



**UN**  
environment  
programme

**Counter  
MEASURE**  
FOR PLASTIC FREE RIVERS

**“Rethink  
Plastic”**

**teri**



RETHINK PLASTIC

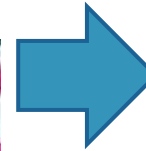
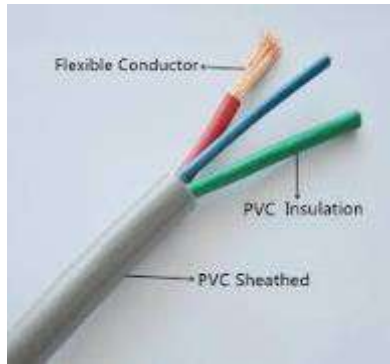


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# **Introduction to Plastic**



..Plastic Is Inevitable

But Let The Pollution  
be Stoppable

Image Sources:

[https://www.google.com/url?sa=i&source=images&cd=&cad=rja&uact=8&ved=2ahUKewiuyaHgh\\_HmAhVNJt8KHf86BUMQjRx6BAGBEAQ&url=https%3A%2F%2Fwww.dreamstime.com%2Fstock-images-medicine-drugs-stethoscope-syringes-still-life-medical-objects-ampoules-image32054664&psig=AOvVaw2KzfoQMZBoAzz2CZ5bYDWD&ust=1578471812077697](https://www.google.com/url?sa=i&source=images&cd=&cad=rja&uact=8&ved=2ahUKewiuyaHgh_HmAhVNJt8KHf86BUMQjRx6BAGBEAQ&url=https%3A%2F%2Fwww.dreamstime.com%2Fstock-images-medicine-drugs-stethoscope-syringes-still-life-medical-objects-ampoules-image32054664&psig=AOvVaw2KzfoQMZBoAzz2CZ5bYDWD&ust=1578471812077697)

[https://www.google.com/url?sa=i&source=images&cd=&ved=2ahUKewifovmei\\_HmAhVBLEwKHehtBakQjRx6BAGBEAQ&url=https%3A%2F%2Fpackaging360.in%2Fnews%2Ffaavin-to-purchase-back-used-plastic-milk-packets&psig=AOvVaw3TTCz-QG8xp3kbb8jooHXW&ust=1578472655102598](https://www.google.com/url?sa=i&source=images&cd=&ved=2ahUKewifovmei_HmAhVBLEwKHehtBakQjRx6BAGBEAQ&url=https%3A%2F%2Fpackaging360.in%2Fnews%2Ffaavin-to-purchase-back-used-plastic-milk-packets&psig=AOvVaw3TTCz-QG8xp3kbb8jooHXW&ust=1578472655102598)

<https://www.google.com/imgres?imgurl=https%3A%2F%2Fcdn.thewire.in%2Fwp-content%2Fuploads%2F2019%2F04%2F24172603%2FDeonar-Life-amid-litter-768x512.jpg&imgrefurl=https%3A%2F%2Fthewire.in%2Fenvironment%2Fdeonar-mumbai-slum-waste-dumping-ground&docid=XbP4Yu4reTUzM&tbnid=dABUT1uf->

[kWAIM%3A&vet=1oahUKewjT4LD3\\_vDmAhUl7HMBHcAiAqoQMwhqKBlwEg..i&w=768&h=512&bih=576&biw=1366&q=deonar%20plastics%20burning&ved=oahUKewjT4LD3\\_vDmAhUl7HMBHcAiAqoQMwhqKBlwEg&iact=mrc&uact=8](https://www.google.com/search?sa=i&source=images&cd=&ved=2ahUKewjT4LD3_vDmAhUl7HMBHcAiAqoQMwhqKBlwEg..i&w=768&h=512&bih=576&biw=1366&q=deonar%20plastics%20burning&ved=oahUKewjT4LD3_vDmAhUl7HMBHcAiAqoQMwhqKBlwEg&iact=mrc&uact=8)



# Who Am I ? – “Plastic”

Derived from Greek Word “PLASTIKOS” which means able to shaped or molded\*.

Plastic is a Synthetic Material Made From a Wide Range Of Organic Polymers:

- Polyethylene
- PVC
- Nylon

It Can Be Molded Into various Shapes While Soft And Then Set Into A Rigid Or Slightly Elastic Form.

[Read More](#)

*A Brief History of the Invention of Plastics*

<https://www.thoughtco.com/history-of-plastics-1992322>



\* [https://www.slideshare.net/jeh\\_neh/intro-to-plastic](https://www.slideshare.net/jeh_neh/intro-to-plastic)  
<https://www.goodnewsnetwork.org/companies-taking-the-lead-in-plastics-reduction-2019/>

# Emissions from Plastic



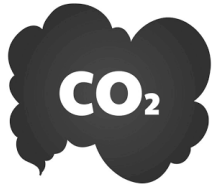
- Polychlorinated Biphenyls
- Dioxins
- Furan
- Mercury
- Persistent Organic Pollutants
- The burning of polystyrene polymers - such as foam cups, meat trays, egg containers, yogurt and deli containers - releases **Styrene**.
- Styrene gas can readily be absorbed through the skin and lungs

[Toxic Pollutants from Plastic Waste](http://www.wecf.eu/cms/download/2004-2005/homeburning_plastics.pdf)- A Review Rinku Verma\*, K. S. Vinoda, M. Papireddy, A.N.S Gowda , 2016  
[http://www.wecf.eu/cms/download/2004-2005/homeburning\\_plastics.pdf](http://www.wecf.eu/cms/download/2004-2005/homeburning_plastics.pdf)

## Potential Risks From The Emissions

- *Increase the risk of heart disease.*
- *Aggravate respiratory ailments such as asthma and emphysema*
- *Nausea and headaches*
- *Damages the nervous system, kidney, liver Reproductive and development system.*

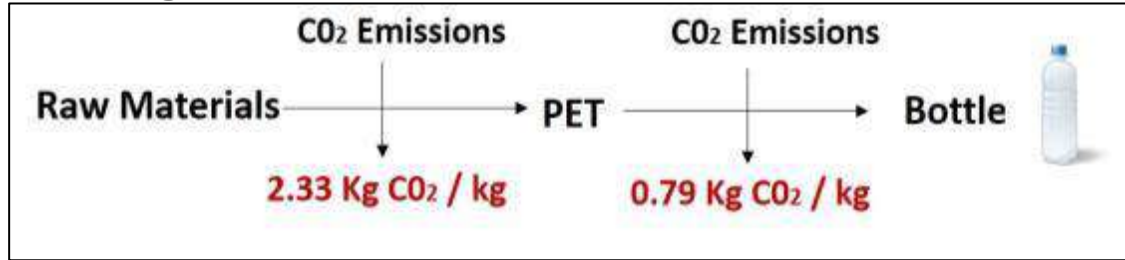
Image source  
: <http://urbanupdate.in/category/municipal-corporations/solid-waste-management/>



#1

# 5 QUICK FACTS About Plastic

Manufacturing of 1 Kg of PET Plastic Bottle Emits 3.12 Kg CO<sub>2</sub> e



**Total CO<sub>2</sub> Emission = 3.12 kg CO<sub>2</sub> e/ kg**

#2. **1 Million** Plastic Drinking Bottles Are Purchased Every Minute Worldwide



#5

The amount of **Bubble Wrap** that is produced annually is enough to wrap around the Equator ten times.

#3

More than **Half a billion plastic straws** are used every day around the world.



#4

**5 Trillion** Single-use Plastic Bags Are Used Worldwide Every Year. i.e. **1000 bags/ every person on earth**

3<sup>rd</sup> July is International Plastic Bag Free Day

Reference

- <http://www-materials.eng.cam.ac.uk/energyforschools/downloads/D-PackingRecycling.pdf>
- <https://www.unenvironment.org/interactive/beaut-plastic-pollution/>
- <https://www.earthday.org/fact-sheet-how-much-disposable-plastic-we-use/>
- <https://www.unenvironment.org/interactive/beaut-plastic-pollution/>
- <https://www.earthday.org/fact-sheet-how-much-disposable-plastic-we-use/>

Image Sources

- [https://www.iconexperience.com/v\\_collection/icons/?icon=pet\\_bottle](https://www.iconexperience.com/v_collection/icons/?icon=pet_bottle)
- <https://georgetowner.com/articles/2018/07/02/plastic-straws-door/>
- <https://pngimage.net/plastic-bag-icon-png-8/>
- <https://deliveris.co.uk/product/bubble-wrap-bundle-150-x-10000/>

Abbreviations:  
 CO<sub>2</sub> e – Cabondioxide equivalent  
 PET – Polyethylene Terephthalate

# **Statistics on Plastics**



# In 2016, The world generated **242 million Tonnes** of Plastic Waste (As per The World Bank)\*

Globally....

The UNEP estimates suggest **> 8.3 billion tonnes** of plastic been produced since the early 1950s\*\*

Only **9%** of all plastic waste ever produced is recycled.

About **60%** of global plastic used has ended up in either a landfill or the natural environment.

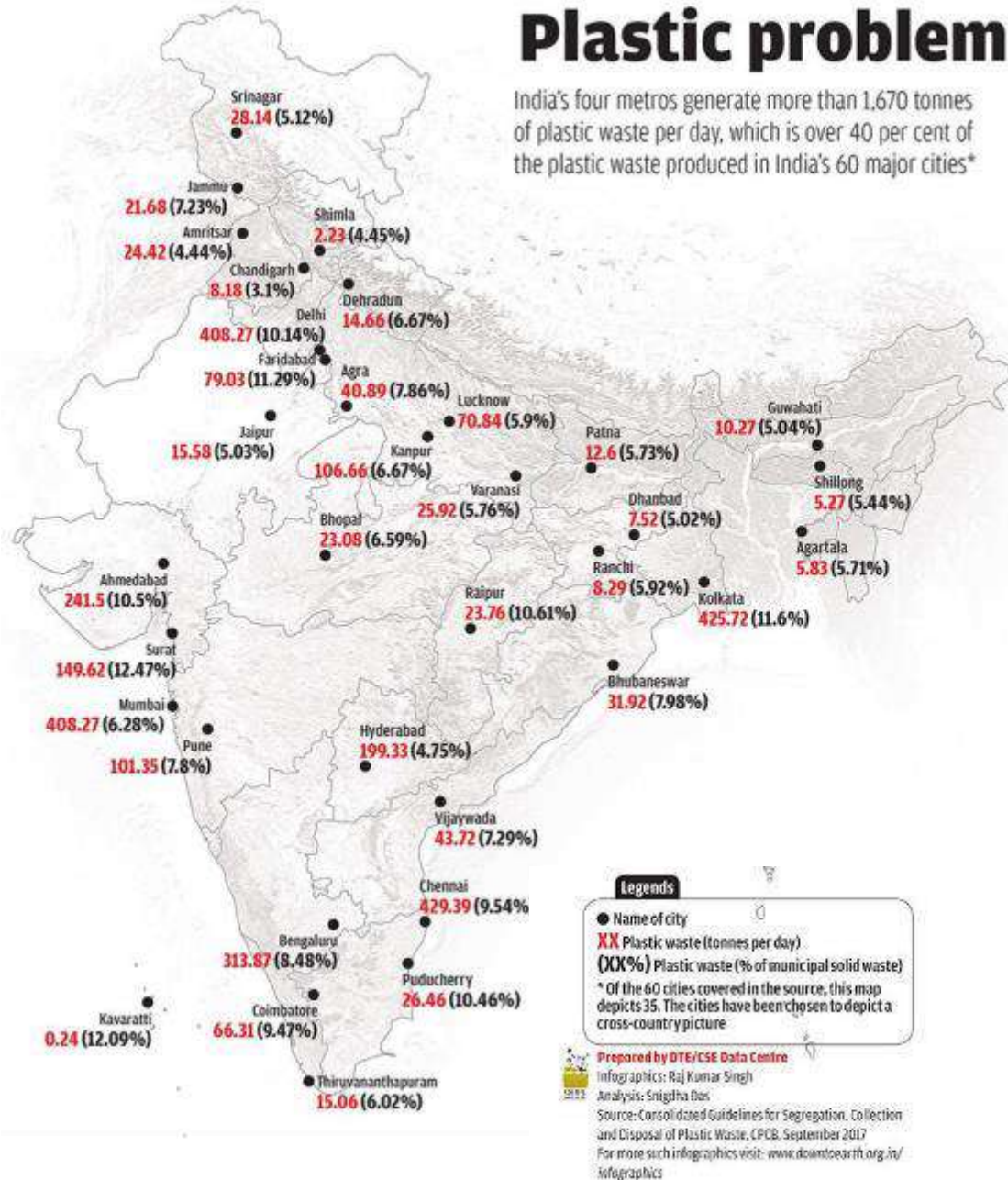


Source:

- \* <https://www.worldbank.org/en/news/press-release/2018/09/20/global-waste-to-grow-by-70-percent-by-2050-unless-urgent-action-is-taken-world-bank-report>
- \*\* <https://www.unenvironment.org/interactive/beat-plastic-pollution/>
- Image source: <http://entaovamosfalar.blogspot.com/2018/02/global-world-map.html>

# Plastic problem

India's four metros generate more than 1,670 tonnes of plastic waste per day, which is over 40 per cent of the plastic waste produced in India's 60 major cities\*



India generated **660,787.90 Tonnes of Plastic Waste** in the year 2017-18 ...CPCB estimates (2017-18)

## % Share Of Plastic Waste In Metro Cities of India (Down To Earth, 2017)

Kolkata	= 11.6%
Delhi	=10.14 %
Chennai	= 9.54%
Mumbai	= 6.28%

Abbreviations  
CPCB- Central Pollution Control Board

<https://www.downtoearth.org.in/news/waste/breaching-the-threshold-60748>

[https://www.cpcb.nic.in/uploads/plasticwaste/Annual\\_Report\\_2017-18\\_PWM.pdf](https://www.cpcb.nic.in/uploads/plasticwaste/Annual_Report_2017-18_PWM.pdf)

# In the Year 2017-18, City of Mumbai Generated...

**408.27**  
**Tonnes/Day**  
**Plastic Waste**



**500**  
**Containers\*/day**

**1,82,500**  
**Containers\*/year**

*\* The dimension of a container= 20 Ft X 8 Ft X 8.6 Ft*



# **Plastic Pollution**

# How Mumbai's Marine Drive turned into a necklace of trash

As you dump, so you shall reap -- that seems to be the message for Mumbaikars after high tides pulled tonnes of soggy garbage out of the Arabian sea onto their city's coast last week.

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India Today Web Desk  
New Delhi and Mumbai  
July 15, 2018, 11:02 AM (GMT+5:30) July 15, 2018, 11:43 (IST)



High tides left Mumbai's Marine Drive strewn with garbage last week. (Photo: Pradeep Patil)

### HIGHLIGHTS

- High tides scatter garbage on Mumbai's iconic boulevard
- Twitterati post videos, photos, express concern
- Municipal workers were cleaning up the mess last evening

**India Today**  
**16<sup>th</sup> July 2018**

Economic times 10<sup>th</sup>

August 2018

Benchmarks >

Nifty **CLOSED**  
12,226.65 **↓ -55.55**



NSE Gainer-Large Cap >

Adani Green Energy ...  
192.60 **↑ 9.15**



Precious Metal >

Gold (MCX) (Rs)  
40,132.00 **↑ 85**

## Garbage in water drains polluting Mumbai coastline: BMC

In an affidavit filed before a division bench of justices A S Oka and Riyaz Chagla, the Brihanmumbai Municipal Corporation said, "There are 107 storm water drain outfalls which drain into the Arabian sea directly."

PTI | Aug 10, 2018, 10:06 PM IST

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0 Comments

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PTI



File photo (PTI)

MUMBAI: The Mumbai civic body told the Bombay High Court on Friday that garbage and solid waste thrown into open storm water drains by people were causing pollution along the metropolitan city's coastline.

In an affidavit filed before a division bench of justices A S Oka and Riyaz Chagla, the Brihanmumbai Municipal Corporation said, "There are 107 storm water drain outfalls

which drain into the Arabian sea directly. In suburbs and extended suburbs, open storm water drains are constructed on both sides of the road. The flow from such open drains are discharged into nullahs, creeks or the sea."

"Garbage and solid waste is thrown by citizens into such drains. Also release of sullage (filth) into such drains is then discharged into the sea without any treatment," it said.

The BMC affidavit was filed in response to a public interest litigation by a city NGO seeking direction to authorities to frame guidelines on disposal of garbage and debris and their

# Plastic Pollution making Head Lines in Mumbai

<https://www.indiatoday.in/india/story/how-mumbai-s-marine-drive-turned-into-a-necklace-of-trash-1286705-2018-07-16>

<https://economictimes.indiatimes.com/news/environment/pollution/garbage-in-water-drains-polluting-mumbai-coastline-bmc/articleshow/65358462.cms?from=mdr>



# Examples of Leakage points of Plastic Pollution



Rivers



Land



Mangroves



Nallahs



Sea/ Beach

Image Source : <https://edition.cnn.com/2017/05/22/asia/mumbai-beach-dramatic-makeover/index.html>

Plastic Persists In The Environment For **450 Years**.



# **Impacts of Plastic Pollution**



# Impacts of Plastic on Marine Life

- ~ **800** marine species have had damaging interactions with marine litter-**entanglement and ingestion**
- ~ **17%** species impacted by marine plastic debris: **Near Threatened** species as per the IUCN Red List.



1. <https://www.google.com/url?sa=i&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwiootLg8JjmAhWRgAKHV5nBFoQjRx6BBAgBEAQ&url=https%3A%2F%2Fscienceworld.scholastic.com%2Fissues%2F2016-17%2Fo41717%2Fan-ocean-of-plastic.html&psig=AOvVaw3fwng8d12hBe6Mn8tFrCfD&ust=1575441266915303>

2. <https://www.thenational.ae/image/policy/1.838894:1552991629/07430364.jpg?f=16x9&w=1200&psf#w=6f82040>

3. [https://www.google.com/imgres?imgurl=https%3A%2F%2Fpiningm.com%2foriginals%2F8e%2F5d%2F21%2F8e5d213b095857b30d8e0da29397db97.jpg&imgrefurl=https%3A%2F%2Fwww.pinterest.com%2Fpin%2F343329171577877182%2F&docid=3TjVz1958mCk7M&tbnid=Nomh3suXgWzdbM%3A&vet=10ahUKEwjShdaZ7pjmAhXBSHUIHc53AIMQMwhnKAwwDA..i&w=1600&h=1016&bih=757&biw=1600&q=marine%20animals%20and%20plastics&ved=oahUKEwjShdaZ7pjmAhXBSHUIHc53AIMQMwhnKAwwDA&iact=mrc&uact=8](https://www.google.com/imgres?imgurl=https%3A%2F%2Fpiningm.com%2Foriginals%2F8e%2F5d%2F21%2F8e5d213b095857b30d8e0da29397db97.jpg&imgrefurl=https%3A%2F%2Fwww.pinterest.com%2Fpin%2F343329171577877182%2F&docid=3TjVz1958mCk7M&tbnid=Nomh3suXgWzdbM%3A&vet=10ahUKEwjShdaZ7pjmAhXBSHUIHc53AIMQMwhnKAwwDA..i&w=1600&h=1016&bih=757&biw=1600&q=marine%20animals%20and%20plastics&ved=oahUKEwjShdaZ7pjmAhXBSHUIHc53AIMQMwhnKAwwDA&iact=mrc&uact=8)

4. [https://www.tropicalconservationfund.com/uploads/8/5/2/9/85297444/plastics-pollution\\_orig.jpg](https://www.tropicalconservationfund.com/uploads/8/5/2/9/85297444/plastics-pollution_orig.jpg)



# Plastic Litter : A Curse for Marine Life

## 1 40 Kg Plastic Found in Dead Whale's Belly

### Whales are at 'significant' risk from ocean microplastic, says study

The team's analysis also found that species tend to congregate in areas that overlap "microplastic pollution hotspots", which include the Gulf of Mexico, the Mediterranean Sea, the Bay of Bengal and the Coral Triangle in Southeast Asia.

## Plastic Pollution Kills More than Half a Million Hermit Crabs in Two Remote Islands

Hermit crabs do not have shells of their own and use empty shells or hollow objects as a protection.

Trending Desk | Updated December 9, 2019, 3:42 PM IST

## Sperm whale dies with 100kg of rubbish in its stomach in Outer Hebrides

More than 100kg of fishing nets and other marine rubbish has been found in the stomach of a sperm whale that died after being stranded on the west coast of the island of Harris in the Outer Hebrides.



### Source:

1. <https://www.thehindu.com/sci-tech/energy-and-environment/40-kg-plastic-found-in-dead-whales-belly/article26575854.ece>
2. <https://zeenews.india.com/environment/whales-are-at-significant-risk-from-ocean-microplastic-says-study-2078851.html>
3. <https://www.countryfile.com/wildlife/marine-life/sperm-whale-dies-with-100kg-of-rubbish-in-its-stomach-in-outer-hebrides/>
4. <https://www.news18.com/news/buzz/plastic-pollution-kills-more-than-half-a-million-hermit-crabs-in-two-remote-islands-2417331.html>

### Links for further reading:

- [https://www.biologicaldiversity.org/campaigns/ocean\\_plastics/](https://www.biologicaldiversity.org/campaigns/ocean_plastics/)
- <https://www.nationalgeographic.com/magazine/2018/06/plastic-planet-animals-wildlife-impact-waste-pollution/>
- <https://www.theguardian.com/environment/2019/aug/04/five-species-affected-by-plastic-pollution>
- <https://www.iucn.org/resources/issues-briefs/marine-plastics>
- <https://news.mongabay.com/2019/12/2019s-top-10-ocean-news-stories-commentary/>
- <https://www.thebetterindia.com/207906/earth-heroes-environment-conservation-waste-water-wildlife-changemakers-2019-india-new-year/>
- <https://www.onegreenplanet.org/environment/500000-hermit-crabs-die-every-year-after-being-trapped-in-plastic-mistaken-for-shells/>

### Must watch videos

- The Story of Stuff <https://youtu.be/9GorqroigqM>
- It's a Plastic World <https://vimeo.com/100694882>
- Albatross <https://vimeo.com/218502282>
- All the Way to the Ocean <https://youtu.be/IWRrpFkJDo8>



# Impacts on Birds



## Nearly Every Seabird on Earth is Eating Plastic

### *Links for further reading:*

- <https://www.nationalgeographic.com/news/2015/09/15092-plastic-seabirds-albatross-australia/>

### *Must watch videos*

- Report: How plastic in the Ocean impacts your health <https://www.youtube.com/watch?v=IQQajO5yIUE>
- HACK: How our plastic obsession is killing sea birds <https://www.youtube.com/watch?v=Mh-bJetDYqM>

### Sources:

1. [https://www.aquarium.co.za/cache/ce\\_img\\_cache/local/24be6a810f238a37/Entangled\\_Animals\\_\(3\)\\_750\\_448\\_70.jpg](https://www.aquarium.co.za/cache/ce_img_cache/local/24be6a810f238a37/Entangled_Animals_(3)_750_448_70.jpg)
2. <https://img-s-msn-com.akamaized.net/tenant/amp/entityvid/AAcYgHD.img?h=351&w=624&m=6&q=60&o=f&l=f>
3. <https://www.nationalgeographic.com/news/2015/09/15092-plastic-seabirds-albatross-australia/>
4. [https://www.aquarium.co.za/cache/ce\\_img\\_cache/local/24be6a810f238a37/Entangled\\_Animals\\_\(5\)\\_750\\_493\\_70.jpg](https://www.aquarium.co.za/cache/ce_img_cache/local/24be6a810f238a37/Entangled_Animals_(5)_750_493_70.jpg)
5. [https://www.aquarium.co.za/cache/ce\\_img\\_cache/local/24be6a810f238a37/33275735831\\_108b65c091\\_o\\_750\\_500\\_70.jpg](https://www.aquarium.co.za/cache/ce_img_cache/local/24be6a810f238a37/33275735831_108b65c091_o_750_500_70.jpg)



# We can differentiate...Animals can not...



## Image source

<https://www.timesnownews.com/mirror-now/in-focus/article/banning-single-use-plastics-what-india-can-learn-from-other-countries/499252>

<https://www.thesun.ie/news/1488035/shocking-snaps-show-elephants-eating-massive-piles-of-fly-tipped-rubbish-including-plastic-bags-and-sanitary-towels-in-rural-india/>

<https://www.hindustantimes.com/delhi/plastic-pollution-is-killing-wildlife-in-south-delhi/story-GKtCe4UW83Zk1z4iJIYrdM.html>



2019 Special

Home >> News

# No Plastic Please: Madhya Pradesh Cites Cow Deaths As Reason For Ban

The Madhya Pradesh government has decided to ban plastic or polythene carry bags across the state from May 1

News | PTI | April 13, 2017 8:15 AM | 0



Madhya Pradesh government to ban plastic bags from May 1

### HIGHLIGHTS

- 1 Polythene bags are harmful for the environment
- 2 The cows eat polythene/plastic bags, which leads to their death
- 3 The ban would not be meant for bucket and other plastic materials

### Plastic With A 'Pen Drive'

“The cows eat polythene/plastic bags, which leads to their death. Banning of polythene use will protect their lives. Besides, the plastic/polythene bags are also harmful for the environment, he said.

**Bhopal:** Madhya Pradesh government today decided to ban plastic/polythene carry bags across the state from May 1 saying that its consumption results in large number of cow deaths.

“The state cabinet, chaired by the chief minister Shivraj Singh Chouhan has accorded nod to the proposal of imposing the ban on plastic/polythene bags across the state from May 1,” State Public Relations Department Minister Narottam Mishra told reporters here after the meeting.

**Also Read: Say No To Plastic: Kerala Wages A War On**

# Tamil Nadu: Doctors remove 52 kg plastic from cow's stomach

Surgeons from Tamil Nadu Veterinary and Animal Sciences University (TANUVAS) operated on the bovine to remove the plastic which was ingested by the bovine over a period of two years probably while foraging for food.

Shalini Saha  
Chennai  
October 21, 2019 10:54:10 (October 21, 2019 22:42:00)



The cow was brought to the TANUVAS, Chennai by its owner after he noticed something was wrong with her. (Photo: India Today)

**A** team of veterinarians in Tamil Nadu have removed 52 kilograms of plastic from the stomach of a cow. The plastic was removed through a surgery which lasted for over five hours in Vepery, Chennai. The waste in the cow's stomach also included needles, coin, a screw and pins.

Surgeons from Tamil Nadu Veterinary and Animal Sciences University (TANUVAS) operated on the bovine to remove the plastic which was ingested by the bovine over a period of two years probably while foraging for food.

The cow was brought to the TANUVAS, Chennai by its owner after he noticed something was wrong with her. The animal was visibly in pain. It recently gave birth to a calf and had difficulties yielding milk. The animal also struggled to urinate and defecate, and frequently kicked its

### Pollution

# Elephant dies in Kerala after eating plastic: Who is to blame?

The dumping of plastic is putting the lives of wild animals at risk in and around the famous temple.

THIS Staff | Wednesday, February 14, 2018 - 18:00

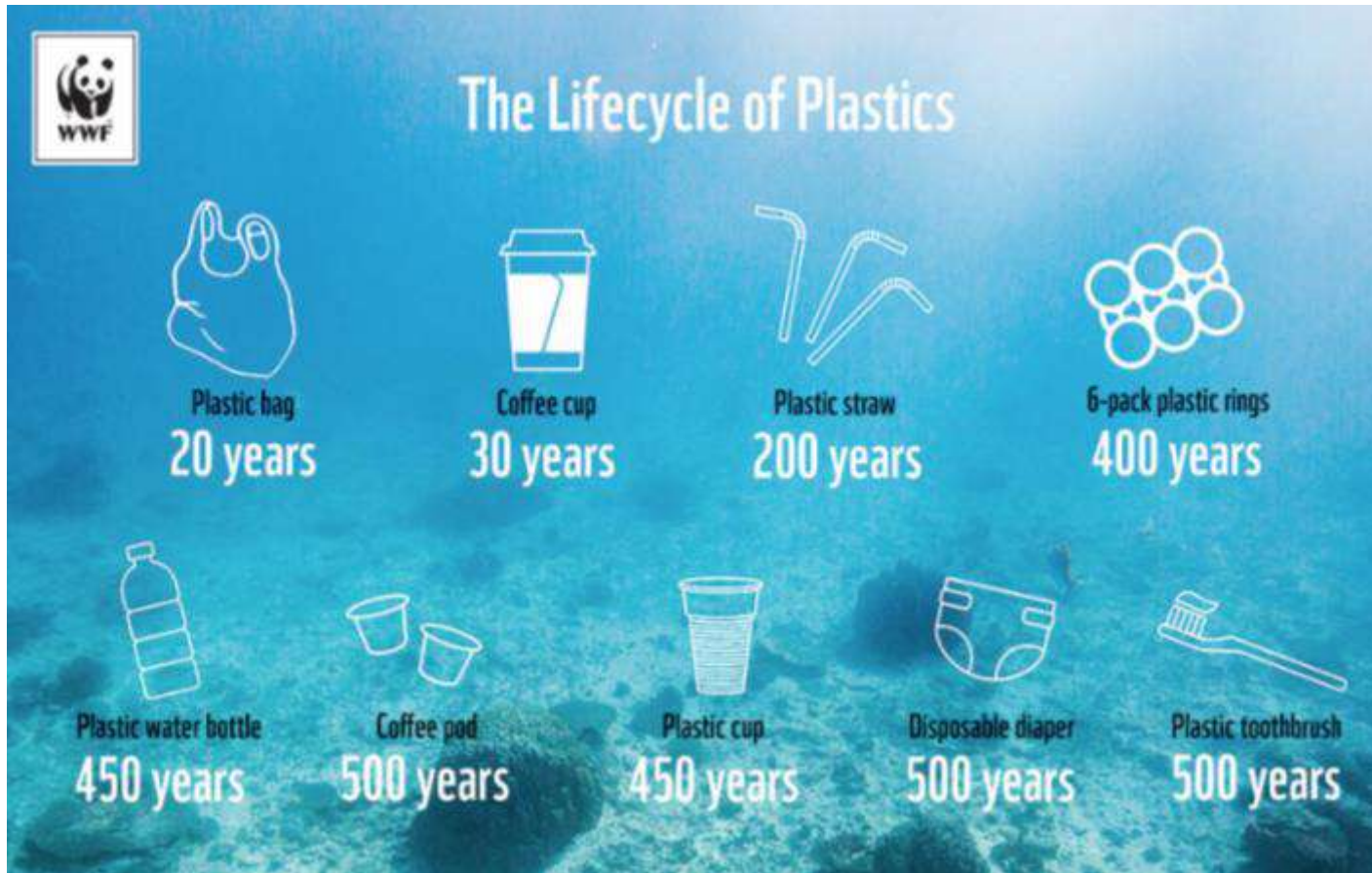
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### References

1. <https://swachhindia.ndtv.com/no-plastic-please-madhya-pradesh-cites-cow-deaths-as-reason-for-ban-6107>
2. <https://www.indiatoday.in/india/story/tamil-nadu-doctors-remove-52-kg-plastic-from-cow-stomach-1611643-2019-10-21>
3. <https://www.thenewsminute.com/article/elephant-dies-kerala-after-eating-plastic-who-blame-76467>





- Plastics gets degraded into small plastic fragments of dimensions  $\leq 5$  mm - defined as **"MICROPLASTICS"** **after many years.**

- These tiny plastics can be consumed by different marine biota including corals, planktons, marine invertebrates, fish and whales and are ultimately Bio-accumulated in higher animals and Humans

# Sources of Micro-Plastics in Soil



## Sources:

1. <https://doi.org/10.1016/j.envpol.2018.05.008>
2. <https://doi.org/10.1111/gcb.14020>
3. de Souza et. al., 2018. Impacts of micro plastics on the soil biophysical environment. *Environmental Science & Technology*

## Image sources:

1. <https://www.google.com/url?sa=i&source=images&cd=&ved=2ahUKEwjKuYus2-7mAhWE6XMBHUBkCs8QjRx6BAGBEAQ&url=https%3A%2F%2Fwww.naturesvalleytrust.co.za%2Fblog%2Fmicroplastic-small-pieces-causing-large-problems%2F&psig=AOvVaw2OazGKclglAdfnGLyBviu8&ust=157839111984184>
2. [https://www.google.com/url?sa=i&source=images&cd=&ved=2ahUKEwi5qu6bze7mAhWRLVAKHd2jDIQQjRx6BAGBEAQ&url=https%3A%2F%2Fstopmicrowaste.com%2Fen%2Fmicroplastic&psig=AOvVaw1XvProQC\\_wJBHTbp5aYpQQ&ust=1578387342521207](https://www.google.com/url?sa=i&source=images&cd=&ved=2ahUKEwi5qu6bze7mAhWRLVAKHd2jDIQQjRx6BAGBEAQ&url=https%3A%2F%2Fstopmicrowaste.com%2Fen%2Fmicroplastic&psig=AOvVaw1XvProQC_wJBHTbp5aYpQQ&ust=1578387342521207)

# Soil: Impacts of Micro-plastic Pollution

## Impacts on soil

- Disrupts the functional relationship between the microbial activity and aggregates not impacted by water
- Reduces Soil fertility

## Impacts on flora and fauna

- Transfer of pollutants to soil biota
- Plastic additives- e.g. colorants, plasticizers
- Toxics absorbed- e.g. Persistent Organic Pollutants (PoP), heavy metals
- Ingestion by micro fauna
- Negatively impact growth (e.g. shoot height, biomass) of plants and soil fauna

### Microplastics in the soil point to another potential ecosystem collapse

When these particles are eaten by earthworms, the results are not good.

DEREK BERES 17 October, 2019



- New Research From Anglia Ruskin University states that Microplastics in soil are causing earthworms to lose weight.
- Soil affected by micro plastics produces less crop yield due to less productive earthworms and lower pH levels.
- If this trend continues , our entire agricultural system could be comprised.

### Read more at:

- <https://www.botany.one/2019/03/microplastics-could-pose-a-threat-to-plants/>
- <https://www.forbes.com/sites/linhanhcat/2019/05/01/microplastic-s-changing-agricultural-crops/#720482ee46d2>

1. de Souza et. al., 2018. Impacts of micro plastics on the soil biophysical environment. *Environmental Science & Technology*
2. He et al., 2018. <https://doi.org/10.1016/j.trac.2018.10.006>
3. Wang, et al., 2019. Micro plastics as contaminants in the soil environment: A mini-review. *Science of The Total Environment*
4. <https://pubs.acs.org/doi/full/10.1021/acs.est.9b03304>

### Image source:

1. <https://www.downtoearth.org.in/news/agriculture/microplastics-in-soil-threatens-earthworms-growth-study-66708>



# We Know Plastic Is Harming Ecosystems

## What About Humans?



**Microplastics**

**Accumulation in Fishes**

**Accumulation in Humans**

# Humans May Be Consuming Around **50,000** Micro Plastic Particles A Year

estimates a study by University of Victoria, British Columbia

**EFFECTS OF PLASTIC**

Microplastics are very small pieces of plastic that pollute the environment. They are not a specific kind of, but rather any type of plastic fragment that is less than 5mm in length. They enter natural ecosystems from a variety of sources, including cosmetics, clothing, and industrial processes. Scientists still know little about the effects of microplastics once they enter human food chain

**ETHYLENE:** Not recognized as a significant human health threat

**ETHYLENE TEREPHTHALATE:** Poses significant human health threat

**VINYL CHLORIDE:** Could cause genetic changes in body

**PHthalATES:** Affects endocrine system

**BISPHENOL A:** Disturbs endocrine secretions and causes hormonal imbalance

**FLAME RETARDANTS:** Liver and kidney toxicity

**NONYLPHENOLS:** Disrupts functioning of endocrine system

**DEBRIS FROM SEA TO COASTS**

> The quantity of debris flowing into the coastal ecosystem was found to be considerably higher during the full moon and new moon period coinciding with spring tides

> It is estimated that during the pre-monsoon period, marine litter amounting up to 18kg per day enters the Arabian Sea through the mouth bar at Moothakunnam

**GHOST NETS**

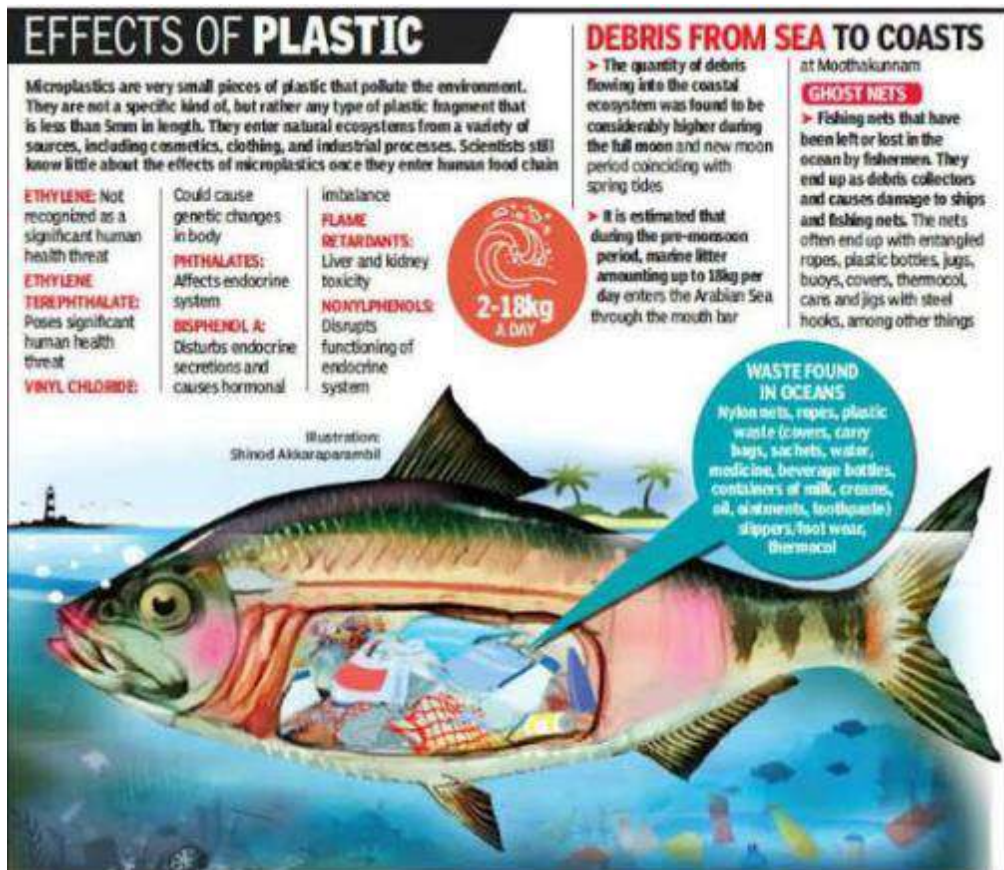
> Fishing nets that have been left or lost in the ocean by fishermen. They end up as debris collectors and causes damage to ships and fishing nets. The nets often end up with entangled ropes, plastic bottles, jugs, buoys, covers, thermocol, cans and jigs with steel hooks, among other things

**WASTE FOUND IN OCEANS**

Nylon nets, ropes, plastic waste (covers, carry bags, sachets, water medicine, beverage bottles, containers of milk, creams, oil, shampoos, toothpaste) slippers, foot wear, thermocol

2-18kg A DAY

Illustration: Shinod Akkaraparambil



<https://timesofindia.indiatimes.com/city/kochi/kerala-plastic-in-fish-a-cause-for-concern/articleshow/71948560.cms>

Cox et. al., 2019 Human consumption of micro plastics, Environmental Science and Technology <https://doi.org/10.1021/acs.est.9b01517>

# Impacts of Microplastics on Human Health

## Looking ahead: Hormone-altering chemicals threaten our health, finances and future <sup>1</sup>

Advances in science, legal action and public understanding are existential threats to today's chemical industry. Investors should pay attention.

### Most common additives in plastics

- BPA (Bisphenol A)
- Plasticizers
- Flame retardants

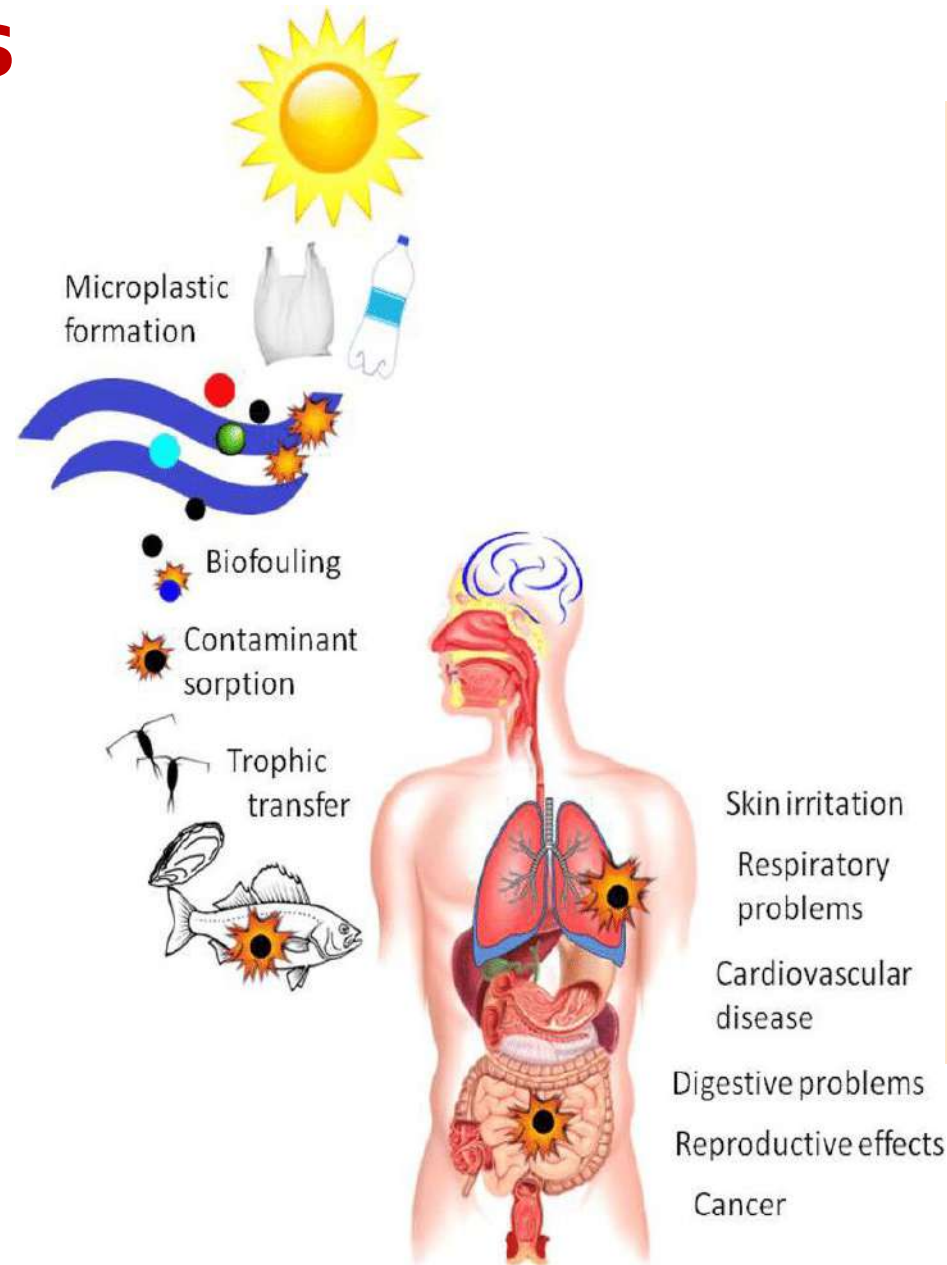
### How plastics and chemicals from plastics enter our bodies

- Contaminated seafood
- Micro plastics and chemicals from packaging
- Absorption through clothes
- Reference: <https://repurpose.global/5-ways-that-plastic-pollution-affects-human-health/>

Sources:

1. <https://www.ehn.org/endocrine-disrupting-chemicals-and-health-2641948290.html>

Print PDF Emi



### Links for further reading

- <https://ecologycenter.org/factsheets/adverse-health-effects-of-plastics/>
- <https://royalsocietypublishing.org/doi/full/10.1098/rstb.2009.0053>
- [https://researchonline.lshtm.ac.uk/id/eprint/4654368/1/Yates\\_et\\_al-2019-Campbell\\_Systematic\\_Reviews.pdf](https://researchonline.lshtm.ac.uk/id/eprint/4654368/1/Yates_et_al-2019-Campbell_Systematic_Reviews.pdf)
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3299092/>
- <https://repurpose.global/5-ways-that-plastic-pollution-affects-human-health/>



# **Policy Highlights**

# Evolution of Policies Governing Plastic Waste in India

Sr. No.	Notification /Rules/Act	Description	References
1	Plastic Waste Management (Amendment) Rules, 2018	<ul style="list-style-type: none"> <li>Phasing out of Multilayered Plastic which are "non-recyclable, non-energy recoverable, or have no alternate use</li> <li>A central registration system for the registration of the producer/importer/brand owner</li> </ul>	<a href="https://pib.gov.in/newsite/PrintRelease.aspx?relid=178707">https://pib.gov.in/newsite/PrintRelease.aspx?relid=178707</a>
2	Plastic Waste Management Rules, 2016	<ul style="list-style-type: none"> <li>Items that should <b>not be less than 50 microns</b> thickness: Carry Bags made of virgin and recycled material, Plastic Sheet, Multilayered packaging</li> <li>Plastic waste which can be recycled, shall be channelized to registered plastic waste recyclers</li> </ul>	<a href="http://www.mpcb.gov.in/sites/default/files/plastic-waste/rules/Plastic_Waste_Management_2016_english.pdf">http://www.mpcb.gov.in/sites/default/files/plastic-waste/rules/Plastic_Waste_Management_2016_english.pdf</a>
3	Draft rules- 'the Plastic Waste Management, Rules, 2015'	<ul style="list-style-type: none"> <li>Draft rules published and made available to public inviting objections and suggestions from all persons likely to be affected</li> </ul>	Published vide number G.S.R. 423(E), dated the 25th May, 2015 in the Gazette of India
4	Plastic Waste (Management and Handling) Rules, 2011	<ul style="list-style-type: none"> <li><b>Ban on</b> use of plastic materials in sachets for storing ,packing or selling gutkha, tobacco and pan masala</li> <li>Food stuffs <b>not to be</b> packed in recycled plastics or compostable plastics</li> <li><b>Color of Recycled carry bags should conform with the Bureau of Indian Standards (BIS), and thickness not be less than 40 microns</b></li> <li>Municipal authority to engage agencies or groups working in waste management including waste pickers and set up, operate and coordinate the waste management system (safe collection, storage, segregation, transportation, processing and disposal of plastic waste)</li> </ul>	<a href="https://pib.gov.in/newsite/PrintRelease.aspx?relid=69649">https://pib.gov.in/newsite/PrintRelease.aspx?relid=69649</a>
5	The Plastics Manufacture, Sale and Usage Rules, 1999	<ul style="list-style-type: none"> <li><b>Minimum thickness of carry bags</b> made of virgin plastics or recycled plastics: <b>not be less than 20 microns</b></li> <li><b>Recycling of plastics</b> strictly in accordance with the '<b>Guidelines for Recycling of Plastics, 1998</b>'</li> </ul>	<a href="http://www.ppcb.gov.in/Attachments/Plastic%20Waste/2nd.pdf">http://www.ppcb.gov.in/Attachments/Plastic%20Waste/2nd.pdf</a>
6	Bureau of Indian Standard Specification: IS 14534: 1998 The Guidelines for Recycling of Plastics, 1998	<ul style="list-style-type: none"> <li>Guidelines for Recycling of Plastics</li> </ul>	

**Plastic Pollution is Global Concern.**

**There are actions taken by the Governments,  
Industries, Civil Society Organizations and Citizens  
to Manage Plastic Waste.**

**But .....**

**There is still a long way to go before we reach the  
GOLDEN MEAN.**





# **Rethink Plastic Campaign**

# “Rethink Plastic”- Campaign



United Nations Environment Programme (UNEP) is implementing the project:

**Promotion of countermeasures against marine plastic litter in Southeast Asia and India**  
in

Mumbai, Agra, Prayagraj (Allahabad), Haridwar

TERI is the outreach partner in **MUMBAI**

**TERI has initiated campaign –RETHINK PLASTIC under this project to counter plastic litter**

## Partner Organizations



United Nation  
Environment  
Programme



University of Mumbai



National Productivity  
Council (NPC)



Veermata Jijabai  
Technological  
Institute (VJTI)

## Other Associates



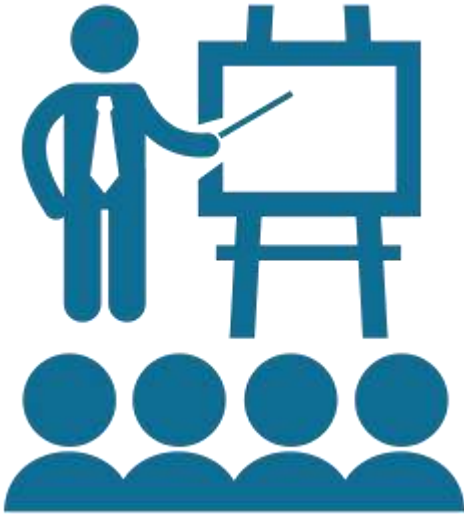
Thane Belapur Industries Association



**IndusInd Bank**



# Be a Change Agent



## Be the Motivator

Participate in Training of Trainers (ToT) and train/motivate others to use plastic responsibly and follow the 7Rs (Retain, Refuse, Recycle, Reuse, Reduce, Rethink)



## Commit Yourself

Take a pledge and fill the perception survey sheet and spread the word



## Take Action

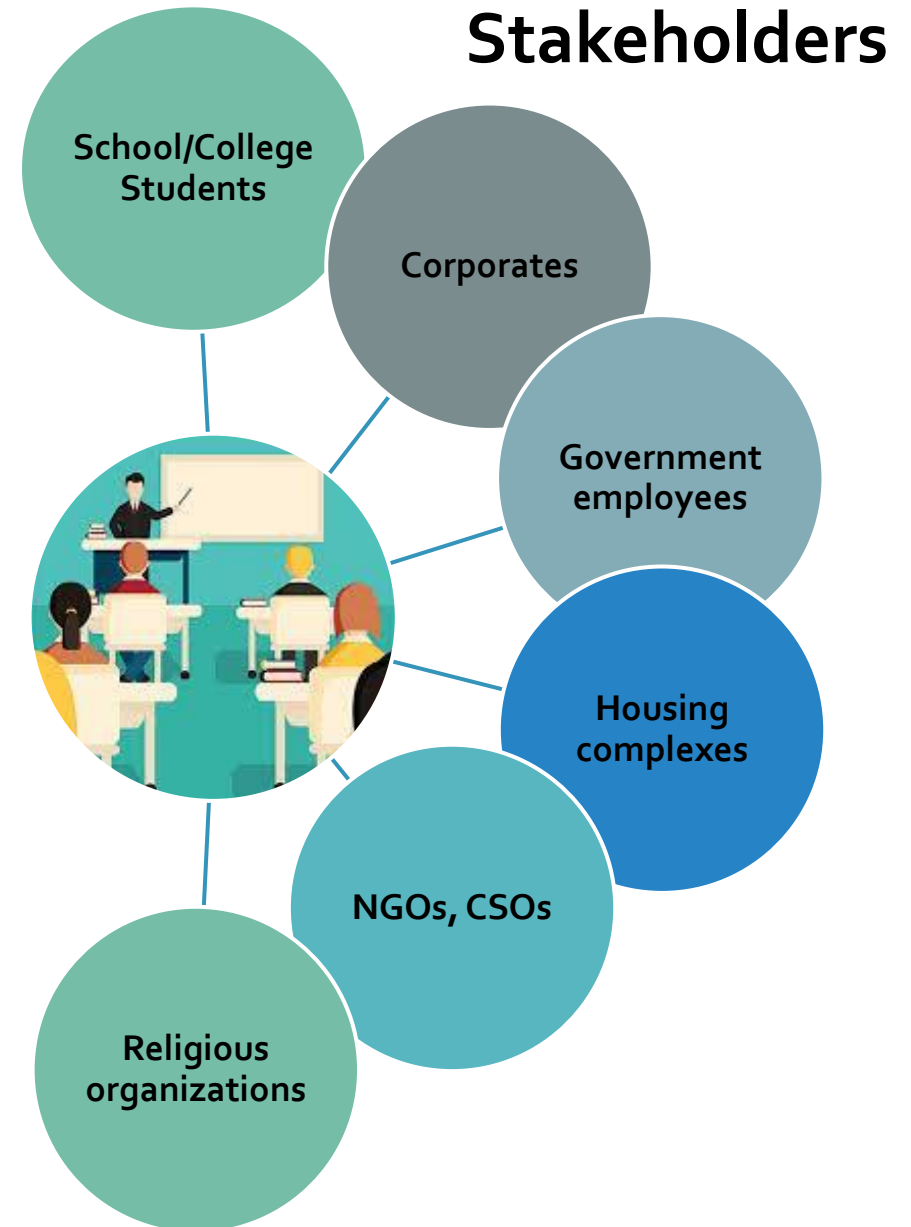
Raise native saplings in waste plastic bottles and contribute in carbon offsetting



# Training of Trainers (ToT)

## Why ToT?

- Raising awareness
- Creating trained workforce
- Motivating and sensitizing stakeholders
- Capacity building
- Promoting the concept of circularity of plastic



## Treasure Hunt (Waste bottles)



Along roadsides



Cleanup activities



Along water bodies



Along railway tracks and other leakage points



## Treasure Hunt (Native Saplings)



Anywhere around- your campus, roadside, footpath, gardens, building walls.....

**You Just Need To Find The Treasure**

# Reuse and Recycle



Non-recyclable plastic bottle  
Collected from Treasure Hunt - Plastic



Upper cut portion  
Collected and sent to scrap dealers/ recyclers



Lower portion -  
Use for growing saplings  
Make 3-4 holes at the bottom of the bottle

Medium  
Coffee waste,  
Municipal Compost  
and Soil



Fill the lower portion with  
Soil : Compost (2:1)

Seedlings/  
saplings  
(Collected from during Treasure Hunt)



Afforestation



Around **630** mature trees are required to offset Carbon footprint towards production of **1 lakh** PET bottles



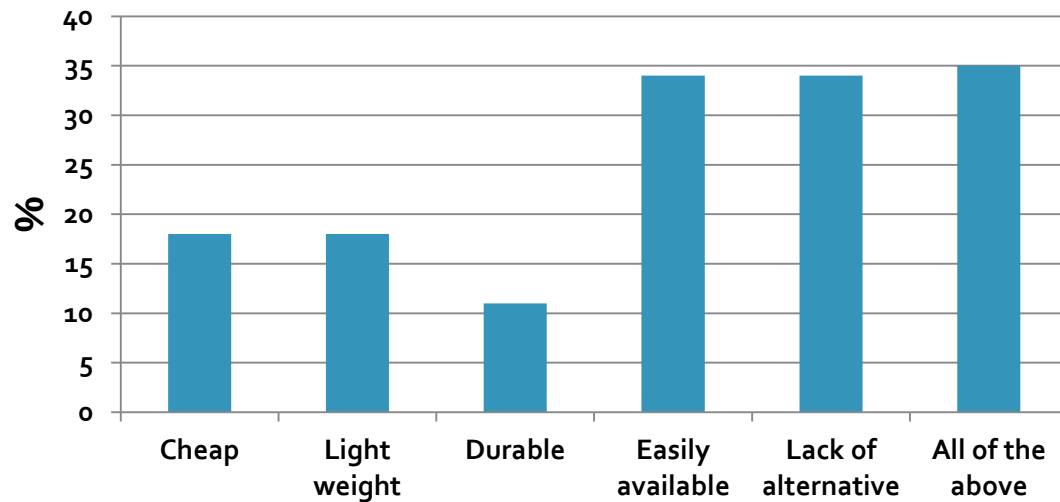
# Perception Survey



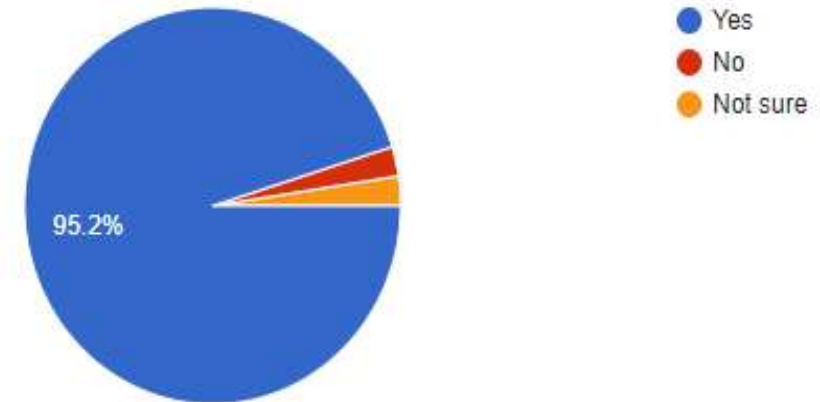
## Key Questions Asked and Summary of Responses\*

1. Why do you prefer to use the plastic product(s)?

### Reasons to Prefer Plastic Products



2. Do you think plastic waste is a problem for health and environment?



\*Based on Responses received till 8<sup>th</sup> January 2020

Google Form Link  <https://drive.google.com/open?id=1A-VksO-GT6tZGDOF2cBr9oGrTp83wohCPfyAiWyNDbM>

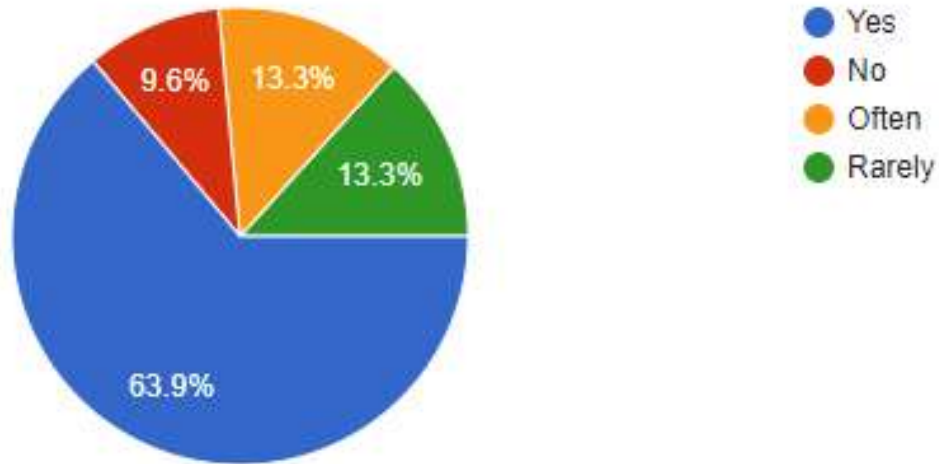
Image Source : [https://www.google.com/search?q=survey+icon&tbm=isch&ved=2ahUKEwid3N\\_zNzIAhUr5IUKHeorCiMQ2-cCegQIABAA&oeq=survey+&gs\\_l=img.1.0.0i67110.3505.5567..7142...0.0..0.405.2709.3-5j2.....0....1..gws-wiz-img.....0..ojoia31.3URWheZirts&ei=EWrGXdzPGKvllwTq16iYAg&bih=625&biw=1349&rlz=1C1GIGM\\_enIN671IN671&hl=en-US#imgrc=MtUGYCOT79P-dM&imgdii=RKfD5egkR6cpwM](https://www.google.com/search?q=survey+icon&tbm=isch&ved=2ahUKEwid3N_zNzIAhUr5IUKHeorCiMQ2-cCegQIABAA&oeq=survey+&gs_l=img.1.0.0i67110.3505.5567..7142...0.0..0.405.2709.3-5j2.....0....1..gws-wiz-img.....0..ojoia31.3URWheZirts&ei=EWrGXdzPGKvllwTq16iYAg&bih=625&biw=1349&rlz=1C1GIGM_enIN671IN671&hl=en-US#imgrc=MtUGYCOT79P-dM&imgdii=RKfD5egkR6cpwM)

# Perception Survey

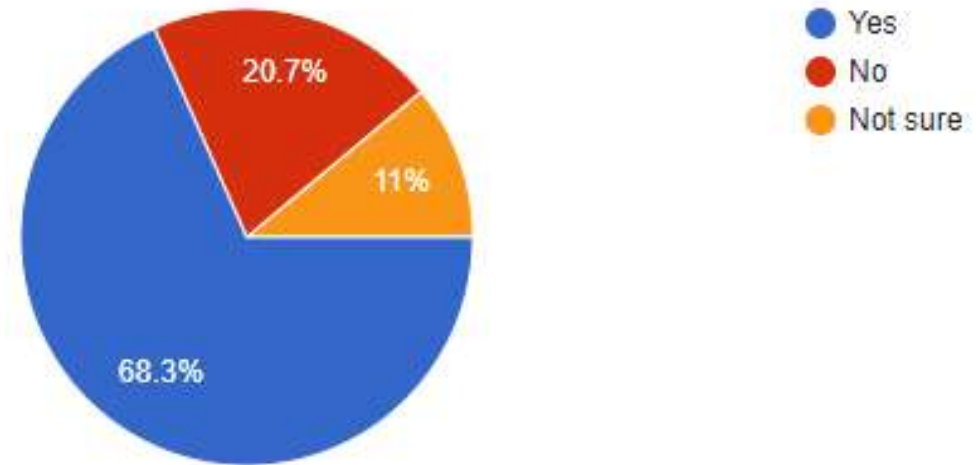


## Key Questions Asked and Summary of Responses\*

3. Do you reuse plastic carry bags?



4. Are you aware about Micro plastics and their impacts?



\*Based on Responses received till 8<sup>th</sup> January 2020

Google Form Link <https://drive.google.com/open?id=1A-VksO-GT6tZGDOF2cBr9oGrTp83wohCPfyAiWyNDbM>

Image Source : [https://www.google.com/search?q=survey+icon&tbm=isch&ved=2ahUKEwid3N\\_zNzIAhUr5IUKHeorCiMQ2-cCegQIABAA&oeq=survey+&gs\\_l=img.1.0.0i6710.3505.5567..7142...0.0..0.405.2709.3-5j2.....0....1..gws-wiz-img.....0..ojoia31.3URWheZirts&ei=EWrGXdzPGKvllwTq16iYAg&bih=625&biw=1349&rlz=1C1GIGM\\_enIN671IN671&hl=en-US#imgsrc=MtUGYCQT79P-dM&imgdii=RKfD5egkR6cpwM](https://www.google.com/search?q=survey+icon&tbm=isch&ved=2ahUKEwid3N_zNzIAhUr5IUKHeorCiMQ2-cCegQIABAA&oeq=survey+&gs_l=img.1.0.0i6710.3505.5567..7142...0.0..0.405.2709.3-5j2.....0....1..gws-wiz-img.....0..ojoia31.3URWheZirts&ei=EWrGXdzPGKvllwTq16iYAg&bih=625&biw=1349&rlz=1C1GIGM_enIN671IN671&hl=en-US#imgsrc=MtUGYCQT79P-dM&imgdii=RKfD5egkR6cpwM)

# Take the Pledge

The earth has the plastic problem to solve,  
To help her, today I resolve  
To do my bit, small or large,  
To keep plastic litter on land and oceans far  
I pledge to practice the 8 R's-  
Rethink, Refuse, Reduce, Recycle, Repair,  
Re-gift, Recover, and Reuse  
And stop using plastic meant for single use

To take the pledge visit

<https://forms.gle/SasMWU33UGFVrAiM7>

## The Pledge

As a good citizen of my country and a responsible resident of the planet Earth, I pledge to **Refuse, Reduce, Recycle, Reuse, Repair, Re-gift, Recover** and **"Rethink plastic"**, to the best of my efforts by doing the following:

- I shall say "NO" to single use plastic items (Straw, carry bags, cutlery etc.)
- I shall always carry a cloth bag, reusable cutlery, straw and cup.
- NOT purchase fruits and vegetables wrapped in plastic films
- Sensitize peers, friends and family about minimizing single use plastic
- Sort my waste for recycling and disposal
- Ask restaurants NOT to send plastic cutlery when ordering food online
- Purchase usually what can be either recycled, reused, refilled or repaired
- NOT accept gifts/ bouquets wrapped in plastics
- Avoid sachets as much as possible



# **Appeal for your Contribution**



# Join the 'Rethink Plastic' Campaign Through These Simple Ways

Take the *Perception survey* on  
'Plastic Use and Management' at

<https://drive.google.com/open?id=1A-VksO-GT6tZGDOF2cBr9oGrTp83wohCPfyAiWyNDbM>

Take a Pledge against Single use Plastics at  
<https://forms.gle/ct7Ctd9GSP3k9c1n7>

OR

By downloading the Rethink Plastic App  
(Android users) using the link or QR code:



<https://play.google.com/store/apps/details?id=com.teri.RethinkPlasticApp>

To Become a Trainer

OR

Contribute Saplings of  
Native Trees/Waste PET  
Bottles

Contact

022-27580021

[m.asodekar@teri.res.in](mailto:m.asodekar@teri.res.in)

For More Details Visit <https://www.teriin.org/project/rethink-plastic>



# THANK YOU

**Join TERI and UNEP in our quest and:**

- **Take action against negligent use of plastic**
- **Stop using single-use plastic**
- **Be aware of the problem**

**Get Involved:**  
Become a volunteer today

**Become a trainer:**  
Spread your knowledge to others

**Learn more:**  
Contact us to know more

CONTACT DETAILS:  
022-27580021  
masodekar@teri.res.in



<https://www.teriin.org/project/rethink-plastic-unep-teri-joint-initiative-mumbai-region>