“Rethink Plastic”

UN Environment Programme

Counter MEASURE FOR PLASTIC FREE RIVERS

TERI

RETURN PLASTIC
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Introduction to Plastic
But Let The Pollution be Stoppable

..Plastic Is Inevitable
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.

* [https://www.slideshare.net/jeh_neh/intro-to-plastic](https://www.slideshare.net/jeh_neh/intro-to-plastic)
Emissions from Plastic

Potential Risks From The Emissions

- 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

- 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/
5 QUICK FACTS About Plastic

#1 Manufacturing of 1 Kg of PET Plastic Bottle Emits 3.12 Kg CO\textsubscript{2} e

<table>
<thead>
<tr>
<th>Raw Materials</th>
<th>PET</th>
<th>Bottle</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.33 Kg CO\textsubscript{2} / kg</td>
<td>0.79 Kg CO\textsubscript{2} / kg</td>
<td></td>
</tr>
</tbody>
</table>

Total CO\textsubscript{2} Emission = 3.12 kg CO\textsubscript{2} e / kg

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

#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

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

Abbreviations:
CO\textsubscript{2} e – Cabondioxide equivalent
PET – Polyethylene Terephthalate

References:
2. https://www.unenvironment.org/interactive/bea*t-plastic-pollution/
5. https://www.earthday.org/factsheet-how-much-disposable-plastic-we-use/

Image Sources:
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.unenvironment.org/interactive/beat-plastic-pollution/](https://www.unenvironment.org/interactive/beat-plastic-pollution/)
### India's Plastic Waste Problem

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

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

<table>
<thead>
<tr>
<th>City</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kolkata</td>
<td>11.6%</td>
</tr>
<tr>
<td>Delhi</td>
<td>10.14%</td>
</tr>
<tr>
<td>Chennai</td>
<td>9.54%</td>
</tr>
<tr>
<td>Mumbai</td>
<td>6.28%</td>
</tr>
</tbody>
</table>

**Abbreviations**

- CPCB: Central Pollution Control Board

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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.

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.”

“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 impact on coastal areas.


Plastic Pollution making Head Lines in Mumbai
Examples of Leakage points of Plastic Pollution

- Rivers
- Land
- Nallahs
- Mangroves
- Sea/ Beach

Plastic Persists In The Environment For 450 Years.

Impacts of Plastic Pollution
• ~ 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.

2. https://www.thenational.ae/image/policy-1_81894_555299787205337274.jpg?c=1&w=1200&h=1600&bih=757&biw=1600&q=marine%20animals%20and%20plastics&ved=0ahUKEwjShdaZ7pjmAhXBSbhUIHc53gAMQAhwDA...&bav=on&bav=s6v&t=8
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.

2. **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.

3. **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.

Source:


Links for further reading:

- https://www.biologicaldiversity.org/campaigns/ocean_plastics/
- https://www.iucn.org/resources/issues-briefs/marine-plastics

Must watch videos:

- The Story of Stuff
  https://youtu.be/9GorqroiqqM
- It's a Plastic World
  https://vimeo.com/100694882
- Albatross
  https://vimeo.com/218502282
- All the Way to the Ocean
  https://youtu.be/lWRrpFkJDo8
Impacts on Birds

Nearly Every Seabird on Earth is Eating Plastic

Links for further reading:

Must watch videos
• Report: How plastic in the Ocean impacts your health https://www.youtube.com/watch?v=lQOaiO5yUE
• HACK: How our plastic obsession is killing sea birds https://www.youtube.com/watch?v=Mh-jetDYqM

Sources:
1. https://www.aquarium.co.za/cache/ce_img_cache/local/24be6a810f23b3a37/Entangled_Animals_(3)_750_448_70.jpg
2. https://img-msn-com.akamaized.net/tenant/amp/entityid/AACygHD.img?h=351&w=624&m=6&q=60&o=f&l=f
4. https://www.aquarium.co.za/cache/ce_img_cache/local/24be6a810f23b3a37/Entangled_Animals_(5)_750_493_70.jpg
5. https://www.aquarium.co.za/cache/ce_img_cache/local/24be6a810f23b3a37/33275735831_108b65c091_o_750_500_70.jpg

Nearly Every Seabird on Earth is Eating Plastic
We can differentiate...Animals can not...

Image source
https://www.hindustantimes.com/delhi/plastic-pollution-is-killing-wildlife-in-south-delhi/story-GKtCe4UW8zZk1z4jILYrdM.html
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.

References
• Plastics gets degraded into small plastic fragments of dimensions ≤ 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.


https://journals.openedition.org/factsreports/5257
Sources of Micro-Plastics in Soil

Disposal of Municipal Wastewater Effluent

Sewage Sludge

Waste In Landfills

Plastic Wastes From Agricultural Activities

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:
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

Read more at:
- https://www.botany.one/2019/03/microplastics-could-cause-a-threat-to-plants/

Image source:

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.

References:
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/10.1021/acs.est.8b03304
4. https://pubs.acs.org/doi/full/10.1021/acs.est.9b03304

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

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


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

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/

Links for further reading
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3299092/
- https://repurpose.global/5-ways-that-plastic-pollution-affects-human-health/

Sources:
Policy Highlights
## Evolution of Policies Governing Plastic Waste in India

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Notification /Rules/Act</th>
<th>Description</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plastic Waste Management (Amendment) Rules, 2018</td>
<td>• Phasing out of Multilayered Plastic which are &quot;non-recyclable, non-energy recoverable, or have no alternate use • A central registration system for the registration of the producer/importer/brand owner</td>
<td><a href="https://pib.gov.in/newsite/PrintRelease.aspx?relid=178707">https://pib.gov.in/newsite/PrintRelease.aspx?relid=178707</a></td>
</tr>
<tr>
<td>2</td>
<td>Plastic Waste Management Rules, 2016</td>
<td>• Items that should <strong>not be less than 50 microns</strong> thickness: Carry Bags made of virgin and recycled material, Plastic Sheet, Multilayered packaging • Plastic waste which can be recycled, shall be channelized to registered plastic waste recyclers</td>
<td><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></td>
</tr>
<tr>
<td>3</td>
<td>Draft rules- 'the Plastic Waste Management, Rules, 2015'</td>
<td>• Draft rules published and made available to public inviting objections and suggestions from all persons likely to be affected</td>
<td>Published vide number G.S.R. 423(E), dated the 25th May, 2015 in the Gazette of India</td>
</tr>
<tr>
<td>4</td>
<td>Plastic Waste (Management and Handling) Rules, 2011</td>
<td>• <strong>Ban on</strong> use of plastic materials in sachets for storing, packing or selling gutkha, tobacco and pan masala • Food stuffs <strong>not to be</strong> packed in recycled plastics or compostable plastics • <strong>Color of Recycled carry bags should conform with the Bureau of Indian Standards (BIS), and thickness not be less than 40 microns</strong> • 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)</td>
<td><a href="https://pib.gov.in/newsite/PrintRelease.aspx?relid=69649">https://pib.gov.in/newsite/PrintRelease.aspx?relid=69649</a></td>
</tr>
<tr>
<td>5</td>
<td>The Plastics Manufacture, Sale and Usage Rules Rules, 1999</td>
<td>• Minimum thickness of carry bags made of virgin plastics or recycled plastics: <strong>not be less than 20 microns</strong> • Recycling of plastics strictly in accordance with the 'Guidelines for Recycling of Plastics, 1998'</td>
<td><a href="http://www.ppcb.gov.in/Attachments/Plastic%20Waste/2nd.pdf">http://www.ppcb.gov.in/Attachments/Plastic%20Waste/2nd.pdf</a></td>
</tr>
</tbody>
</table>
Plastic Pollution is a 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
- Seag Mitra
- 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

You Just Need To Find The Treasure

Treasure Hunt (Native Saplings)

- Anywhere around: your campus, roadside, footpath, gardens, building walls.....
Reuse and Recycle

Non-recyclable plastic bottle
Collected from Treasure Hunt - Plastic

Upper cut portion
Collected and sent to scrap dealers/recyclers

Medium
Coffee waste, Municipal Compost and Soil

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

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

Seedlings/saplings
(Collected from during Treasure Hunt)

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

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

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

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*Based on Responses received till 8th January 2020

Google Form Link: [https://drive.google.com/open?id=1AVksO-GT6tZGD0F2cBr90GrTp83wohCPfyAiWyNDbM](https://drive.google.com/open?id=1AVksO-GT6tZGD0F2cBr90GrTp83wohCPfyAiWyNDbM)
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 8th January 2020

Google Form Link: [https://drive.google.com/open?id=1A-VksO-GT6tZGDOf2cBr90GrTp83wohCPfyAiWyNDbM](https://drive.google.com/open?id=1A-VksO-GT6tZGDOf2cBr90GrTp83wohCPfyAiWyNDbM)

Image Source: [https://www.google.com/search?q=survey+icon&tbm=isch&ved=0ahUKEwid3N__zNzlAhUr5IUKHeorCiMQ2cCegQIABAA&oq=survey+&gs_l=img.1.0.0i67l10.3505.5567..7142...0.0..0.405.2709.35j2......0....1..gws-wiz.....0..0j0i131.3URWheZirts&ei=EWrGXd2PGKvIlwTq16iYAg&bih=625&biw=1349&rlz=1C1GIGM_enIN671IN671&hl=en-US#imgrc=MtUGYCQT79P-dM&imgdii=RKfD5egkR6cpwM](https://www.google.com/search?q=survey+icon&tbm=isch&ved=0ahUKEwid3N__zNzlAhUr5IUKHeorCiMQ2cCegQIABAA&oq=survey+&gs_l=img.1.0.0i67l10.3505.5567..7142...0.0..0.405.2709.35j2......0....1..gws-wiz.....0..0j0i131.3URWheZirts&ei=EWrGXd2PGKvIlwTq16iYAg&bih=625&biw=1349&rlz=1C1GIGM_enIN671IN671&hl=en-US#imgrc=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:

**To Become a Trainer**

**Contribute Saplings of Native Trees/Waste PET Bottles**

Contact
022-27580021
m.asodekar@teri.res.in

For More Details Visit https://www.teriin.org/project/rethink-plastic
THANK YOU

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