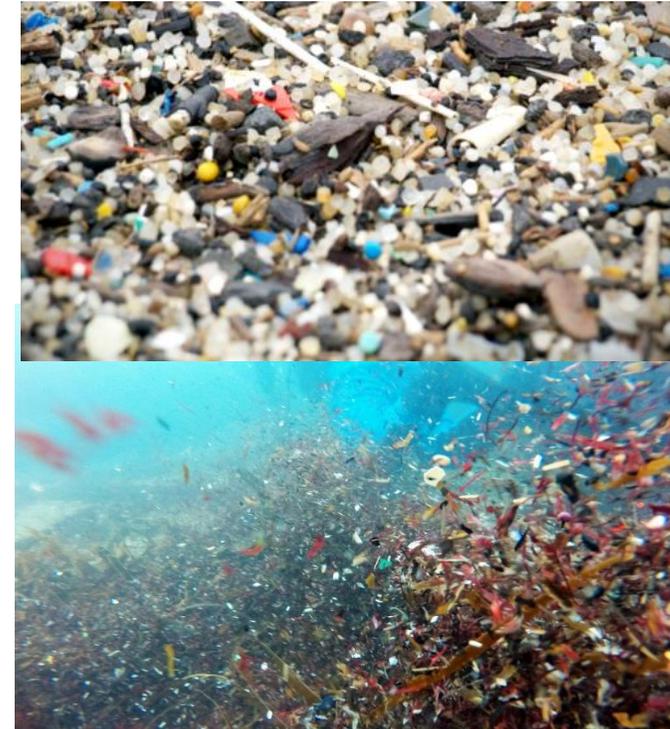


MARINE MICROPLASTICS: AN ENVIRONMENTAL SECURITY CHALLENGE IN ASEAN

THE NTS-ASIA CONSORTIUM ANNUAL CONFERENCE:
“RESILIENCE IN THE FACE OF DISRUPTIONS”

*27 – 28 March 2018
SINGAPORE*



OVERVIEW

- Environmental Security Issues in ASEAN
- Marine Debris, Microplastics and Environmental Disruptions
- The implications of marine microplastics to the environmental security in ASEAN
- Possible initiatives to increase resilience against the disruptions that are caused by marine microplastics in ASEAN.

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Environmental security issues in ASEAN

- 1. *Resource scarcity and depletion*** is a major cause of concern – ASEAN Countries is being subjected to severe environmental stress due to rapid industrialization and population growth, and the associated problems of urbanization, pollution and deforestation.
- 2. *Allocation in instances of shared resources*** is also a serious cause of conflict, particularly in maritime territory and resource issues.
- 3. *The capacity to manage threats*** to environmental security varies significantly across the region – it depends on the level of democratization and the attitude of the state in question.
- 4. *The increasingly evident economic costs of environmental degradation*** is the key motivating factor in forcing governments to take action.

Source: Evelyn Goh, Institute of Defense & Strategic Studies, Singapore (2002)

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- The United Nations Oceans Conference in June 2017 and other efforts at the global level in recent times acknowledge marine litter and microplastics as a serious form of marine pollution that needs to be addressed. Global plastics production in 2014 alone was estimated to be more than 300 million tonnes of which between 5-13 million tonnes were washed into the oceans.
- Plastic debris and microplastics are transported by ocean currents across regions and water bodies. Whether caused by poor waste and wastewater management, accidental losses, or illegal dumping, their leakage into the oceans pose serious environmental, social, and economic consequences by adversely impacting marine life and ecosystems, sea transport, fisheries, tourism, recreation, and ultimately the human well-being.

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- Six ASEAN countries i.e., Indonesia, the Philippines, Vietnam, Malaysia, Thailand, and Myanmar have been identified to be among 20 top global polluters. Coastal and marine waters in the region provide essential needs for the livelihood of the people, and hence ASEAN leaders resolved to foster enhanced conservation and sustainable management of the coastal and marine ecosystems. This is also reflected in the Blueprint for the ASEAN Socio-Cultural Community (ASCC Blueprint) (2009-2015) that serves as the guiding mandate of ASEAN Working Group on Coastal and Marine Environment (AWGCME).

MICROPLASTICS AND MARINE DEBRIS : MICRO TO MACRO PROBLEM?

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Marine Debris

- Marine litter/debris that go into the oceans are anthropogenic and has its source on human activities at land, air, or sea.
- Approximately 60-80% of marine debris consisted of plastics.
- Marine plastic debris is considered a major environmental and economic concern due to the large quantities entering the global ocean that can remain in the environment for years, decades or even centuries where it is a risk to marine life and food security.



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Microplastics

Microplastics are synthetic polymers that are sized less than 5 mm in diameter.

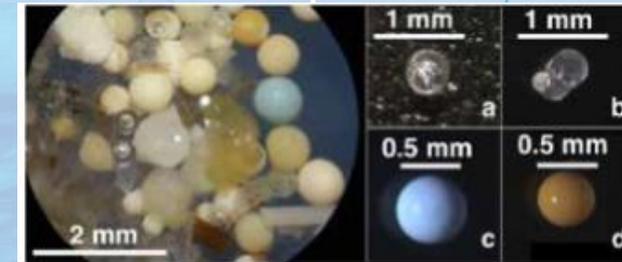
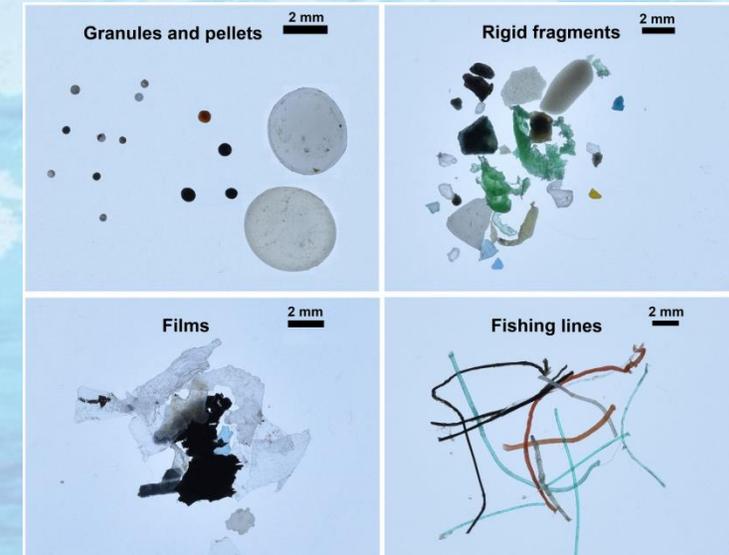
Primary source:

- Direct release of small particles such as pellets (around 5 mm diameter) or powders (less than 0.5 mm).
- Small plastics particles that are typically around 0.25 mm diameter are used as abrasive in cosmetic products such as facial wash.

Secondary Source:

Fragmentation of larger plastic items that are caused by UV radiation, bio degradation by microorganisms, oxidation and physical abrasion.

- 85% of plastics in the ocean consisted of microplastics.
- Absorb harmful chemicals such as Persistent Organic Pollutants (POPs).
- Threats to seafood safety and may impact the human health.



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Micro to Macro Problem?

- The accumulation of plastic debris in the ocean can lead to increased presence of microplastics, which in turn put the ecosystem at risk of its deteriorating impacts.
- Ingested microplastics can result in negative health impacts such as reduced stomach space for actual food and the build-up of plastic-derived toxic compounds.

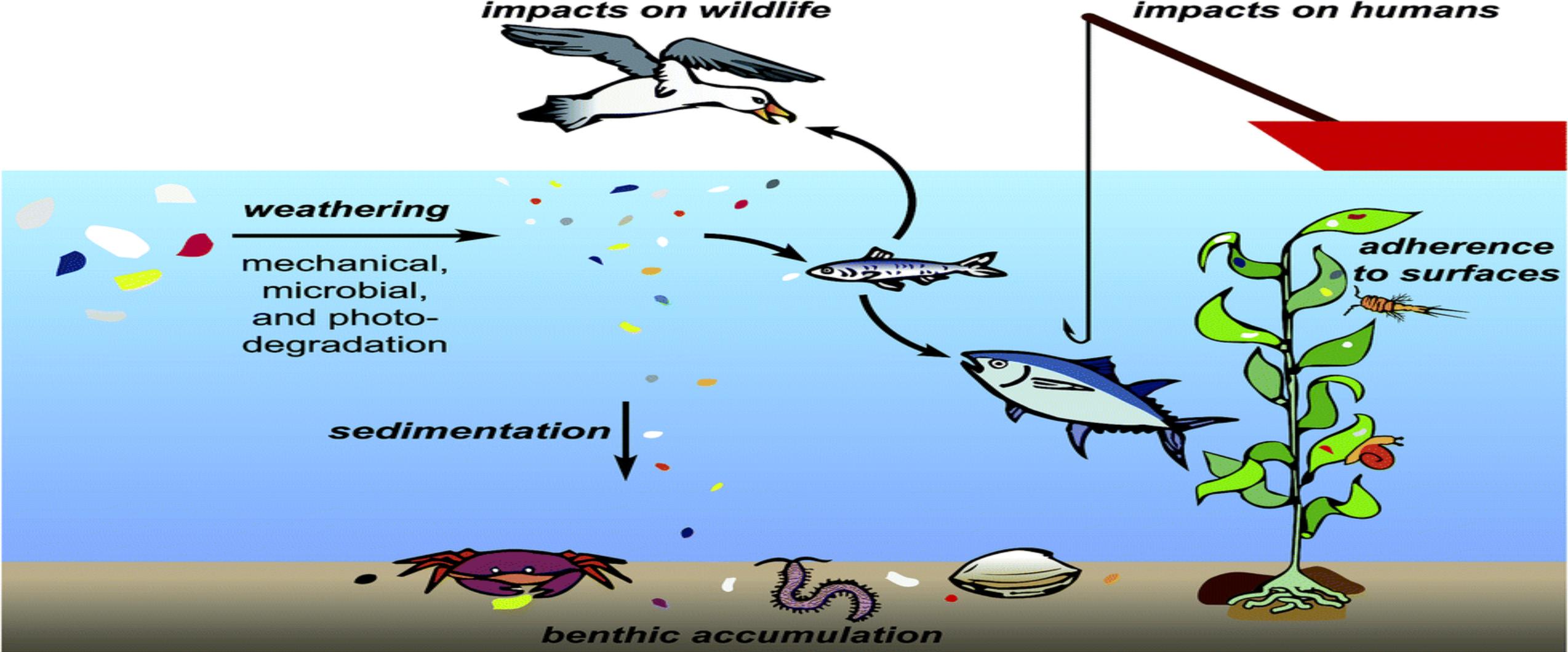
Two recent studies in Marine Biology and Animal Behavior found that microplastics can indeed be passed through the food chain to fishes. When we consume this fish, the microplastics will enter our systems as well.



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Research has confirmed that marine animals consume plastics. In addition to this direct ingestion, plastics can be transferred from one species to another by predators eating prey that have consumed microplastics.

THE IMPLICATIONS OF MARINE MICROPLASTICS TO ENVIRONMENTAL SECURITY IN ASEAN

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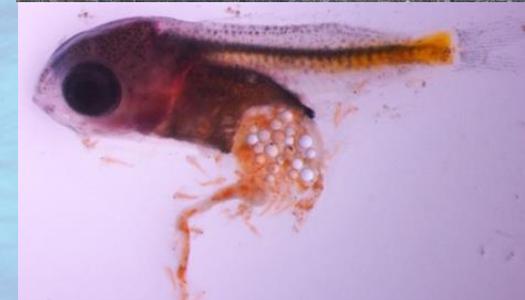
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Implications of Microplastics

ASEAN where 80% covered by sea indicates to get harmful effects of microplastics to its marine wildlife and human health :

- Plastics materials which takes a long time to break down presence in the sea can be mistaken for food by animals.
- Animals ingestion of microplastics can have adverse impacts on their health.
- The accumulation of harmful chemicals from the ingested microplastics in the tissues of the animals can be continued in the food chain.
- Can lead to unsafe consumption of seafood by humans.



Threat to Aquatic Creatures

- *Ingestion*: Marine animals confuse plastic pieces for food and end up eating them. For example, pelicans and albatross consume plastic mistaking it for small fish. This plastic cannot be digested by the marine animal's body and remains in its stomach causing the animal to feel full. Eventually, the animals will stop eating, leading to malnutrition, starvation or dehydration. It will even damage their digestive system.
- *Suffocation*: Animals can suffocate due to plastic bags and six pack holders. These items can block air passageways and/or inhibit normal growth patterns. For instance, sea turtles try and ingest plastic bags, mistaking them for jellyfish. Often the plastic bag is too large for the animal to digest, which means that the turtle will suffocate on it.
- *Entanglement*: This occurs when plastic items like fishing line or six-pack rings affect the mobility of marine animals. If they are entangled, animals will have trouble eating, breathing and/or swimming, leading to fatal results.



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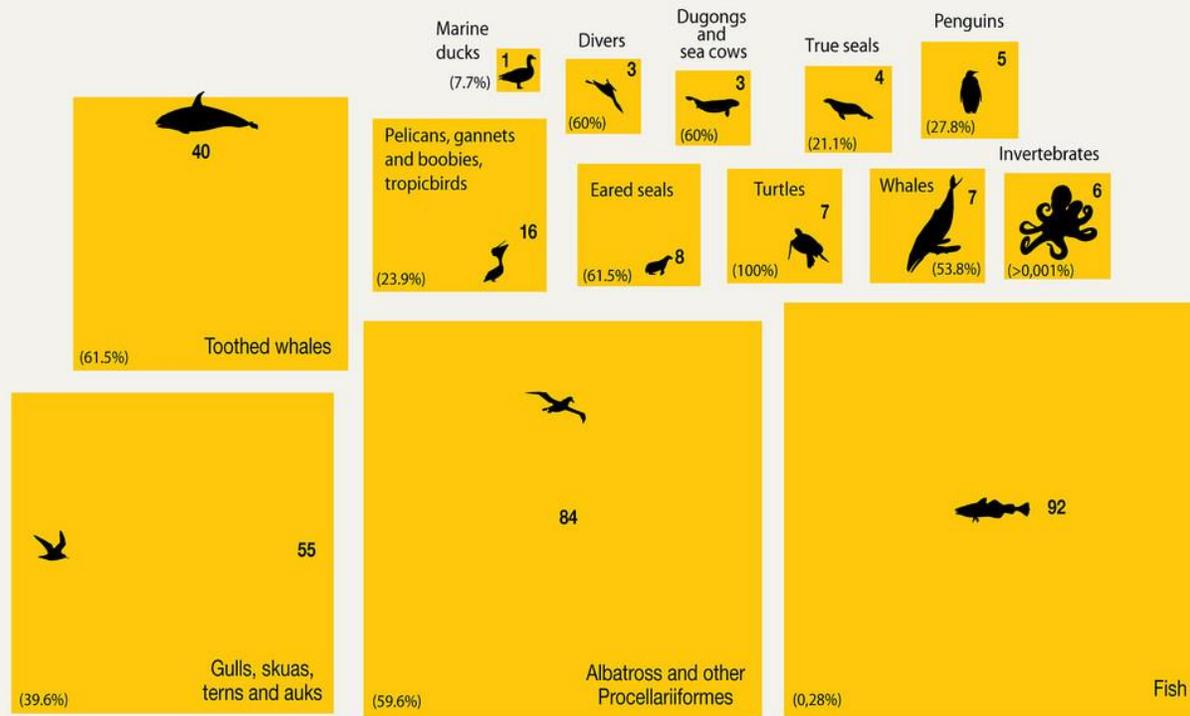
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Impacts to the Environment

Plasticized animal species - Ingestion

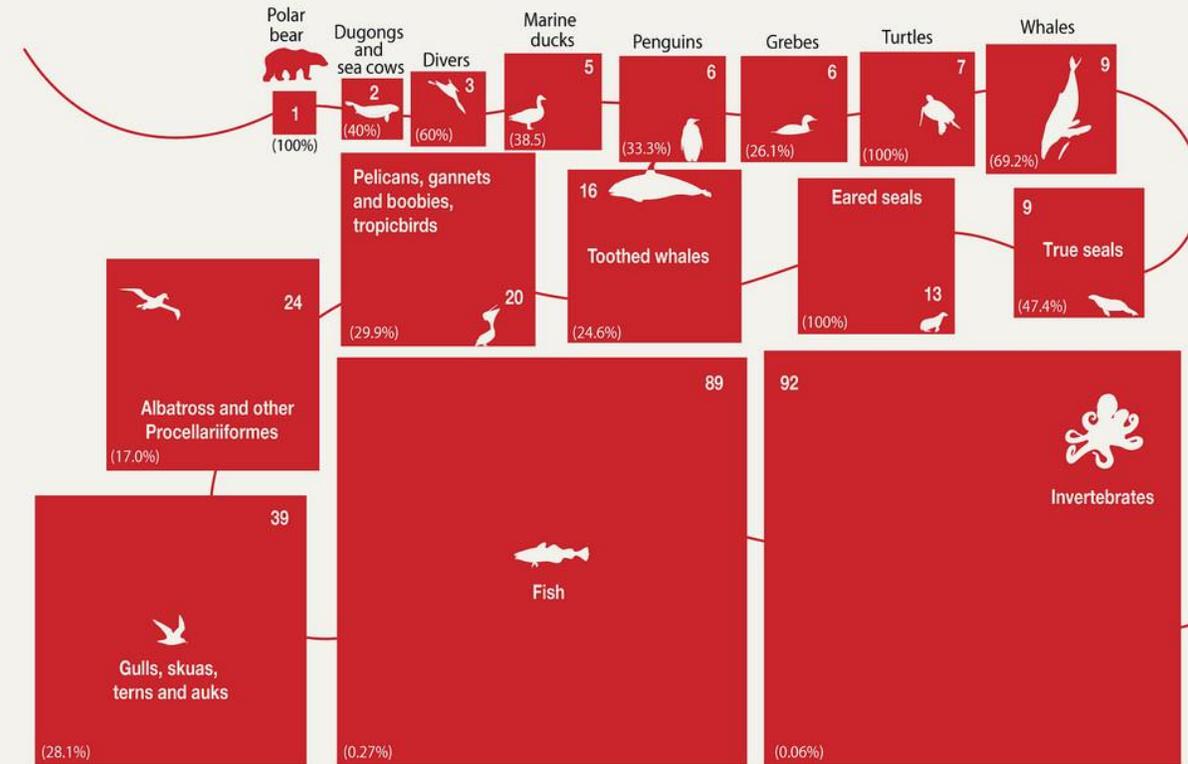
Number of species with documented records of marine debris ingestion



Source: Kühn, S., et al., Deleterious Effects of Litter on Marine Life, in Bergmann, M., et al., Marine Anthropogenic Litter, Springer, 2015

Plasticized animal species - Entangled

Number of species with documented records of entanglement in marine debris



Source: Kühn, S., et al., Deleterious Effects of Litter on Marine Life, in Bergmann, M., et al., Marine Anthropogenic Litter, Springer, 2015

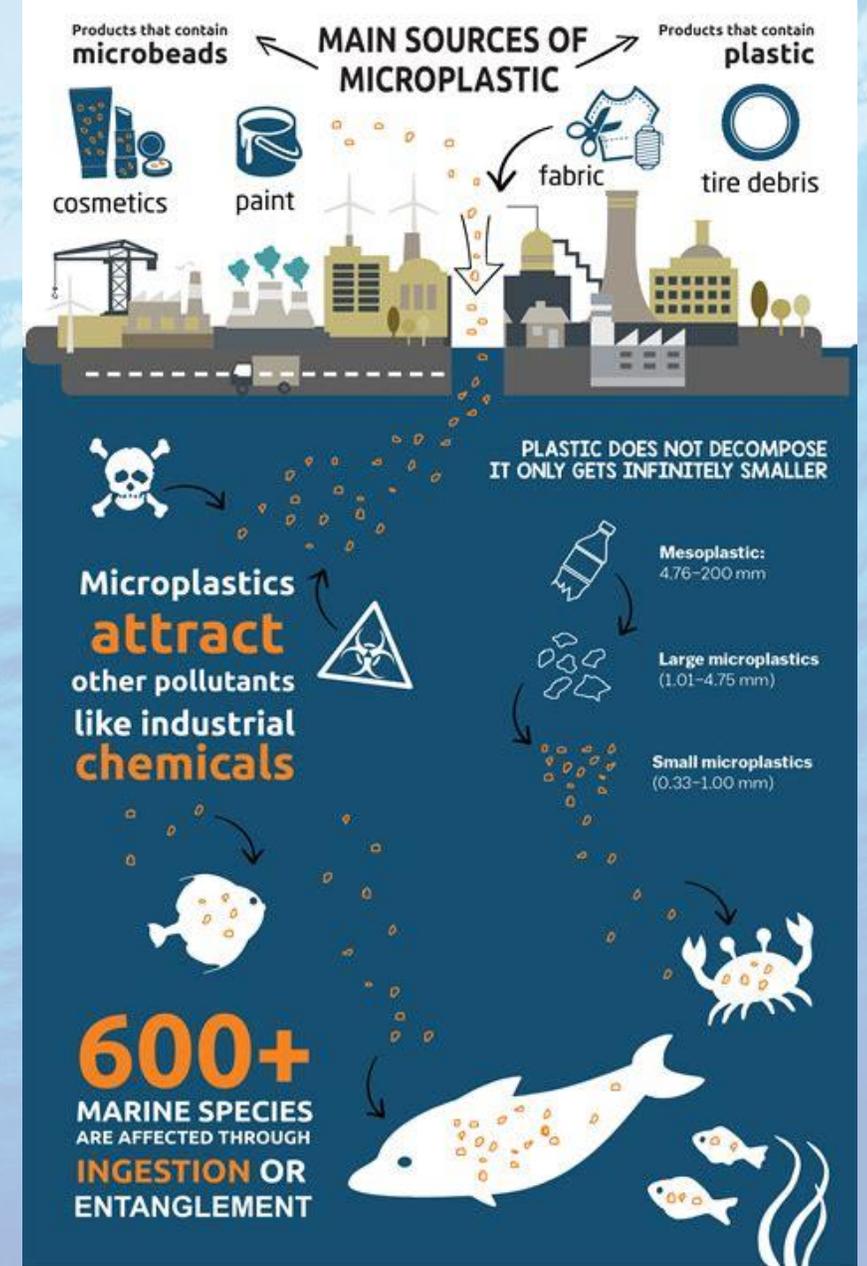
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Impacts to Human Health

- This may pose a risk to human health as the micro size of the particles can enter the blood stream. The accumulation of the microplastic particles in the body can disrupt vital organs of the body.
- Other hazardous pollutant substance that are absorbed by these plastics could pose danger to the human health.
- The impact of plastic to human health can cause abnormal male sexual development, infertility, cancer, asthma, premature breast development, miscarriage, and premature birth.

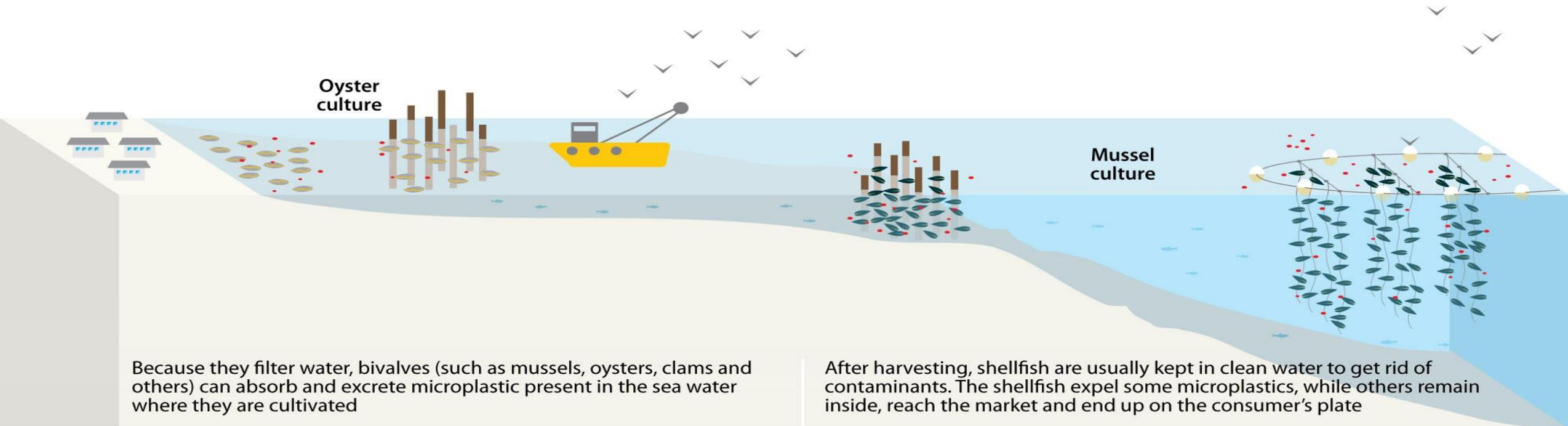


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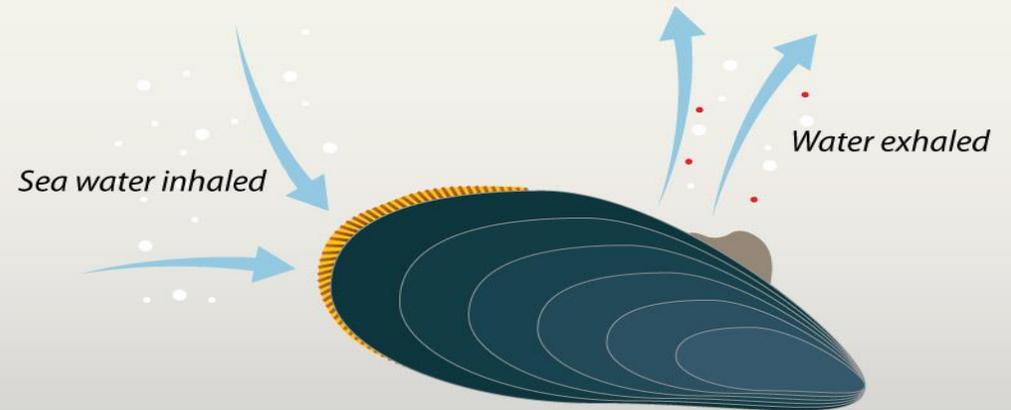
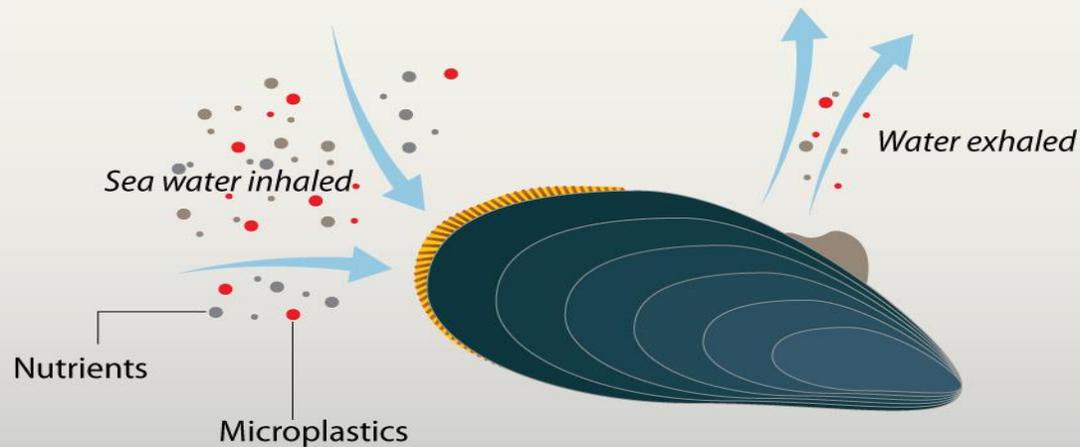
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An example of how microplastics could end up on a consumer's plate



Because they filter water, bivalves (such as mussels, oysters, clams and others) can absorb and excrete microplastic present in the sea water where they are cultivated

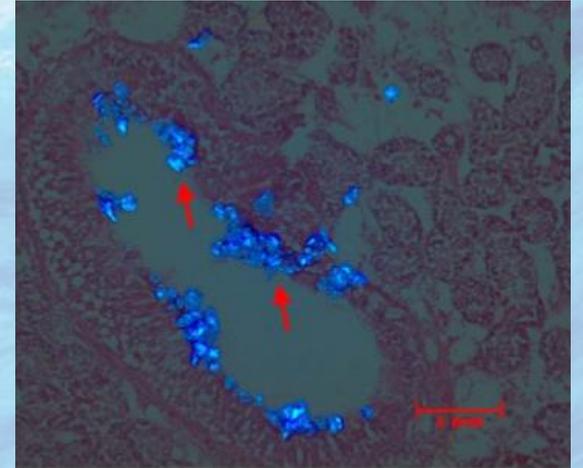
After harvesting, shellfish are usually kept in clean water to get rid of contaminants. The shellfish expel some microplastics, while others remain inside, reach the market and end up on the consumer's plate



Impact Studies Relevant to the Food Industry

- Several studies have identified the presence of microplastics in shell fish such as blue mussels and oysters.
- These species are consumed by human and has the potential to transfer microplastics along with the dangerous chemicals that it brings in across the food chain.
- Microplastics were also found in commercial fish.

Blue Mussels



Tissue sections showing particles in the intestine



The relevant studies on the Impact of Microplastic

- According to the data produced by SINTEF, 74% of the micro marine debris are microplastics.
- The chemicals in microplastics can cause infertility, genetic disruption and poisoning in marine animals.
- The chemicals can have direct exposure to human and pose risk to human health.
- 90% of ingested plastic could pass through the human body, some may end up lodged in the gut or travels through the lymphatic system (European Food Safety).

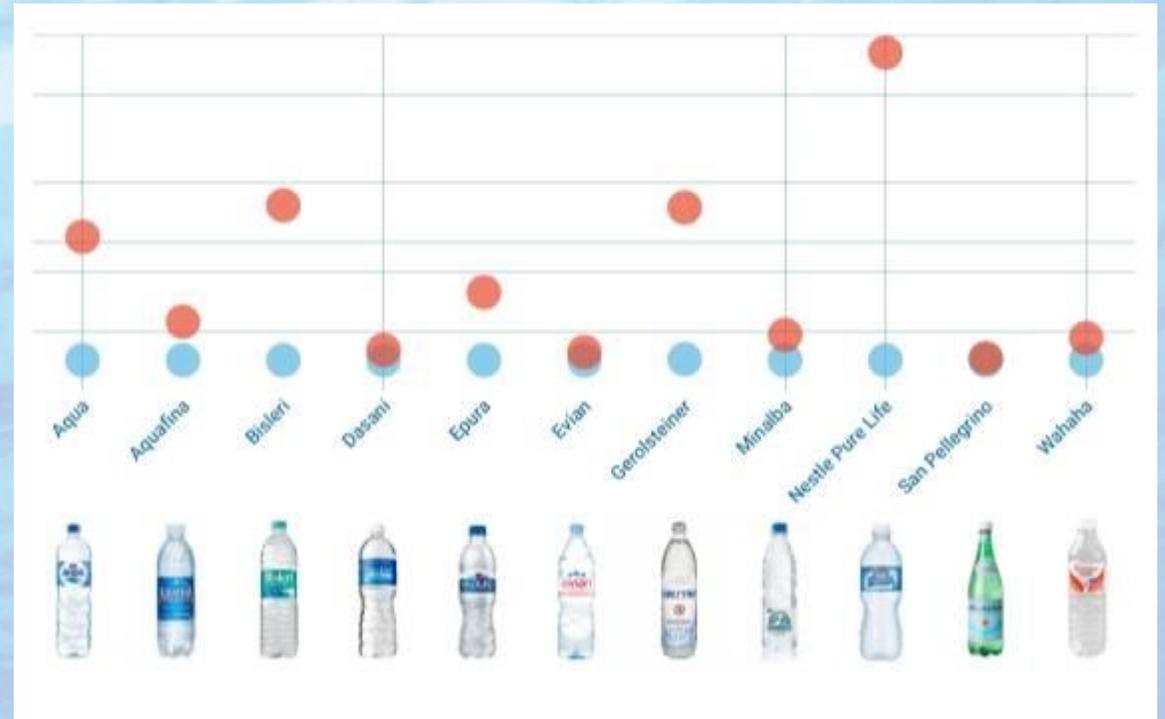
Evidence of Microplastics in Bottled Water

A research that was done in 2017 by Global State University of New York, America, 259 bottles from 11 brands across 9 countries namely China, India, Germany, Indonesia, Lebanon, Mexico, Thailand and USA.

The result shows that 93% of the the samples contains microplastics.

There were 30 samples of water bottles that were bought in Jakarta, Bali and Medan for the research.

An average total of more than 320 microplastic particles are found per liter across all brands. The size ranges from 6.5 micrometer to 100 micrometer or equivalent to the diameter of a human hair.



POSSIBLE INITIATIVES TO INCREASE
RESILIENCE AGAINST THE DISRUPTIONS
THAT ARE CAUSED BY MARINE
MICROPLASTICS IN ASEAN.

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ASEAN-UN Initiatives

- The UN 2030 Agenda for Sustainable Development, particularly Sustainable Development Goals 14, and the ASEAN Socio-Cultural Community Blueprint 2025 for ASEAN Member States to integrate the UN and ASEAN's commitments into national plan and policy, especially to promote cooperation for the protection, restoration and sustainable use of coastal and marine environment, respond and deal with the risk of pollution and threats to marine ecosystem and coastal environment, in particular in respect of ecologically sensitive areas

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ASEAN Initiatives

- The 30th ASEAN Summit in Manila, ASEAN leaders discussed how to reduce the impact and sources of marine debris, particularly **plastics and microplastics**, within the region as well as globally. Through other Asian regional architecture such as the East Asia Summit (EAS) and the Asia-Pacific Economic Cooperation (APEC) Forum, ASEAN could also involve China, which is accountable for 28 percent of the plastic in ocean waters and the United States, the world's 20th largest polluter of plastics.

Possible Initiatives by ASEAN Countries

- Develop a well concerted coordination between governments, research institutions, NGOs, educational institutions and other relevant stakeholders to address and raise awareness on the issue of microplastics accumulation.
- Stimulate behavioural change towards reducing the use of single use plastics.
- Socialization of the available alternatives to single use plastics to the public.
- Propose an integrated monitoring system that establishes a comprehensive quantitative data on the abundance of debris on the seabed and sources, which again require a coordination between policymakers, stakeholders and educational institutions.
- Strengthen the law of waste management that reaches the grass root level of the society.
- Increasing education about the harmful effects of plastic pollution

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Possible Initiatives to Increase the Resilience of ASEAN People Against the Environmental Disruption

- Buying products with little to no plastic packaging using recycled products
- Recycling as much as you can
- Disposing waste properly
- Reducing the number of plastic products we use
- Support companies that provide sustainable products
- Participating in community cleanup drives and encouraging local leaders to pass bans on plastic bags, Styrofoam containers, etc.
- Avoiding the use of plastic single-use items, such as plastic grocery bags, plastic tableware, plastic straws, and plastic cups
- Reporting incidents of littering

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THANK YOU