PROFILED AND PUBLISHED BY APPL FOUNDATION

ORGANIC GROWTH

VOL 16

SEE PLASTICS IN A NEW LIGHT

Let's Talk Trash, Shall We?

"It's amazing how empowered we feel when we make small changes that are part of a bigger movement towards a cleaner and greener planet. Every choice we make has an impact on the planet, so if you could make wiser, more enlightened choices, wouldn't you?"

WHAT IS PLASTIC?

Plastic is a synthetic polymer. The term was coined from a Greek word meaning "able to be molded or shaped". Most importantly pure plastics are insoluble in water and are non-toxic. The additives in plastics make it toxic, ultimately polluting the environment.

Overall, there are about 45 types of plastics with most of them having its own variations. The ability to mold plastics has made it an inexpensive product along with an assortment of applications. Every year, around 90,800 million kilograms of plastic is produced everyday around the globe.

The invention of plastic with collodion and camphor (which are organic in nature) turned it into a toxic, vile material. Plastics are used only once and thrown away. The lack of awareness regarding the time that it takes to decompose (which is nothing less than 500 years, unless burnt completely), makes the entire population on Earth disregard the importance of recycling.

WHAT ARE WE TO DO NOW?

In many ways we could oppose the production of plastic. But at the same time millions and trillions of plastics are generated newly. The plastics that were first produced may never have decomposed. In the documentary made by Craig Leeson, "The Plastic Ocean", dead Sea Water Birds were cut open to see the level of consumption of plastics in them. Humanity has overlooked the idea of recycling plastic and created the disposable culture of consumerism. We impulsively and compulsively dispose bags, toothbrushes, aero-plane wastes etcetera. On the contrary, Susan Freinkel argues that plastics could possibly save the environment by changing our lens towards the polymer.

David Katz and his 'PLASTIC BANK', could be one example. The idea behind the plastic bank is to collect waste from communities of various socio-economic profiles and pay a value against the amount of plastic collected. Similar initiative has been taken by the Meghalaya Government in collaboration with Bethany Society in Shillong, thus changing connotation of plastic from nature's nemesis to that of a livelihood generator.

It is a fact that most amount of plastic waste found in the ocean is from developing or underdeveloped nations. This is so because, food, shelter and security in general is more precious than recycling plastic.

In order to build our natural assets, the need is to engage with both affluent and not so affluent communities and inculcate the habit of recycling and uplifting the idea of circular economy.

Dependency on plastics is one time whereas the amount produced is not equivalent to the amount recovered or recycled. Marks and Spencer's have collaborated with Ellen MacArthur Foundation, with the idea to use plastic in business where it has a clear and demonstrable benefit, with no viable lower impact alternative and to use it, when it is simple to recover and/or recycle.

WAY FORWARD.

The first step towards building socio-economic mobility lies in the valuation of our natural assets and their consequent propagation. The need is to create awareness about the nasty 'disposal culture' and adapt the recycling and reusing culture. If recycling products at the household level does not provide people any incentive,

Diagram: The above diagram explains the idea of being able to make plastic more 'social' in nature and thus helping the society, especially those in need to make profits out of waste which would help them to send their children to school, afford better clothing, have three meals a day and so on.

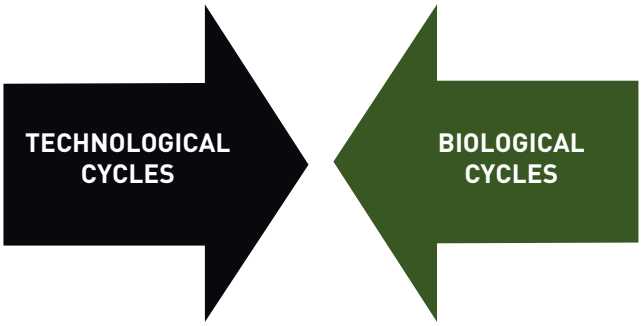


Diagram: The circular economy is interlinked. In this sense, technologies produce, and biology consumes.

then the need to propagate the Circular Economy model might.

The need for circular economy denotes the overall development of the society's 'health' system implying development in terms of social, economic, environmental, cultural upliftment. The way forward is to shift the paradigm from a linear outlook to a broader perspective with more inclusion and less exclusion, including small businesses alongside bigger ones along with inclusion of rural futures.

By introducing the idea of circular economy through plastics, we enhance the notion of using plastics as a product which would bring monetization even after manifold uses. Therefore, we can easily call it the Bit Coin of the Earth.

On a personal note, we tend to blame and point fingers at everything immaterial, like plastic. But we are the ones who created such a product to be used in the handiest way possible. The effort to manage plastic instead of eradicating it completely will firstly take quite a lot of time and secondly, the above mentioned examples are the best ways of motivating us to take small steps in engaging a more 'aware' world. Awareness would eventually lead to some amount of caring which will emerge as a change. This change should take place right now. At the end of the day, after much destruction of the environment and effort by various individuals and groups to restore the environment, we would not want whales and sea water birds to consume plastics from the ocean, we do not want our rivers clogged with plastic bags. We want to see them reused and recycled for a better tomorrow.

Ranjit Barthakur
Chairman
APPL Foundation

KNOW YOUR PLASTICS

1
PET

Polyethylene Terephthalate better known as PET(E) is used to make common household goods. Items made from this are commonly recycled. It at times absorbs odor and flavors from food and drinks stored in them.

2
HDPE

High Density Polyethylene is safe and commonly recycled product as well. It is never safe to reuse and HDPE container for storage of food products.

3
PVC

Polyvinyl Chloride (PVC) is used for making all kinds of pipe and tiles. It is sometimes recycled. This type of plastic should never come in contact with food items as it can be harmful if ingested.

4
LDPE

Low Density Polyethylene (LDPE) is sometimes recycled. It is a healthy plastic and is durable and flexible. Sandwich bags, squeeze able bottles and grocery bags are made from this plastic.

5
PP

Polypropylene (PP) is strong and can withstand high temperature. It is occasionally recycled.

6
PS

Polystyrene (PS) is commonly recycled but it is difficult to do so. Generally disposable coffee cups, plastic food box, packing foam are made from this material.

7
OTHER

This type of plastic is known as miscellaneous plastic. Polycarbonate and Polyactide are in this category. This type of plastic is difficult to recycle.

PLASTIC PROBLEM

Over the last ten years we have produced more plastic than during the whole of the last century.

50 percent of the plastic we use, we use just once and throw away.

Enough plastic is thrown away each year to circle the earth four times

We currently recover only five percent of the plastics we produce.

Plastic accounts for around 10 percent of the total waste we generate.

THE PLASTIC IN OUR WORLD – SOLVING THE PROBLEM

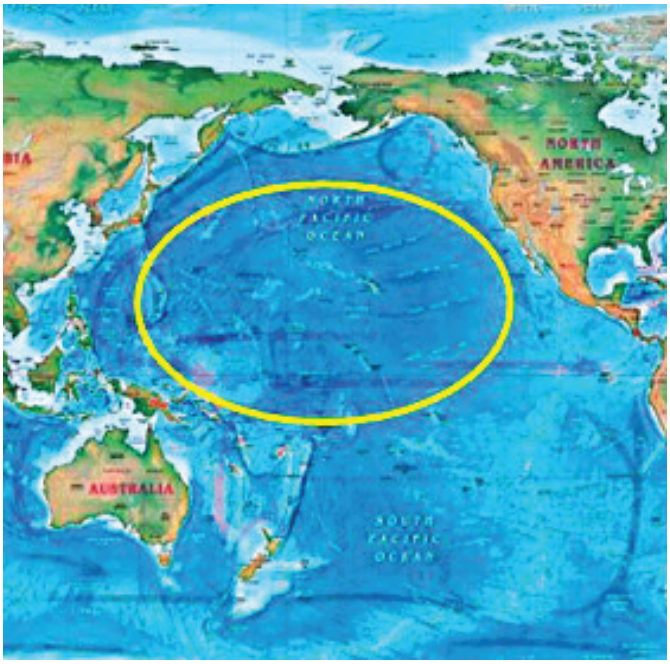
Given below is Data on Plastics in our Environment which will give you an idea on the Impact it has on the Global Environment.

- Plastics have been found In over 30 % of Fish caught at Sea.
- Plastic debris results in over $ 13 billion a year in losses from damage to Marine ecosystems (This includes financial losses to fisheries and tourism as well as time spent cleaning beaches).
- Around 300 Million tons of Plastic are created annually.
- As of 2015, 8.3 Billion Tons of plastic have been produced by Humans in the last 60 Years.
- Out of 8.3 Billion Tons, 6.3 Billion tons has become waste.
- Up to 1 Trillion Plastic bags are Discarded every year.
- Only around 9 % of plastic Gets Recycled.
- As much as 13 million tons of plastic enters the oceans globally each Year, This is Equivalent to the mass of Around 85,000 Blue whales.
- On land plastic bottles will take around 450 years to decompose, but at sea they will never truly disappear.
- The plastic Bottles breakdown into micro plastics, less than 5mm Long.
- 180 Species of Marine animals have been documented feeding on Plastic.

Article written by
Mr. Arvind Awasthi

By 2050, There could be more plastic in the sea than fish. The floating island of Rubbish that's supposedly found at the center of the Pacific Ocean and Dubbed the great Pacific Garbage patch. As plastic moves through our seas, It breaks down into smaller pieces –The kind of pieces that can be easily swallowed by Marine life.

THE problem of plastic pollution is growing exponentially every year; we are producing more than 300 million tons of plastic, half of this is designed for single use, and each year around 8 million tons of it ends up in our oceans. We can solve this problem and we can do it by educating and engaging everyone in a conversation to rethink plastic. Plastic Oceans is working to change the way we deal with plastic waste by challenging society's perception that this indestructible substance can be treated as 'disposable'.



THE GREAT PACIFIC GARBAGE PATCH

The Great Pacific garbage patch has one of the highest levels known of plastic particulate suspended in the upper water column. As a result, it is one of several oceanic regions where researchers have studied the effects and impact of plastic photodegradation in the layer of water. Unlike organic debris, which biodegrades, the photo degraded plastic disintegrates into ever smaller pieces while remaining a polymer. This process continues down to the molecular level. As the plastic flots and photo degrades into smaller and smaller pieces, it concentrates in the upper water column. As it disintegrates, the plastic ultimately becomes small enough to be ingested by aquatic organisms that reside near the ocean's surface. In this way, plastic may become concentrated thereby entering the food chain of the marine Life.

NEGATIVE IMPACT OF PLASTIC ON MARINE LIFE IN THE OCEAN

Some of these long-lasting plastics end up in the stomachs of marine animals, and their young, including sea turtles and the black-footed albatross. Midway Atoll in the pacific ocean receives substantial amounts of marine debris from the patch, Of the 1.5 million Laysan albatrosses that inhabit Midway Atoll, nearly all are likely to have plastic in their digestive system. Approximately one-third of their chicks die, and many of those deaths are due to being fed plastic from their parents. Twenty tons of plastic debris washes up on Midway every year with five tons of that debris being fed to albatross chicks.

Besides the particles' danger to wildlife, on the microscopic level the floating debris can absorb organic pollutants from seawater, including PCBs, DDT, and PAHs. Aside from toxic effects, when ingested, some of these are mistaken by the endocrine system as estradiol, causing hormone disruption in the affected animal. These toxin-containing plastic pieces are also eaten by jellyfish, which are then eaten by fish.

Many of these fish are then consumed by humans, resulting in their ingestion of toxic chemicals. While eating their normal sources of food, plastic ingestion can be unavoidable or the animal may mistake the plastic as a food source.

Marine plastics also facilitate the spread of invasive species that attach to floating plastic in one region and drift long distances to colonize other ecosystems. Research has shown that this plastic marine debris

affects at least 267 species worldwide.

The United Nations Ocean Conference estimated that the oceans might contain more weight in plastics than fish by the year 2050.

PLASTIC POLLUTION

This involves the accumulation of plastic products in the environment that adversely affects wildlife, wildlife habitat, or humans. Plastics that act as pollutants are categorized into micro or macro debris, based on size. The prominence of plastic pollution is correlated with plastics being inexpensive and durable, which lends to high levels of plastics used by humans. However, it is slow to degrade.

Plastic pollution can unfavorably affect lands, waterways and oceans. Living organisms, particularly marine animals, can also be affected through entanglement, direct ingestion of plastic waste, or through exposure to chemicals within plastics that cause interruptions in biological functions. Humans are also affected by plastic pollution, such as through the disruption of the thyroid hormone axis or hormone levels. In the UK alone, more than 5 million tonnes of plastic are consumed each year, of which an estimated mere 24% makes it into recycling systems. That leaves a remaining 3.8 million tons of waste, destined for landfills.

Plastic reduction efforts have occurred in some areas in attempts to reduce plastic consumption and pollution and promote plastic recycling.

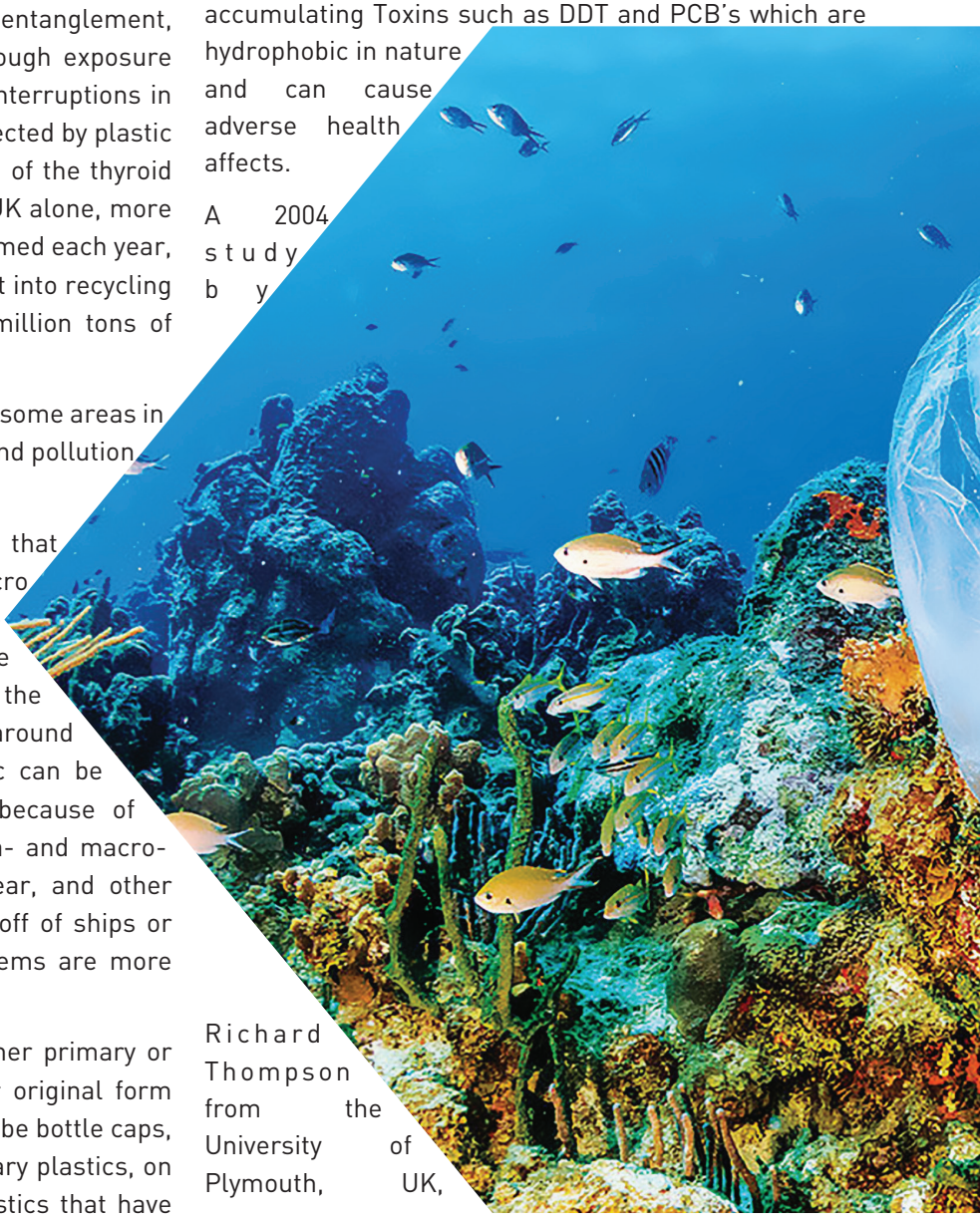
There are three major forms of plastic that contribute to plastic pollution: micro plastics as well as mega- and macro-plastics. Mega- and micro plastics have accumulated in highest densities in the Northern Hemisphere, concentrated around urban centers and water fronts. Plastic can be found off the coast of some islands because of currents carrying the debris. Both mega- and macro-plastics are found in packaging, footwear, and other domestic items that have been washed off of ships or discarded in landfills. Fishing-related items are more likely to be found around remote islands.

This Plastic debris is categorized as either primary or secondary. Primary plastics are in their original form when collected. Examples of these would be bottle caps, cigarette butts, and microbeads. Secondary plastics, on the other hand, account for smaller plastics that have resulted from the degradation of primary plastics.

A) Micro debris are plastic pieces between 2 mm and 5 mm in size. Plastic debris that starts off as macrodebris can become microdebris through degradation and collisions that break it down into smaller pieces. Microdebris is more commonly referred to as nurdles. Nurdles are recycled to make new plastic items, but they easily end up released into the environment during production because of their small size. They often end up in ocean waters through rivers and streams. Microdebris that come from cleaning and cosmetic products are also referred to as scrubbers. Because microdebris and scrubbers are so small in size, filter-feeding organisms often consume them.

These micro-plastics can accumulate in the oceans and allow for the accumulation of Persistent Bio-accumulating Toxins such as DDT and PCB's which are hydrophobic in nature and can cause adverse health affects.

A 2004 study by Richard Thompson from the University of Plymouth, UK,



found a great amount of microdebris on the beaches and waters in Europe, the Americas, Australia, Africa, and Antarctica.

Thompson and his associates found that plastic pellets from both domestic and industrial sources were being broken down into much smaller plastic pieces, some having a diameter smaller than human hair. If not ingested, this micro debris floats instead of being absorbed into the marine environment. Thompson predicts there may be 300,000 plastic items/km^2 of sea surface and 100,000 plastic particles/km^2 of seabed. International pellet watch collected samples of polythene pellets from 30 beaches from 17 countries which were then analyzed for organic micro-pollutants. It was found that pellets found on beaches in America, Vietnam and Southern Africa contained compounds from pesticides suggesting a high use of pesticides in the areas.

B) Macro Debrisn

Plastic debris is categorized as macrodebris when it is larger than 20 mm. These include items such as plastic grocery bags. [Macrodebris are often found in ocean waters, and can have a serious impact on the native organisms. Fishing nets have been prime pollutants. Even after they have been abandoned, they continue to trap marine organisms and other plastic debris. Eventually, these abandoned nets become too difficult to remove from the water because they become too heavy, having grown in weight up to 6 tons.

Decomposition

Plastics themselves contribute to approximately 10% of discarded waste. Many kinds of plastics exist depending on their precursors and the method for their polymerization. Depending on their chemical composition, plastics and resins have varying properties related to contaminant absorption and adsorption. Polymer degradation takes much longer as a result of haline environments and the cooling effect of the sea. These factors contribute to the persistence of plastic debris in certain environments. Recent studies have shown that plastics in the ocean decompose faster than was once thought, due to exposure to sun, rain, and other environmental conditions, resulting in the release of toxic chemicals such as bisphenol A. However, due to the increased volume of plastics in the ocean, decomposition has slowed down. The Marine Conservancy has predicted the decomposition rates of several plastic products. It is estimated that a foam plastic cup will take 50 years to Degrade, a plastic beverage holder will take 400 years to Degrade, a disposable diaper will take 450 years Degrade, and fishing line will take 600 years to degrade.

EFFECTS ON THE ENVIRONMENT

The distribution of plastic debris is highly variable as a result of certain factors such as wind and ocean currents, coastline geography, urban areas, and trade routes. Human population in certain areas also plays a large role in this. Plastics are more likely to be found in enclosed regions such as the Caribbean. It serves as a means of distribution of organisms to remote coasts that are not their native environments. This could potentially increase the variability and dispersal of organisms in specific areas that are less biologically diverse. Plastics can also be used as vectors for chemical contaminants such as persistent organic pollutants and heavy metals.

IMPACT ON LAND

Chlorinated plastic can release harmful chemicals into the surrounding soil, which can then seep into

groundwater or other surrounding water sources and also the ecosystem. This can cause serious harm to the species that drink the water.

Landfill areas contain many different types of plastics. In these landfills, there are many microorganisms which speed up the biodegradation of plastics. The microorganisms include bacteria such as Pseudomonas, nylon-eating bacteria, and Flavobacteria. These bacteria break down nylon through the activity of the nylonase enzyme. Breakdown of biodegradable plastics releases methane, a very powerful greenhouse gas that contributes significantly to global warming.

OCEANS

In 2012, it was estimated that there was approximately 165 million tons of plastic pollution in the world's oceans. One study estimated that there are more than 5 trillion plastic pieces (defined into the four classes of small micro- plastics, large micro- plastics, meso- and macro-plastics afloat at sea. The litter that is being delivered into the oceans is toxic to marine life, and humans. The toxins that are components of plastic include diethylhexyl phthalate, which is a toxic carcinogen, as well as lead, cadmium, and mercury.

Plankton, fish, and ultimately the human race, through the food chain, ingest these highly toxic carcinogens and chemicals. Consuming the fish that contain these toxins can cause an increase in cancer, immune disorders, and birth defects.

The majority of the litter near and in the ocean is made up of plastics. According to Dr. Marcus Eriksen of The 5 Gyres Institute, there are 5.25 trillion particles of plastic pollution that weigh as much as 270,000 tons (as in 2016). This plastic is taken by the ocean currents and accumulates in large vortexes known as ocean gyres. The majority of the gyres become pollution dumps filled with plastic.

OCEAN-BASED SOURCES OF OCEAN PLASTIC POLLUTION

Almost 90% of plastic debris that pollutes ocean water, which translates to 5.6 million tons, comes from ocean-based sources. Merchant ships expel cargo, sewage, used medical equipment, and other types of waste that contain plastic into the ocean. Naval and research vessels also eject waste and military equipment that are deemed unnecessary. Pleasure crafts also release fishing gear and other types of waste. These different ships do not have enough storage space to keep these pollutants on the ship, and thus they are discarded. These plastic items can also accidentally end up in the water through negligent handling. The largest ocean-based source of plastic pollution is discarded fishing gear, responsible for up to 90% of plastic debris in some areas. This equipment includes a variety of traps and nets.

LAND-BASED SOURCES OF OCEAN PLASTIC POLLUTION

Estimates for the contribution of land-based plastic vary widely. While one study estimated that a little over 10% of plastic debris in ocean water comes from land-based sources, responsible for 0.8 million tonnes (790,000 long tons; 880,000 short tons) every year. In 2015 it was calculated that 275 million tonnes (271,000,000 long tons; 303,000,000 short tons) of plastic waste was generated in 192 coastal countries in the year 2010, with 4.80 to 12.70 million tons entering the ocean - a percentage of only up to 5%.

A source that has caused concern is landfills. Most waste in the form of plastic in landfills are single-use items such as packaging. Discarding plastics this way leads to accumulation.

PLASTIC POLLUTION IN TAP WATER

A 2017 study found that 83% of tap water samples taken around the world contained plastic pollutants. This was the first study to focus on global drinking water pollution with plastics, and showed that with a contamination rate of 94%, tap water in the United States was the most polluted, followed by Lebanon and India.

European countries such as the United Kingdom, Germany and France had the lowest contamination rate, though still as high as 72%. This means that people may be ingesting between 3,000 and 4,000 micro particles of plastic from tap water per year. It is currently unclear if this contamination is affecting human health.

EFFECT ON ANIMALS

Plastic pollution has the potential to poison animals, which can then adversely affect human food supplies. Plastic pollution has been described as being highly detrimental to large marine mammals, described in the book Introduction to Marine Biology as posing the "single greatest threat" to them. Some marine species, such as sea turtles, have been found to contain large proportions of plastics in their stomach. When this occurs, the animal typically starves, because the plastic blocks the animal's

digestive tract.

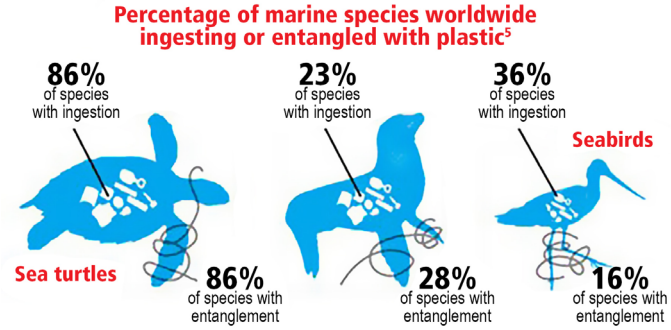
ENTAGLEMENT

Entanglement in plastic debris has been responsible for the deaths of many marine organisms, such as fish, seals, turtles, and birds. These animals get caught in the debris and end up suffocating or drowning. Because they are unable to untangle themselves, they also die from starvation or from their inability to escape predators. Being entangled also often results in severe lacerations and ulcers. In a 2006 report known as Plastic Debris in the World's Oceans, it was estimated that at least 267 different animal species have suffered from entanglement and ingestion of plastic debris. It has been estimated that over 400,000 marine mammals perish annually due to plastic pollution in oceans. Marine organisms get caught in discarded fishing equipment, such as ghost nets. Ropes and nets used to fish are often made of synthetic materials such as nylon, making fishing equipment more durable and buoyant.

INGESTION OF PLASTICS

MARINE ANIMALS

Sea turtles are affected by plastic pollution. Some species are consumers of jelly fish, but often mistake plastic bags for their natural prey. This plastic debris can



kill the sea turtle by obstructing the esophagus. Large amounts of plastics have been found in the stomachs of many beached whales.

Some of the tiniest bits of plastic are being consumed by small fish, in a part of the pelagic zone in the ocean called the Mesopelagic zone, which is 200 meters to 1000 meters below the ocean surface, and completely dark. Not much is known about these fish, other than that there are many of them. They hide in the darkness of the ocean, avoiding predators and then swimming to the ocean's surface at night to feed. Plastics found in the stomachs of these fish were collected.

A study conducted by Scripps Institution of Oceanography showed that the average plastic content in the stomachs of 141 mesopelagic fish over 27 different species was 9.2%. Their estimate for the ingestion rate of plastic debris by these fish in the North Pacific was between 12,000 and 24000 tons per year. The most popular mesopelagic fish is the lantern fish. It resides in the central ocean gyres, which is a large system of rotating ocean currents. Since lantern fish serve as a primary food source for the fish that consumers purchase, including tuna and swordfish, the plastics they ingest become part of the food chain. The lantern fish is one of the main bait fish in the ocean, and it eats large amounts of plastic fragments, which in turn will not make them nutritious enough for other fish to consume.

BIRDS

Plastic pollution does not only affect animals that live solely in oceans. Seabirds are also greatly affected. In 2004, it was estimated that gulls in the North Sea had an average of thirty pieces of plastic in their stomachs. Seabirds often mistake trash floating on the ocean's surface as prey. Their food sources often has already ingested plastic debris, thus transferring the plastic from prey to predator. Ingested trash can obstruct and physically damage a bird's digestive system, reducing its digestive ability and can lead to malnutrition, starvation, and death. Toxic chemicals called polychlorinated biphenyls (PCBs) also become concentrated on the surface of plastics at sea and are released after seabirds eat them. These chemicals can accumulate in body tissues and have serious lethal effects on a bird's reproductive ability, immune system, and hormone balance. Floating plastic debris can produce ulcers, infections and lead to death. Marine plastic pollution can even reach birds that

have never been at the sea. Parents may accidentally feed their nestlings plastic, mistaking it for food. Seabird chicks are the most vulnerable to plastic ingestion since they can't regurgitate like the adult seabirds.

An estimate of 1.5 million Laysan albatrosses, which inhabit Midway Atoll, all have plastics in their digestive system. Midway Atoll is halfway between Asia and North America, and north of the Hawaiian archipelago. In this remote location, the plastic blockage has proven deadly to these birds. These seabirds choose red, pink, brown, and blue plastic pieces because of similarities to their natural food sources. As a result of plastic ingestion, the digestive tract can be blocked resulting in starvation. The windpipe can also be blocked, which results in suffocation. The debris can also accumulate in the animal's gut, and give them a false sense of fullness which would also result in starvation. On the shore, thousands of birds corpses can be seen with plastic remaining where the stomach once was. The durability of the plastics is visible among the remains. In some instances, the plastic piles are still present while the bird's corpse has decayed.

EFFECTS ON HUMANS

Due to the use of chemical additives during plastic production, plastics have potentially harmful effects that could prove to be carcinogenic (Cancer Causing) or promote endocrine disruption.

BIODEGRADABLE AND DEGRADABLE PLASTICS

The use of biodegradable plastics has many advantages and disadvantages. Biodegradables are biopolymers that degrade in industrial composters. Biodegradables do not degrade as efficiently in domestic composters, and during this slower process, methane gas may be emitted.

Although biodegradable and degradable plastics have helped reduce plastic pollution, there are some drawbacks. One issue concerning both types of plastics is that they do not break down very efficiently in natural environments.

COLLECTION (An example from the United States of America)

The two common forms of waste collection include curbside collection and the use of drop-off recycling centers. About 87 percent of the population in the U.S.A. (273 million people) have access to curbside and drop-off recycling centers. In curbside collection, which is available to about 63 percent of the U.S.A. population (193 million people), people place designated plastics in a special bin to be picked up by a public or private hauling company. Most curbside programs collect more than one type of plastic resin; usually both PETE and HDPE. At drop-off recycling centers, which are available to 68 percent of the U.S.A. population (213 million people), people take their recyclables to a centrally located facility. Once collected, the plastics are delivered to a Materials Recovery Facility (MRF) or handler for sorting into single-resin streams to increase product value. The sorted plastics are then baled to reduce shipping costs to re-claimers.

Approximately 2.7 million tons of plastics were recycled in the U.S. in 2011. Some plastics are recycled more than others; in 2011 "29 percent of HDPE bottles and 29 percent of PET bottles and jars were recycled.

NON-USAGE AND REDUCTION IN USAGE OF PLASTICES

The Ministry of Drinking Water and Sanitation, Government of India, has requested various governmental departments to avoid the use of plastic bottles to provide drinking water during governmental meetings, etc., and instead make arrangements for providing drinking water that do not generate plastic waste. The state of Sikkim has restricted the usage of plastic water bottles (in government functions and meetings) and styrofoam products. The state of Bihar has banned the usage of plastic water bottles in governmental meetings.

The 2015 National Games of India, organised in Thiruvananthapuram, was associated with green protocols. This was initiated by Suchitwa Mission that aimed for "zero-waste" venues. To make the event "disposable-free", there was ban on the usage of disposable water bottles. The event witnessed the usage of reusable tableware and stainless steel tumblers. Athletes were provided with refillable steel flasks. It is estimated that these green practices stopped the generation of 120 metric tonnes of disposable waste.

ACTION FOR CREATING AWARENESS

On 11 April 2013 in order to create awareness, artist Maria Cristina Finucci founded The Garbage Patch State at UNESCO – Paris in front of Director General Irina Bokova, first of a series of events under the patronage of UNESCO and of Italian Ministry of the Environment.

UNITED NATIONS OCEAN CONFERENCE

The 2017 United Nations Ocean Conference was a United Nations conference that took place on June 5th-9th 2017 which sought to mobilize action for the conservation and sustainable use of the oceans, seas and marine resources.

The Earth's waters are said to be under threat like never before, with pollution, overfishing, and the effects of climate change severely damaging the health of our oceans. For instance as oceans are warming and becoming more acidic, biodiversity is becoming reduced and changing currents will cause more frequent storms and droughts

UN Secretary-General António Guterres stated that decisive, coordinated global action can solve the problems created by Humanity. Mr Peter Thomson, President of the UN General Assembly, highlighted the conference's significance, saying "if we want a secure future for our species on this planet, we have to act now on the health of the ocean and on climate change".

Earth is often called the "blue planet" as oceans cover over 70 percent of the planet giving it a markedly blue appearance when seen from space. (The planet Earth here is photographed by Apollo 17 spacecraft in 1972)

SDG -14 The conference sought to find ways and urge

OCEAN OF PLASTIC

Floating plastic waste, which can survive for thousands of years in water, serves as mini transportation devices for invasive species, disrupting habitats.

Billions of pounds of plastic can be found in swirling convergences in the oceans making up about 40 percent of the world's ocean surfaces. 80 percent of pollution enters the ocean from the land.

Plastic constitutes approximately 90 percent of all trash floating on the ocean's surface, with 46,000 pieces of plastic per square mile.

46 percent of plastics float and it can drift for years before eventually concentrating in the ocean gyres.

for the implementation of Sustainable Development Goal 14. Its theme is "Our oceans, our future: partnering for the implementation of Sustainable Development Goal 14". It also asked governments, UN bodies, and civil society groups to make voluntary commitments for action to improve the health of the oceans with over 1,000 commitments – such as on managing protected areas – being made.

PARTICIPANTS TO UN OCEANS CONFERENCE

As many as 6,000 leaders gathered for the conference over the course of the week. The Governments of Fiji and Sweden had the co-hosting responsibilities of the Conference. 7 partnership dialogues with a rich state-developed state theme were co-chaired by Australia-Kenya, Iceland-Peru, Canada-Senegal, Estonia-Grenada, Italy-Palau, Monaco-Mozambique and Norway-Indonesia.

OUTCOMES OF THECOCEAN CONFERENCE

Over 1,300 voluntary commitments have been made which UN Under-Secretary-General for Economic and Social Affairs Mr Wu Hongbo called "truly impressive" and stated that they now comprise "an ocean solution registry" via the public online platform. Delegates from China, Thailand, Indonesia and the Philippines pledged to work to keep plastics out of the seas. The Maldives announced a phase out of its non-biodegradable plastic and Austria pledged to reduce the number of plastic bags used per person to 25 a year by 2019.

Several nations announced plans for new marine protected areas. China plans to establish 10 to 20 "demonstration zones" by 2020 and introduced a regulation which requires that 35 percent of the country's shoreline should be natural by 2020. Gabon announced that it will create one of Africa's largest marine protected areas with around 53,000 square kilometers of ocean when combined with its existing zones. New Zealand affirmed the government's commitment to establishing the Kermadec / Rangitahua Ocean Sanctuary, which – with 620,000 square kilometres – would be one of the world's largest fully protected areas Pakistan also announced its first marine protected area.

PRIVATE SECTOR

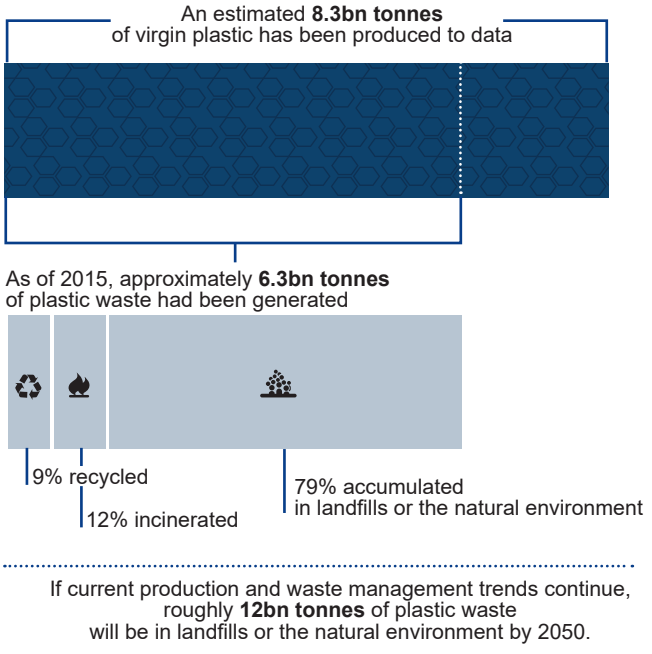
Nine of the world's biggest fishing companies from Asia, Europe and the US have signed up for The Seafood Business for Ocean Stewardship (SeaBOS) initiative, supported by the Stockholm Resilience Centre, aiming to end unsustainable practices.

FLAGSHIP SPECIES

The study argues that large filter feeders, many of which are "charismatic and economically important species", should be prioritized for further research into risks from micro plastics. Filter feeders swallow hundreds of cubic meters of water a day to capture their food from water, and may take in micro plastics during the process. Micro plastics are similar in size and mass to many types of plankton. The Gulf of Mexico, the Mediterranean Sea, the Bay of Bengal and the Coral Triangle are priorities for monitoring, according to a review of studies.

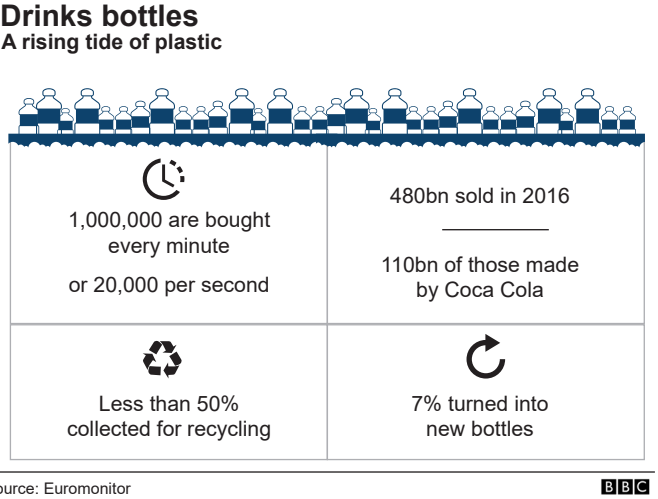
Given below are 3 Slides which shows the impact of Plastic pollution.

HOW MUCH PLASTIC IS THERE



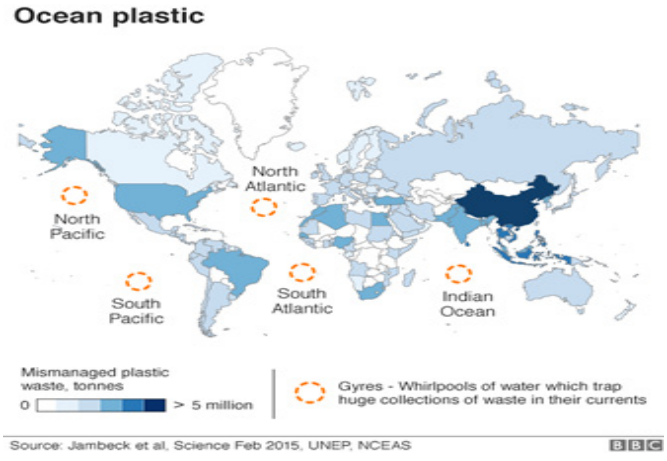
Source: Science Magazine BBC

RISING TIDE OF PLASTIC



Source: Euromonitor BBC

OCEAN PLASTIC GYRES



HOW YOU CAN HELP IN THE BATTLE AGAINST PLASTIC POLLUTION

1) Avoid single use plastics: The culprits in this case are plastic Carrier Bags, Plastic bottles and Drinking straws. Solution – 1) Purchase a Bag for Life, 2) Carry a Reusable bottle, 3) Sip Drinks straight from the glass and do not use a Straw.

2) Give up Chewing Gum: Chewing gum is made from Synthetic Rubber (a Plastic) and around 100,000 tons of chewing gum is discarded every year. Is minty Fresh Breath worth This ??.

3) Go on a Beach Clean: Many organizations conduct beach clean ups throughout the Year. They remove rubbish from the Beaches and raise awareness of.

4) Recycle: only a third of recyclable plastic used by even UK consumers is recycled, so SWOT up on your local Rules and get into the Recycling Habit.

5) Go MICROBEAD Free: in the UK a ban is coming into Force for even Products such as sunscreen and make-up so Read the ingredients List.

THE CONNECTION WITH PLASTIC AND LENT:

In February 2018, The Church of England in its list of things to Give up for period of LENT (The 6 weeks prior to Easter Sunday which is a Time of Penance). Mrs Ruth Knight the Church of Englands Environmental Policy Officer states that as part of its Lent Plastic Challenge they have created a Calendar for a Plastic Free Lent each day bearing either an environmentally themed bible Verse or a Suggestion on how to avoid Buying plastics.

A SOLUTION FOR THE OCEAN PLASTICS BATTLE: KRILL

They might be at the bottom of the Food Chain, but Krill could prove to be a secret weapon in the Fight against the growing threat of plastic pollution in the world's oceans. New Research showed the Tiny Zooplankton are capable of digesting micro plastics under five millimeters (0.2 Inches) before excreting them back into the environment in even smaller form. Researchers stumbled on the finding while working on a Project involving Micro beads. Polyethylene plastics often used in cosmetics such as face scrubs at the Australian Antarctic division Krill aquarium to check the toxic effects of pollution." we realized that Krill actually break up plastic says the researchers from Australia's Griffith University. The theory is that because plastics in the ocean are already degraded and More Fragile they could be even easier for Krill to break.

OCEANS ARE NOW MADE OF PLASTIC

"Humanity's plastic footprint is probably more dangerous than its carbon footprint," said Captain Charles Moore, who, in 1997, discovered the Great Pacific Garbage Patch. Its name is misleading because the huge expanse of floating marine debris is actually more like a soup of confetti-sized plastic bits, produced by the runoff of our throwaway lifestyle that has made its way into our oceans.

The Great Pacific Garbage Patch, the most notorious stretch of plastic debris, is located northeast of Hawaii, about 1000 miles from Hawaii and California. It's an enormous and immeasurable area of marine debris, trapped by one of the five major subtropical gyres (systems of ocean currents) that corrals and carries marine garbage into its vortex. 5 Gyres, an organization that partners with Moore's Algalita Marine Research Foundation to study plastic pollution in the ocean, has sent expeditions across the North Pacific Gyre, the North and South Atlantic Gyres, and the Indian Ocean Gyre, and found plastic in every one of them, though concentrations vary. Some reports have estimated the Great Pacific Garbage Patch to be twice the size of the continental United States, but no one can accurately measure the boundaries of the trash gyres because they are vast, remote and always shifting with ocean conditions. In any case, plastic marine debris is now found on the surface of every ocean on Earth.

Some plastic and marine debris comes from fishing gear, offshore oil and gas platforms, and ships. But 80 percent of it comes from the land—litter that gets stuck in storm drains and is washed into rivers and out to sea, the legal and illegal dumping of garbage and appliances, and plastic resin pellets inadvertently spilled and unloaded by plastic manufacturers. Trash Travels, Ocean Conservancy's 2010 report, states that 60 percent of all marine debris in 2009 consisted of "disposable" items, with the most common being cigarettes, plastic bags, food containers, bottle caps and plastic bottles. And no matter where the litter originates, once it reaches the ocean, it becomes a planetary problem as garbage travels thousands of miles carried by the gyres.

The lightness and durability that make plastic such a useful and versatile material for manufacturers also make it a long-term problem for the environment. Trash Travels estimates that plastic bags can take 20 years to decompose, plastic bottles up to 450 years, and fishing line, 600 years; but in fact, no one really knows how long plastics will remain in the ocean. With exposure to UV rays and the ocean environment, plastic breaks down into smaller and smaller fragments. The majority of the plastic found in the ocean are tiny pieces less than 1 cm. in size, with the mass of 1/10 of a paper clip.

The Sea Education Association's (SEA) expedition to the western North Atlantic Ocean found bits of HDPE (high density polyethylene), LDPE (low density polyethylene), and PP (polypropylene) from items such as milk containers, plastic bags, and straws, which float on the surface because they are less dense than seawater. It did not find PET (polyethylene terephthalate), PVC (polyvinyl chloride), and PS (polystyrene solid), which sink because they are denser than seawater. Algalita, which sampled down to depths of 100 hundred meters throughout the eastern side of the North Pacific Gyre, found LDPE, styrene, PP and PET.

Last year, SEA released the results of its 22-year study of plastic pollution in the western North Atlantic and Caribbean Sea. The greatest amount of plastic was found in the North Atlantic Gyre, which contains the Sargasso Sea. The most plastic collected during a 30-minute tow was 1069 pieces, which, if scaled up, would be equal to about 580,000 pieces per square kilometer. The average concentration of samples would roughly equal 20,300 pieces per square kilometer. While discarded plastic in the U.S. quadrupled between 1980 and 2008, however, the concentration of debris in the Atlantic did not appear to increase. Where has it all gone? Lead scientist Kara Lavender Law speculated that some is being eaten by marine animals, some has broken down into bits too small to be captured by tow nets, some gets washed up

Annually approximately 500 billion plastic bags are used worldwide. More than one million bags are used every minute.

onto beaches, and some is sinking to the ocean floor. According to Project Kaisei, a non-profit also studying marine debris, 70 percent of the man-made waste that enters the ocean sinks to the bottom. That means that the plastic soup is only the 30 percent of the debris that floats. No one knows what lies deep down because so far, there have been no studies of the plastic on the ocean floor.

But we know the plastic debris on the surface of the ocean is taking its toll on marine life. Animals get strangled in fishing lines, nets, and plastic litter. Fish and seabirds ingest bits of plastic they mistake for food that can block their intestinal tracts and kill them, or make them feel full so that they do not eat real food. One of Moore's expeditions collected hundreds of samples of fish, and conducted necropsies on them: over 1/3 had ingested polluted plastic fragments, including one 2.5 inch fish that had 84 pieces of plastic in its tiny gut. In 1999, Moore's research in the Central Pacific found six times more plastic than zooplankton in the water. In 2002, off the coast of Southern California, he discovered the ratio of plastic to plankton was 2.5. Preliminary results on samples Algalita took in 2008 already show that there is a significant increase in the ratio of plastic to plankton in the water.

PLASTIC BITS ALSO CREATE HABITATS FOR MICROORGANISMS AND OTHER SPECIES, ALLOWING WOULD-BE INVASIVE SPECIES TO HITCH RIDES TO NEW AREAS OF THE OCEAN.

A recent study found that plastics take up and accumulate persistent organic pollutants (POPs) such as carcinogenic and endocrine-disrupting polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and organochlorine pesticides such as DDD, a derivative of DDT. Over 50 percent of the plastic samples studied contained PCBs, and over 75 percent contained PAHs. According to Moore, plastic debris can attract and concentrate POPs up to a million times their levels in the surrounding seawater, and when consumed by marine animals, the POPs endanger both the creatures that ingest them and humans higher up on the food chain, especially infants. Moore has said, "No fish monger on Earth can sell you a certified organic wild-caught fish."

Despite all these environmental and potential human health impacts, most scientists agree that it is not feasible to clean up the plastic soup in our oceans. The areas are huge, and the debris is unevenly distributed and always shifting. A cleanup would entail filtering enormous amounts of water, and the by-catch of plankton and other marine organisms would be harmful to ocean ecosystems. Moreover, the fact that the trash gyres are in the open ocean, in international waters, makes it difficult to get governments to invest in research or cleanup efforts.

Undaunted, Project Kaisei, on its two expeditions to the North Pacific Gyre, has been working to develop and test new methods for removal of some of the plastic waste. Its goal is to learn more about how to efficiently remove the floating plastic, and to use new techniques to recycle the material into fuel or other products. Project Kaisei plans to test new, and scaled-up catch methods on future expeditions, as well as passive netting and catch methods that require little fuel and have low impacts on marine life.

Moore and Algalita believe that the best way to deal with the plastic debris is to stop the waste from entering the ocean in the first place: to replace, reduce, reuse and recycle our plastics. Marcus Eriksen, one of the founders of 5 Gyres, also promotes beach cleanup because "What we now know is that if we stop adding more plastic to the ocean, in time the gyres will kick out the plastic pollution they currently hold. If you want to clean the gyre, clean your beach." In 2010, approximately 500,000 volunteers did just that, taking part in the 25th Annual International Coastal Cleanupand removing millions of pounds of marine debris from 6,000 sites around the world, including all 50 U.S. states.

The Algalita Marine Research Foundation has launched a three-year scientific study expedition to the Antarctic Ocean, and is planning a voyage to the North Pacific gyre in July. This spring, 5 Gyres is preparing to sail across the South Pacific Gyre from Chile to Easter Island. Findings from these expeditions and others will be shared at the 5th International Marine Debris Conference in March, 2011.

MARINE ANIMALS ARE DYING – BECAUSE OF PLASTIC

The role plastic products play in the daily lives of people all over the world is interminable. We could throw statistics at you all day long (e.g. Upwards of 300 MILLION tons of plastic are consumed each year), but the impact of these numbers border on inconceivable.

For those living on the coasts, a mere walk on the beach can give anyone insight into how staggering our addiction to plastic has become as bottles, cans, bags, lids and straws (just to name a few) are ever-present. In other areas that insight is more poignant as the remains of animal carcasses can frequently be observed; the plastic debris that many of them ingested or became entangled in still visible long after their death. Sadly, an overwhelming amount of plastic pollution isn't even visible to the human eye, with much of the pollution occurring out at sea or on a microscopic level.

The short-lived use of millions of tons of plastic is, quite simply, unsustainable and dangerous. We have only begun to see the far-reaching consequences of plastic pollution and how it affects all living things. According to a study from Plymouth University, plastic pollution affects at least 700 marine species, while some estimates suggest that at least 100 million marine mammals are killed each year from plastic pollution.

Here are some of the marine species most deeply impacted by plastic pollution.

SEA TURTLES

Like many other marine animals, sea turtles mistake plastic waste for a viable food source, sometimes causing blockages in their digestive system. Though the declining sea turtle populations in the oceans are due to a variety of factors (most all of which involve human exploitation), plastic pollution plays a significant role.

Separate studies from 2013 suggest as many as 50 percent of sea turtles are ingesting plastic at an unprecedented rate, and dying because of it. Another study of the Loggerhead species found that 15 percent of young turtles examined had ingested such enormous quantities of plastic that their digestive system was obstructed.




SEALS AND SEA LIONS

Marine life can become entangled in a variety of ocean debris including fishing nets, lines, and lures. Still, there are a number of seals and sea lions that become entangled in plastic bags or plastic packing bands leading to injury and death.

In fact, plastic packing bands and rubber bands continue to deeply impact the Steller Sea Lionpopulation. An eight-year study in Southeast Alaska and British Columbia documented 388 sea lions entangled in plastic debris. These plastic packing bands and rubber bands can become so embedded in the animal that it can lead to severe infection and death.

SEABIRDS

Plastic pollution leads to the deaths of millions of marine bird species each year. Arguably more so than other birds, the Laysan albatross has been deeply impacted by plastic debris through their hunting techniques. When the albatross dives into the ocean to catch fish, squid or other food they use their beak to skim the surface, picking up plastic along the way.

Shockingly, an estimated 98 percent of albatross studied are found having ingested some kind of plastic debris. Once the plastic has been ingested, it causes an obstruction in the digestive tract and can puncture internal organs.

FISH

Fish, along with pretty much any marine mammal that brings in water through its gills, are increasingly at risk to microscopic plastic debris. A study performed at the University of Exeter UK suggested that microscopic marine debris could take up to six times as long for the animal to rid themselves of in comparison to ingesting the debris orally.

Of course plastic pollution deeply impacts species of fish, but unlike other animals on our list, this is the one animal that's also commonly eaten by humans. A number of studies suggest that the fish humans continue to consume have at one time or another ingested plastic microfibers, including brown trout, cisco, and perch.

WHALES AND DOLPHINS

Like other marine mammals, whales often mistakes marine debris for a potential food source. In some species, similar to that of the albatross, the whales mouth is so large it unknowingly picks up plastic debris (a technique observed in baleen whales). Necropsies performed after numerous whale strandings saw an increase in the amount of plastic debris found.

A study also found that hundreds of species of cetaceans have been negatively impacted by plastic pollution in the past two decades. The obstructions often puncturing and tearing the stomach lining, leading to starvation and death. According to Marine Pollution Bulletin, cetaceans are ingesting plastic debris at a rate as high as 31 percent, and in turn, 22 percent of those cetaceans were at an increased risk of death.

It's clear that plastic pollution impacts virtually every living organism in, or thriving off of, the oceans of our world. This is simply not acceptable. The balance of our ecosystem is essential to our quality of life and will ultimately depend on when the world decides to stop turning a blind eye to the issue and make the necessary lifestyle changes.

We all must remain diligent as we work to minimize our own individual consumption of plastic products. So, whether you're just beginning the journey to minimizing plastic in your life or not, there are a few key steps that never hurt to repeat.

Chemicals added to plastics are absorbed by human bodies. Some of these compounds have been found to alter hormones or have other potential human health effects.

People are exposed to chemicals from plastic multiple times per day through the air, dust, water, food and use of consumer products.

DO YOU KNOW? – WE ARE DRINKING PLASTIC

The World Health Organisation (WHO) has announced a review into the potential risks of plastic in drinking water after a new analysis of some of the world's most popular bottled water brands found that more than 90% contained tiny pieces of plastic. A previous study also found high levels of microplastics in tap water.

In the new study, analysis of 259 bottles from 19 locations in nine countries across 11 different brands found an average of 325 plastic particles for every litre of water being sold.

In one bottle of Nestlé Pure Life, concentrations were as high as 10,000 plastic pieces per litre of water. Of the 259 bottles tested, only 17 were free of plastics, according to the study.

Scientists based at the State University of New York in Fredonia were commissioned by journalism project Orb Media to analyse the bottled water.

The scientists wrote they had "found roughly twice as many plastic particles within bottled water" compared with their previous study of tap water, reported by the Guardian.

According to the new study, the most common type of plastic fragment found was polypropylene – the same type of plastic used to make bottle caps. The bottles analysed were bought in the US, China, Brazil, India, Indonesia, Mexico, Lebanon, Kenya and Thailand.

Scientists used Nile red dye to fluoresce particles in the water – the dye tends to stick to the surface of plastics but not most natural materials.

The study has not been published in a journal and has not been through scientific peer review. Dr Andrew Mayes, a University of East Anglia scientist who developed the Nile red technique, told Orb Media he was "satisfied that it has been applied carefully and appropriately, in a way that I would have done it in my lab".

The brands Orb Media said it had tested were: Aqua (Danone), Aquafina (PepsiCo), Bisleri (Bisleri International), Dasani (Coca-Cola), Epura (PepsiCo), Evian (Danone), Gerolsteiner (Gerolsteiner Brunnen), Minalba (Grupo Edson Queiroz), Nestlé Pure Life (Nestlé), San Pellegrino (Nestlé) and Wahaha (Hangzhou Wahaha Group).

A World Health Organisation spokesman told the Guardian that although there was not yet any evidence on impacts on human health, it was aware it was an emerging area of concern. The spokesman said the WHO would "review the very scarce available evidence with the objective of identifying evidence gaps, and establishing a research agenda to inform a more thorough risk assessment."

A second unrelated analysis, also just released, was

commissioned by campaign group Story of Stuff and examined 19 consumer bottled water brands in the US. It also found plastic microfibres were widespread.

The brand Boxed Water contained an average of 58.6 plastic fibres per litre. Ozarka and Ice Mountain, both owned by Nestlé, had concentrations at 15 and 11 pieces per litre, respectively. Fiji Water had 12 plastic fibres per litre.

Abigail Barrows, who carried out the research for Story of Stuff in her laboratory in Maine, said there were several possible routes for the plastics to be entering the bottles.

"Plastic microfibres are easily airborne. Clearly that's occurring not just outside but inside factories. It could come in from fans or the clothing being worn," she said.

Stiv Wilson, campaign coordinator at Story of Stuff, said finding plastic contamination in bottled water was problematic "because people are paying a premium for these products".

Jacqueline Savitz, of campaign group Oceana, said: "We know plastics are building up in marine animals and this means we too are being exposed, some of us every day. Between the microplastics in water, the toxic chemicals in plastics and the end-of-life exposure to marine animals, it's a triple whammy."

Nestlé criticised the methodology of the Orb Media study, claiming in a statement to CBC that the technique using Nile red dye could "generate false positives".

Coca-Cola told the BBC it had strict filtration methods, but acknowledged the ubiquity of plastics in the environment meant plastic fibres "may be found at minute levels even in highly treated products".

A Gerolsteiner spokesperson said the company, too, could not rule out plastics getting into bottled water from airborne sources or from packing processes. The spokesperson said concentrations of plastics in water from their own analyses were lower than those allowed in pharmaceutical products.

Danone claimed the Orb Media study used a methodology that was "unclear". The American Beverage Association said it "stood by the safety" of its bottled water, adding that the science around microplastics was only just emerging.

Plastic buried deep in landfills can leach harmful chemicals that spread into groundwater.

Around 4 percent of world oil production is used as a feedstock to make plastics, and a similar amount is consumed as energy in the process.

BEWARE OUR FOOD CONTAINS PLASTIC

The synthetic chemicals used in the packaging, storage, and processing of foodstuffs might be harmful to human health over the long term, warn environmental scientists in a commentary in the Journal of Epidemiology and Community Health.

This is because most of these substances are not inert and can leach into the foods we eat, they say.

Despite the fact that some of these chemicals are regulated, people who eat packaged or processed foods are likely to be chronically exposed to low levels of these substances throughout their lives, say the authors.

And far too little is known about their long term impact, including at crucial stages of human development, such as in the womb, which is "surely not justified on scientific grounds," the authors claim.

They point out that lifelong exposure to food contact materials or FCMs substances used in packaging, storage, processing, or preparation equipment "is a cause for concern for several reasons."

These include the fact that known toxicants, such as formaldehyde, a cancer causing substance, are legally used in these materials. Formaldehyde is widely present, albeit at low levels, in plastic bottles used for fizzy drinks and melamine tableware.

Secondly, other chemicals known to disrupt hormone production also crop up in FCMs, including bisphenol A, tributyltin, triclosan, and phthalates.

"Whereas the science for some of these substances is being debated and policy makers struggle to satisfy the needs of stakeholders, consumers remain exposed to these chemicals daily, mostly unknowingly," the authors point out.

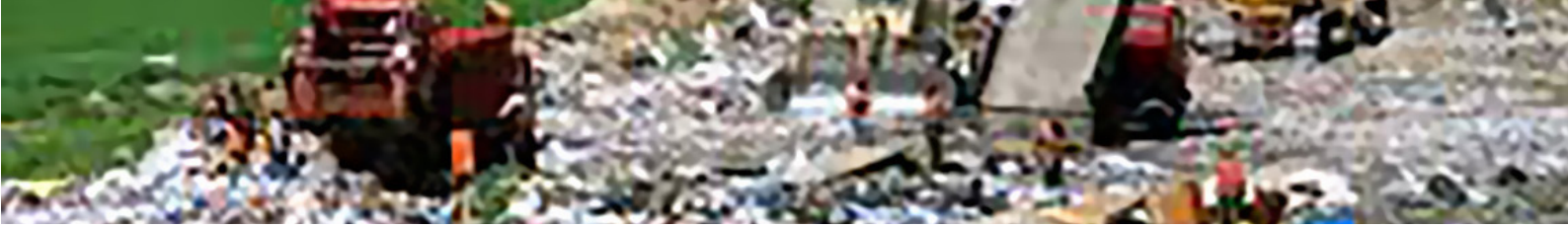
And, thirdly, the total number of known chemical substances used intentionally in FCMs exceeds 4000.

Furthermore, potential cellular changes caused by FCMs, and in particular, those with the capacity to disrupt hormones, are not even being considered in routine toxicology analysis, which prompts the authors to suggest that this "casts serious doubts on the adequacy of chemical regulatory procedures."

They admit that establishing potential cause and effect as a result of lifelong and largely invisible exposure to FCMs will be no easy task, largely because there are no unexposed populations to compare with, and there are likely to be wide differences in exposure levels among individuals and across certain population groups.

But some sort of population-based assessment and biomonitoring are urgently needed to tease out any potential links between food contact chemicals and chronic conditions like cancer, obesity, diabetes, neurological and inflammatory disorders, particularly given the known role of environmental pollutants, they argue.

"Since most foods are packaged, and the entire population is likely to be exposed, it is of utmost importance that gaps in knowledge are reliably and rapidly filled," they urge.



79% OF PLASTIC IN LANDFILLS, WATER BODIES

When Prime Minister Narendra Modi had last year given a call to save cows from plastic, his message brought into focus the hazards of this non biodegradable product not only for animals but also for the overall environment. Protection of cows or other animals from plastic can well be dealt with by civic authorities but the challenge to save the earth from plastic waste seems tough. The ecological hazards, posed by this conventional fossil fuel-based product, is much bigger across the globe where it pollutes water, air and soil, affecting human and aquatic lives. An international journal, Science Advances, of the US based non-profit organisation, American Association for the Advancement of Science (AAAS), has come out with a new study on plastic, quantifying its production and explaining how 79% of the total plastic waste of 6,300 million metric tons (MMT) is accumulated in landfills or in the natural environment (river system and oceans). The study, 'Production, Use and Fate of all Plastics Ever Made', highlighted that if current production and waste management trends continue, roughly 12,000.

MMT of plastic waste will be in landfills or in the natural environment by 2050. It is also well established that all types of plastics waste cannot be recycled. Therefore, it is accumulated into open drains, low-lying areas, river banks, coastal areas and sea-beaches, affecting soil, ground water and the surroundings.

The research study, published in Science Advances, is the first global analysis of all mass-produced plastics ever made by developing and combining global data on production, use, and end-of-life fate of polymer resins, synthetic fibers, and additives into a comprehensive material flow model.

Lead author of the study, Roland Geyer, along with coauthors Jenna R Jambeck and Kara Lavender Law noted in the research article that the growth of plastics production in the past 65 years.

They estimate that 8300 MMT of virgin plastics have been produced to date in the world. As of 2015, approximately 6300 MMT of plastic waste had been generated, around 9% of which had been recycled, 12% was incinerated, and 79% was accumulated in landfills or the natural environment.

They noted that although there are emerging technologies, such as pyrolysis, which extracts fuel from plastic waste, to date, virtually all thermal destruction has been by incineration, with or without energy recovery. The environmental and health impacts of waste incinerators strongly depend on emission control technology, as well as incinerator design and operation.

Finally, plastics can be discarded and either contained in a managed system, such as sanitary landfills, or left uncontained.

IMPACTS OF PLASTIC POLLUTION ON LAND ENVIRONMENT

Out of the 33.6million tons of plastic that americans discard each year, only 6.5 percent of it is recycled and 7.8 percent is combusted in waste to energy facilities. The remainder 85.7% ends up in landfills where it may take up to 1000 years to decompose, leaching potential pollutants into the soil and water.

Even though there has yet to be concrete research on the impacts of plastic waste on land-based wild-life, there is concern that incorrectly managed landfills could lead to the escape of plastic waste or the escape of landfill leachate containing chemicals associated with plastic decomposition. Plastic contains chemicals or additive to give it certain properties. Some of the key chemicals are Bisphenol A (negative impact on reproductive systems), Phthalates (endocrine disruptors), and Brominated Flame Retardants (hormone disrupting effects that impairs development of the reproductive and nervous system). A study in 2009 found evidence that more industrialised countries, such as Malaysia and Thailand, had higher BPA concentrations in landfill leachate than less industrialised country.

Even though formal research is lacking, but plastic are similarly ingested by land-based animals. Racoons and wild dogs are often seen to be scavenging garbage dump and may accidentally ingest plastics, thinking that they're food. Often, we may also observe animals behind tangled by plastic bags, rings or even jars. All this contribute to the suffering of animals.

Over the last ten years we have produced more plastic than during the whole of the last century.

50 percent of the plastic we use, we use just once and throw away.

Enough plastic is thrown away each year to circle the earth four times

We currently recover only five percent of the plastics we produce.

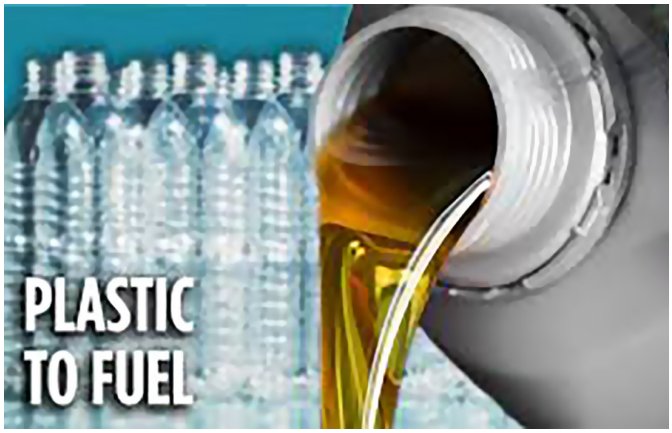
Plastic accounts for around 10 percent of the total waste we generate.

PLASTIC TO FUEL

Plastic is made from petroleum or natural gas in a chemical process that combines smaller molecules into a large chainlike molecule, often with other substances added to give it particular qualities. (Some, like phthalates and bisphenol A, can have harmful health effects.) Plastic production is estimated to use four percent of global oil production—both as the raw material and for energy in the manufacturing process. Because plastics embody energy from fossil fuels (and actually have a higher energy value than coal and wood), leaving so much of it in landfills is not only an environmental hazard, it is a huge waste of a valuable resource that could be used to produce electricity, heat, or fuel.

The Plastics Division of the American Chemical Council asked the Earth Institute's Earth Engineering Center to explore ways of recovering the energy inherent in non-recycled plastics. The 2011 report, which was updated in 2014, determined that the amount of energy contained in the millions of tons of plastic in U.S. landfills is equivalent to 48 million tons of coal, 180 million barrels of oil, or one trillion cubic feet of natural gas. If all this plastic were converted into liquid fuel, it could produce 5.7 billion gallons of gasoline, enough to power 8.9 million cars per year. And the fact is, there are now technologies that can put all this waste plastic to good use.

The report examined three ways of utilizing non-recycled plastic for energy production: converting plastics directly into liquid fuel, using separated plastics as fuel in special types of power plants, and increasing the amount of garbage burned in waste-to-energy facilities.



Plastics can be converted into crude oil or other types of products through pyrolysis, a high heat process that does not use oxygen. Agilyx, an Oregon-based company, has developed a system that heats polystyrene from foam cups, packaging materials, and Styrofoam to create a styrene monomer, a building block of the plastic industry. The final liquid product can be sold to other refiners to produce oil or to make more polystyrene.

Plastic2Oil in Niagara Falls, NY, uses unwashed, unsorted waste plastic to produce ultra-low sulfur fuels that do not require further refining. The company maintains that its process is "highly green, clean and scalable."

A number of other companies in the U.S., Africa, Asia and Europe are investing in technology that produces liquid fuel from plastic wastes.

According to the updated Earth Engineering Center report, power plants specially designed to use non-recycled plastics as fuel could theoretically produce 61.9 million MWh of electricity, enough to power 5.7 million homes.

A 2009 United Nations Environmental Programme report on converting plastic waste into a resource described the production of gaseous fuels, using high heat to decompose plastic waste, and solid fuel derived from a mixture of waste plastic, paper, and wood. The materials are first shredded, sorted then made into pellets. A number of companies in Japan are producing both solid and gaseous fuels. The

Showa Denko company, headquartered in Tokyo, uses heat gasification to recycle plastic waste into ammonia, used to manufacture many products, and CO^2 for carbonization.

Liter of Light, a grassroots movement with partnerships around the world, has found another way to recycle plastic bottles. It helps energy-poor communities convert discarded plastic soda bottles into solar bottle bulbs to illuminate homes and streets. The organization has installed over 350,000 bottle lights in more than 15 countries.

SIKKIM LEADS INDIA TOWARDS A PLASTIC FREE FUTURE

The tiny state of Sikkim nestled in the Himalayas in northeastern India has been leading a green revolution of its own kind. Despite being small and isolated, and with its people leading their lives in extremely tough mountainous terrain, Sikkim has emerged as one of India's environmental leaders.

Sikkim, which in 1998 became the first Indian state to ban disposable plastic bags, is also among the first to target single-use plastic bottles. In 2016, Sikkim took two major decisions. It banned the use of packaged drinking water in government offices and government events. Second, it banned the use of Styrofoam and thermocol disposable plates and cutlery in the entire state in a move to cut down toxic plastic pollution and tackle its ever-increasing garbage problem.

The state government took up these drastic initiatives on the grounds that disposable products which were in vogue in both rural and urban areas were environmentally hazardous, generated a huge quantity of municipal waste and were claiming a lot of space in landfills. And on plastic water bottles, the government held the view that the rampant usage of packaged drinking water in departmental meetings and functions was adding an unnecessary burden on the dump yards so it banned their use in official functions.

Sikkim is a small and biodiversity-rich area and hence has limited space for garbage dumps. It has already stretched its limit and opting for new landfill sites is neither an easy option nor permissible as it would mean taking over forest land that's home to endangered wildlife.

It is estimated that with the growing population and rising consumerism, the world's plastic bottle consumption will increase to half a trillion annually by 2021. Studies have also suggested that some compounds in plastics may threaten human health.

With massive awareness drives and penalties, this ban has been impactful. Sikkim's resident are now opting for plates made of paper, leaf, bagasse and even areca nut. Government offices have switched to alternatives like filtered water, large reusable dispensers and reusable water bottles for functions and meetings.

However, with the large number of tourists visiting Sikkim, it is challenging to control the use of plastic water bottles. The government is considering banning plastic bottles in the entire state, meaning that tourists would be need to get their drinking water from filters in hotels, restaurants and public spaces.

Sikkim is a state with many firsts when it comes to green policies. It is the first Indian state to aim to be fully organic, which means all the food produced in Sikkim should soon be free of pesticides. It is also India's first state to ban open defecation. Urinating in public can cost Rs 500 ($7.50). The government made it mandatory to have a sanitary toilet at home to be eligible for any benefits from the government or to contest in village-level elections. This has resulted in the success of the programme which was envisaged years before Swach Bharat Campaign (Clean India Campaign) was even conceptualized. The state even banned firecrackers in 2014 to contain noise and air pollution.

"What happened was that in one episode in the 1990s, plastic carry bags got washed down due to heavy rainstorm. Drains got blocked, which resulted in huge landslide. Some people died too. This triggered the state government to ban plastic bags," said Rajendra P Gurung, CEO, Ecotourism and Conservation Society of Sikkim (ECOSS), a local NGO that works in Sikkim.

Gangtok-based ECOSS is working with other organizations like WWF, Swach Bharat Campaign on the Zero Waste Himalaya project, which is aiming to tackle garbage in the Himalayan regions of Bhutan, India and Nepal. The project has been actively campaigning and lobbying with the state government for effective implementation of the ban in Sikkim.

According to Gurung, even though municipal staff is doing multiple rounds of garbage collection daily in the morning, only 20 per cent to 30 per cent of waste gets recycled. More needs to be done to make Sikkim truly plastic free.

"Instead of plastic bags, people are opting for non-woven polypropylene bags which have a texture of cloth but are actually plastic. People are using it thinking it is eco-friendly. So government needs to strengthen implementation more seriously and promote alternative options," said Gurung. "Also multi-layered plastics like tetrapacks, chips packets are a problem. People eat lot of instant noodles here, so that is also adding to non-biodegradable waste," he added.

Shakti Singh Choudhury, Mayor of Gangtok Municipal Corporation acknowledged the problem of polypropylene bags. "They are being used on a small scale. They feel like cloth so people think it is not bad for environment. But we are working towards gradually phasing it out too. We are asking people to carry their own cloth bags when they go out for shopping," Choudhury said.

Studies by Delhi-based Toxics Link and Pune-based eCoexist NGOs conducted in 2014 and 2018, respectively, showed that, despite the continued use of plastic bags, Sikkim has fared quite well in the implementation of its green policies. eCoexist's study found that around 66 per cent of shops in Sikkim used paper bags or newspapers and around 34 per cent used plastic bags, which includes non-woven bags.

Through penalties, state-level policies and a mass awareness programme, this tiny state is well on its way to becoming free of the scourge of plastic pollution.

SAVING THE BEACH FROM PLASTIC POLLUTION

For decades tourists have flocked to the Indonesian island of Bali to surf, snorkel and sunbathe on its perfect beaches.

But now the island has declared a "garbage emergency" after the country's most popular tourist beaches were inundated with a rising tide of plastic waste.

A 3.6-mile stretch of beach on the island's western coast was declared an emergency zone after authorities realised that the volume of plastic being washed up was endangering the tourist trade.

Workers sent in to Jimbaran, Kuta and Seminyak beaches, among the island's busiest, were carting off up to 100 tons of junk each day at the peak of the cleanup, AFP news agency reported.

Plastic pollution on Bali has soared in recent years and has become a major concern for visitors and residents.

"It is awful. People just don't care, it's everywhere, it's everywhere," said Gulang, a hotel worker who declined to give his second name.

"The government does something but it is really just a token thing," he said.

He said much of the pollution on Bali is down to habitual fly tipping that sees rubbish carried out to sea during the rainy season and blamed much of the problem on the indifference of many islanders to the issue.

But he added that municipal refuse management is inadequate. He often resorts to using waste disposal facilities at the hotels where he works for domestic rubbish.

Kelly Slater, the US world surfing champion, warned after a visit in 2012 that pollution on the island was getting so bad it could soon make surfing there "impossible."

The island's government has made some moves to tackle the issue.

Last year authorities said they would aim to ban polythene bags by 2018, following a campaign launched by two school girls and endorsed by celebrities including Australian surfing champion Mick Fanning.

But much of what arrives on its beaches comes from other parts of the heavily polluted Java Sea.

Indonesia is the second biggest maritime plastic polluter in the world after China. The river of Citarum in West Java has been described as the most polluted river in the world with detritus dumped in it by nearby factories.

An estimated eight million metric tons of plastic were released into the world's oceans in 2010, according to a University of Georgia study.

Indonesia accounted for up to 1.29 million tons, or more than 10 per cent of the total.

In March this year the Indonesian government pledged to spend up to $1 billion a year to clean up its seas.

Luhut Binsar Pandjaitan, Indonesia's coordinating minister for maritime affairs said at a World Oceans Summit - held, appropriately enough, on Bali - that the country would seek to reduce plastic pollution by 75 per cent by 2025.

The Bali clean up comes after David Attenborough's Blue Planetsparked a debate in Britain on the damage done to the environment by plastic.

Michael Gove, the Environment Secretary, has said he was left "haunted" by scenes in the series that showed sea life struggling to survive in polluted seas and is understood to be developing plans to crackdown on use of single use plastics.

The Department for International Development is considering proposals to direct aid to help clean up particularly polluted rivers in Africa and Asia that are believed to contribute disproportionately to plastics in the oceans.

WONDER OF RECYCLING

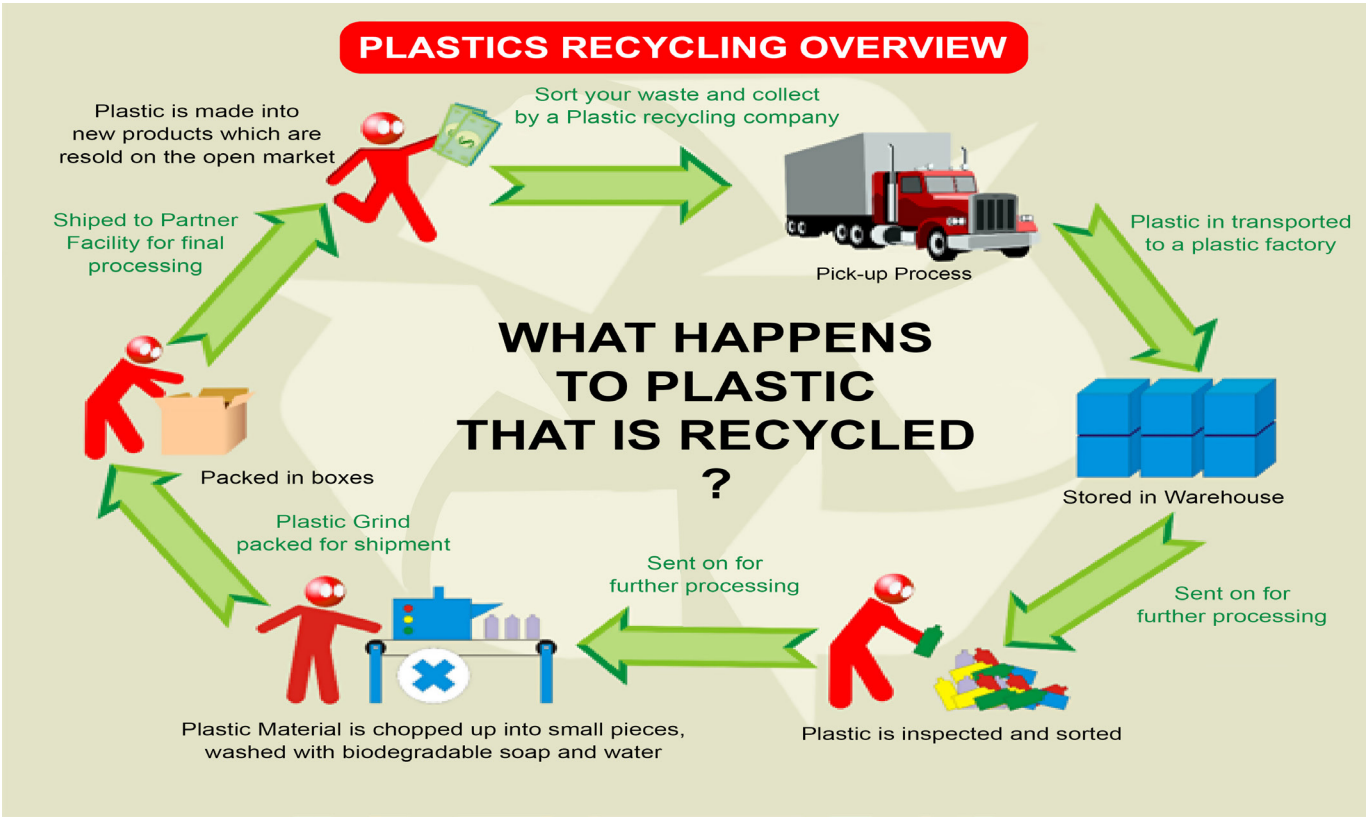
It is Increasingly evident that in industrialized nations such as the United States and Sweden mandatory post-consumer recycling programs often raise costs, waste resources, and even harm the environment.1 In Guatemala, however, a competitive recycling industry that successfully recycles both post-industrial and post-consumer waste has grown up without any coercive government action. In fact, Guatemalan entrepreneurs are competing for sources of recyclable materials, expanding the industry's reach beyond its initial niche of recycling post-industrial scrap.

Eight years ago, the partners in a Guatemalan plastic packaging company began a small recycling operation they named Ecoplast. The recycling company has grown from a single, jury-rigged machine at the back of the packaging company to a 24-hour-per-day, 7-days-a-week operation using imported Italian machinery capable of handling more than 400 kg/hour of plastics, with more than thirtyfive full-time employees and as many as twenty temporary workers at busy times. Most impressively, the company has expanded to additional waste streams-and is looking for more.

Having begun with relatively clean, post-industrial scrap from local plastics factories, Ecoplast now recycles dirty post-consumer waste (that is, household trash) taken from Guatemala City's sprawling garbage dump. Ecoplast sells the recycled plastic pellets it produces to customers in China, Mexico, and the United States, as well as to local plastics producers.

Guatemala is a relatively poor country (per capita gross national income was only $1,910 in 2003 compared to $37,610 in the U.S.), so its citizens use less plastic than those in wealthier countries. Even so, the Guatemalan recycling industry has succeeded at doing what wealthier countries struggle with-recycling post-consumer waste. Why has private-sector recycling been so successful in Guatemala?

For one thing, Guatemala does not domestically produce the plastic pellets used to make packaging and other products. The transportation costs of bringing such pellets from the United States (the primary source of raw materials for the Guatemalan plastics industry) created a business opportunity for plastics recycling.



Garbage collectors are the real heroes of Recycling plastic

Another factor is the relatively low cost of labor in Guatemala. Recycling post-consumer waste is labor-intensive. It requires separating the various types of plastic from one another and from the remainder of the garbage, and then cleaning it for recycling. (The high cost of labor in the United States is one reason why U.S. municipal recycling programs require consumers to presort their garbage.) In Guatemala, sorting and cleaning garbage are accomplished without making the recycled product more expensive than virgin materials.

Turning an opportunity into a successful business takes more than a potential cost advantage, of course. Guatemalan entrepreneurs have found new ways to separate recyclables from other garbage. Recycling begins in the trucks (operated by private concessionaires, not the government) that pick up Guatemala City's garbage. As the trucks circulate through the city, employees work inside the trucks sorting out recyclable materials, including the bags households use to dispose of their trash. By the time the truck arrives at the dump, a first pass at removing recyclables has already taken place. (By combining trash collecting and sorting in one truck, the Guatemala method reduces truck air pollution emissions and lowers costs. In New York City, in contrast, one set of trucks picks up trash and another picks up recyclables- leading to high costs, including environmental ones.)

Once the garbage is unloaded at the Guatemala City dump, an army of independent garbage sorters sifts through it a second time in search of recyclables. A series of specialized markets exists at the dump, including various types of plastics, glass, and metal. Ecoplast recently opened a facility next to the dump. This cut its transportation costs (and truck emissions) significantly, since on-site shredding reduces the volume that must be trucked to the main plant.

The life of a garbage sorter is not an easy one. Guatemala's city dump has been featured in documentaries that focus on the difficult lives of the poor people who work there. Many have scarred arms and legs from the cuts they receive sifting through the refuse. The smell and clouds of insects that hover around the dump make working conditions unpleasant. Yet garbage sorting provides a source of income for hundreds of people.

Without the efforts of the garbage sorters, the critical separation of valuable materials from trash would not take place. Recycling post-consumer material is dependent upon dividing garbage into its separate components. This separation can either occur through compensated, voluntary work at the end of the waste stream, as in Guatemala, or through mandatory uncompensated labor in the home, as with most U.S. municipal recycling programs.

As more businesses have entered plastics recycling, they have expanded their search for recyclable plastic beyond the city dump and other original sources. Ecoplast, for example, has persuaded several food companies to sell it their plastic packaging waste rather than burn the waste in open air fires. The food companies earn income from a waste product, Ecoplast secures more plastic, and air quality improves as open-air burning of heaps of plastic ends.

By providing remote collection points with equipment to crush bottles, recyclers can cut the costs of transporting post-consumer waste. Ecoplast, for example, plans to collect post-consumer plastic at schools throughout Guatemala.

Another Guatemalan company found a unique opportunity to gather post-consumer materials. A hydroelectric plant on the Las Vacas River had to deal with floating trash in the river that snarled its equipment. To keep the

trash out, the company built a screen across the river upstream from the intake point. The firm then built a plant to recycle the plastics that accumulated. It now creates plastic fence posts from the post-consumer trash it removes from the water.

Recyclers face challenges unimaginable in developed economies. Recycling requires substantial amounts of electricity, transportation services, and clean, cold water (inputs that are often obscured by recycling's "green" image). None of these is cheap or readily available in Guatemala. Ecoplast, for example, spends more than $8,000 per month on electricity, more than twice what it would pay to operate the same plant in even the most expensive parts of the United States.

A "garbage mafia" operates at the Guatemala City dump. A series of bosses hold "concessions" for various types of material at the dump from the main organized crime groups. Only individuals authorized by the relevant boss may sort trash, and all the recyclables they find must be sold to the boss. The lack of competition among suppliers led to substandard loads of recyclables being delivered to Ecoplast, including unsorted plastics and dirty material.

Ecoplast decided to circumvent the garbage boss and posted a sign at the dump seeking direct sales of recyclables. The garbage mafia quickly retaliated, cutting off sales to Ecoplast and physically threatening the facility and the company's owners. Because of the power of the garbage mafia-which stems from its ability to shut down the dump completely-no public authority was willing or able to prevent this lawless behavior. By complaining to higher authorities within the mafia, however, Ecoplast was able to induce the plastics boss to change his behavior.

Even a major advantage, low labor costs, is not what it would be in a freer market. The Guatemalan government raises labor costs through a variety of taxes and regulations, including a requirement that employers pay workers an additional month's salary every six months (effectively requiring the payment of seven month's pay for six month's work), a mandatory bonus each month, and fifteen working days of vacation per year. Together with unemployment insurance and other taxes, these costs add approximately 45 percent to labor costs.

Someday Guatemala may, like the United States, become so wealthy that its citizens won't be eager to sort garbage for their livelihood, and recycling may recede as a business. But today it is providing opportunities for increasing prosperity in Guatemala, while showing that when recycling makes economic sense, entrepreneurs will provide it.

The recycling Journey

How your plastic bottle is reborn

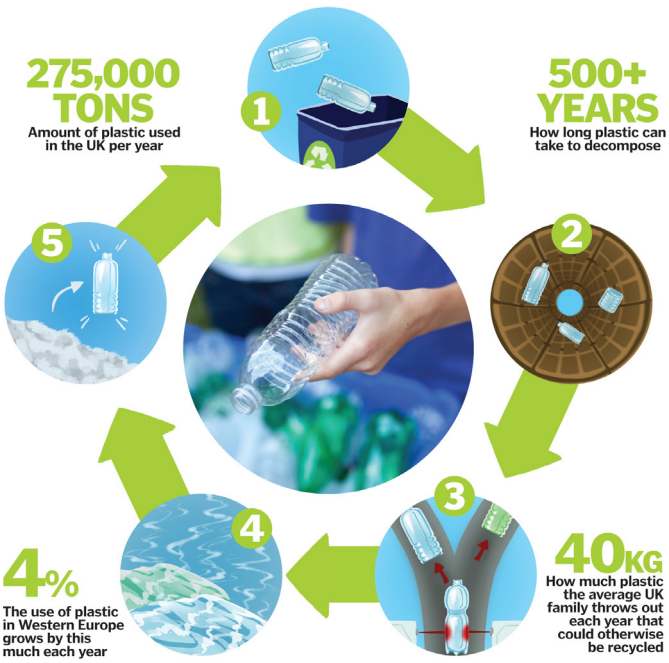
1 Collection
Your empty plastic bottle is collected and taken to a recycling facility for sorting. If you have already separated the plastic bottles from the rest of your recycling they can be sent straight to a recycling plant.

2 Separating
The recycling is hand-checked to remove any non-recyclable material. It is then loaded into a 'trommel', a large perforated spinning drum. Plastic bottles and cans are separated through the perforations, and then steel and aluminium cans are removed using magnets and electromagnetic technology.

3 Sorting
The bottles are then cleaned and sorted by type and colour using infrared beams. The infrared light is reflected off of the plastics in different ways, allowing a sensor to detect which is which. Precision jets of air then separate the different types.

4 Shredding and melting
Next the bottles are shredded by a machine and the shreds washed again to remove any impurities, including remnants of paper labels or the bottle's original contents. They may also be decontaminated further using a chemical solution. The shreds of plastic are then dried and melted down.

5 Flaking
The melted plastic is reformed into flakes or pellets as it cools. These can then be melted down again and used to make new products. For example, the melted plastic can be reshaped into new plastic bottles, ready to be filled with a product.



LET'S DO OUR BIT IN FIGHTING PLASTIC POLLUTION

Plastic, of course, is uniquely problematic because it's nonbiodegradable and therefore sticks around for a lot longer (like up to 1,000 years longer) than other forms of trash. And we're not just talking about people dumping their garbage overboard. Around 80 percent of marine litter actually originates on land—either swept in from the coastline or carried to rivers from the streets during heavy rain via storm drains and sewer overflows.

So the best thing we can do to protect our waterways is try to keep as much plastic as possible out of the waste stream in the first place. The good news? There are many small ways you can have a big impact.

WEAN YOURSELF OFF DISPOSABLE PLASTICS

Ninety percent of the plastic items in our daily lives are used once and then chucked: grocery bags, plastic wrap, disposable cutlery, straws, coffee-cup lids. Take note of how often you rely on these products and replace them with reusable versions. It only takes a few times of bringing your own bags to the store, silverware to the office, or travel mug to Starbucks before it becomes habit.

STOP BUYING WATER

Each year, close to 20 billion plastic bottles are tossed in the trash. Carry a reusable bottle in your bag, and you'll never be caught having to resort to a Poland Spring or Evian again. If you're nervous about the quality of your local tap water, look for a model with a built-in filter.

BOYCOTT MICROBEADS

Those little plastic scrubbers found in so many beauty products—facial scrubs, toothpaste, body washes—might look harmless, but their tiny size allows them to slip through water-treatment plants. Unfortunately, they also look just like food to some marine animals. Opt for products with natural exfoliants, like oatmeal or salt, instead.

COOK MORE

Not only is it healthier, but making your own meals doesn't involve takeout containers or doggy bags. For those times when you do order in or eat out, tell the establishment you don't need any plastic cutlery or, for some serious extra credit, bring your own food-storage containers to restaurants for leftovers.

PURCHASE ITEMS SECONDHAND

New toys and electronic gadgets, especially, come with all kinds of plastic packaging—from those frustrating hard-to-crack shells to twisty ties. Search the shelves of thrift stores, neighborhood garage sales, or online

postings for items that are just as good when previously used. You'll save yourself a few bucks, too.

RECYCLE

It seems obvious, but we're not doing a great job of it. For example, less than 14 percent of plastic packaging is recycled. Confused about what can and can't go in the bin? Check out the number on the bottom of the container. Most beverage and liquid cleaner bottles will be #1 (PET), which is commonly accepted by most curbside recycling companies. Containers marked #2 (HDPE; typically slightly heavier-duty bottles for milk, juice, and laundry detergent) and #5 (PP; plastic cutlery, yogurt and margarine tubs, ketchup bottles) are also recyclable in some areas.

SUPPORT A BAG TAX OR BAN

Urge your elected officials to follow the lead of those in San Francisco, Chicago, and close to 150 other cities and counties by introducing or supporting legislation that would make plastic-bag use less desirable.

BUY IN BULK

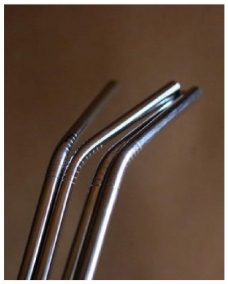
Single-serving yogurts, travel-size toiletries, tiny packages of nuts—consider the product-to-packaging ratio of items you tend to buy often and select the bigger container instead of buying several smaller ones over time.

BRING YOUR OWN GARMENT BAG TO THE DRY CLEANER

Invest in a zippered fabric bag and request that your cleaned items be returned in it instead of sheathed in plastic. (And while you're at it, make sure you're frequenting a dry cleaner that skips the perc, a toxic chemical found in some cleaning solvents.)

PUT PRESSURE ON MANUFACTURERS

Though we can make a difference through our own habits, corporations obviously have a much bigger footprint. If you believe a company could be smarter about its packaging, make your voice heard. Write a letter, send a tweet, or hit them where it really hurts: Give your money to a more sustainable competitor.



LEARN MORE ABOUT PLASTIC POLLUTION

World's first ocean plastic clean up machine set to launch

https://www.independent.co.uk/news/world/americas/ocean-plastic-cleanup-machine-great-pacific-garbage-patch-launch-boyan-slat-a8317226.html

Plastics are being transformed into apparels

https://www.independent.co.uk/life-style/fashion/adidas-yoga-wanderlust-recycled-plastic-parley-for-the-oceans-a8289191.html

Plastics made from plants can reduce world waste

https://www.independent.co.uk/environment/lastics-pollution-how-plants-organics-world-waste-problem-solution-a8228656.html

Plastics in major salt brands in use

https://food.ndtv.com/food-drinks/iit-bombay-study-identify-microplastic-in-popular-table-salt-brands-1910601

Building Eco-Bricks by recycling plastic

https://www.ndtv.com/video/player/news/building-eco-bricks-by-recycling-plastic/489834

Could a greenhouse gas make plastics 'green?'

https://www.plasticstoday.com/sustainability/could-greenhouse-gas-make-plastics-green/183747035959490

Oceans of plastic waste

https://www.sciencedirect.com/science/article/pii/S0960982215000706

India Is Not Rubbish: You'll Be Surprised How It Manages Its Plastic!

https://www.thebetterindia.com/134697/india-rubbish-plastic-waste-management/

THE EARTH DOESN'T NEED LAMINATION

SAY NO TO PLASTICS

Profiled and Published by APPL Foundation
Registered Office: 1 Bishop Lefroy Road. Kolkata 700020.