ombating marine litter and microplastics

eidi Savelli,
rogramme Officer, Marine Litter
N Environment
eidi.savelli@un.org

GPML Global Partnership on Marine Litter

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GPA Global Program Protection of the from Land-base

Content of the Presentation:

1. Introduction
    - Marine Litter & Plastic
    - Impacts
2. International Legal Framework
3. UN Environment, key processes and activities
4. Questions

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Introduction – Marine Litter

Marine litter, sometimes referred to as marine debris, is defined as:

"Any persistent, manufactured, or processed solid material that is discarded, disposed of or abandoned in the marine and coastal environment (UNEP, 2009)."

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Introduction

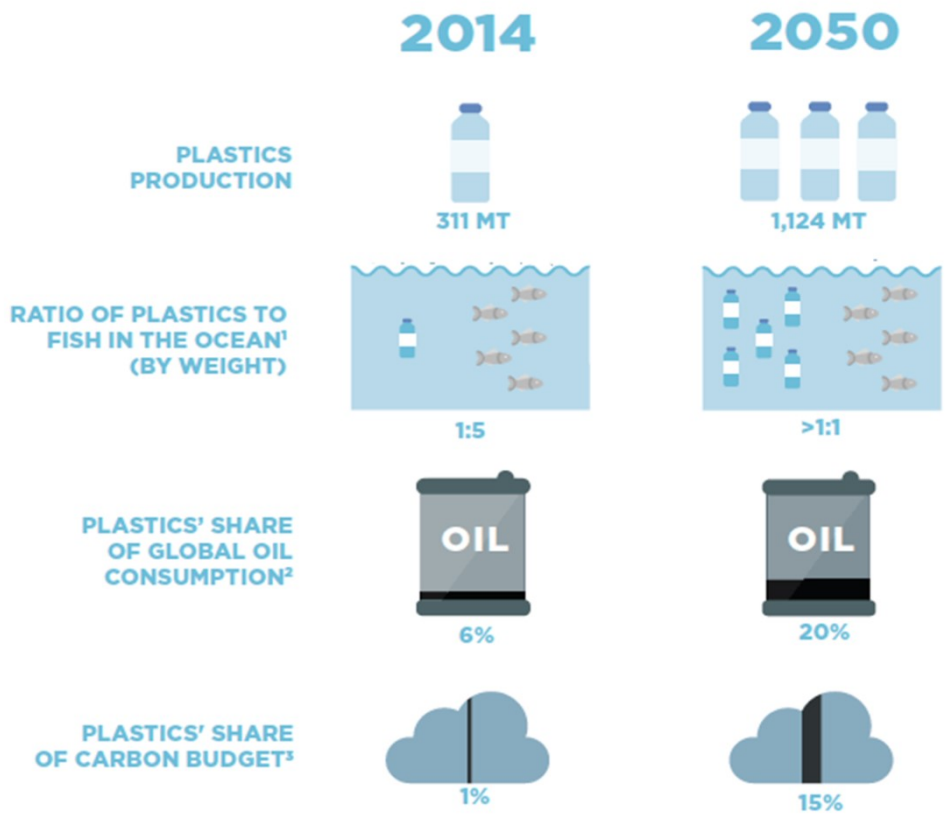
According to some estimates, 60-80% of the marine litter is from land-based sources – varies between regions

60-90% of the marine litter consists of plastic

Approx. 8 million tons of Plastics entering into oceans every year (4.8-12.7)

By 2025 the plastics entering into oceans could be 155 million tons a year if action is not taken upstream to improve plastics management

Need better figures on sea-based i.e. ALDFG and Ship waste



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Introduction – Land-based marine litter

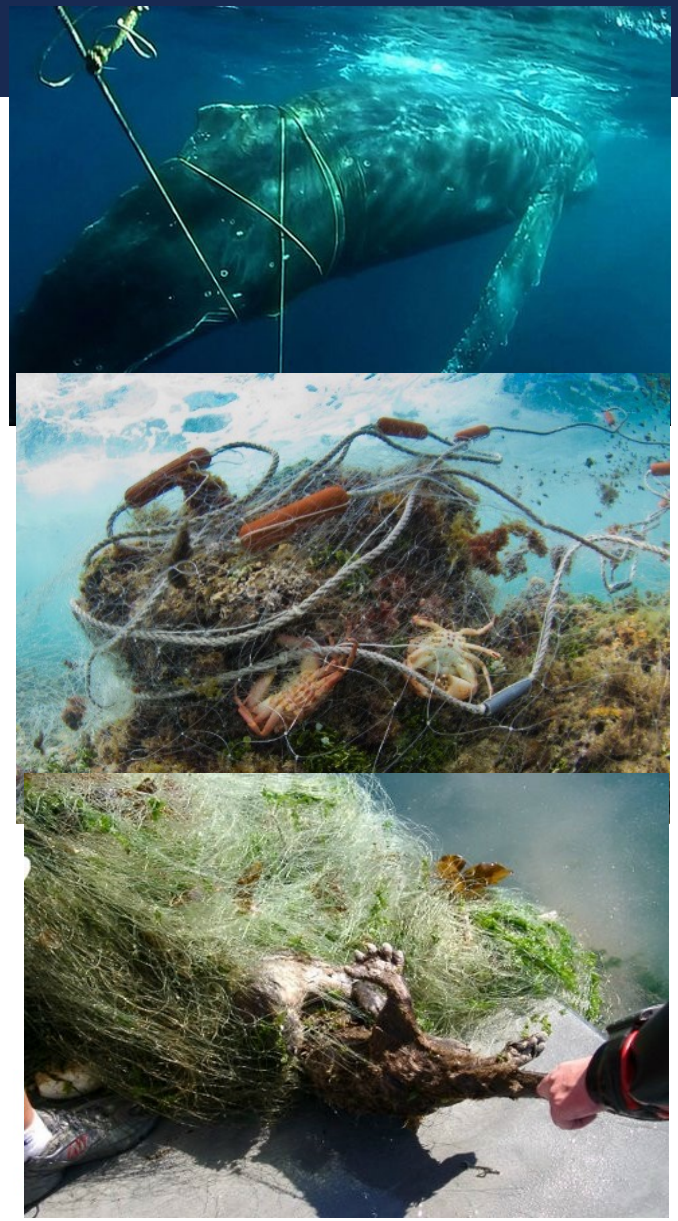
Most common macro-items according to International Costal Cleanup (ICC/Ocean Conservancy, 2016) are consumer products.

Top 10 Items Collected

Ocean Conservancy

1. CIGARETTE BUTTS 2,127,565
2. PLASTIC BEVERAGE BOTTLES 1,024,470
3. FOOD WRAPPERS 888,589
4. PLASTIC BOTTLE CAPS 861,340
5. STRAWS, STIRRERS 439,571
6. OTHER PLASTIC BAGS 424,934
7. GLASS BEVERAGE BOTTLES 402,375
8. PLASTIC GROCERY BAGS 402,122
9. METAL BOTTLE CAPS 381,669
10. PLASTIC LIDS 351,585

Introduction – ALDFG



Abandoned, lost or otherwise discarded fishing gear (**ALDFG**) is a significant and dangerous component of marine litter:

- ➢ **Impact on ecosystem and wildlife**
- ➢ **Loss of potential catches**
- ➢ **Cost for fishing sector**
- ➢ **Navigation and safety hazard**

- Causes of ALDFG include: Bad weather, Gear conflicts, Snagging on living and inert structures, Operator error, Deliberate discarding / abandonment, IUU fishing

Disposal of fishing gear at sea is in contravention of **MARPOL Annex V**.

Introduction – Plastics

Since their widespread introduction in the mid-1950s, the production and development of plastics has expanded dramatically

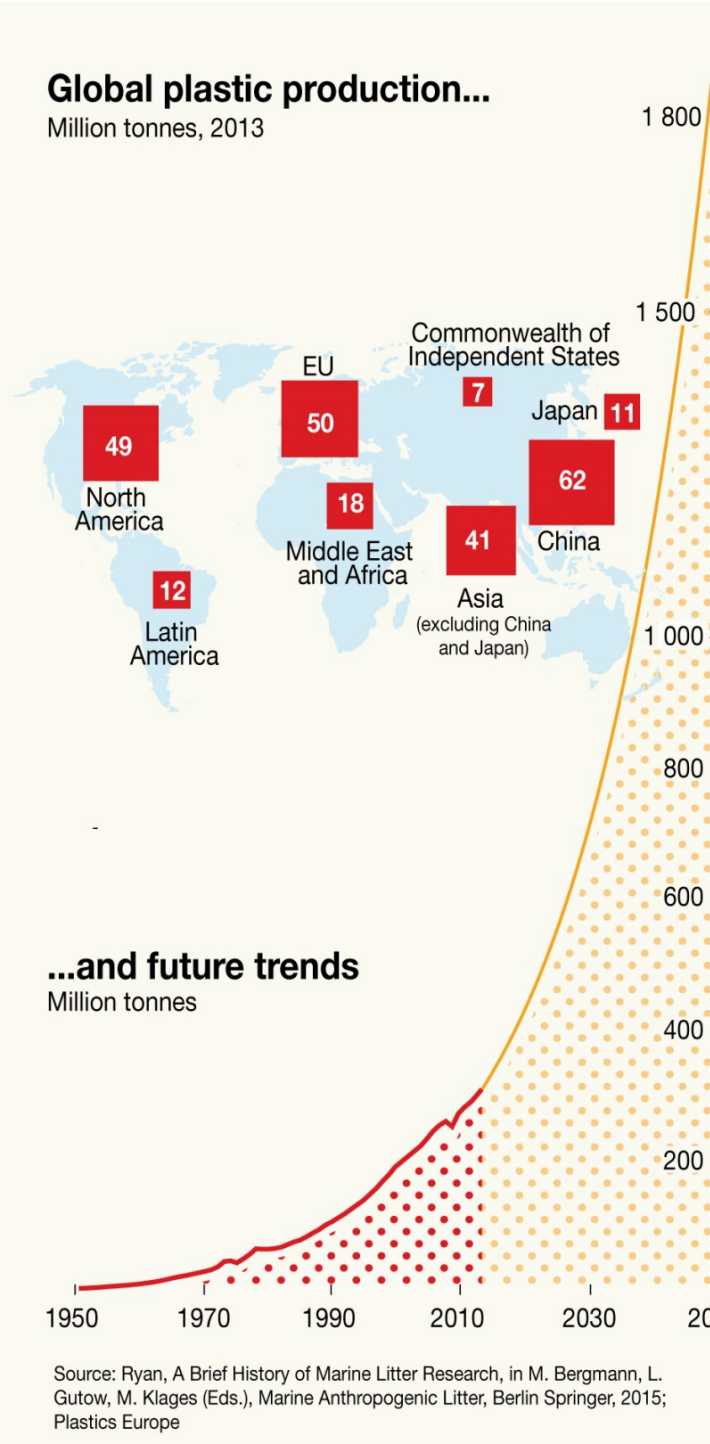
8,300 million metric tons (Mt) of virgin plastics have been produced to date

Plastic production: more than 322 Mt in 2015 (an increase of > 50% from 204 in 2002) – 2016 – **335 Mt**

6,300 Mt of plastic waste has been generated as of 2015

Of this waste, **9%** has been recycled, **12%** incinerated, and **79%** has accumulated in landfills or the natural environment.

12,000 Mt of plastic waste will be in landfills or in the natural environment by 2050 under current production and waste management trends



Plastic and chemicals - Additives

- **Additives** – compounds that are added to modify the properties of the finished item, e.g. these may make the polymer more flexible, resist UV-degradation, add colour or impart flame retardation
- Some benign, others have toxicological effects through ingestion, inhalation, and dermal contact.
- Additives **may be released into the environment** over time, especially when the plastic begins to degrade - re-absorbed to other plastic particles or to lipids (fats) and enter the food chain secondary route.
- **Bisphenol A (BPA),** used in the production of polycarbonate and some epoxy resins, for example, use to line food containers. BPA acts as a **synthetic oestrogen** and is readily absorbed by the body.
- **Most of the population of developed countries have detectable levels of BPA**, but the degree to which it causes health effects is a matter of intense debate.

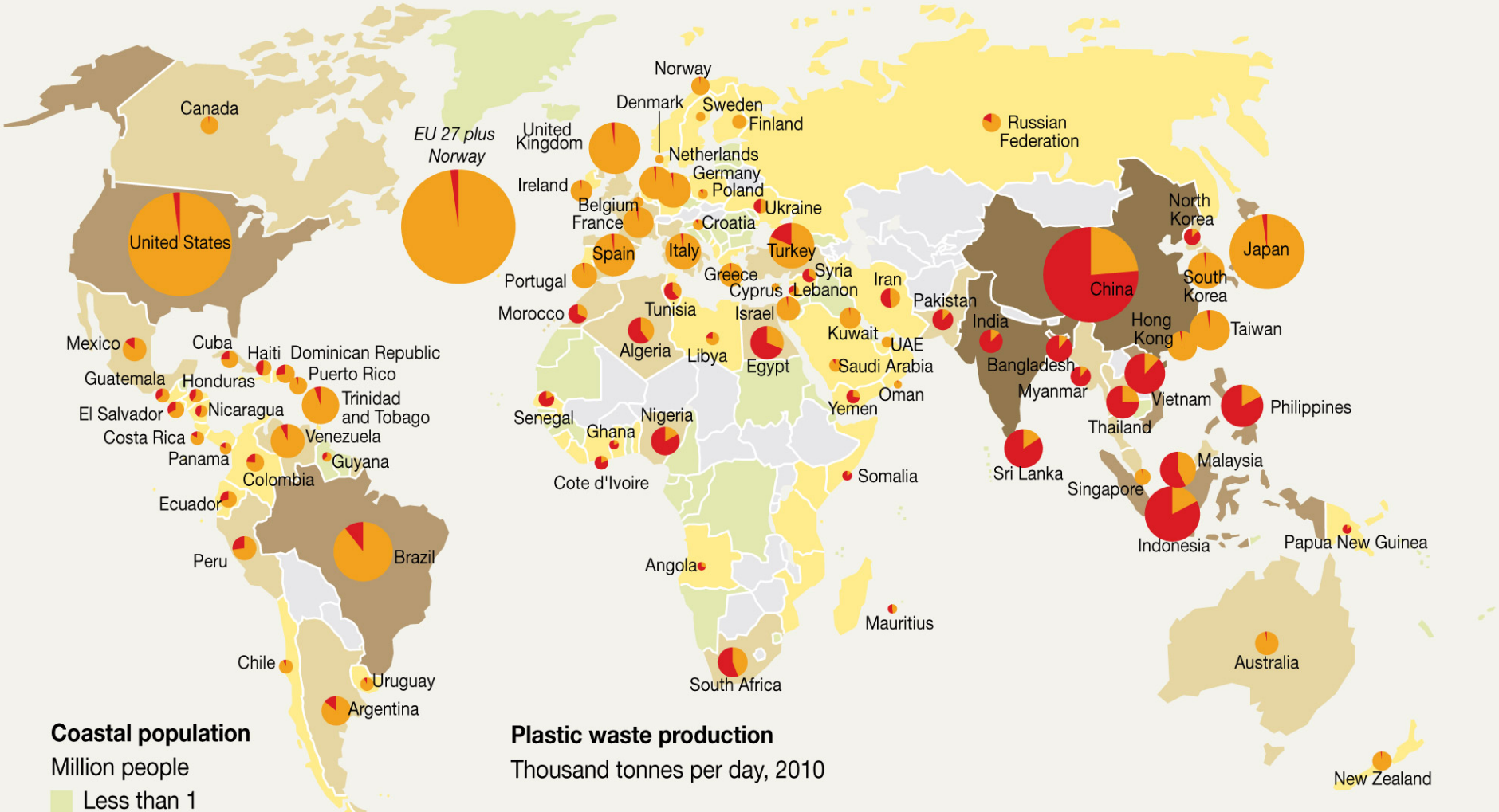
Plastic and chemicals - vectors

- A wide range of organic and inorganic compounds found in ocean
- Many organic pollutants are **lipophilic**, meaning they **sorb readily to fats and oils in fish, mammals** and other organisms. This includes pollutants classified as POPs under the Stockholm Convention, as w as other emerging Persistent, Bioaccumulating and Toxic compounds (PBTs).
- **Plastics have similar properties to natural fats, acting as a 'sponge'** to remove and concentrate contaminants from the water column. If an animal, such as a fish, bird or marine mammal, ingests plast particles then **there is the potential for transfer** of these absorbed chemicals into the tissue.
- Because of the persistence of such compounds, humans and other animals continue to be exposed lor after a chemical has been withdrawn from production (e.g. PCBs).

Plastic and chemicals – common additive chemicals in plastic (GESAMP 2016)

ort form	Full name	Examples of function
P	dibutyl phthalate	anti-cracking agents in nail varnish
P	diethyl phthalate	skin softeners, colour and fragrance fixers
HP	di-(2-ethylhexyl)phthalate	Plasticizer in PVC
CD	hexabromocyclododecane	Flame retardant in durable goods
DEs	Polybrominated diphenyl ethers (penta, octa & deca forms)	Flame retardants in durable goods (e.g. electronics, furnishings)
ylphenol	Stabilizer in PP, PS	
halates	Phthalate esters	Improve flexibility and durability

Plastic waste produced and mismanaged



Coastal population

Million people

- Less than 1
- 1 to 2
- 2 to 10
- 10 to 50
- 50 to 263
- Land locked country

Plastic waste production

Thousand tonnes per day, 2010

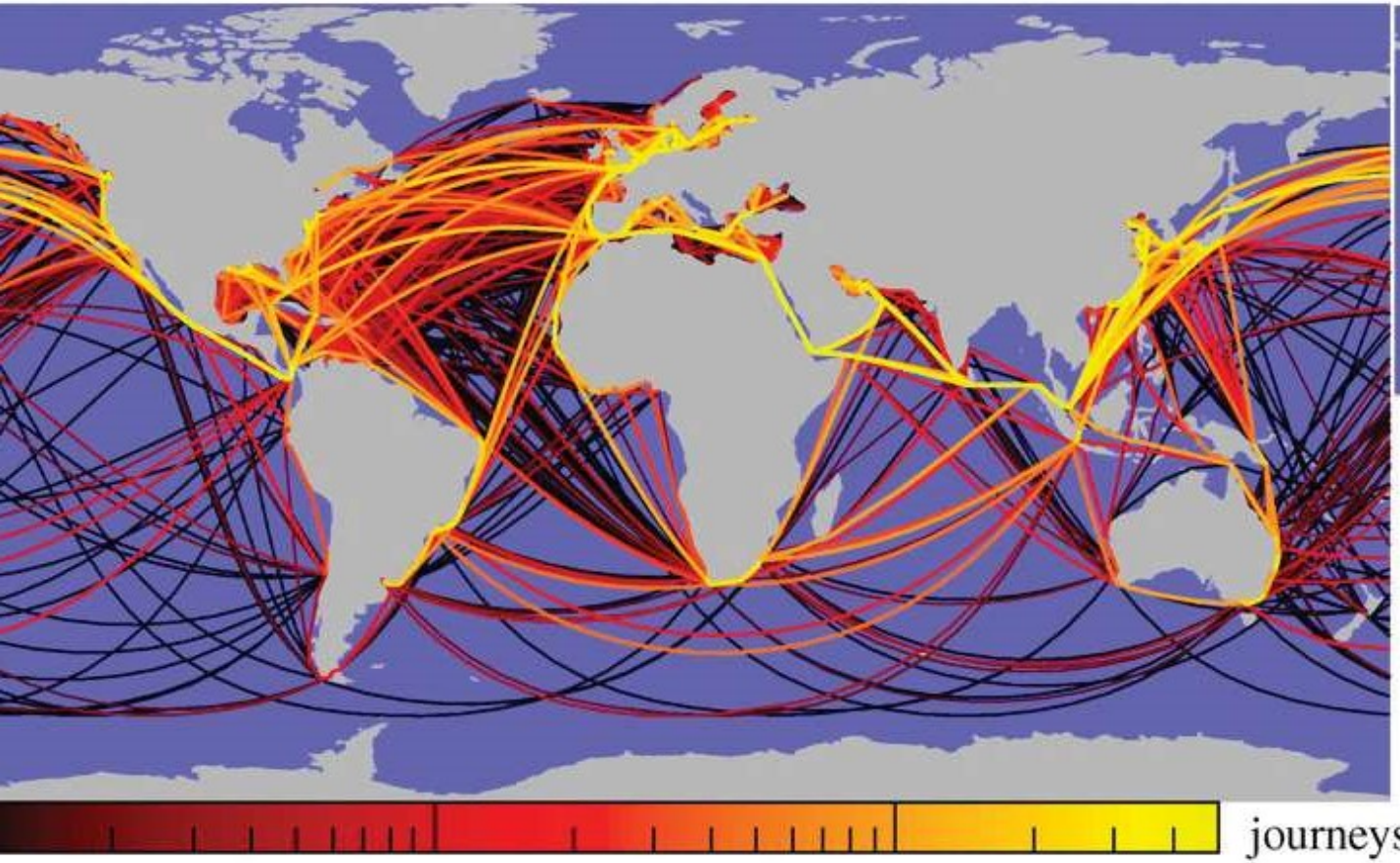
37
10
1
0,2

Total plastic waste produced

Portion of plastic waste mismanaged

Source: Jambeck, J., R., et al., Plastic waste inputs from land into the ocean, Science, 2015; Neumann B., et. al., Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding - A Global Assessment. PLoS ONE, 2015.

Global shipping density (Kaluza et al, 2010)



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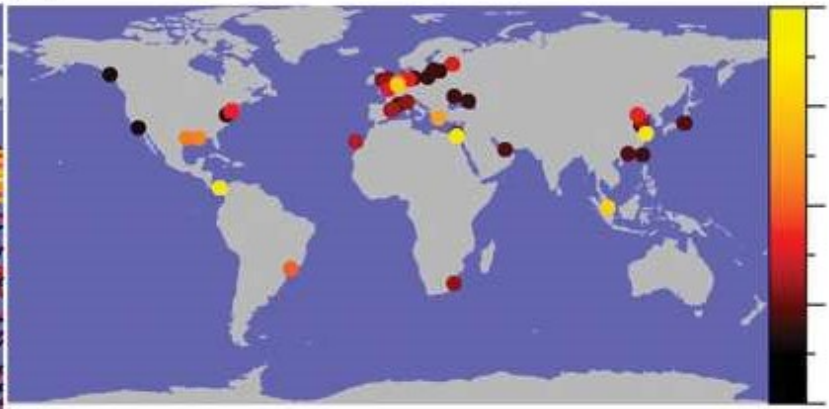


the 20 most central ports

1 Panama Canal	11 Santos
2 Suez Canal	12 Tianjin
3 Shanghai	13 New York and New
4 Singapore	14 Europoort
5 Antwerp	15 Hamburg
6 Piraeus	16 Le Havre
7 Terneuzen	17 St Petersburg
8 Plaquemines	18 Bremerhaven
9 Houston	19 Las Palmas
10 Ijmuiden	20 Barcelona

PLASTICS IN THE MARINE ENVIRONMENT:
WHERE DO THEY COME FROM? WHERE DO THEY GO?

eunomia

LAND BASED - INLAND - 0.50 Mtpa

LAND BASED - COASTAL
9
Million tonnes per annum

AT SEA
1.75
Mtpa

FISHING LITTER - 1.15

SHIPPING LITTER - 0.60

TOTAL PLASTIC ENTERING THE MARINE ENVIRONMENT
12.2
Million tonnes per annum

BEACHES
2,000kg/ km² (5% of total)

OCEAN SURFACE
18kg/ km²
(1% of total)*

PRIMARY MICROPLASTIC - 0.95 Million tonnes per annum

(Thousand tonnes)

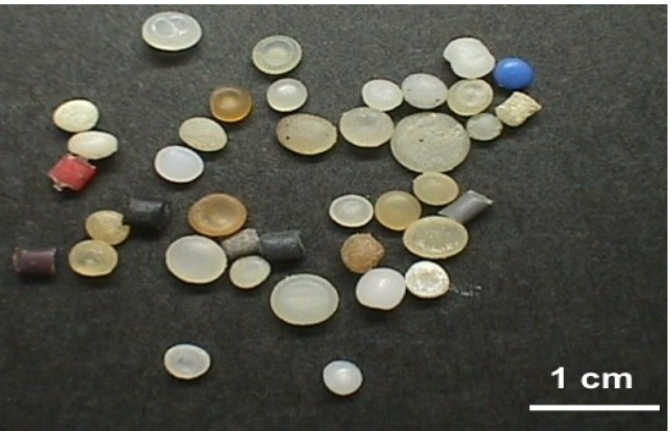
MARINE PAINT	16
COSMETICS	35
ROAD PAINT	80
BUILDING PAINTS	130
TEXTILES	190
PELLET SPILLS	230
VEHICLE TYRE DUST	270

SEA FLOOR
70kg/ km² (94% of total)

*Peak concentration found in North Pacific gyre. Average concentration globally is <1kg per km²

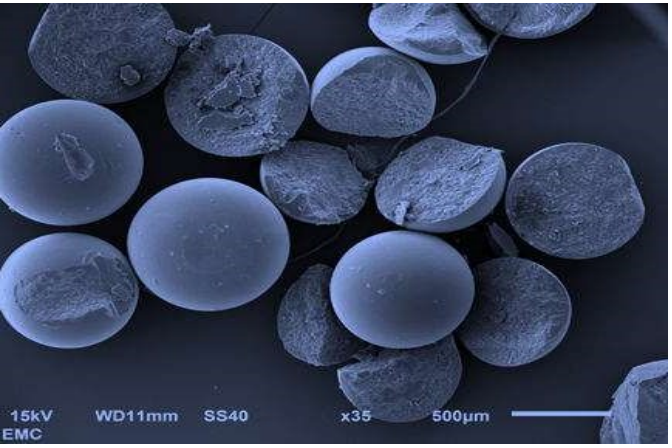
Emerging Issues - Microplastics

perational definition – particles < 5mm

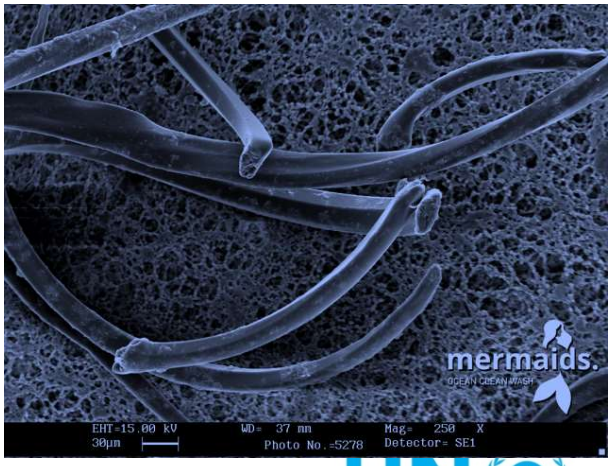


Plastic resin beads, used in plastics manufacture (Ogata)

Beach sample of microplastics, Hawaii (NOAA Marine Debris Program)



Polyethylene microplastics extracted from shower gel (A. Bakir and RC Thompson)



Microfiber from synthetic garment (Mermaids Project

1900 fibers/item

35.6 billion laundry loads in Europe al

Tyre dust ? Atmospheric transportation?

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Microplastics – where do we find it?

259 bottles of water from 11 brands across 9 countries (China, Brazil, India, Indonesia, Mexico, Lebanon, Kenya, Thailand and the US.

Only 17 free from plastic, on average 325 pieces of microplastics (polypropylene, nylon etc. Highest 5,230)

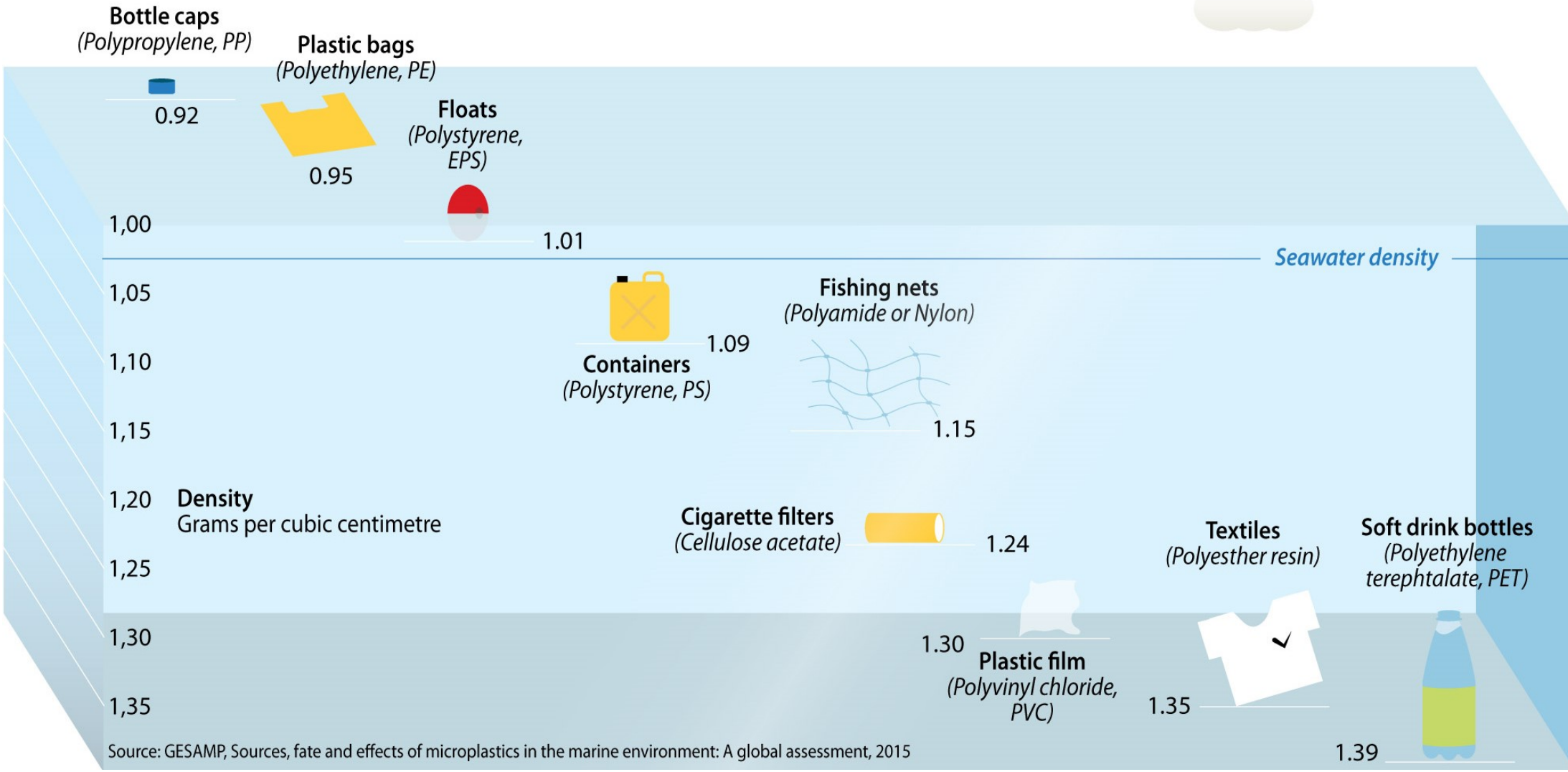
Tap water, sea salt, beer (e.g. Germany and US), honey, fish and bivalves

Arctic: **12,000 microplastic particles/liter of sea ice** (2018), Study from 2015 – **95% fibers**

European shellfish consumers can ingest 11,000 microplastics per year (Cauwenberghe et al 2014)

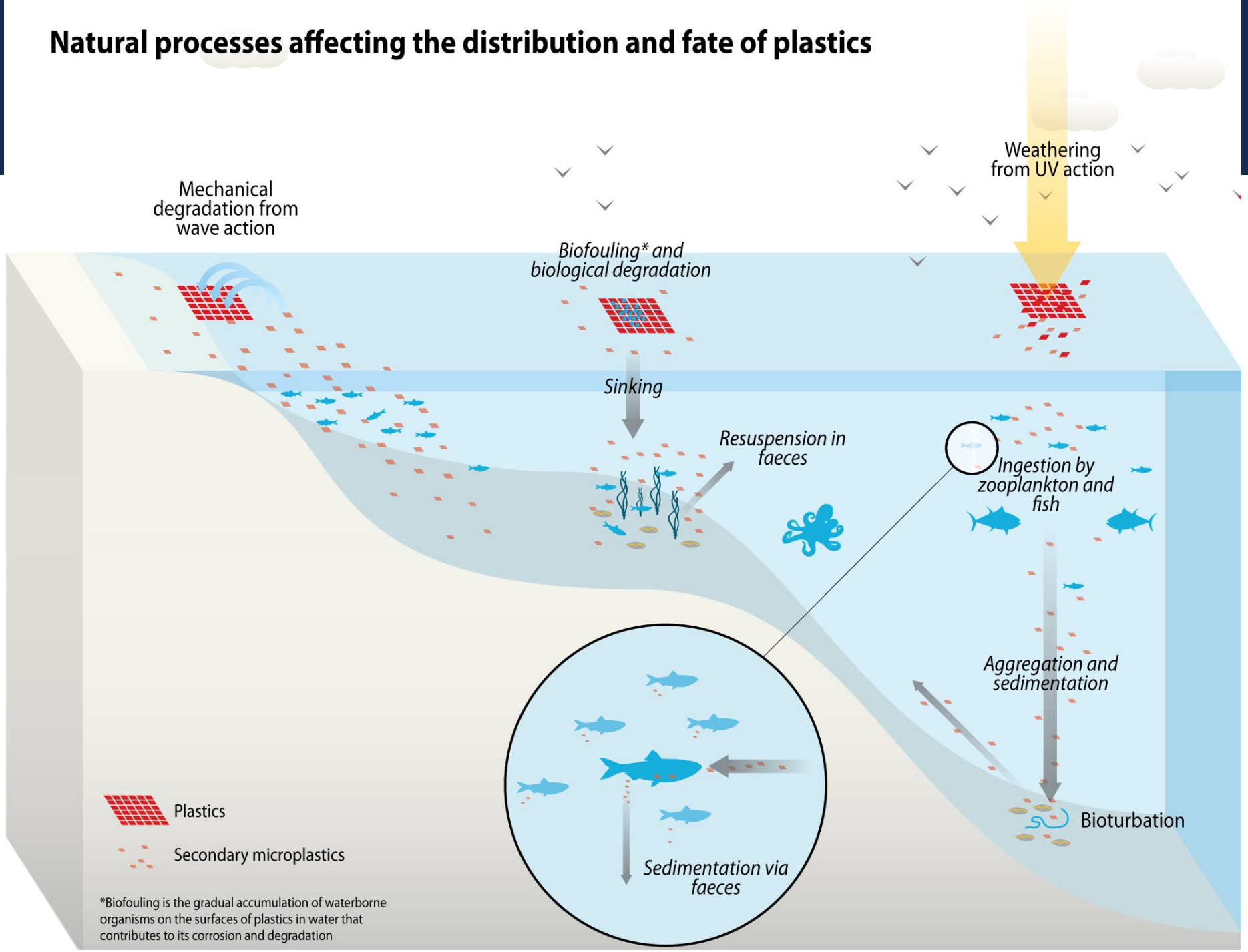
Nano plastics? Transport across cell membranes

Which plastics float and which sink in seawater?



Source: GESAMP, Sources, fate and effects of microplastics in the marine environment: A global assessment, 2015

Natural processes affecting the distribution and fate of plastics



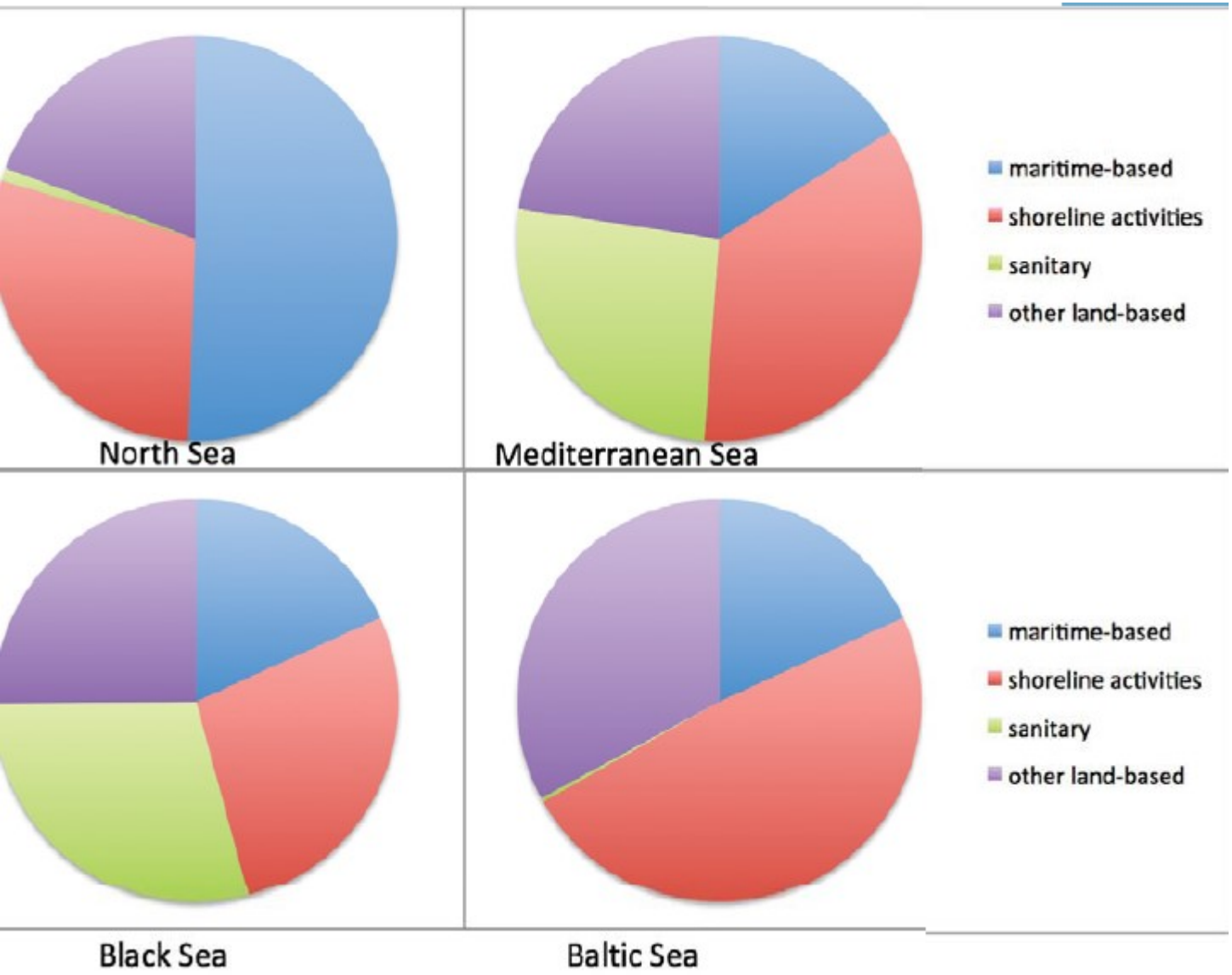
Regional variations

Analysis floating macro-debris (> 200 mm diameter) **20% by number and 70% by weight was fishing–related,** principally floats/buoys (Eriksen et al. 2014). This was based on 4 291 visual observations from 891 sampling locations in the North and South Pacific, North and South Atlantic, Indian Ocean, Bay of Bengal, Mediterranean Sea and coastal waters of Australia.

ALDFG losses in different regions - incidence is likely to be influenced by a number of regionally dependent factors, such as:

- the type of gear, the education level of the crew, inefficient fishing methods, gear conflicts with other fishers and maritime users, the value of the catch compared with the cost of the net and the extent of IUU fishing (Gilman 2015).

Regional variations



Oostende (Belgium) – North Sea

Barcelona (Spain) – Western Mediterranean

Constanta (Romania) – Black Sea
46% of litter from recreational fishing

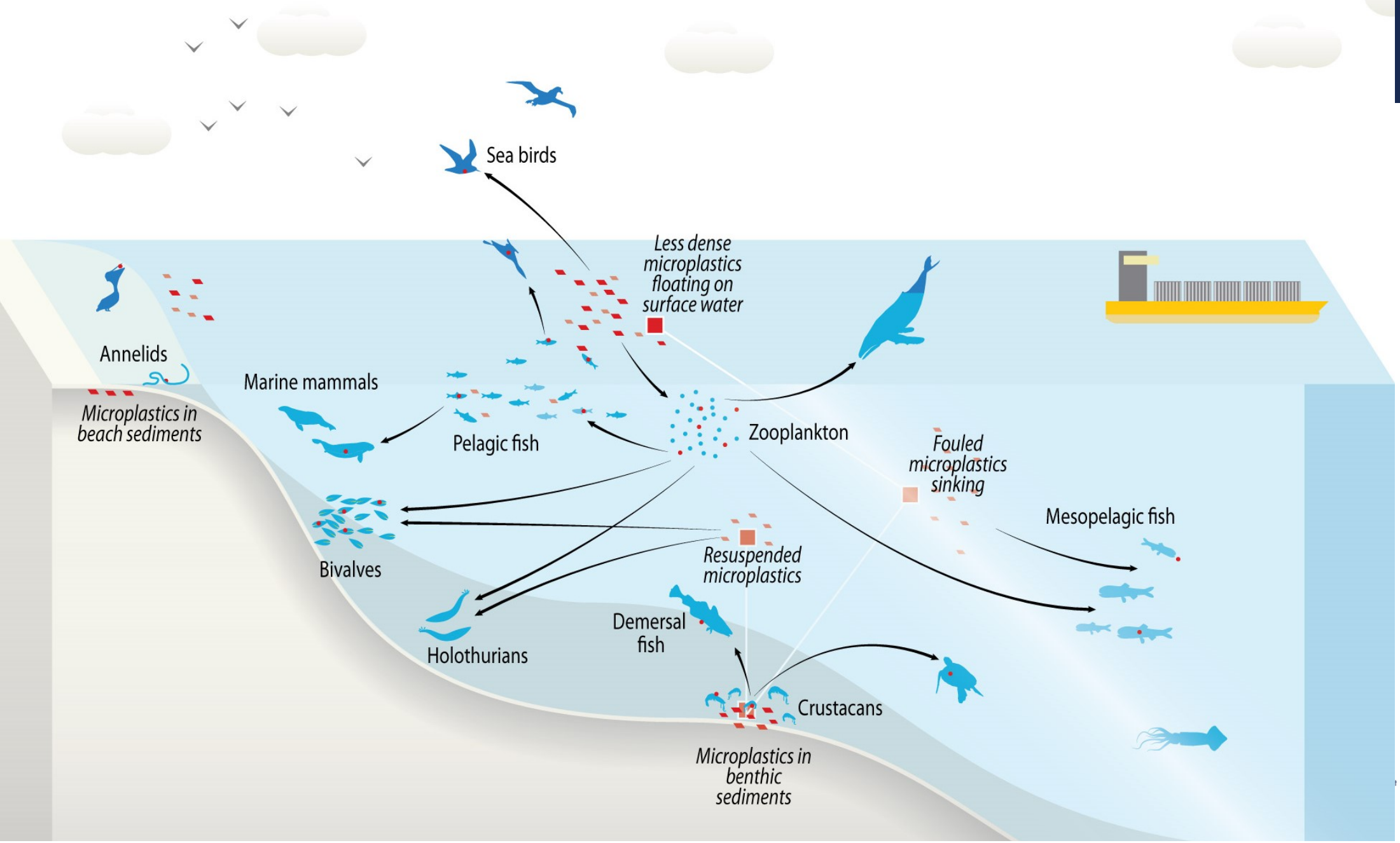
Riga (Latvia) – Baltic Sea;

Regional variations (EU pilot)

oad sector category*	Oostende North Sea	Constanta Black Sea	Riga Baltic Sea	Barcelona Mediterranea
ritime-based	50.51	18.2	18.18	16.08
oreline-based	29.11	48.58	27.69	35.09
nd-based	20.36	33.23	54.4	48.82

Table 5.7 Sources of shoreline marine litter from four pilot locations, grouped by major source cate
* maritime based = fishing, shipping, ports, recreational boating, aquaculture and other ac
shoreline-based = coastal/beach tourism and recreational
land-based = sanitary, general household, waste collection and transport, construction and demolition, other ind
activities, agriculture and dump sites/

How plastics enter the food web



Plastic debris impact on the marine environment

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Impacts: Overview

Environmental:

- entanglements and ghost fishing
- ingestion (intestinal blockage, malnutrition and poisoning)
- blockage of filter feeding mechanisms from small particulate (neustonic) plastic debris
- physical damage and smothering of reefs, seagrasses, mangroves
- potential to vector marine pests including invasive species.

Social

- loss of aesthetics and / or visual amenity
- loss of indigenous values
- antagonism against perceived polluters
- perceived or actual risks to health and safety (including from microplastics)

Economic

- cost to tourism (loss of visual amenity and obstruction to beach use)
- cost to vessel operators (downtime and damage due to entanglements)
- losses to fishery and aquaculture operations due to damage or entanglements
- costs for clean-up, people/animal rescue operations, recovery and disposal

Public Safety

- navigational hazards (loss of power or steerag sea is potentially life threatening)
- hazards to swimmers and divers (entanglemer
- cuts, abrasion and stick (puncture) injuries
- leaching of poisonous chemicals
- explosive risk (gas cylinders frequently wash ashore)

Wildlife Entanglement & Ingestion

tanglement can cause a quick or a slow ath and injury that cause infection.

me 600-700 species are impacted by rine litter

% of species affected by ingestion and anglement from marine litter are dangered

ecent study has estimated that by 2050, % of seabirds are likely to have ingested stic.

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Economic loss: Vessel Damage and navigational hazard

Marine litter costs the European Union fishing fleet an estimated USD 81.7 million per year.

Economic Loss: Tourism

Marine debris impacts tourism as residents and travellers prefer clean beaches.

The annual loss in tourism caused by marine litter is estimated to more than USD 600 million.

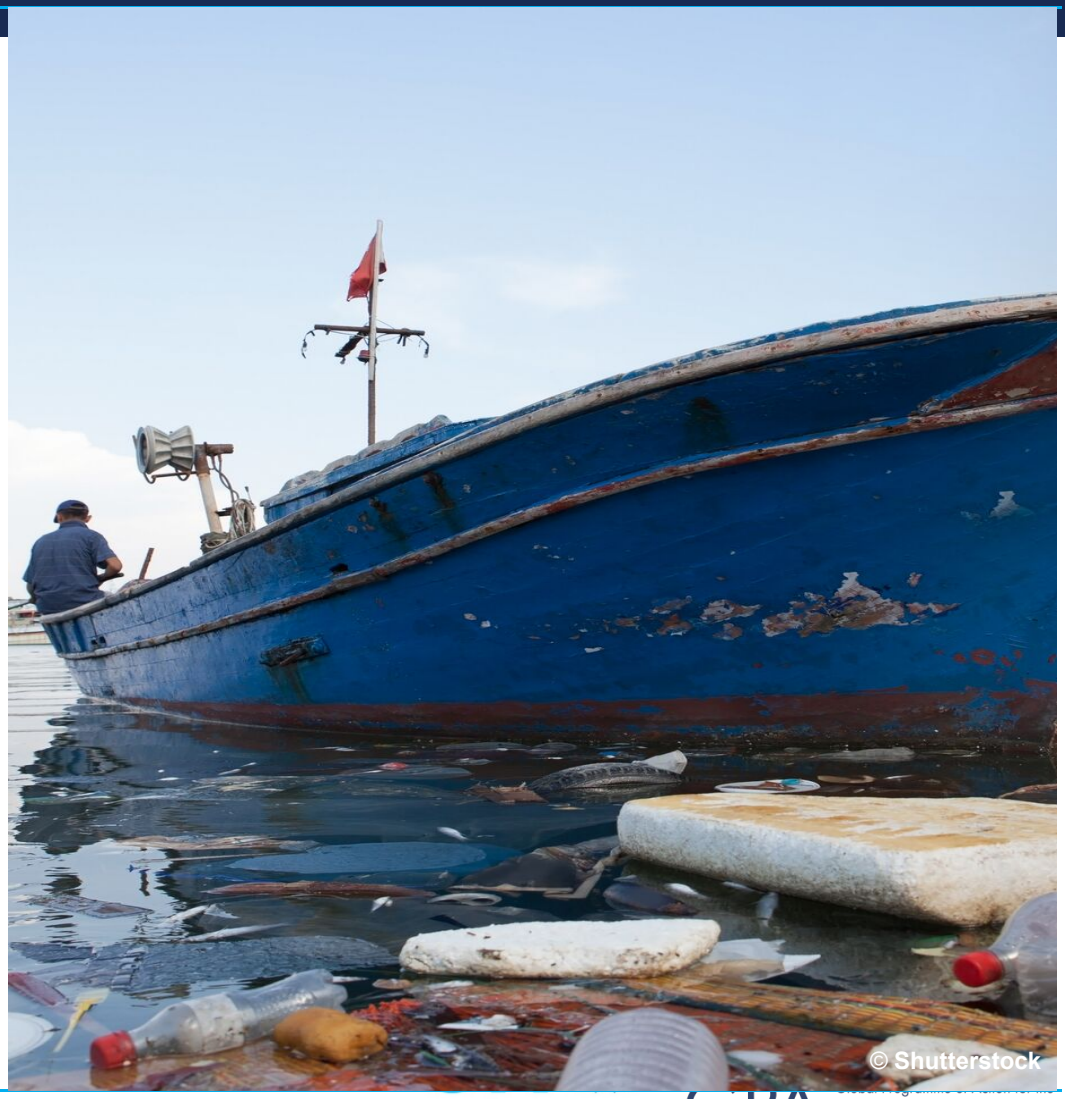

Photo: Aaron Vuola, 2017


© Susan White/USFWS

Economic Loss: Marine Industry

The estimated cost
of marine litter in
the Asia-Pacific region
is approximately €1 billion per year
to marine industries.

This is equivalent
of 0.3 % of the gross domestic
product for
the marine sector of
the region.



International Legal Framework

International Legal Framework: Pollution

United Nations Convention on the Law of the Sea (UNCLOS), 1982: General obligation on the States to protect and preserve marine environment – calls to address land-based sources of pollution as well as pollution from the ships.

International Convention for the Prevention of Pollution from Ships (MARPOL), 1973/1978: regulations aimed at preventing and minimizing pollution from ships, both accidental pollution and that occurring during routine operations -> **Annex V of MARPOL** (2013), addresses ocean-based litter pollution and prohibits the discharge of all plastics from ships.

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention), 1972: Dumping of plastics is prohibited.

Photo: South Korea, Aaron Vuola, 2017

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International Legal Framework: Other instruments

Other instruments that have relevance to marine litter:

Chemicals and waste oriented agreements:

- **The Stockholm Convention** on Persistent Organic Pollutants
- **The Basel Convention** on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal

Biodiversity and species oriented agreements:

- **The Convention on Biological Diversity** (CBD)
- The Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks **(United Nations Fish Stocks Agreement).**

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ALDFG and marking of fishing gear

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UNGA Resolution A/Res/60/31

United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks

MARPOL Annex V

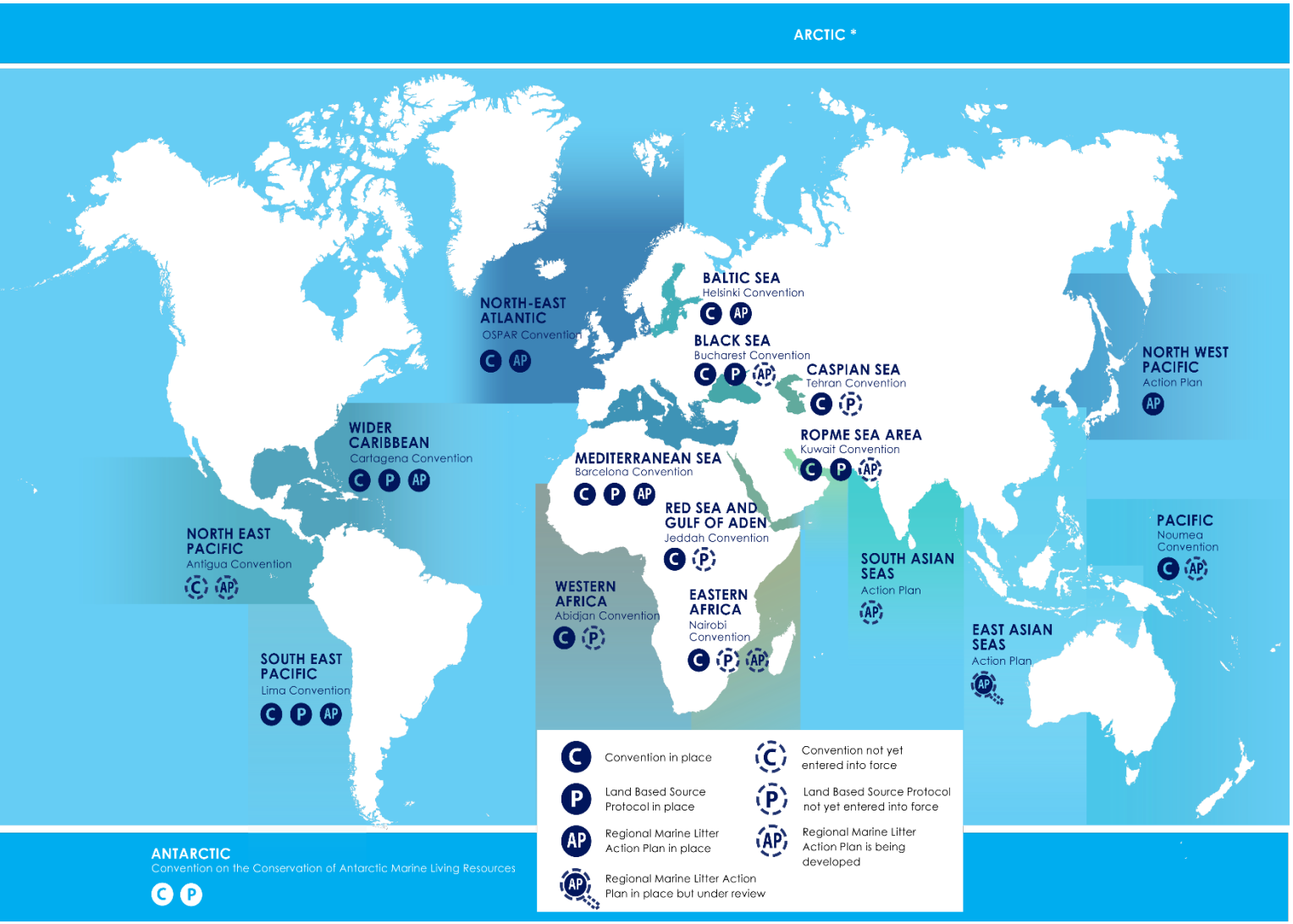
International Guidelines on Bycatch Management and Reduction of Discards (FAO 2011)

Agreement of Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (FAO 2009)

Voluntary Guidelines for Flag State Performance (FAO 2015)

FAO Committee on Fisheries (COFI)

International Legal Framework: Regional instruments – Marine Litter Action Plans



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International Legal Framework – Soft Instruments

Declaration on Environment and Development: Adopted at the 1992 UN Conference "Rio Earth Summit" - Agenda 21

Global Programme of Action (GPA) for the Protection of the Marine Environment from Land-based Activities (1995)

- Global Partnership for Marine Litter (GPML) (2012)

Food and Agricultural Organization of the United Nations (FAO) Code of Conduct for Responsible Fisheries (1995)

The Future We Want: Adopted at the 2012 UN Conference on Sustainable Development ("Rio+20") – launch of the GPML

SAMOA Pathway (2014)

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International Legal Framework: Soft Instruments cntd.

Sustainable Development Goals (10/2015) - Agenda 2030 for Sustainable Development:

- Goal 14 seeks to conserve and sustainably use the oceans, seas, and marine resources for sustainable development, **and explicitly addresses marine debris**.
- 14.1: By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution

United Nations General Assembly Resolution 235 (12/2015) - Resolution on Oceans and the Law of the Sea, addresses marine debris in many ways, including urging States to adopt national and **regional strategies**, incentives, and infrastructure

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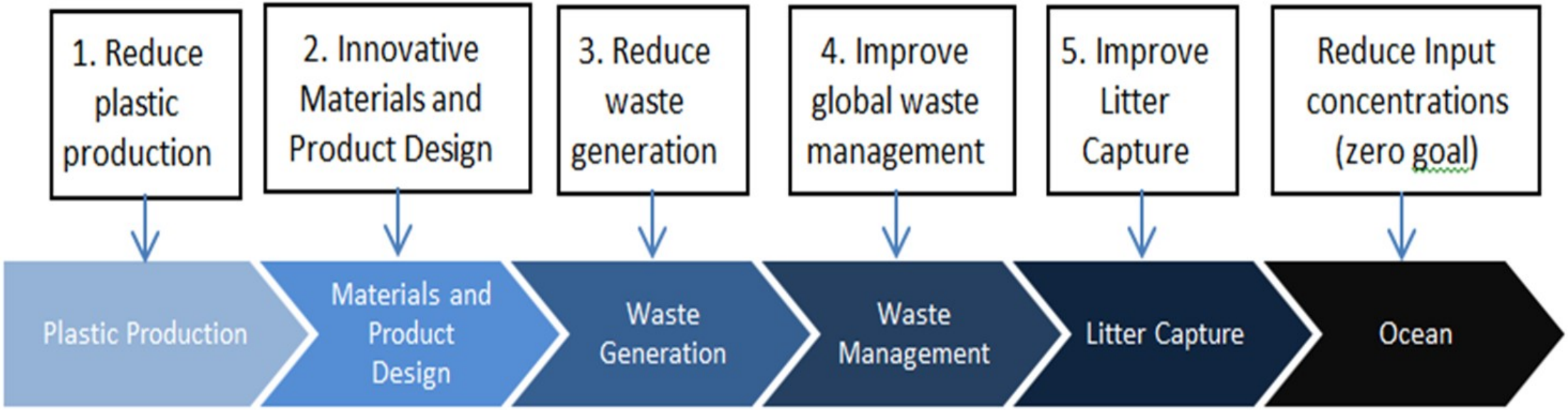
UN Environent and key processes

Prevention Interventions



Source: NOAA/EPA

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Selection of different types of measures

Closing the loop

- Moving from linear to more circular economy
- 3 Rs (REDESIGN etc Reduce, Reuse, Recycle)

Reduction measures

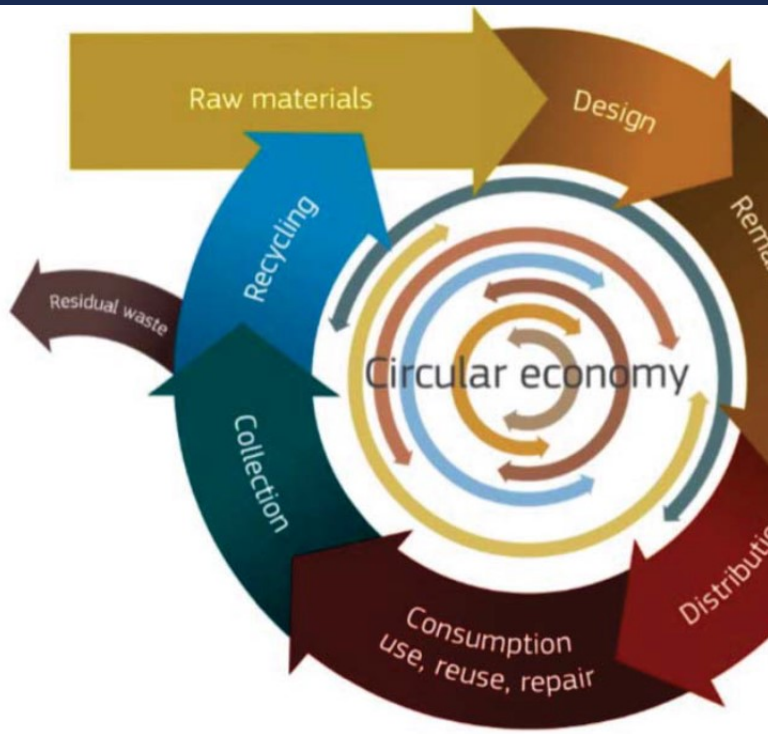
- Market-Based Instruments
- Legislation
- Best Available Techniques (BATs)
- Best Practices/Best Environmental Practices (BEPs)

Removal (Mostly used at the moment)

- Shorelines / Beach Clean-ups / Underwater / Fishing for litt
- Abandoned, lost or otherwise discarded fishing gear (ALDF

Encouraging changes in behavior (Very important)

- Attitudes towards marine litter
- Fishing Industry/ Costal Tourism
- Education, Awareness raising and Citizen science



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Selection of different types of measures: Examples

Research to improve product design and efficiency of processes can prevent waste, and improve recycling and resource efficiency

The application of extended producer responsibility (EPR) can help to avoid certain types of marine litter (Take back schemes)

Investment in waste management infrastructure and wastewater treatment facilities avoid dispersion of litter in the marine environment

Economic incentives, such as deposit refund schemes and plastic bag charges influence consumer choice AND CAN FUND INTERVENTIONS

Bans, such as plastic bags of a certain thickness, single-use plastics and non-recoverable plastics

Awareness-raising activities among consumers help avoid (REDUCE) the generation of marine litter

Better implementation of existing legislation on the release of litter, on land and at sea

Marine litter clean-ups are costly but necessary downstream actions

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What is the GPA?

The Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities

Adopted in 1995, it is a voluntary, action-oriented, intergovernmental programme, led by UN Environment, to prevent the degradation of the marine environment from land-based activities

Brings together Governments, private sector actors, NGOs, and the scientific community to discuss solutions and catalyze action

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Global Partnership on Marine Litter (GPML):

- Launched in Rio+20, June 2012 to protect human health and the environment by the reduction and management of ML
- **Stand alone resolutions on marine litter and microplastics adopted both at all United Nations Environmental Assemblies (UNEA 1/6, 2/11 and 3/7) -> preparations for UNEA-4**
- Voluntary multi-stakeholder partnership ~ 100+ partners, many networks in their own right (African Marine Waste Network, Clean Europe Network etc.)
- Help countries reach their targets related to Sustainable Development Goal target 14.1

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Activities: UNEA Resolutions Marine Litter and Microplastics:

- → Requested UNEP to provide **support to the development of marine litter action plans** upon request by countries
- → State of knowledge
- → Requested **assessment of the effectiveness of relevant international, regional and sub-regional governance strategies and approaches** to combat marine plastic litter and microplastics and **identify gaps and options** for addressing them (→ UNEA-3)
- → Establishment of **public-private partnerships**, development of **campaigns** for awareness-raising, prevention and clean-up
- → Encouraged product manufacturers to consider the lifecycle environmental impacts of products containing **microbeads and compostable polymers**

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Activities: Knowledge Generation: Marine Plastic Debris and Microplastics – policy relevant recommendations

→ **Phase out** of microbeads

→ Drastic reduction/ban of **single-use plastics**

→ Short-term: waste management, **long-term: upstream reduction**

→ 'Biodegradable' will NOT decrease ML **internationally agreed definition of biodegradability** (marine env.)

→ harmonization and **standardization** of methoc

→ Gaps/solutions for governance frameworks

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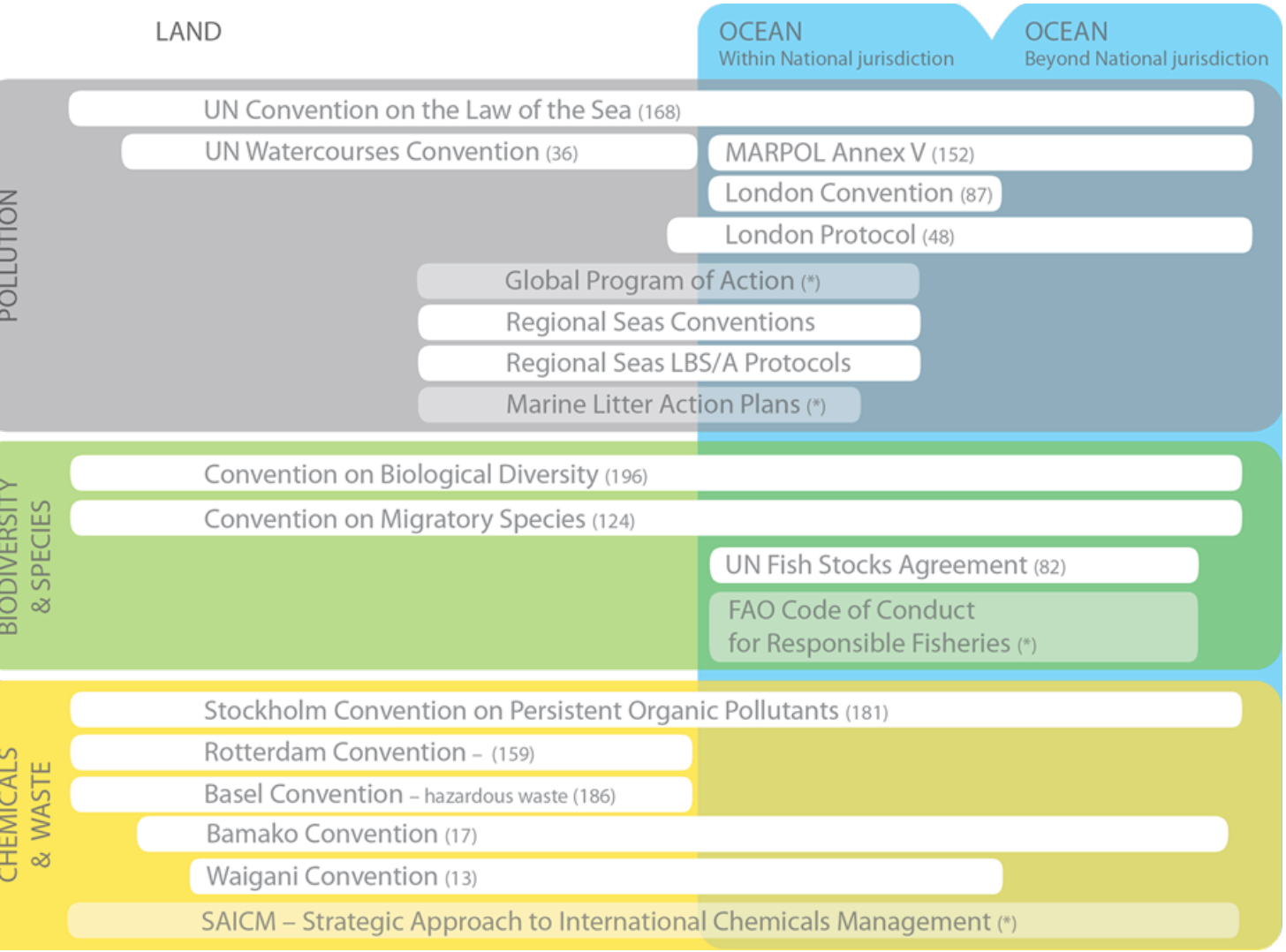
International Legal Framework - Overview



An Assessment of the effectiveness of relevant international, regional and sub-regional instruments and frameworks was submitted to UNEA-3 as an information document!

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Conclusion

Current governance strategies and approaches provide a fragmented approach that does not adequately address marine litter and microplastics

Gaps in legal framework

- The reduction of marine plastic and microplastic is not the primary objective of any international legally binding agreement;
- Geographic gaps in the coverage of existing agreements, particularly on the high seas, but also with regard to internal waters and watersheds;
- In particular, the international legal structure does not address land-based sources and activities specifically with respect to marine plastics and microplastics;
- At regional level, the mandate and geographic coverage of existing agreements is limited: only 9 regions out of 14 have adopted protocols related to land-based sources and activities. However, 4 of these protocols are not in force;
- Not all regions developed protocols/other binding measures to address marine litter;
- Land-based sources and activities protocols vary in geographic scope and application;
- Regional Marine Litter Action Plans vary in approach & methodology
- the Honolulu Strategy – a Global Framework for Prevention and Management of Marine Debris suggests approaches to reducing marine litter from land- and sea-based sources but provides no measurable targets or timelines.

Further gaps

- No global institution with the mandate to coordinate current efforts and manage the issue upstream;
- Lack of harmonized binding standards at the global level for the mitigation of pollution by plastic waste, particularly from land-based sources;
- Lack of global standards for national monitoring and reporting on consumption, use, final treatment and trade of plastic waste;
- Lack of global industry standards for environmental controls and quality specifications of plastics;
- Little recognition at the international policy level of the potential risks to human health,
- A fragmented approach at the regional level to waste management, including wastewater treatment.
- Lack of data in some regions on the sources and the extent of plastics and microplastics in the marine environment, in organisms and on the associated health and ecosystem risks;
- Poor application of the due diligence and polluter pays principles within the various sectors of the plastics industry;
- Poor/inadequate design of products to meet air and water quality standards;
- Failure to establish sustainable and profitable end-markets for all end-of-life plastics;
- Lack of effective compliance and enforcement mechanisms;
- No global liability and compensation mechanism for pollution by plastic.

Options

OPTION 1 Maintain Status Quo

- Strengthen implementation of existing instruments
- Continue current efforts

OPTION 2 Revise and Strengthen existing framework

- Bring industry into the solution
- Expand the mandate of an existing international body to include the coordination of existing institutions
- Strengthen existing measures
- Revise existing instruments such as the Honolulu Strategy
- Adopt a voluntary agreement on marine

OPTION 3 New global architecture with multilayered governance approach

- Establish a new international legally binding architecture.
- Take phased approach:
  - Phase I: Develop voluntary measures (same as Option 2)
  - Phase II: Develop a binding agreement

ample: Implementation of the Marine Litter and Micro Plastics Resolution

Operative Paragraph 9
Analysis of voluntary commitments

Operative Paragraph 7
ansion of the Global Partnership on
rine Litter
velopment of six new Regional Action
ns
monization of monitoring methodologies
marine litter

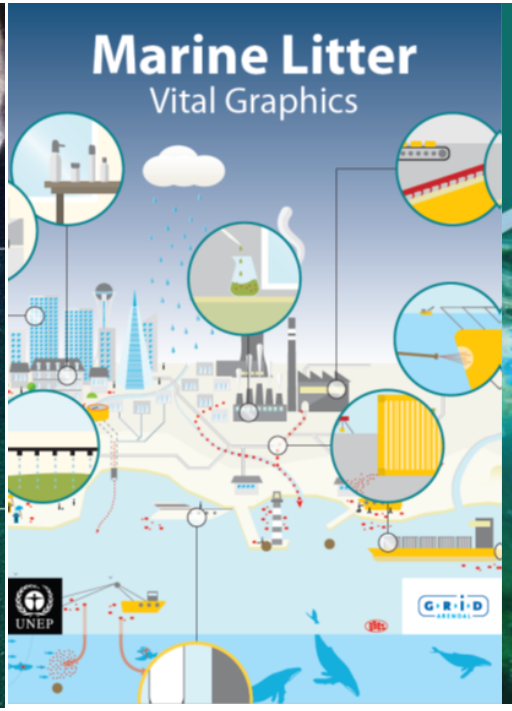
Operative Paragraph 10
Ad-Hoc Open-Ended Experts Group (M
& November):

- ✓ barriers to combating marine litter and microplas
- ✓ Identify response options, including actions and innovative approaches, and voluntary and legally binding governance strategies and approaches;
- ✓ Identify environmental, social and economic cost examine the feasibility and effectiveness of differ response options;
- ✓ Identify potential options for continued work

Operative Paragraph 11
Progress report on implementation of marine litter resolutions

tion for the Environment

Activities: Other Recent Knowledge Products



e pipeline: Alternative materials and marine litter, Economics of
ne litter, Baseline Single use plastics (Bags, bottles, disposable,
obeads, polystyrene)

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Activities: #Clean Seas, truly global campaign on Marine Litter

English is just the beginning! We are looking for partners to help with translation

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#Clean Seas - Mission

- Improve plastics management (reduce, redesign, reuse, recycle)
- Global phase out non-recoverable plastics (e.g. microplastics in cosmetics)

清洁海洋
海洋零塑料

- Reduce single-use plastics drastically
  - Global ban on certain types of single-use plastic bags
- Move towards: Plastics consumed re-enter the product life cycle, i.e. generate zero waste, all plastics recyclable

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#Clean Seas – Countries and Commitments

urrently more than 40 countries have joined,

Many more countries have expressed interest in joining

mples of commitments:

ndonesia plans on reducing plastic litter 70% by 2025

enya banned the sales, manufacturing and import of plastic bags from August 2017

ffective 2020, France will ban the use of plastic cups, plates, and cutlery

ruguay announced it will initiate a tax on single-use plastic bags later this year

osta Rica will make efforts to reduce plastic waster by increasing proper waste management
easures (legislation) and education

rivate Sector: Dell, Volvo Ocean Race, 11th Hour Project, Musto

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Activities: Massive Open Online Course (MOOC) on Marine Litter

rst Massive Open Online Course on arine Litter in 2015 (6500 registered udents)

econd ML MOOC in 2017 just finished

panish MOOC in Q1/2018

week in all UN languages in 2018 eadership track) & PORTUGUESE

eadership Track:
hours of learning consist of 2 blocks

xpert Track:
2 additional hours consisting of 6 ocks

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Food and Agriculture Organization of the United Nations

Guidelines on the Marking of Fishing Gear

- Agreed by Technical Consultation in February 2018;
- Need to be endorsed by COFI32 in July to be considered final;
- Voluntary guidelines however they represent a high level, politically negotiated text that following agreement by COFI will have the endorsement of all FAO Member governments;
- High level political incentive for governments to implement the guidelines;
- Support the principles and standards already included within the FAO Code of Conduct for Responsible Fisheries;
- Guidelines provide a framework for national, regional and international efforts to addressALDFGs;
- Reference for national and international efforts.

Food and Agriculture Organization of the United Nations

Next steps:

- COFI33 in July to consider endorsement of the Guidelines
  nendations of the Technical

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- additional pilot projects be developed and implemented in other regions and fisheries;
- a comprehensive global strategy to address ALDFG be developed; and
- national action plans to address ALDFG be developed and implemented

Thank you for your attention!

Questions?

gpml@unep.org

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