be treated with caution. He argued that while they sound good they can have unforeseen side effects – as has been experienced already with biofuels. Additionally, he argued that 99% of the impacts from marine litter, including entanglement and ingestion by marine life, would still occur if bioplastics were up-scaled.

With respect to the Plastics Strategy, Mr ten Brink said there was a case for bans on some products which are sources of pollution and substitutable. He encouraged better application of EU funds in waste management and waste water treatment, as well as highlighting the Environmental Implementation Review (EIR) and the Greening of the Semester as opportunities for national level action. He also stressed the central role of market-based instruments, including deposit refund schemes.

Mr Benton: also stressed the limitations and complexity of bioplastics, recognising the need to distinguish between bio-based and bio-degradable plastics. Biodegradable plastics do not

currently degrade in oceans, and should only be used where industrial composting is guaranteed. With respect to the Plastics Strategy, he called for plastics to be valorised in the economy, and for the Strategy not to shy away from strong regulation including bans, e.g. for polystyrene and microbeads.

Dr Galgani: called for eco-design which is innovative and supported with research and development. He called for a greater homogenisation of plastics in order to facilitate recycling, as well as education and awareness raising to support ecological stewardship in citizens.

Simona Bonafè closed the workshop by thanking the panel, and with a look towards the UN Conference on Oceans in New York from 5-9 June 2017.

EU Action to Combat Marine Litter

WORKSHOP

Wednesday, 3rd May 2017 from 11:30 to 12:30
European Parliament (Brussels), Room: Altiero Spinelli 3G2

PROGRAMME

Chair: Simona Bonafè MEP (ENVI)

The workshop is organised at the request of the ENVI Committee in order to contribute to European policy making to address marine litter. It is part of the ENVI Committee's follow up to the European Commission's Circular Economy Action Plan.

11:30 – 11:35
Welcome by the Chair, opening remarks

11:35 – 11:45
Presentation 1: The global context for the marine litter issue
François Galgani, IFREMER (French Research Institute for the Exploitation of the Sea)

11:45 – 11:55
Presentation 2: Ocean clean-up? Why prevention is better than a cure
Dustin Benton, Policy Director, Green Alliance

11:55 – 12:05
Presentation 3: Measures to address marine litter
Patrick ten Brink, Institute for European Environmental Policy (IEEP)

12:05 – 12:15
Presentation 4: Messages from a marine litter scientist
Heather Leslie, Vrije Universiteit Amsterdam and CleanSea

12:15 – 12:30
Q&A with closing remarks by Chair

SHORT BIOGRAPHIES OF EXPERTS

François Galgani

Dr François Galgani is project manager at IFREMER (French Research Institute for the Exploitation of the Sea) and head of the Environment and Resources Laboratory in Corsica, France. He has more than 30 years of research experience in marine biology and conservation and 110 peer reviewed publications.

His work focuses on marine litter and ecotoxicology as well as the implementation of marine litter monitoring. He serves as chair of the scientific and technical group of the European Commission / DG environment group on marine litter. He is also part of the G20 and G7 processes on marine litter and member of the international scientific groups from UNEP (OSPAR and MEDPOL) and UNESCO (GESAMP WG on microplastics).

Dustin Benton

Dustin is acting Policy Director at the UK-based environmental think tank Green Alliance, where he leads on Low Carbon Energy and Resource Stewardship.

He has been responsible for Green Alliance's work with the Alliance for Circular Economy Solutions (ACES), a partnership of businesses and think tanks committed to ambitious circular economy policy in Europe funded by the MAVA Foundation. ACES has paid close attention to the European Commission's Circular Economy Package, including supporting effective policies to address marine litter within the context of the forthcoming plastics strategy.

Before joining Green Alliance, Dustin worked for the Campaign to Protect Rural England where he led on the relationship between landscape protection, climate change, and new energy infrastructure. He holds an MA in Political Thought and Theory from the University of Birmingham and an MA in International Relations and French from the University of St Andrews.

Patrick ten Brink

Patrick ten Brink is the Director of IEEP's Brussels Office, Head of the Green Economy programme and leads IEEP's circular economy and marine litter work. He led IEEP's policy contributions on the DGENV Scoping study to identify potential circular economy actions, priority sectors, material flows and value chains.

He is responsible for IEEP's work on Plastics, Marine Litter and The Circular Economy (for UNEP, and for MAVA) and well as for the ongoing project on market-based instruments for pollution and natural resources that includes a theme on the circular economy and on marine litter.

He lectured on the socio-economic impacts of marine litter and on market-based instrument to address marine litter in a MOOC that had 7460 inscriptions (2016) and is in the process of contributing to further MOOCs for 2017, updating the existing modules and contributing to a new circular economy module. He is co-chair of the T20 expert group on circular economy and lead author of the paper on Circular Economy, Plastic and Marine Litter.

Patrick has an MSc in Environmental and Natural Resource Economics from University College London. He speaks English, German, French and Spanish.

Heather Leslie

Dr Heather A. Leslie from Vrije Universiteit Amsterdam (NL) is an environmental pollution scientist with a deep interest in studying how marine litter, plastics and industrial chemicals can negatively impact our ecosystems, society and health - and what can be done about it.

She takes an interdisciplinary approach to studying complex issues like marine litter, from its environmental, societal and economic impacts to the technology and policy mix needed to address the issue, as demonstrated in the European FP7 CleanSea Project (www.cleansea-project.eu), which she coordinated.

She is committed to exploring the opportunities in the circular economy, eco-design of product systems, policy and law to prevent the environmental pollution she and her team measure in the field and laboratory.

PRESENTATIONS

Presentation by Dr François Galgani

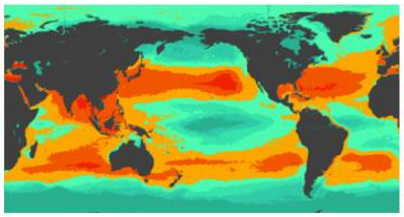
EU Action to Combat Marine Litter

European Parliament, 3 May 2017

F Galgani, IFREMER

What does the global situation of marine litter look like?

8 M tons of Plastic are entering the world ocean every year (700 tons/day in the MED)

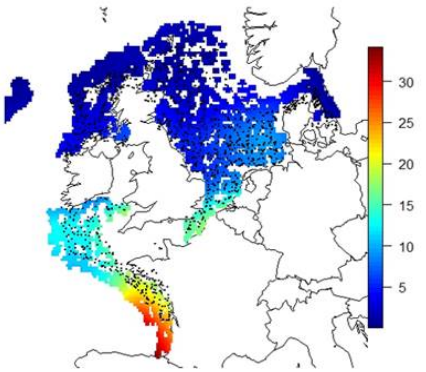


5 trillions particules of plastic are floating in the World ocean (# 250 billions in the MED)

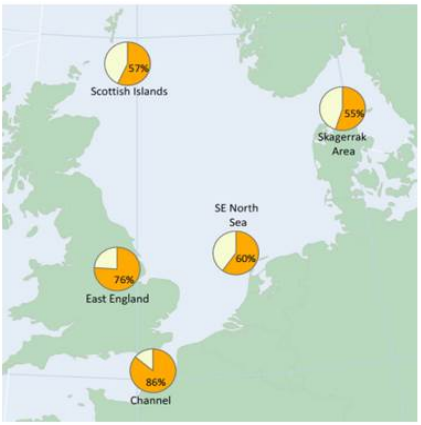
#700 marine species are affected by litter (Entanglement, ingestion, rafting of species)

The Mediterranean sea and the gulf of Bengal are the most affected areas,
up to 100 000 items/ km2 (sea floor) and 64 M items/km 2 (floating microplastics)

Are there regional differences?



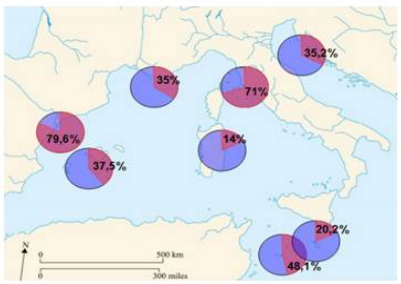
Total litter per km² seafloor across OSPAR region (source OSPAR)



% Fulmars above GES (source OSPAR)

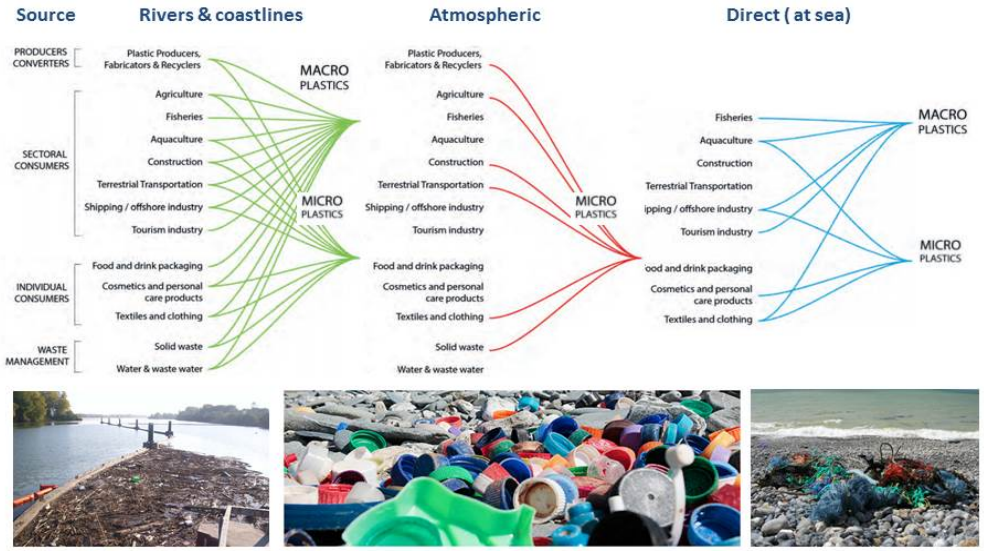
Are there regional differences?

Microplastics per km² in the MED sea (modelled,source L. Lebreton)



% of sea turtles with ingested litter (source CEFE)

What are the main sources of marine litter?



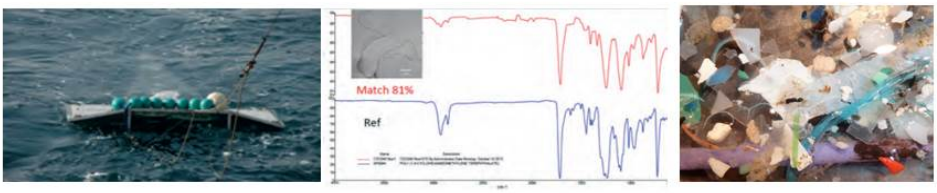
What are the main pathways for marine litter to reach the oceans?

Rivers, run offs, shipping, fishing, tourism… and diffuse pathways

What are the challenges in measurement / verification of ML?

Research priorities

- Methods capable of quantifying small particles (µm range)
- Better understanding of degradation processes
- New tools and strategies to optimize sampling effort
- Developing automated sensors and real-time measurements
- Better understanding of harm caused



Monitoring

- Harmonising sampling and quantification methodologies
- Creating global standardized technology for monitoring
- Creating / designing cost-effective methods & rapid methods
- Organising data and storage

Who are the main actors involved in tackling marine litter?

- EC / DG ENV Plastic strategy (recycling, circular economy)
- EC directives (waste management, Port receptions facilities, etc.)
- UNEP Regional Sea conventions (Regional Actions Plans, Fishing for litter)
- National Action Plans (Ministries: bans on plastic bags & microbeads, taxes, etc.)

What kind of global regional initiatives exist to combat marine litter?

- Global initiatives (G7, G20 on Waste management, UNEP/GPML on education)
- Local Authorities (bans of smoking on beaches, taxes, etc.)
- Conventions / Agreements (Marpol, Honolulu strategy , DAVOS on plastic)
- NGOs (cleaning and monitoring)
- Everybody… (prevention)

Common misconceptions associated with marine litter

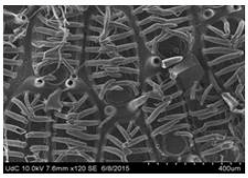
- **'Plastic islands'** are convergence zones with densities of litter higher than other areas, **far less than many coastal waters** (Mediterranean Sea). The Atlantic gyre has only 1000 tons.

- **Clean up of debris in gyres is nonsense** (due to small amounts of plastic, long distance to collect / repair, expensive systems, and it kills organisms). Better to prevent, recycle, and collect along coastal waters.

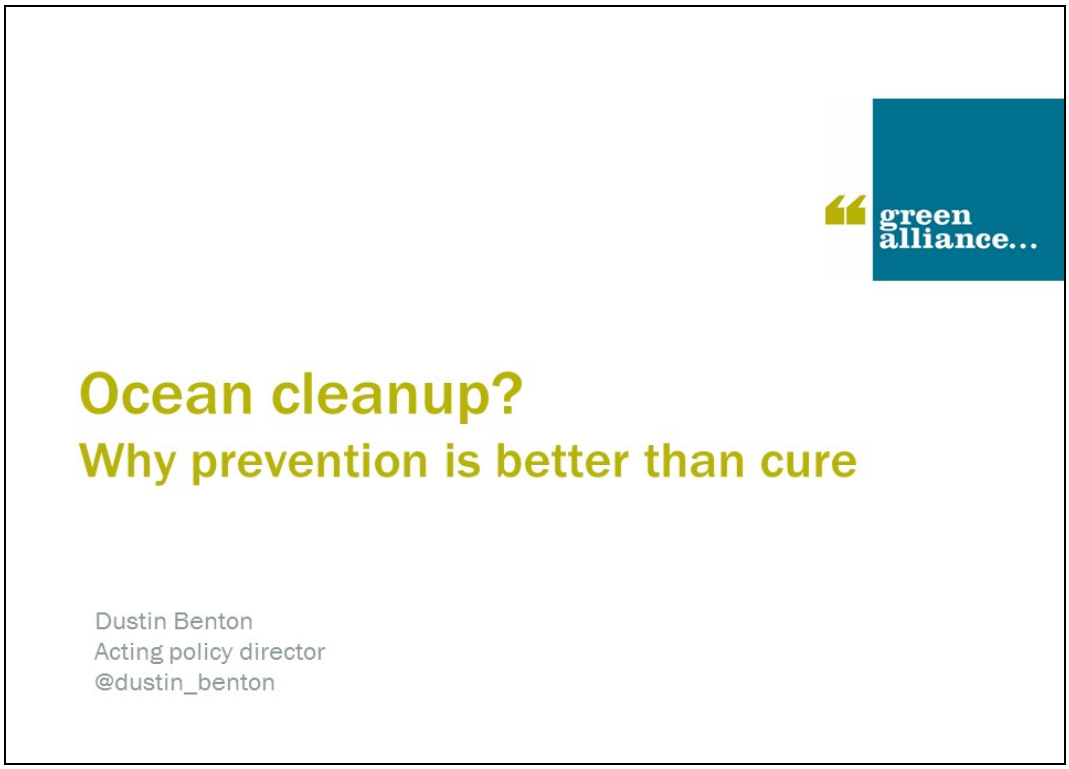
- Debris affect marine species (up to 100% of turtles have ingested litter in some areas), but **trophic transfer is limited,** and unknown for nanopolymers.

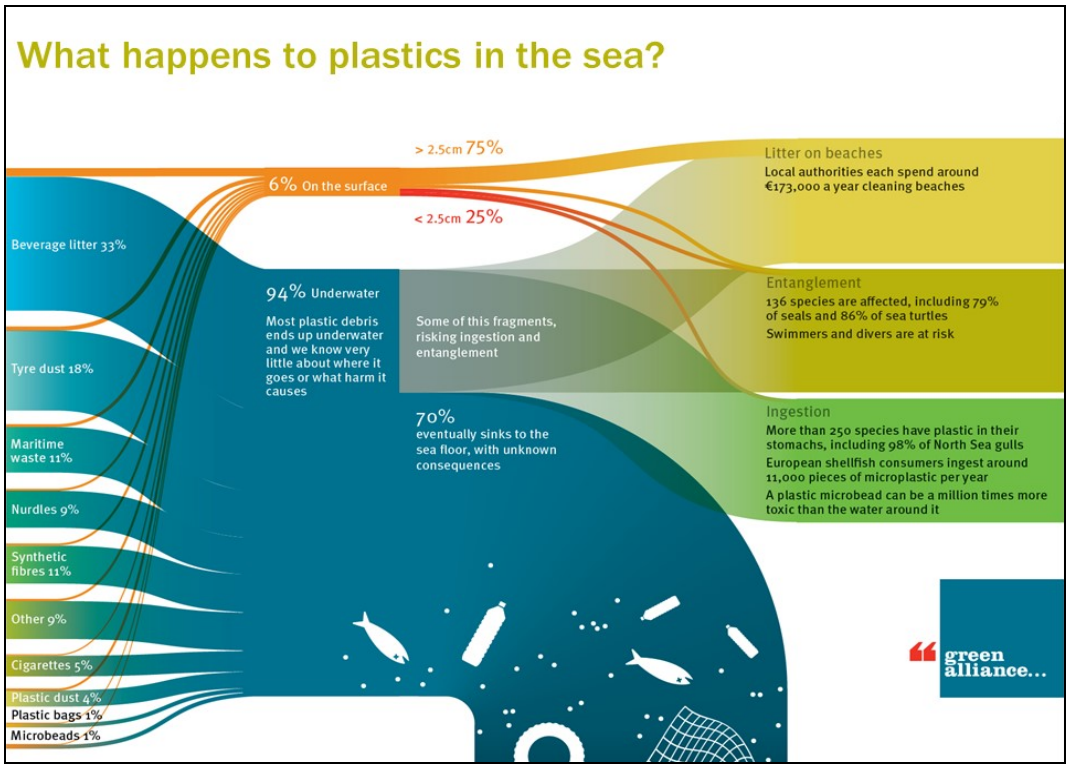
- **Plastic / microplastic is a minor pathway for contaminants** (contamination comes from water), but affects some sensitive species (high ingestion rate) locally.

- **The rafting of species could be underestimated** (long distance transport, pathogens, etc.)

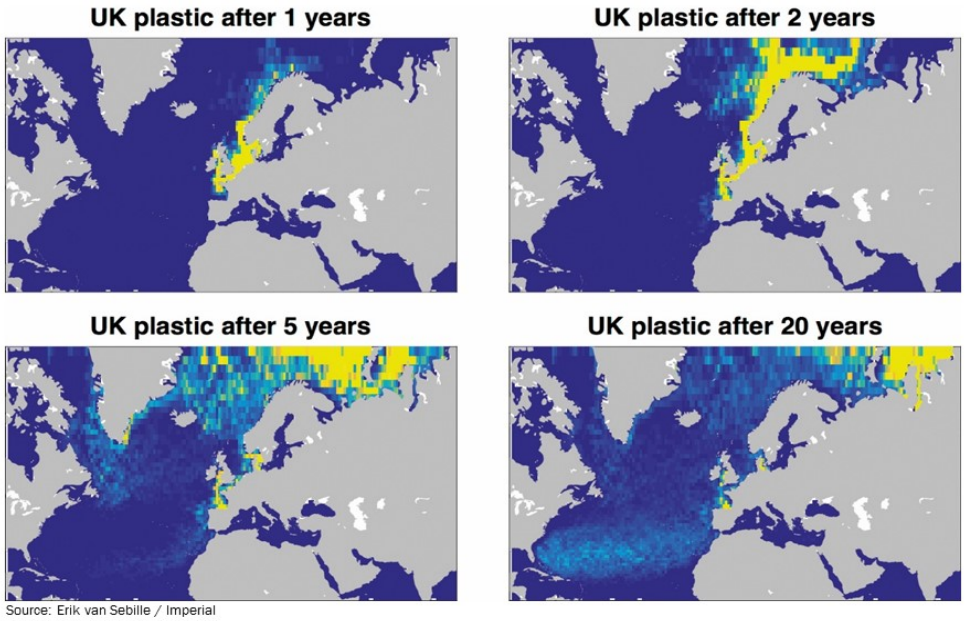


Presentation by Dustin Benton



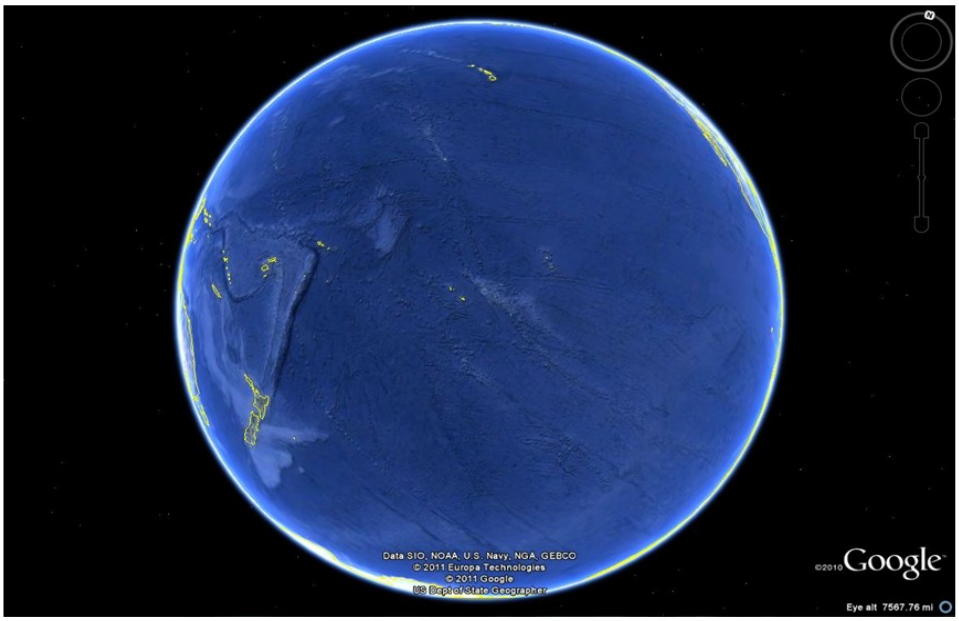


Floating plastic gets around - slowly

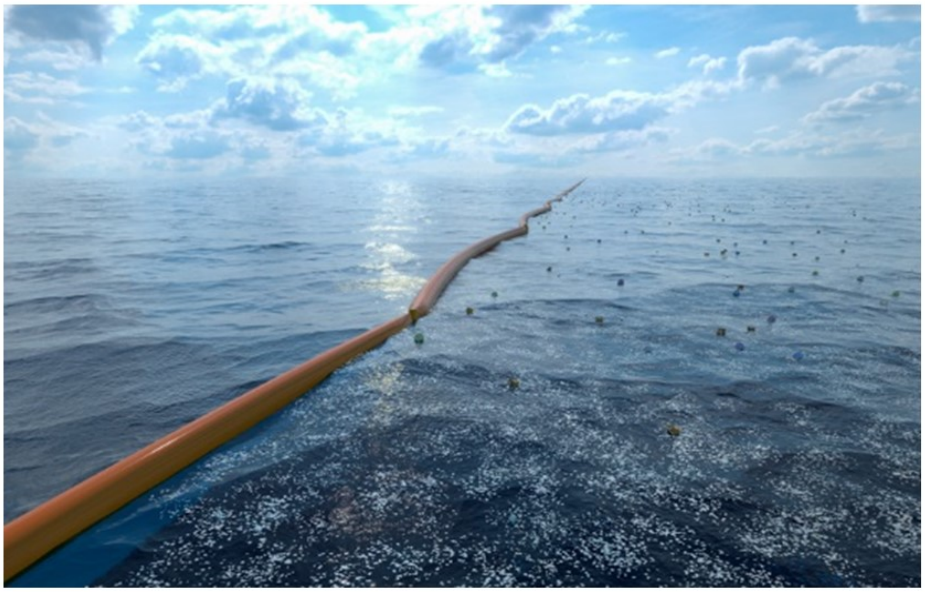


Source: Erik van Sebille / Imperial
http://www.imperial.ac.uk/grantham/publications/the-ocean-plastic-pollution-challenge-towards-solutions-in-the-uk--grantham-briefing-paper-19.php

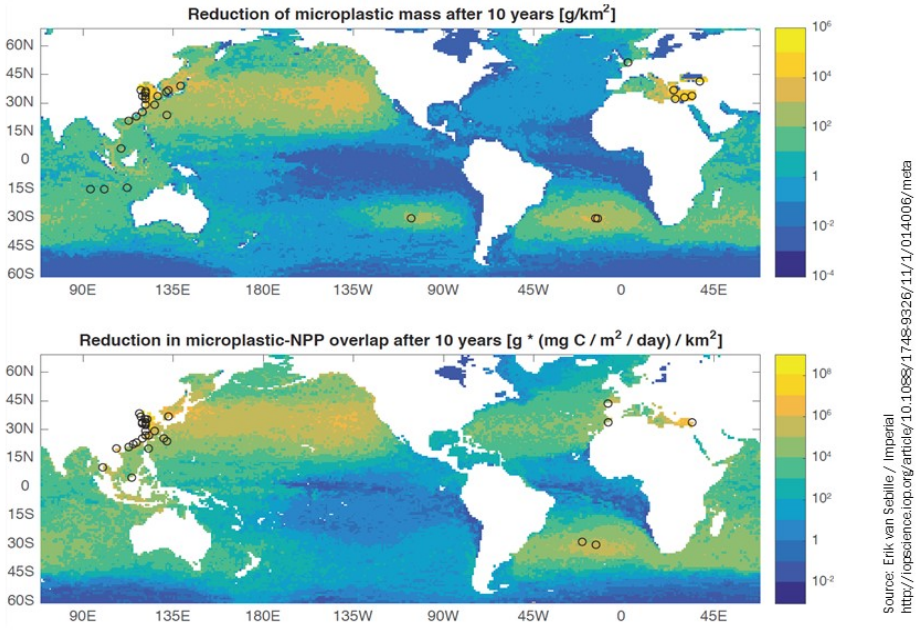
The ocean is a really really big place



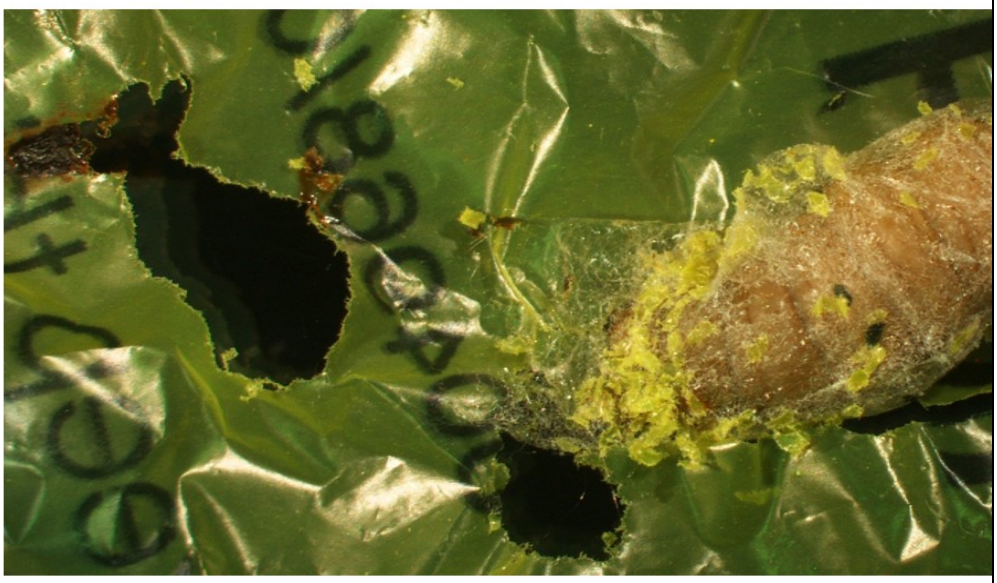
Siren songs v1: floating buoys



Siren songs v1: floating buoys



Siren songs v2: plastic eating bugs



Some better ideas

green alliance...

Keep plastic from getting into the ocean

Ban designed-to-pollute products
- Microbeads
- Expanded polystyrene

Support redesign
- Require biobased alternatives (cigarette filters, cotton buds)
- Plastic bottle lid tethers
- Use ecodesign to require recyclability

Enforce liability
- Nurdles are industrial pollution

Clean up as close to the source as possible
- Bottle deposits
- Wastewater filters for microfibres

Presentation by Patrick ten Brink

Institute for European Environmental Policy

Measures to address Marine Litter

Patrick ten Brink

Director IEEP-Brussels & Head of the Green Economy Programme

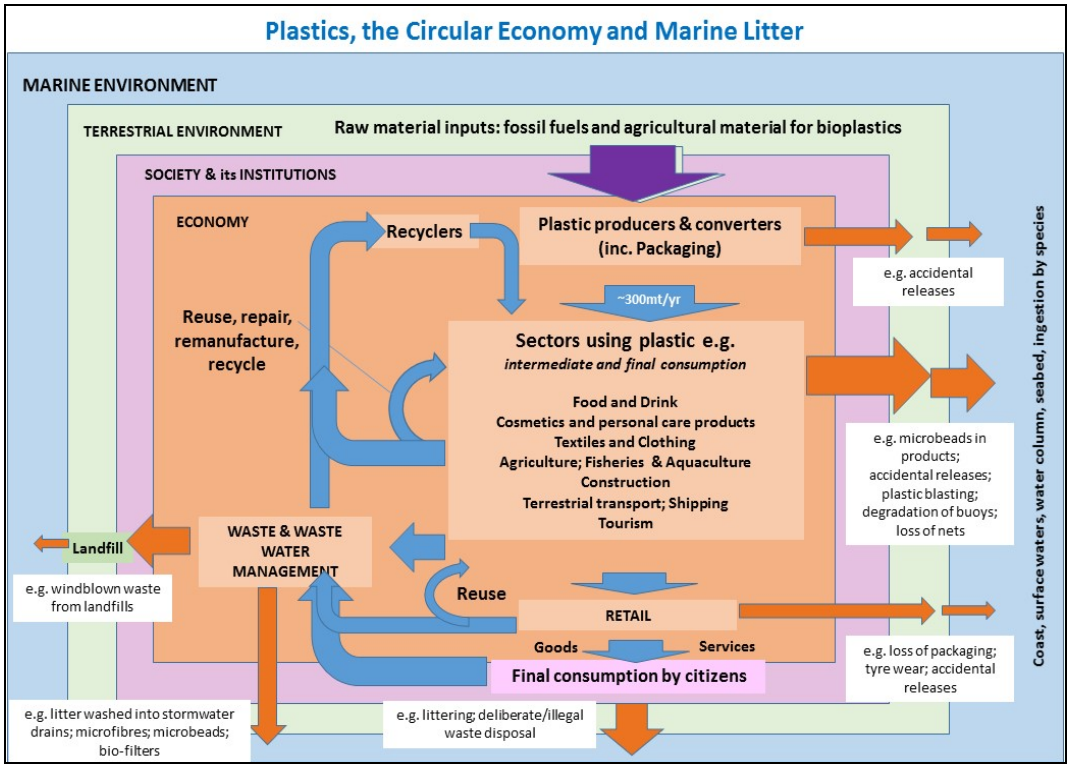
3 May 2016

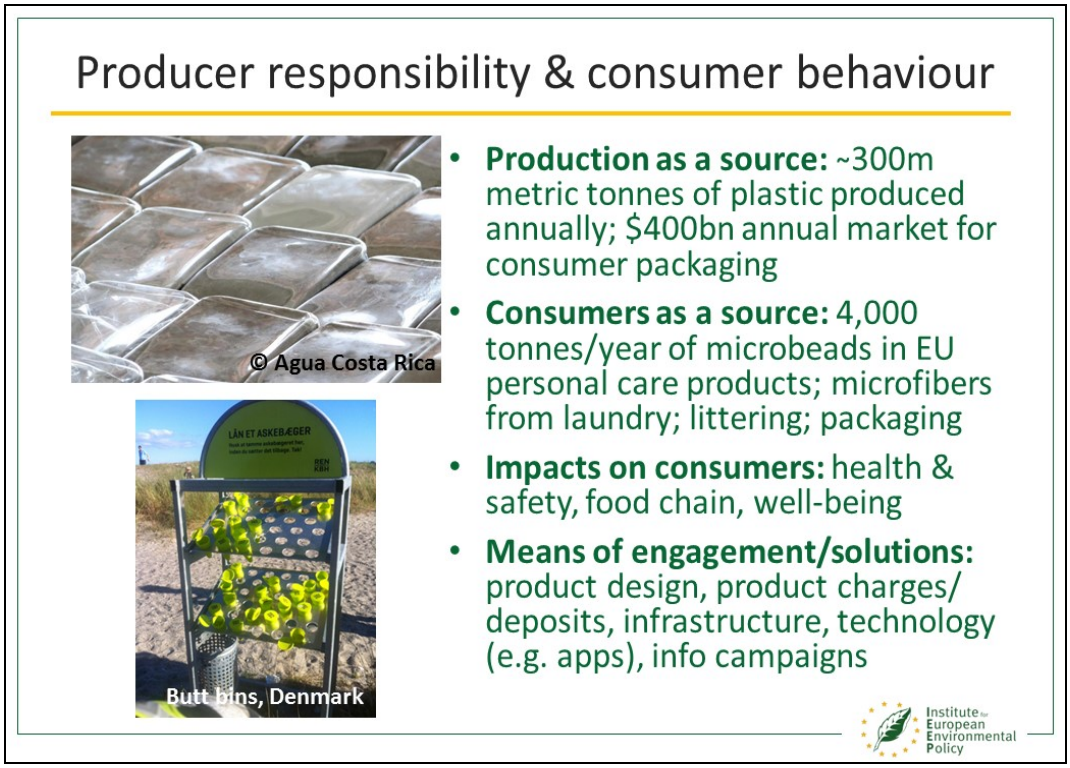
European Parliament, Brussels

www.ieep.eu
@IEEP_eu

Structure

1. Plastics the Circular Economy and Marine Litter
2. Overview of Measures
3. Examples
4. Way forward


Plastics, the Circular Economy and Marine Litter
MARINE ENVIRONMENT
TERRESTRIAL ENVIRONMENT
Raw material inputs: fossil fuels and agricultural material for bioplastics
SOCIETY & its INSTITUTIONS
ECONOMY
Recyclers
Plastic producers & converters (inc. Packaging)
e.g. accidental releases
~300mt/yr
Reuse, repair, remanufacture, recycle
Sectors using plastic e.g.
intermediate and final consumption
Food and Drink
Cosmetics and personal care products
Textiles and Clothing
Agriculture; Fisheries & Aquaculture
Construction
Terrestrial transport; Shipping
Tourism
e.g. microbeads in products; accidental releases; plastic blasting; degradation of buoys; loss of nets
Landfill
WASTE & WASTE WATER MANAGEMENT
e.g. windblown waste from landfills
Reuse
RETAIL
Goods
Services
Final consumption by citizens
e.g. loss of packaging; tyre wear; accidental releases
e.g. litter washed into stormwater drains; microfibres; microbeads; bio-filters
e.g. littering; deliberate/illegal waste disposal
Coast, surface waters, water column, seabed, ingestion by species


Producer responsibility & consumer behaviour
© Agua Costa Rica
Butt bins, Denmark
Production as a source: ~300m metric tonnes of plastic produced annually; $400bn annual market for consumer packaging
Consumers as a source: 4,000 tonnes/year of microbeads in EU personal care products; microfibers from laundry; littering; packaging
Impacts on consumers: health & safety, food chain, well-being
Means of engagement/solutions: product design, product charges/ deposits, infrastructure, technology (e.g. apps), info campaigns
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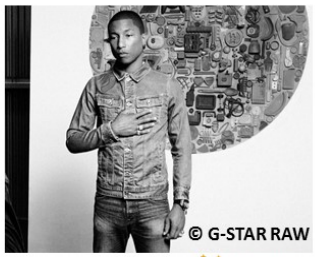
Waste and wastewater sector

- **Waste sector as a source/pathway:** poor infrastructure, dumping, windblown waste, biofilters, stormwater, microbeads
- **Waste prevention:** extended producer responsibility, product design, wastewater treatment
- **Waste collection:** public/municipal and small/voluntary projects
- **Waste disposal:** capture windblown waste, clean up illegal dumps
- **Trash to treasure…!**



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Fishing and aquaculture

- **Fisheries/aquaculture as a source:** abandoned, lost & discarded fishing gear (ALDFG) e.g. nets, buoys, ropes
- **Impacts on the sector:** vessel damage (cooling systems, propellers), loss of catch through ghost fishing, reduced value of catch (e.g. from chemical/ microplastic ingestion)
- **Actions and costs:** fishing for litter, modified gear, on-board technology, deposit refunds, port reception facilities and fees

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Tourism sector

- **Tourism sector as a source:** littering, recreational fishing & boating, hotels/shops, inadequate waste infrastructures
- **Impacts on the sector:** loss of aesthetic value, health & safety risks, reduction in tourist numbers, loss of tourism jobs
- **Actions and costs:** beach clean-ups, beach certification/ sustainable tourism, bans, fees and fines, awareness-raising

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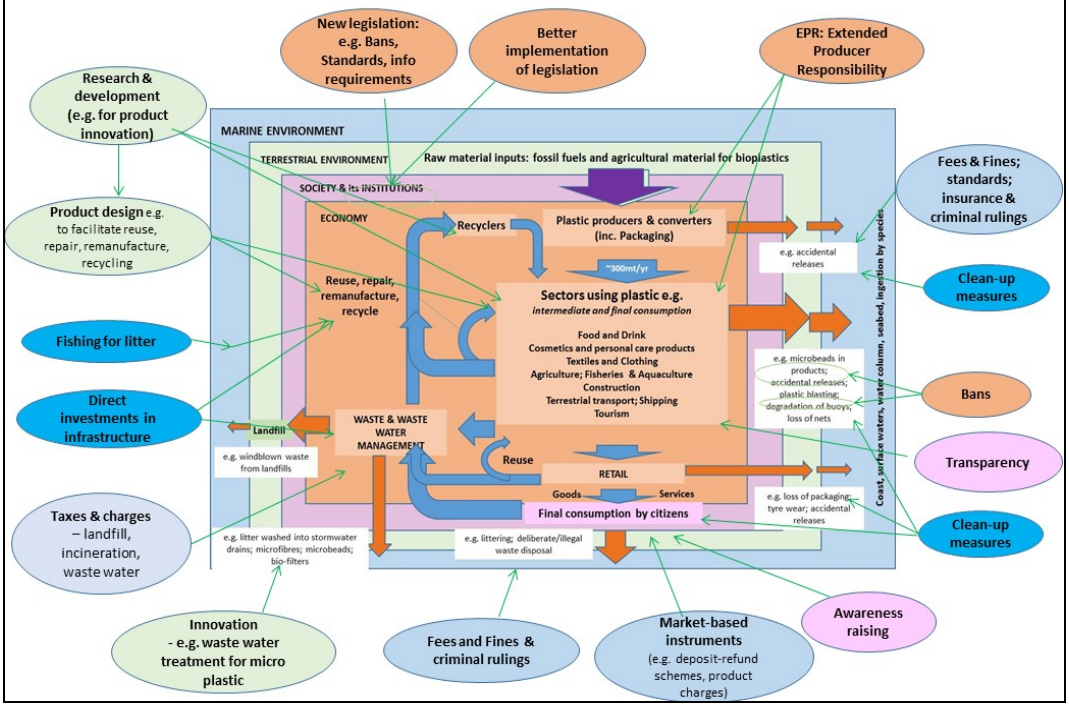
Plastics, the Circular Economy and Marine Litter & Instruments



Hierarchy and types of actions

Prevent/reduce waste that contributes to marine litter:

- Product design, material choice, awareness raising

Prevent/reduce litter that reaches the marine environment:

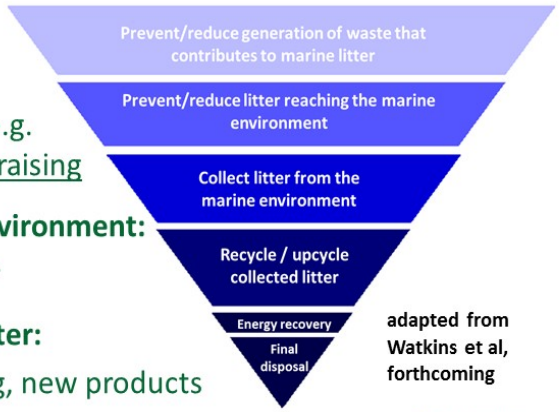
- Waste and wastewater infrastructure; incentives e.g. deposit refund, EPR; plastic bag charges; bans e.g. bags/smoking; awareness raising

Collect litter from marine environment:

- Clean-ups; fishing for litter

Recycle/upcycle collected litter:

- Trash to treasure, recycling, new products



adapted from Watkins et al, forthcoming

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Conclusions / summary and way forward

- **There are many circular economy solutions to address marine litter**
- **Costs (environmental, health, social and economic) of inaction are too high to accept the status quo of plastic pollution**
- **Need multi-level governance solution (i.e. action by all parties)**
- **Best to follow a hierarchy of prevention over treatment as this is likely to be more (cost)effective**
- **Learn from others: e.g. inspired by plastic bag taxes to product bans**
- **EU Plastics strategy within the Circular Economy package a major opportunity not to be missed**
- **Need measures and ambition in proportion to the challenge of keeping plastic and its value in the economy and out of the oceans.**

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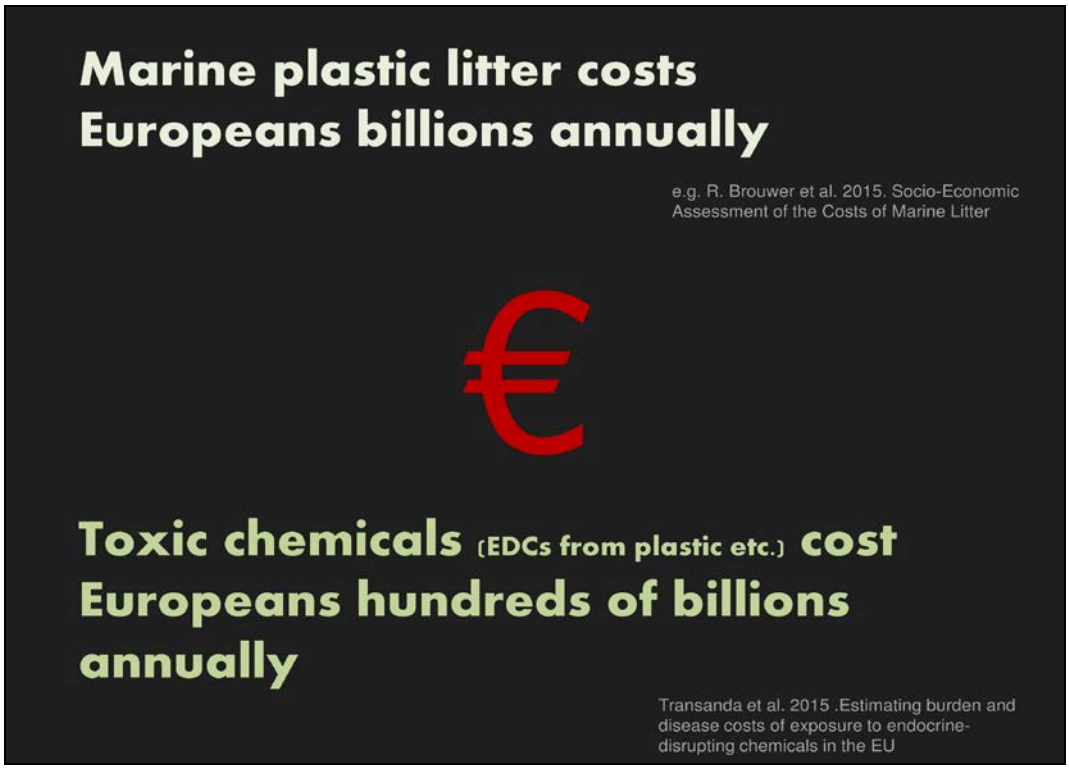
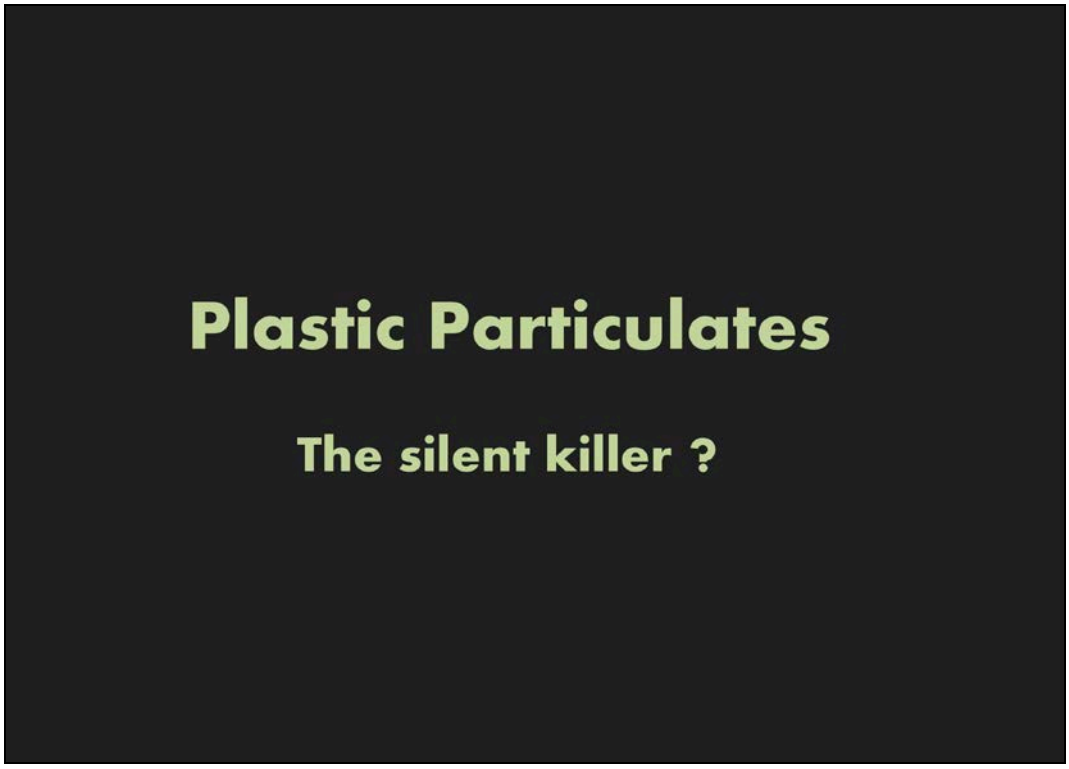
Presentation by Heather Leslie

My policy-maker doesn't understand me.
We scientists don't want to be this guy.


Marine plastic litter costs Europeans billions annually
e.g. R. Brouwer et al. 2015. Socio-Economic Assessment of the Costs of Marine Litter
€
Toxic chemicals (EDCs from plastic etc.) cost Europeans hundreds of billions annually
Transanda et al. 2015 .Estimating burden and disease costs of exposure to endocrine-disrupting chemicals in the EU

Chemical toxicity

endocrine disruption
central nervous system
immune system


Plastic Particulates
The silent killer ?

Particle toxicity
oxidative stress
chronic inflammation
cell death
diseases (way too many to list here)

Plastic pollution is a
human health issue too.

An ecological future
without marine litter
requires a different hierarchy of
values, economic and
political organization
of our societies.

Hardship and disasters are mere challenges to a boundless human ingenuity.
Edward Tenner

Environment & Health Dept.
Vrije Universiteit Amsterdam
heather.leslie@vu.nl
www.falw.vu.nl/environmentandhealth
What's your feedback on this talk?
Check out movie online!
CleanSea, a scientific voyage into the problem of marine ...
CleanSea

CAT: QA-04-17-589-EN-C (paper)
CAT: QA-04-17-589-EN-N (pdf)

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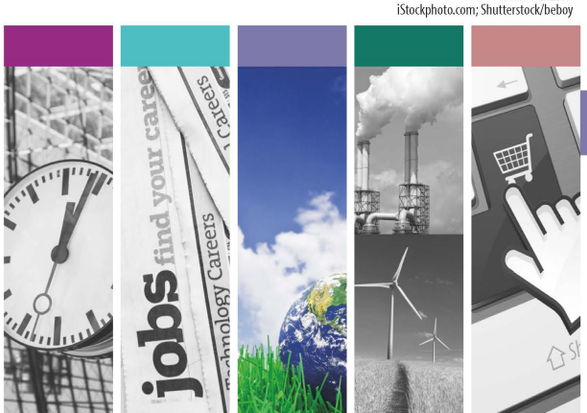

ISBN 978-92-846-1189-8 (paper)
ISBN 978-92-846-1188-1 (pdf)

doi:10.2861/32410 (paper)
doi:10.2861/395627 (pdf)

Publications Office

EU Action to Combat Marine Litter