My Clean City
by HCLFoundation

Lofu and Kofu's

WONDERS IN WASTE

A Book on Solid Waste Management

About 'My Clean City'

HCLFoundation delivers the corporate social responsibility agenda of **HCLTech** in India through its flagship programmes and special initiatives. Under the aegis of its flagship program **My Clean City**, HCLFoundation embarked on an ambitious journey in 2018 to improve and strengthen the process of solid waste management in urban spaces.

My Clean City aims to transform the cities into litter and waste-free regions, covering all Residential Welfare Associations, Urban Villages, and Markets. The major focus areas of the program are capacity building of relevant stakeholders, awareness creation, intensive behaviour change and deployment of technological solutions. The program is currently active in Noida and Greater Noida cities.

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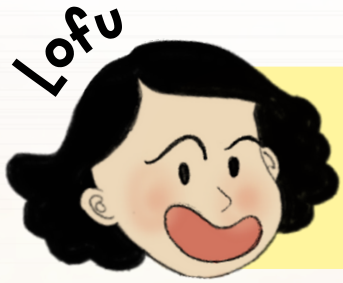
Meet Lofu and Kofu

Lofu and Kofu were the best of friends. They lived in a fast-growing, busy urban town, full of tall buildings, parks, and big malls. However, Lofu and Kofu had a problem—they were quite lazy and didn't think much about the environment. They loved playing video games, eating snacks, and often left their wrappers and cans lying around without a second thought. Their room was a mess, with heaps of paper, plastic bottles, and all sorts of waste scattered about.

One sunny afternoon, Lofu and Kofu were playing around in their society recreation park when they heard a loud noise. They looked up to see their teacher, Mr. Guru, struggling with a huge pile of trash.

Mr. Guru, who cared deeply for the environment, was trying to dispose off the waste lying around. Seeing him struggle made Lofu and Kofu think about the waste they produced every day.



"Why do we have so much trash?"

"I think it's because we use so many things every day and we throw away most of it after using it just once."

Mr. Guru overheard them and walked over. "Do you guys know what happens to our waste after we throw it away?", he asked.

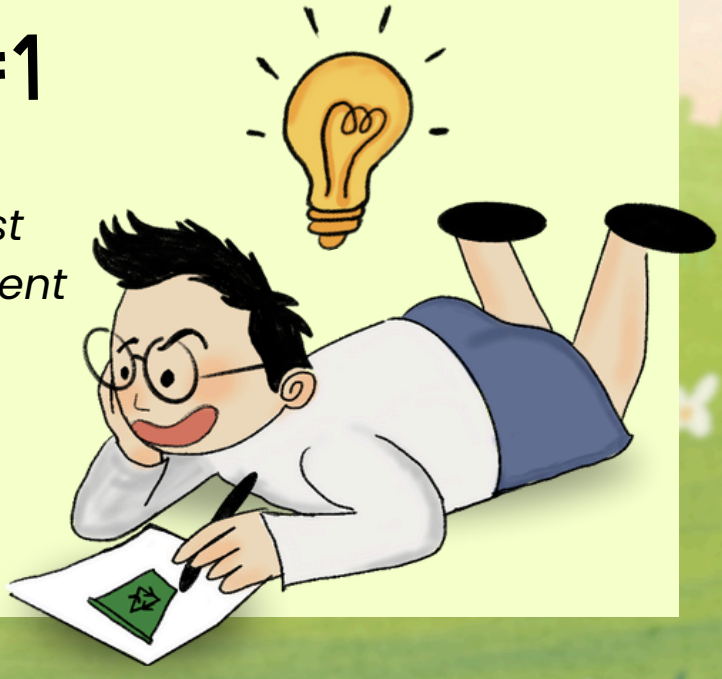
Lofu and Kofu shook their heads. They had never really thought about it before. Mr. Guru smiled kindly and said, "Well, how about you join me on a little adventure to learn more about solid waste management?"

Excited and curious, Lofu and Kofu agreed. This marked the beginning of their journey towards becoming environmentally conscious and responsible citizens. Throughout this book, we will join Lofu and Kofu in their journey as they learn about waste management, why it's important, and how we can make a difference.

Did you know? #1

Athens in the ancient Greece implemented first known waste management laws in 320 BCE.

Do you know which law governs waste management in India?



Source: Cambridge.org

Activity 1

Draw your Waste Champion

Let us know how you picture your waste champion and share your drawing with us by scanning the QR code.

A **waste champion can be anyone who actively takes care of the waste in our communities. They may raise awareness about the impact of waste, advocate for reducing it or even do as little as throwing trash into proper dustbins. Anyone can be a waste champion, be it your house help, a friend of yours, your parents or even yourself.*

Glossary

Waste, trash, or **garbage** are all names used interchangeably to denote the waste.

Solid waste, which may or may not be physically solid, includes all abandoned objects generated by residential, commercial, and industrial activity. E.g., paper, plastic, cardboard, diapers, scrap metal, fruit peels, glass, eggshells, sanitary pads, etc.

Solid waste management is the collecting, treating, and disposing of solid material that is discarded because it has served its purpose or is no longer useful.

What we will learn

1. Understanding Solid Waste

Lofu and Kofu were in their school's science class when their teacher, Mr. Guru, walked in with a big bag.

The students were curious. "What do you think is inside this bag?", Mr. Guru asked.

Lofu guessed, "Maybe some science experiments?"

Kofu thought it might be a surprise gift.

Mr. Guru smiled and said, "Lofu, Kofu, don't you remember about our little adventure we were going to have?"

The class was puzzled. "What adventure, Mr. Guru?", a student asked. Mr. Guru explained, "Today, we are going to learn about solid waste and why it's important to manage it properly."

So, the journey begins

Mr. Guru began, "Solid waste is any discarded or abandoned material. It can be solid, liquid, semi-solid, or containerised gaseous material. It's what we commonly refer to as 'trash' or 'garbage'. But did you know that there are different types of solid waste?", the students shook their heads.

Types of solid waste

Wet Waste: It is also known as biodegradable or organic waste. It primarily consists of materials that decompose naturally over time. This type of waste is typically generated from daily household activities, especially those related to cooking and gardening.

Dry Waste: It refers to material that is non-biodegradable and are generally recyclable. If segregated properly these may be reused or repurposed.

Domestic Hazardous Waste: It refers to items that can be dangerous to human health or the environment, if not handled properly. These are often chemicals, medical waste, sanitary waste, or materials that need special disposal methods due to their potential risks.

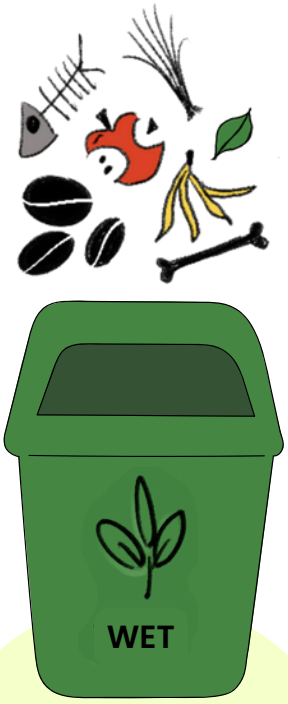
Did you know? #2

According to the Ministry of Environment, Forest and Climate Change, India currently generates 62 million tons of waste (both recyclable and non–recyclable) every year.

Source: PIB

Let us learn to segregate!

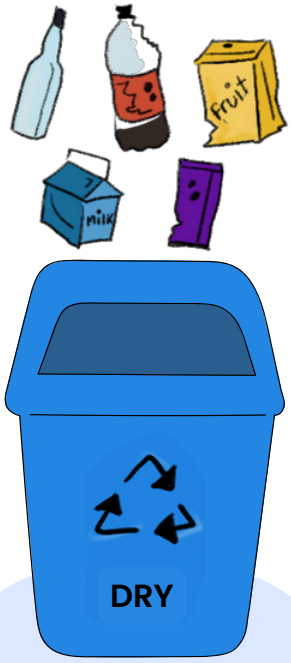
Mr. Guru asked the class to think about the waste they produce every day. "Can you name some items we throw away at home?" Lofu raised his hand, "Banana peels and apple cores." Kofu added, "Plastic wrappers and old toys." Mr. Guru nodded, "Great examples". "Also remember, green waste bin is for wet waste, blue for dry waste and red waste bin for domestic hazardous waste.", Mr. Guru added.



KITCHEN WASTE:
Vegetables, Fruit Peels, Rotten Vegetables and Fruits, Leftover Food, Eggshells, Rotten Eggs, Meat, Fish Bones, Tea Bags, Coffee Grinds, Coconut Shells, Leaf Plates

GARDEN WASTE:
Fallen Leaves, Twigs, Flowers, Garlands, Weeds

OTHERS:
Nails

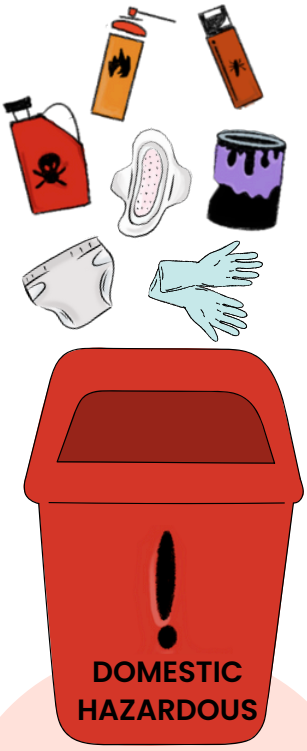


PLASTICS:
Plastic Bottles, Covers, Cups, Boxes/Wrappers of Chips/Chocolates/Toffees, Milk Packets, Curd Packets, Used Pens

PAPER:
Newspaper, Magazine, Cardboard Cartons, Pizza Boxes, Used Paper, Stationery, Tetra Pak Cartons

METAL:
Metal Cans, Foil Containers, Aluminum Foil

OTHERS:
Rubber, Thermocol, Wooden Chips, Jars, Steel Plates

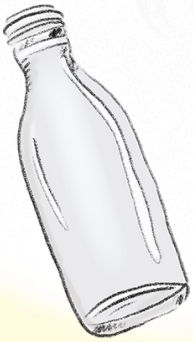


MEDICAL WASTE:
Bandages, Syringes, Injection Needles, Expired Medicine, Razors, Blades

SANITARY WASTE:
Sanitary Napkins, Diapers

OTHERS:
Broken Glass, Pesticides, Insecticides, Cleaning Agents, Items Containing Mercury, Construction Materials, Paints, Cement Powder, Expired Cosmetics

How long before it's gone?

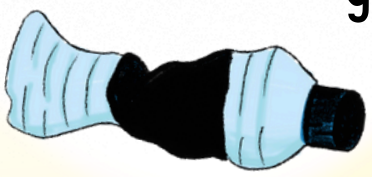


Glass Bottle

1,000,000 YEARS

Plastic Bottle

450 YEARS



Plastic Bag

10-1000 YEARS

Plastic Wrapper

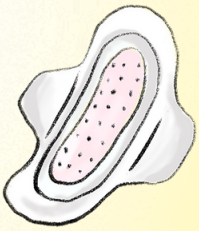
80 YEARS

Aluminum Can

80-200 YEARS

Sanitary Waste

450-700 YEARS



Kitchen and Garden Waste

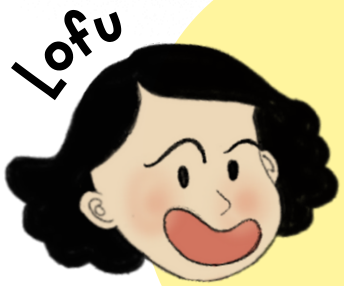
2-5 WEEKS

Paper

4-6 WEEKS

Reflection with Lofu & Kofu

At the end of the lesson, Lofu and Kofu felt more aware of the waste they produced.



"I had no idea that waste could last so long on our planet! Shockingly, what we throw away today might be here for centuries."

"Yes, it's surprising! I always thought waste disappeared once we tossed it, but learning these facts today opened my eyes."

Kofu, reflecting on what he recently learned, said, "Everything we throw away has a journey. We need to understand solid waste to manage it responsibly."

As they walked home, Lofu and Kofu discussed all the waste they generate in their everyday lives. They wondered which of those wastes would be considered wet, dry, or hazardous. They knew they could make a difference just by knowing solid waste better.

Test your knowledge

Submit your responses using the QR code on the next page.

1. Tick the correct answer

(i) Which is a type of wet waste?

(a) Plastic bags (b) Food scraps (c) Metal cans

(ii) Which type of waste can be harmful to health?

(a) Wet waste (b) Dry waste (c) Domestic hazardous waste

(iii) Which item decomposes the fastest?

(a) Glass bottle (b) Paper (c) Plastic bottle

(iv) What is an example of domestic hazardous waste?

(a) Banana peel (b) Medical waste (c) Metal can

2. Match the following

(i) Wet waste

(ii) Dry waste

(iii) Hazardous waste

(a) 

Plastic bottles

(b) 

Used sanitary pad

(c) 

Food scraps

Activity 2

Sort out the waste

Instructions:

- *Match the following waste to their respective bins.*
- *After matching, click a picture of the page and submit it through the QR code.*

2. The Journey of Waste and its Impact

Lofu and Kofu had been observant and paying more attention to the type of waste they see around them after their eye-opening chat with Mr. Guru. They started to wonder what happens to the waste once it leaves their home. One day, they followed the garbage truck down the street around their locality, curious to see where it would go. However, as soon as the truck turned the corner, the trash seemed to have vanished.

“Where does all our waste go?” Lofu wondered aloud.

“Does it just disappear?” Kofu asked, scratching his head.

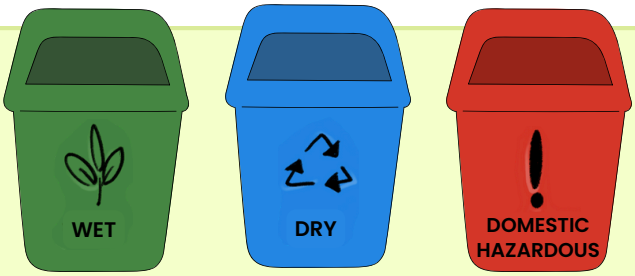
Curiously, they rushed to Mr. Guru the next day before the class; they fired their questions at him. Smiling, Mr. Guru began to explain.

Mr. Guru continues, “After it leaves our hands, it's important for us to segregate our waste into wet, dry, and domestic hazardous waste using 3 different bins. Remember?”

Segregation of waste emphasizes reducing landfill use, promoting recycling and composting, and ensuring hazardous waste is handled responsibly. This not only preserves natural resources but also ensures a healthier and cleaner environment for all.

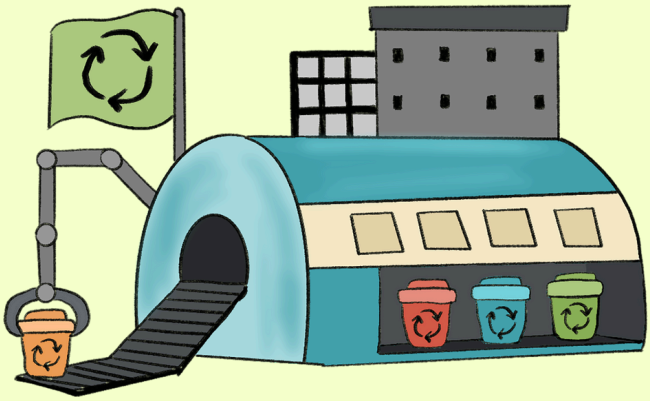
Let’s take a look at the journey of waste after it is segregated by households.

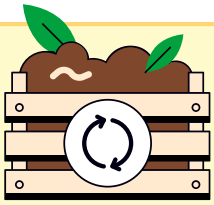
The process of separating waste into wet, dry, and domestic hazardous waste is called **waste segregation**.



After segregation, waste is collected by municipal authorities or **waste collection** services.

The waste is then transported to **sorting and processing facilities**. At the processing facilities, further sorting occurs to ensure that different waste are processed correctly.





Wet waste is taken to composting facilities.

Dry waste is sorted by material and processed for recycling.

Domestic hazardous waste undergoes specialised treatment to neutralise harmful chemicals.

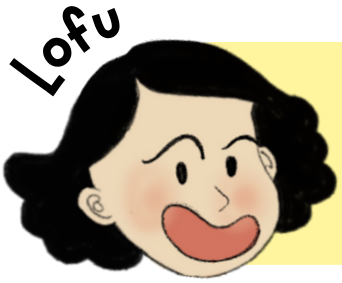
The remaining waste is then sent to landfills, to be buried under soil, or to incinerators, where it is burnt at high temperatures to reduce volume.

Do we really segregate waste the way we should?

Lofu and Kofu were fascinated by the long journey waste goes through. Their thoughts were brought to a halt by a question from Mr. Guru.

"Can you tell me, do you segregate waste at home, and how many bins do you both use at home?"

"We have two bins, one for kitchen waste and the other for the rest of the waste."



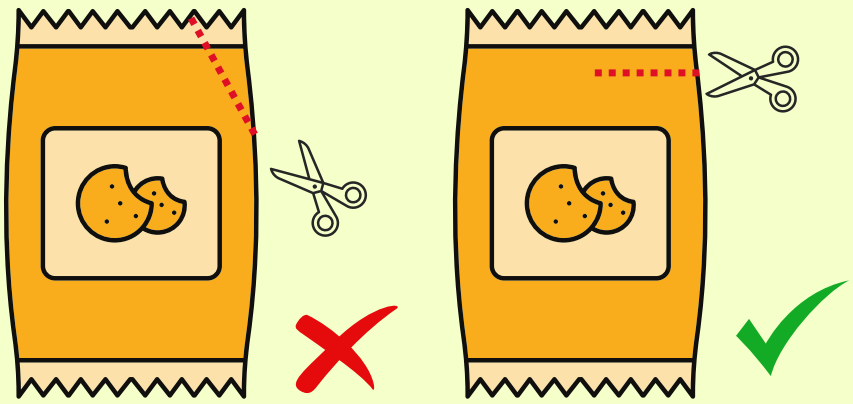
"We only have one bin for all the waste."

"Unfortunately, that's what happens in most of our homes!"

Ideally, we must separate waste at home into 3 bins. In doing so, the waste shall follow the same journey we discussed earlier.

When this is not done right, waste is often littered and causes harm to the environment. For example, all types of waste—food scraps, plastic wrappers, broken glass, and sanitary waste—are thrown into the same bin. This mixed waste is either carelessly dumped in the open, left to rot on the streets, or sent to landfills without proper sorting. Even when mixed waste is collected by municipal authorities, it is dumped in large heaps onto the landfills, creating mountains of garbage, or incinerated as mixed waste cannot be sorted or processed easily.

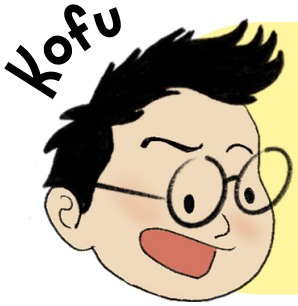
Quick Tip: The best way to tear a plastic packet



This is the best way to open a plastic packet because it helps in recycling the whole packet. When we tear it across, the smaller piece of plastic is often lost and hence becomes difficult to recycle.

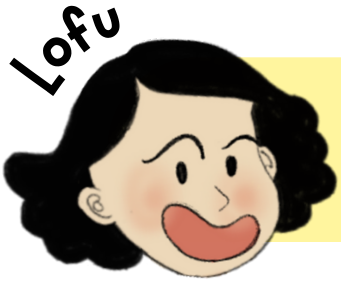
How are we harming our environment?

Thinking about mixed waste, Kofu seemed concerned.



"Sir, how does waste harm the environment? It's just... stuff, right?"

"Waste is more than just 'stuff.' When waste is not properly managed, it can harm the air, water, and even the soil we depend on."



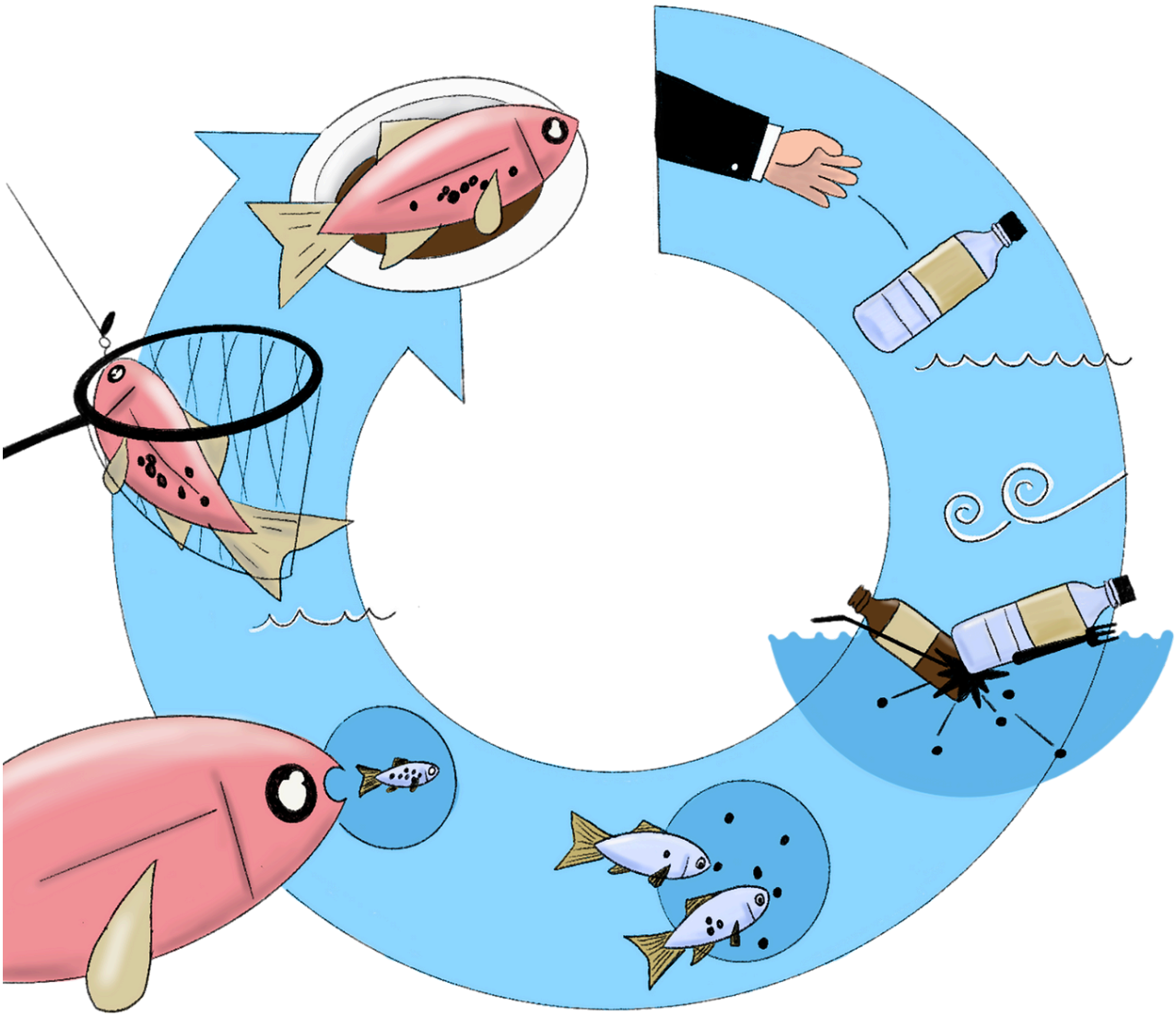
"How does that happen, sir?"

“When mixed waste is littered in open or dumped into landfills, harmful chemicals seep into the soil, causing **soil pollution**.

Hazardous waste releases harmful substances like lead and mercury, further contaminating the environment.

Leachate, a liquid formed when rainwater mixes with waste seeps through landfills and contaminates surrounding water bodies, causing **water pollution**. This water harms our drinking water sources.”

Littered mix waste often ends up in our water bodies too, affecting the quality of water and impacting marine life.



For example, when a plastic bottle ends up in sea, it breaks down into microplastics. These microplastics resemble food to small fishes, which are then eaten by fish higher up in the aquatic food chain. These fish are later consumed by humans, and that's how plastic waste reaches human consumption.

Landfills with mixed waste also produce harmful gases like methane and carbon dioxide which are greenhouse gases contributing to **global warming**.

Incinerators release harmful pollutants such as dioxins and carbon monoxide into the air, causing harm to human health and the environment by contributing to **air pollution**.

Glossary

Landfill is a site for the disposal of waste materials by burial.

Methane is a highly dangerous greenhouse gas produced by the decomposition of organic waste in landfills.

Leachate is a liquid that forms when water passes through waste and picks up harmful substances, potentially contaminating the soil, groundwater and surface water.

Microplastics are small plastic particles less than 5mm in size, often resulting from the breakdown of larger plastic waste.

Marine implies anything relating to or found in the water or sea or ocean.

Compost is a mixture of ingredients used as plant fertilizer and to improve soil's physical, chemical, and biological properties.

Did you know? #3

Landfills are the third largest source of methane emission.

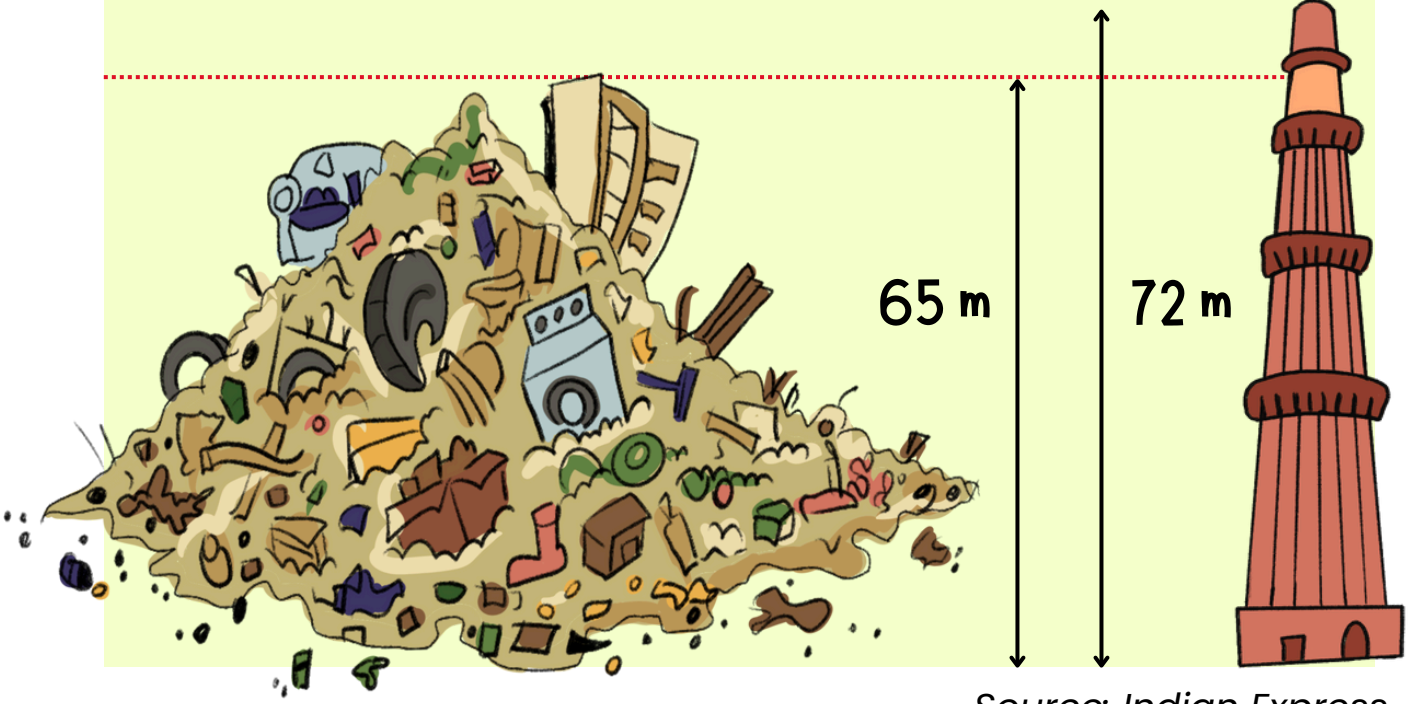
Methane traps 25 times more heat than carbon dioxide causing Global Warming. Two largest sources of methane are agriculture and fossil fuels.

Source: Global Methane Initiative

Stories from around us

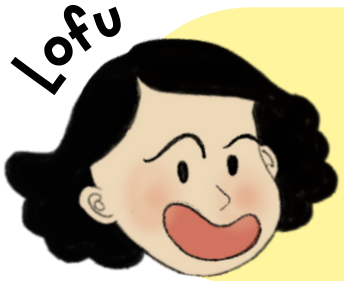
Did you know? #4

The Ghazipur landfill in Delhi, NCR is one of the largest in the country. It looms like a towering monument that's taller than a 15-story building! Imagine a giant hill made of old toys, banana peels, and everything else you throw away. In 2019, it reached a height of 65 meters, nearly as tall as the Qutub Minar.



Source: Indian Express

How does waste collection impact the lives of sanitation workers?



"Sir, what happens to the people who collect or treat mixed waste?"

"It's dangerous for them, Lofu."

Mr. Guru continued, “When waste isn’t segregated, collectors are forced to handle dangerous items like sharp objects, broken glass, and even harmful chemicals. It puts their health at risk."

Kofu worriedly asked, "So, by mixing waste, we’re making their jobs harder and more dangerous?"

"Yes!", Mr. Guru replied. "Segregating waste shows respect for their safety and dignity."

Did you know? #5

India has nearly 15 lakh waste pickers as part of its urban workforce, with nearly 5 lakh being women.

Source: The Hindu

Waste collectors play a crucial role in managing waste. Let's hear the story of such waste collectors through this interview.

Anita and Kavita, long-time residents of Noida, have dedicated over 25 years to collecting waste in Sector 34. As housewives from underprivileged backgrounds, they have shown incredible resilience in balancing work and family, driven by a desire to give their children an education they never had.

With the support of the HCLFoundation and the My Clean City initiative, Anita and Kavita now operate an E-Cart provided to the Sector 34 RWA, collecting segregated waste from households in a way that's dignified and efficient.

The E-Cart has been transformative for both women, drastically reducing the physical strain and time once demanded by their work. They feel a newfound sense of respect and belonging, proud to contribute to the community's cleanliness. This opportunity has not only improved their livelihood but also lifted their spirits, allowing them to envision a brighter future for their families.

Meet the Plastic Man of India

Have you ever thought of plastic waste being used to build roads? **Rajagopalan Vasudeva** had this brilliant idea! He developed a technology to mix plastic waste, like wrappers, with bitumen to make roads stronger and more durable.

This invention:

- Reduces plastic pollution.
- Builds eco-friendly and long-lasting roads.

For his incredible contribution, he was honored with the Padma Shri, one of India's highest awards. Today, many cities in India are using his technology to create roads from waste plastic.

How to ensure safe waste collection?

"It's so difficult for garbage collectors.", Lofu exclaimed.
"Really!", Kofu quickly agreed. "But, what can we do to make collection of waste safer and easier for them?", he asked.

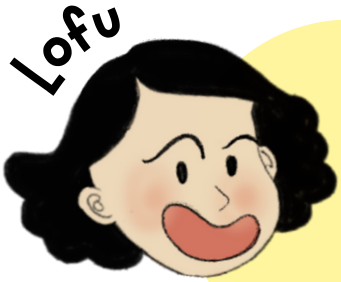
Mr. Guru replied, "Here are some things to keep in mind."

- Segregate our waste at home.
- Avoid throwing hazardous items like batteries or chemicals in with regular waste. Instead, dispose them at designated facilities.
- Treat waste collectors with respect and acknowledge their hard work.
- Raise awareness around the importance of waste segregation and safe disposal practices in our communities.

After the class, Kofu thought out aloud, “Is plastic a waste too? But everything from our pens to our toys, all are made of plastic.”
Mr. Guru smiled and answered, “It’s not that simple, Kofu. Why don’t we discuss plastic problem for our next chapter?”

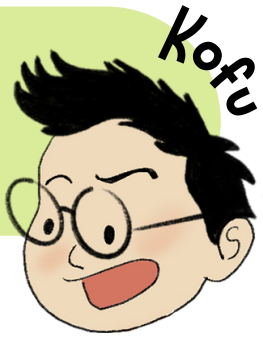
Reflection with Lofu & Kofu

As the school got over, Lofu and Kofu sat under a tree, waiting for their bus, deeply thinking about all that they had learned.



"It's scary to think that our waste can impact our surroundings, environment and even the people around us."

"But now that we know better, we can make better choices."



“Let's start by making sure we dispose off our waste properly”, Kofu interjected. Lofu agreed and added, “What we do today can make a big difference tomorrow.”

With a renewed sense of responsibility, Lofu and Kofu decided to be more careful with their waste, understanding that even after it leaves their hands, it has a long journey, impacting environment and people around them.

Test your knowledge

Submit your responses using the QR code on the next page.

1. Tick the correct answer

(i) Which of the following is not a method of waste disposal?

(a) Incineration (b) Landfill (c) Composting (d) Planting trees

(ii) What is a significant source of methane emissions?

(a) Compost Bins (b) Landfills
(c) Recycling Centers (d) Plastic Bags

(iii) Which of the following types of pollution is caused by leachate?

(a) Soil (b) Plastic (c) Noise (d) Air

(iv) Which of these processes is not a part of domestic hazardous waste's proper disposal?

(a) Collection (b) Safe treatment
(c) Safe disposal facility (d) Composting facility

2. Match the following

(i) Leachate	(a) A greenhouse gas
(ii) Methane	(b) Rainwater mixed with waste
(iii) Ecosystem	(c) Living organisms and their surroundings

Activity 3

Recreate the journey of waste

Instructions:

- *Draw a diagram of the waste journey, starting from the moment waste is thrown into the bin at home.*
- *Label the different stages of the journey, including collection, sorting, recycling, landfill, or pollution in water bodies.*
- *Use different colours to show the paths for segregated and mixed waste.*
- *Click a picture of the diagram and submit it through the QR code.*

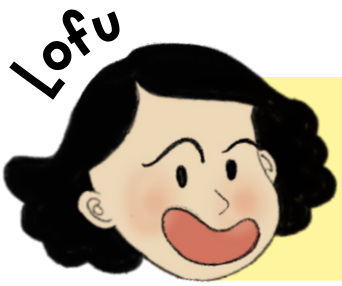
3. The Plastic Problem

Lofu and Kofu were playing at the local park on a Sunday afternoon when they noticed something troubling. A cow was rummaging through a pile of trash, pulling out plastic bags and chewing on them.

Kofu shook his head in dismay. "Look at what plastic is doing to these poor animals, Lofu. I didn't know it was this bad."
Lofu sighed, "Neither did I. We've learnt about waste and segregation, but we haven't talked much about plastic. We should find out more about plastic and what we can do about it."

As they continued their walk, they decided to ask Mr. Guru about the plastic problem in their next class.

As the class started, Lofu pointed to a plastic bottle he was carrying.



"Sir, plastic is everywhere. But is it that bad?"

"Plastic is certainly useful, Lofu. It's durable, affordable, and lasts a long time. But the problem arises once we're done using it. When not disposed off properly, it breaks down into microplastics, which wreak havoc on our ecosystems."

"So, it's good for making things, but bad when we throw it away?"

"Exactly!", Mr. Guru said. "That's why it's called a double-edged sword. It helps us, but it can harm the environment if we're not careful."

Let's learn more about it. Shall we?

Plastic was invented in the late 19th century and quickly became a revolutionary material. It was lightweight, durable, and could mould into almost any shape.

Plastic transformed industries like packaging, medicine, and electronics, providing cheap and versatile solutions that improved everyday life.

For example, plastic syringes are crucial in medicine because they are sterile and disposable. Plastic packaging has made food transportation easier by keeping food fresh and reducing waste. The invention of plastic has undoubtedly brought many benefits to society.

“But Mr. Guru..”, Kofu intervened. “If plastic is so important, why do we see campaigns against plastic?” Mr. Guru smiled and answered, “That is because we have not managed plastic properly.”

Despite its benefits, plastic has become a significant environmental issue due to its **non-biodegradable** nature. Unlike organic materials, plastic does not break down naturally in the environment. Instead, it can last for hundreds or even thousands of years.

One of the biggest problem arises when we are done using the plastic. Usually, plastic is not disposed right when we fail to segregate it at the source. As a result, it cannot be reused, repurposed or recycled. It may also get broken down into smaller pieces called microplastics, which may seep into soil and water bodies, contaminating the ecosystem.

Did you know? #6

The first fully synthetic plastic, Bakelite, was invented in 1907 by Leo Baekeland. It was used for making everything from telephones to jewellery.

Source: Science History

What are the different types of plastic?

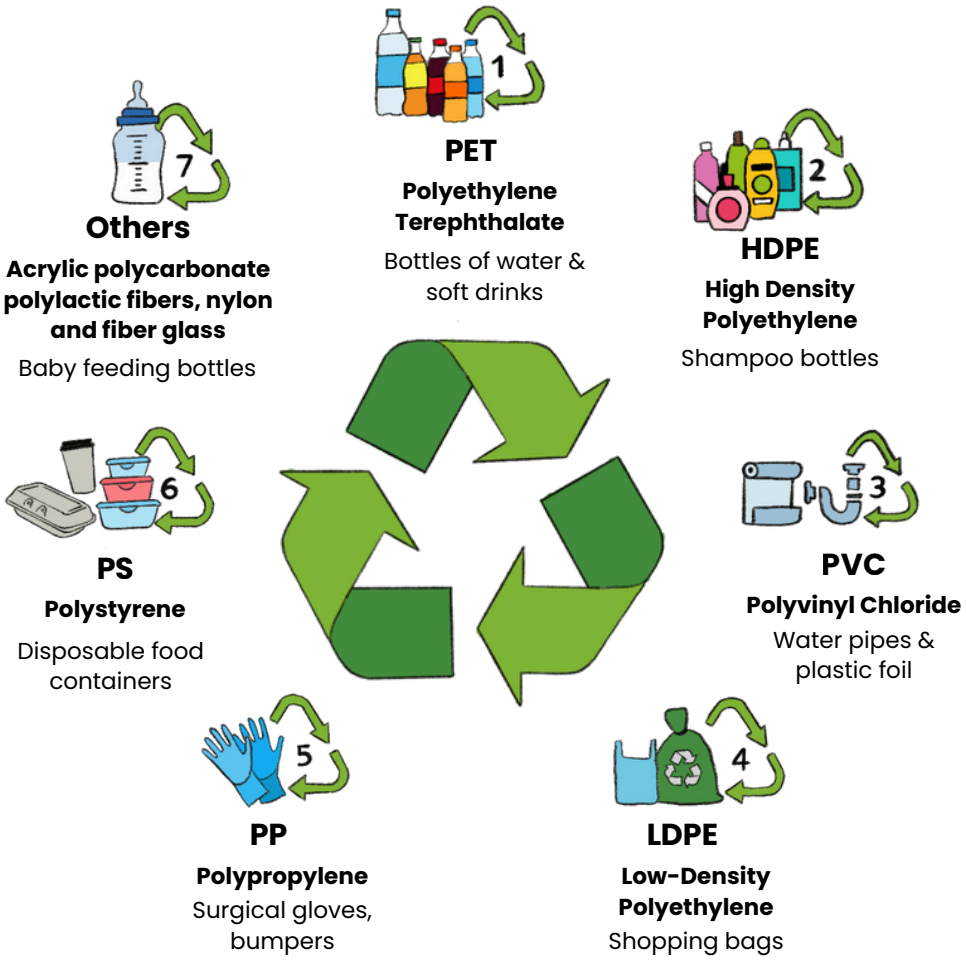
Lofu and Kofu were listening to Mr. Guru with utmost sincerity. Talking about the plastic problem got Lofu thinking. He asked, “Mr. Guru, we come across different plastics every day. Like the plastic wrapper on our chocolates is different from the plastic on water bottles. Are there more such types?”

“Great observation, Lofu!”, applauded Mr. Guru. “There are many types of plastics, each with a different use.”

"So different plastics have different jobs?", Lofu concluded, understanding.

"Exactly! And each one needs to be handled differently when it comes to recycling.", Mr. Guru added.

Plastic comes in many different forms and characteristics. Here are some common types:



So, what is the best way to manage plastic?

In India, managing plastic waste is a significant challenge, but there are recycling options that may help mitigate the problem.

Recycling in India:

- **Recycling Plants:** India has many recycling plants that process certain types of plastic, turning them into new products like plastic furniture, textiles, and construction materials.
- **Plastic Roads:** In some parts of the country, plastic that can't be reused is used in road construction, reducing the waste while also improving road durability.

Disposal Methods:

- **Landfills:** Much of India's plastic waste ends up in landfills, where it can take hundreds of years to decompose.
- **Incineration:** Plastic waste is burned at high temperatures (>850 °C) to create water and carbon dioxide, but this can release harmful toxins into the air if not done correctly.

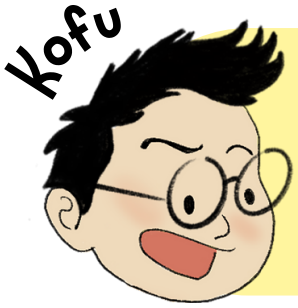
Did you know? #7

India is the largest producer of plastic waste in the world releasing 9.3 million tonnes (Mt) annually.

Source: The Hindu

Dealing with plastic

Kofu stared at his plastic pen and asked:



"Sir, why don't we just stop using plastic altogether? It causes so many problems!"

"Removing plastic completely isn't easy. We rely on it for many things, like packaging and medicine. Instead, limiting or managing plastic use is more realistic."

"So, by reducing plastic and recycling more, we can still reduce the harm it causes, right?"

"If we learn to manage plastic wisely, we can enjoy its benefits without destroying our environment."

We can take steps to reduce plastic's use and manage it more effectively. We can choose alternatives to plastic e.g., use a reusable cloth tote bag instead of using plastic bags.

REMOVE:

Plastic bags

Cloth tote bags

MANAGE:

- **Segregate Plastic Waste:**

Ensure that plastic waste is segregated. It may include chocolate plastic wrappers, soft drink bottles, broken toys etc.

- **Recycling:**

The segregated plastic waste should be sent for recycling to ensure waste is repurposed rather than discarded.
(Note: Make sure plastic waste is clean and dry before sending it for recycling.)

As the day came to an end, Lofu and Kofu were reflecting upon everything they learnt today. They met Mr. Guru on their way to the bus. “Mr. Guru!”, Lofu asked. “I forgot to ask; I heard about 3 R's for managing waste. What is that?”

Mr. Guru smiled, “That’s wonderful, Lofu. The 3 R's stand for Reduce, Reuse, and Recycle. They’re simple steps to help manage waste.” “Tell us more, Mr. Guru!”, Kofu enthusiastically asked. “Don’t worry, we’ll discuss it at length in the next chapter. For now hurry, else you’ll miss your bus!" , said Mr. Guru as he walked away.

Did you know? #8

Every year, 8 million metric tons of plastic end up in the ocean, which is equivalent to a truckload of plastic every minute.

Source: WE Forum

Reflection with Lofu & Kofu

After their lesson with Mr. Guru, Lofu and Kofu decided to take action. They started carrying reusable bags to the market and encouraged their families to do the same. They also joined a local clean-up drive to remove plastic waste from their neighborhood park. As they picked up litter, Kofu said:

"I never realized how much plastic we use every day."

Lofu

Yeah, it doesn't just affect us, it affects the whole planet."

And with that, Lofu and Kofu felt more determined than ever to be part of the solution.

Did you know? #9

India generates 26,000 tonnes of plastic waste every day.

Source: CSIRO

Test your knowledge

Submit your responses using the QR code on the next page.

1. Match the following

(i) HDPE

(ii) LDPE

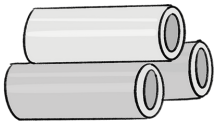
(iii) PVC

(a) 

Plastic bags

(b) 

Shampoo Bottle

(c) 

Pipes

2. Fill in the blanks

(i) Plastic has become a significant environmental issue due to its _____ nature.

(ii) The first fully synthetic plastic was called _____.

(iii) Plastic waste can break down into tiny particles called _____.

3. Tick the correct answer

(i) Which of the following is a type of plastic used in soft drink bottles?

(a) PVC (b) PET (c) HDPE

(ii) Which method is used to dispose of plastic waste in India?

(a) Incineration (b) Landfilling (c) Both

Activity 4

Understanding the plastic

Instructions:

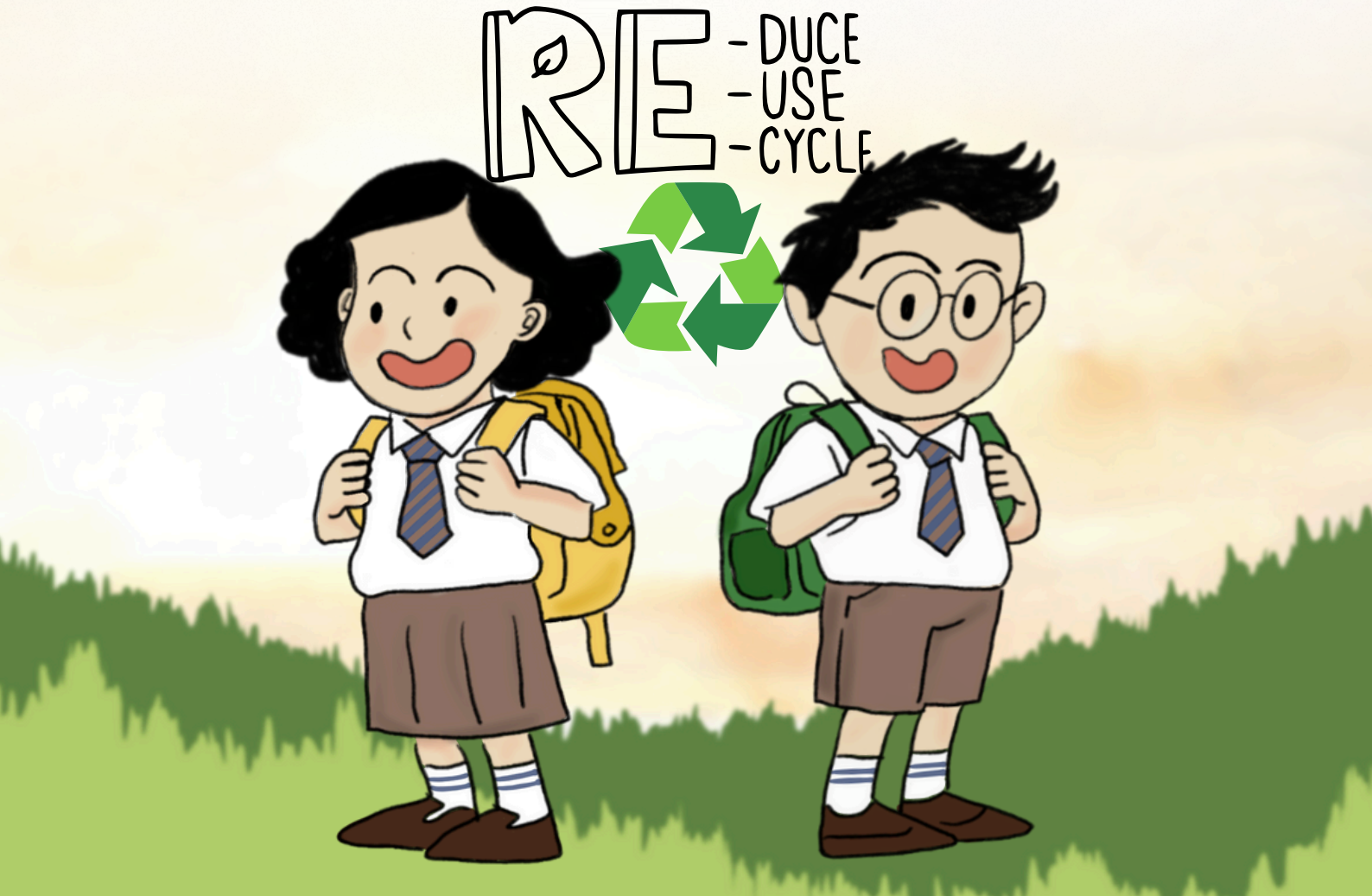
- *Create a list of plastic items that we use in our everyday lives in the box given below. (e.g., pens, lunchbox, carry bags, water bottles, etc.)*
- *On a newspaper, arrange the plastic items from our everyday lists under the type of plastic it falls under all types of plastics that we've studied in the chapter.*
- *Click a picture and submit it through the QR code.*

4. The 3 R's

Lofu and Kofu were riding their bikes in their neighborhood park, thinking about everything they had learned so far.

"We've learned so much about waste, plastic, and how it all affects the environment.", Kofu said thoughtfully. Lofu nodded. "But Mr. Guru mentioned something about the 3 R's. Reduce, Reuse, and Recycle. I wonder what that means?" Mr. Guru, who happened to be walking by, overheard their conversation. He joined them. "I see you're curious about the 3 R's.", he said. "It's one of the most important lessons in waste management. Let's explore it together at school tomorrow!"

The next morning, Lofu and Kofu were excited to learn about the 3 R's as they got ready and headed to school.

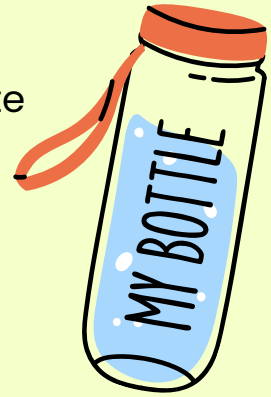


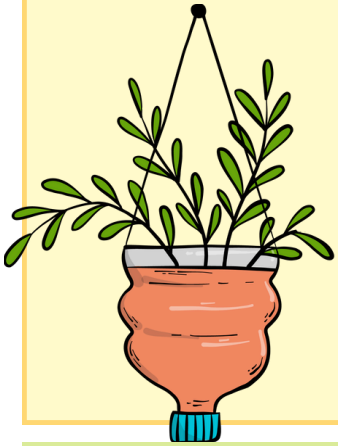
What are 3 R's?

Mr. Guru entered the classroom in a jiff and asked the class, “Have you heard of the 3 R's?” Lofu quickly raised his hand and answered in a hurry, “I know! It’s Reduce, Reuse, and Recycle, right?” Mr. Guru exclaimed, “Exactly! But, do you know why they’re important? Lets find out.”

REDUCE

Reducing is cutting down on the amount of waste we create. By reducing, we consume fewer resources, which helps in saving energy, water, and raw materials. For example, if we bring our own water bottles instead of buying a new one every time, we’re reducing waste.





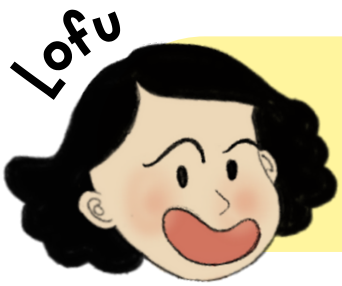
REUSE

Reusing involves finding new ways to use old items or upcycle them, instead of discarding them. This could be as simple as donating books, magazines to schools, public libraries or reuse empty food containers.

RECYCLE

Recycling is the process of converting waste materials into new products. This helps reduce the need for raw materials and minimizes the amount of waste sent to landfills.

What's so special about 3 R's?

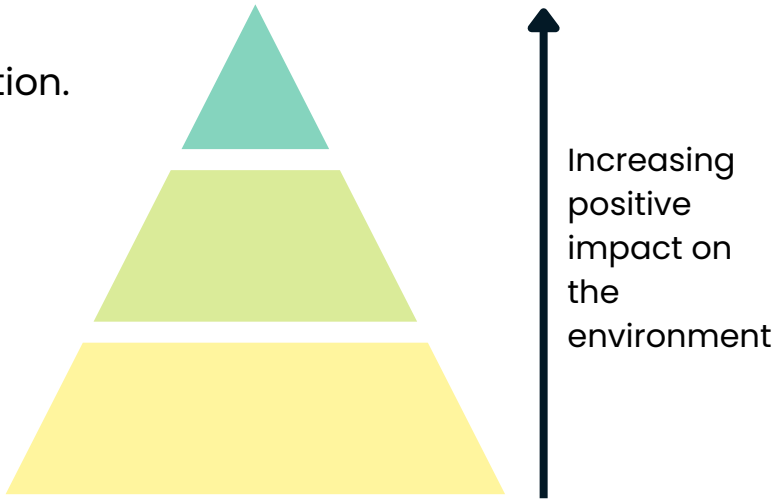


"Why are the 3 R's crucial, sir? What makes them special?"

"The 3R's are crucial because they address the root problem i.e. excess consumption. They also help us understand mindful consumption better and reduce the environmental burden."

Understanding each of these R's is crucial to create a positive impact on the environment:

- **Reduce:** Helps conserve resources and reduce pollution.
- **Reuse:** Extends the life of products and reduces the demand for new items.
- **Recycle:** Conserves energy, reduces greenhouse gas emissions, and minimizes landfill waste.



The 3 R's — Reduce, Reuse, Recycle are the foundation of sustainable waste management. They represent a range of practices that can minimise waste and build a cleaner environment.

Glossary

Upcycling is the process of transforming old or discarded materials into something new and useful.

Did you know? #10

Recycling just one aluminium can save enough energy to power a TV for three hours!

Source: mga.edu

What is a Zero-Waste Society?

Imagine a world where nothing goes to waste! Everything we generate as waste is reused, recycled, composted, or turned into something useful. This is called a Zero-Waste Society. It's like giving a second life to all the things we throw away.

In India, some cities and communities are moving closer to this goal, for example:

- **Navjivan Colony, Delhi:** A shining example of a zero-waste neighborhood.
- **Alappuzha, Kerala:** Known for its innovative initiatives like composting at home and managing waste within neighborhoods.
- **Pune Waste Pickers Cooperative:** A group of waste pickers collects, segregates, and recycles waste. This not only helps manage waste but also provides jobs!

Implementing 3 R's in everyday life

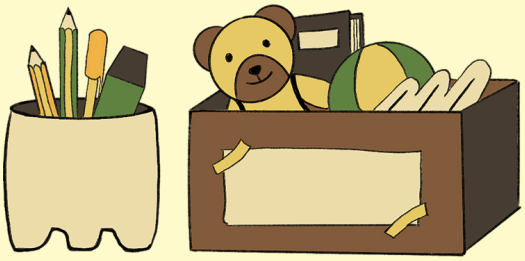
Here are some simple ways to practice the 3 R's in our everyday life:

REDUCE

- Carry a reusable cloth bag.
- Buy products with minimal packaging.
- Carry a reusable water bottle.

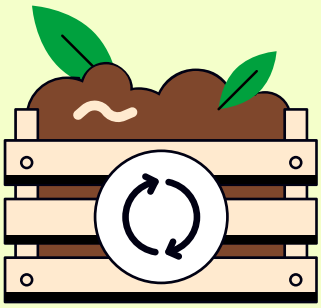
REUSE

- Use jars and containers for storage or as vase or pots.
- Reuse gift wrap and ribbons.
- Donate old clothes and toys.



RECYCLE

- Sort your waste according to local recycling guidelines.
- Compost kitchen waste to create nutrient-rich soil and bio-enzymes.
- Recycle paper, glass, plastic, and metal whenever possible.
- Use citrus fruit peels to make bio-enzymes for cleaning.



Project "Reuse" in action

“Do you guys want to create some fun DIYs reusing waste?”, Mr. Guru inquired.

“Yes, we’d love that!”, exclaimed Lofu and Kofu.

Mr. Guru continued, “Here are some ideas then!”

Individually, these small items can be created reusing plastic bottles, cans, or old newspapers and magazines.

Bottle Planters: Turn empty plastic bottles into planters for herbs or flowers. Just cut the bottle in half, put a hole for drainage, fill it with soil, and plant a seed.

Tin Can Lanterns: Paint or decorate old tin cans, punch holes in them, and place a candle inside to create a charming lantern.

Paper Bead Jewelry: Make beads out of colorful magazine pages by rolling them tightly and stringing them together to create unique necklaces or bracelets.

Best out of waste

Alternatively, a group of friends or family can also come together and create best out of waste.

- **Eco-Friendly Tote Bags:** Use old t-shirts to make reusable bags. Cut off the sleeves, sew the bottom shut, and we have a new shopping bag!
- **Community Mural:** Collect bottle caps, broken tiles, and other small discarded items to create a large mural celebrating the 3 R's. This can be displayed in the school or a public space to inspire others.

Did you know? #11

India recovers only 25–28% of its total paper consumption. Global average is around 58%.

Source: IPPTA

"While it was fun and creative to reuse waste to decrease the burden on the environment, it'd be fun to know more about composting too.", Lofu wondered aloud.

Mr. Guru, who heard Lofu, said, "Wait till the next chapter, Lofu. Your wish shall come true."

Lets do!

Fill in the blanks:

- Using an old jar to store pens is an example of _____.
- The process of converting waste materials into new products is called _____.
- _____ helps conserve natural resources by cutting down on waste creation.

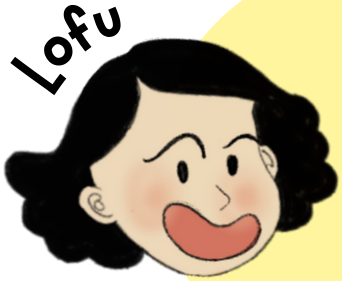
Glossary

"Kabadi Wala" generally refers to a scrap dealer or ragpicker in India who collects and trades in recyclable materials, such as paper, plastic, and metal.
These individuals play a crucial role in the recycling ecosystem, helping reduce waste and promote sustainability by collecting discarded materials from households and businesses.

Bio Enzyme is a natural, chemical free, multi-purpose liquid produced through a fermentation process from vegetables & fruit peels waste (usually citrus peels).

Reflection with Lofu & Kofu

After their lesson on the 3 R's, Lofu and Kofu were eager to make a change. They decided to start small by reusing items around the house. Old jars were turned into planters, and cardboard boxes were used to create organizers for their school supplies.



"It's amazing how much can be done with things that are usually just thrown away. This really shows that reducing and reusing isn't as hard as it seemed."

"And by doing this, we're not just reducing waste – we're saving resources. Plus, it's actually fun to get creative with things we'd normally toss out."

With a sense of accomplishment, Lofu and Kofu felt confident that they were on the right path.

Test your knowledge

Submit your responses using the QR code on the next page.

1. Match the following

(i) Reduce	(a) Buying a product with less packaging
(ii) Reuse	(b) Turning an old t-shirt into a cleaning rag
(iii) Recycle	(c) Sorting paper and plastic waste for recycling

2. Fill in the blanks

(i) The process of _____ involves finding new uses for items instead of throwing them away.

(ii) _____ is considered the most effective way to manage waste because it prevents waste from being created in the first place.

(iii) _____ involves breaking down materials and turning them into new products.

3. Tick the correct answer

(i) Which of the following is the most effective way to manage waste?

(a) Reduce (b) Reuse (c) Recycle

(ii) What does recycling require that reusing does not?

(a) Energy and resources to process materials
(b) Finding new uses for items (c) Using fewer products

Activity 5

Best out of waste

Instructions:

- *On a chart paper, attach the images of "best out of waste" items you created as part of individual and group activities in the chapter.*
- *Click a picture and submit it through the QR code.*

How Waste Management Links to Sustainable Development Goals

SDGs are global goals set by the United Nations to make the world a better place. Proper waste management helps us achieve these goals:

Clean cities with proper waste systems.

Using resources wisely and creating less waste.

Managing waste reduces pollution and helps fight climate change.

Reducing litter protects animals and nature.

Read more about SDGs: sdgs.un.org

5. Composting

Lofu and Kofu were back in Mr. Guru's class, eager to learn more about how they could help the environment. They had the time of their lives creating planters and lanterns reusing the dry waste. But, they wanted to do something about wet waste too. They wanted to know more about composting.

"You kids really put the 3 R's to good use!", Mr. Guru exclaimed as he entered the classroom. "Now who wants to know what we should do with the wet waste?", he further asked. "Me! Me!" everyone shouted.

Mr. Guru

"Did you know that around 60% of the waste we produce at home is wet (organic) waste?"

Lofu

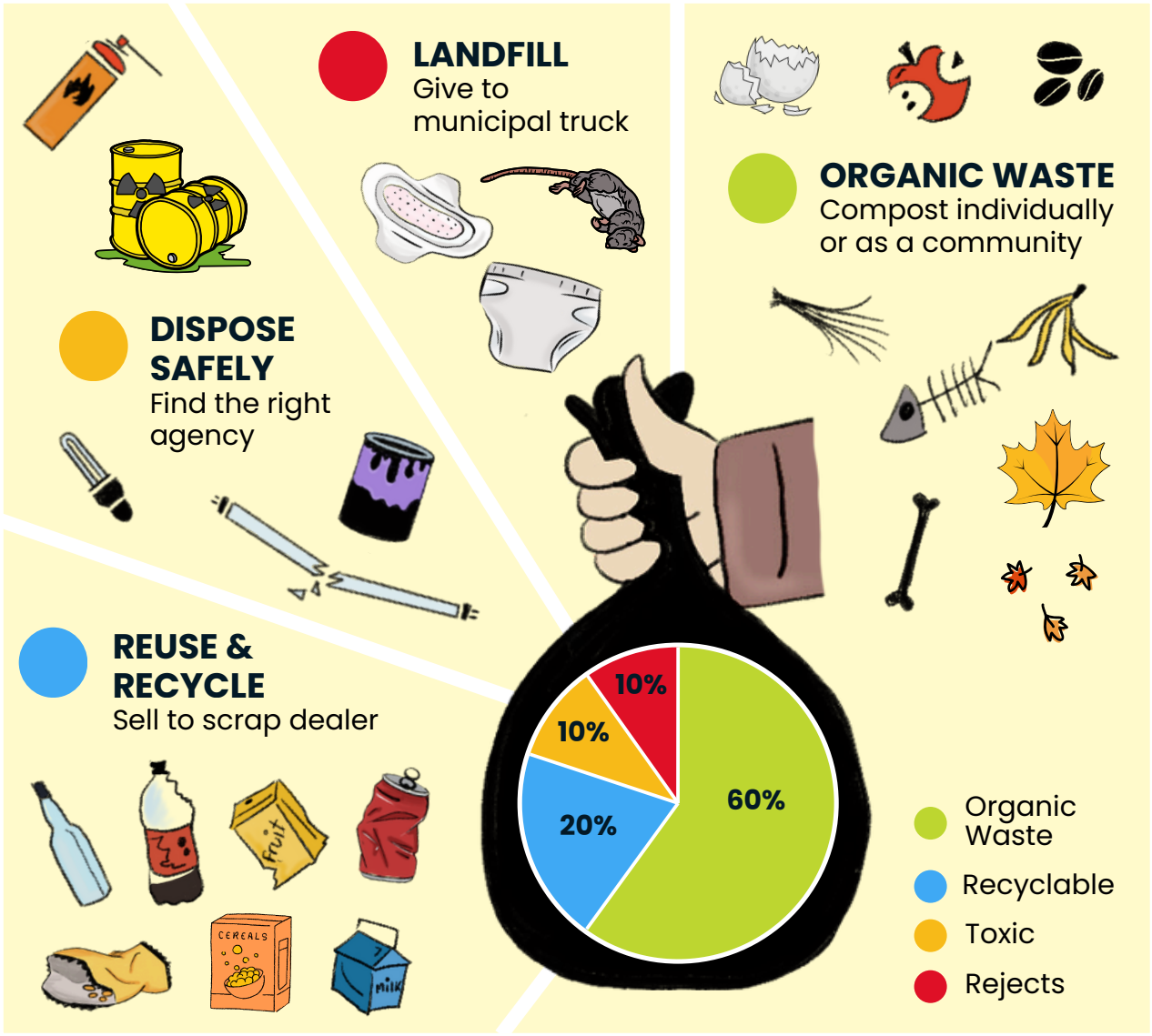
"We didn't know at all."

Kofu

"It means the waste produced in our homes is usually wet waste."

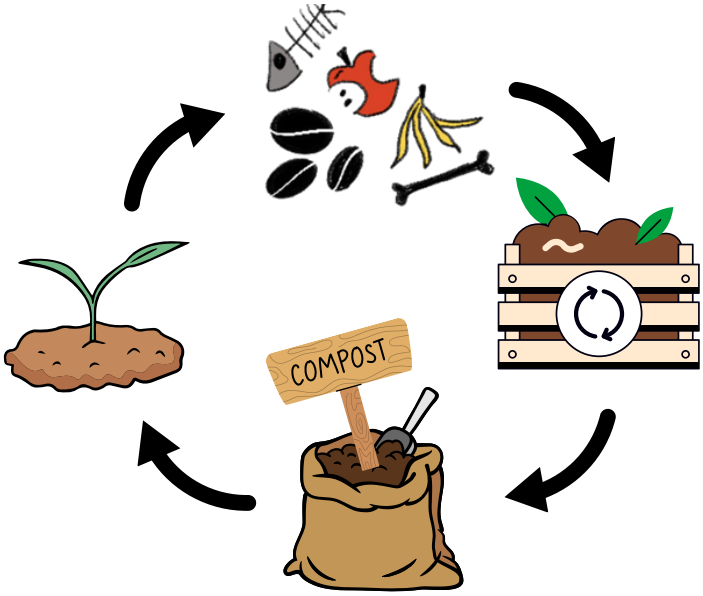
Mr. Guru

"Yes, and that is why composting becomes all the more important for us."



Like we already know, wet waste includes food scraps, vegetable peels, garden waste, and other natural materials. Wet waste is compostable, meaning it can break down naturally and turn into nutrient-rich soil.

Composting is a natural process that turns organic waste into rich soil. When we compost, we're essentially playing our part in decomposing plant and food waste into nutrient-rich compost that can be used to improve soil and plant growth.



In addition to composting, citrus peels also have an interesting use as a natural, non toxic cleaner.

Citrus peels can be used in creating **Bio Enzymes**, a multi-purpose, natural liquid produced through fermentation process. The most common ingredients used are fruit peels like orange or lemon, jaggery and water.

Over a period of 1 to 3 months, natural bacteria and yeast break down the sugars in the fruit peels, creating enzymes that break down dirt, grime, and harmful bacteria. The result is a strong, chemical free cleaner that leads to zero waste production.

Creating Bio Enzyme

1 part jaggery	+	3 parts citrus peels	+	10 parts water	=	**Bio Enzyme** After microbial fermentation for 3 months

Example

60g jaggery	+	180g citrus peels	+	600 ml water	=	1 liter plastic container*

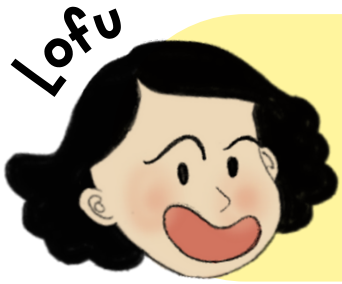
* *Open the container's lid for a while after first month to release gasses.*

Source: Carry on Composting

Did you know? #12

The first written account of composting is from clay tablets carved during the Akkadian Dynasty, which lasted from 2320 BC to 2120 BC.

Why should we compost?



"Why should we compost at all, sir? Isn't wet waste biodegradable?"

"Composting is not just a way to decompose wet waste Lofu. We must compost because it has numerous benefits. Let's discuss them."

- **Reduces Landfill Waste:** Composting diverts waste from landfills to composts, reducing the amount of trash that ends up in waste facilities.

- **Improves Soil Health:** Compost adds valuable nutrients to the soil, improving its texture and fertility.
- **Conserves Resources:** Using compost reduces the need for chemical fertilizers and helps conserve water.
- **Reduces Greenhouse Gases:** Composting organic waste prevents methane emissions from landfills, contributing to a reduction in greenhouse gases.

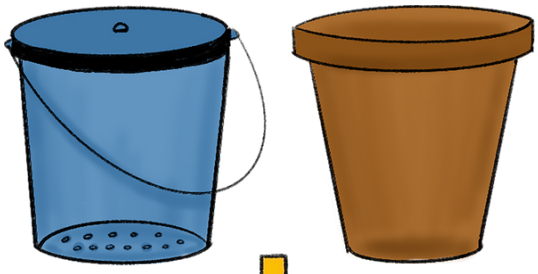
Steps for home composting

"Composting at home is simple and rewarding.", Mr. Guru explained. "Why don't we try and learn how to set up a compost at home." Here's a step-by-step guide to get you started:

1

Choose a composting pot

An earthen or plastic pot with multiple holes for aeration and a lid to cover.



2

Build a pile

Build a pile of 60% "browns" and 40% "greens" alternating in layers. Chop larger chunks into smaller pieces.

Browns

(Carbon)

Saw Dust
Cocopeat
Dry Leaves
Dried plant residue

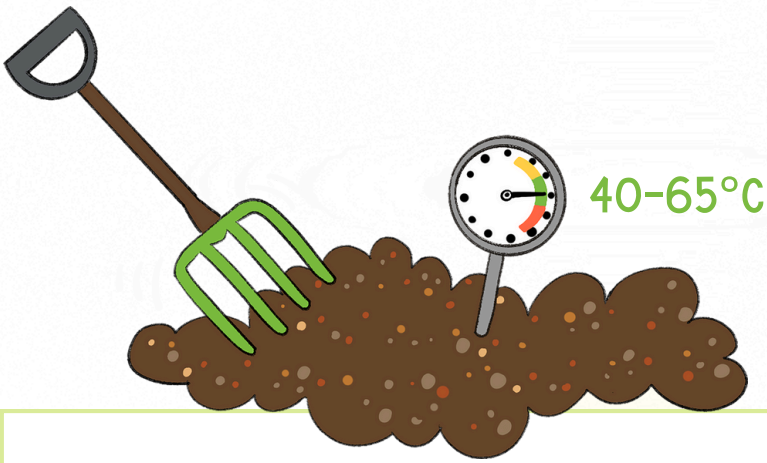
Water

Add water as we build the pile. Keep as moist as a wrung-out sponge

Greens

(Nitrogen)

Grass clippings
Coffee grounds
Vegetable Peels
Fruit Peels
Herbivore manure



DO NOT ADD

- Diseased plants
- Weeds with seeds
- Dog or cat feces
- Chemicals
- Meat, fish, poultry
- Dairy
- Treated wood
- Cooked food

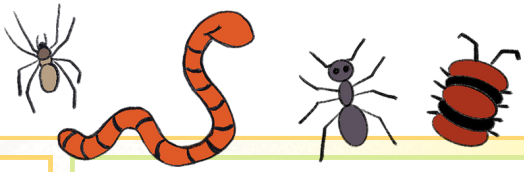
3 Pile maintenance

- To ensure the oxygen supply, turn the pile from the outer edges to the center (which has a higher temperature) using a rake.
- Add water as needed so it is as wet as a wrung-out sponge.
- Use a rake to rotate the pile once a week for aeration.

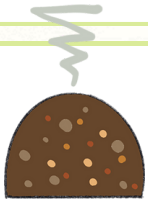
4 Compost critters

Common critters that break down organic material are:

Centipede, Ant, Fungi, Mold, Earthworm, Beetle, Spider.



5 Troubleshooting



Bad Odor
Reason: Too much moisture.
Solution: Turn the pile and add dry porous material.

Pile Will Not Heat Up
Reason: Pile is too dry and/or lack of greens.
Solution: Add water and/or greens and turn the pile.

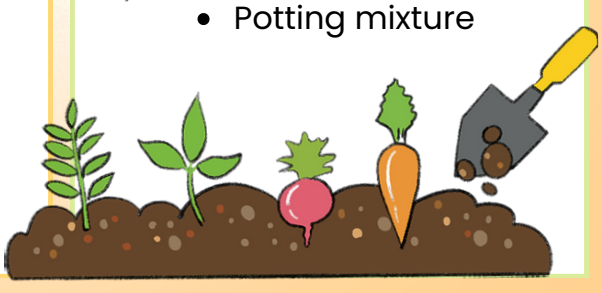
6 Is it done?

Signs that our compost is done and ready for harvesting:

- Dark chocolaty brown
- Crumbly feel
- Earthy smell
- Material fairly small

7 Use it as:

- Soil conditioner
- Mulch
- Potting mixture



Reflection with Lofu & Kofu

After learning about composting, Lofu and Kofu were excited to start their compost bin at home. They began by collecting kitchen scraps and yard waste to set up compost bin with their families. Watching their waste slowly turn into rich compost, they knew it was now ready to be used in the garden!

"It's amazing how our food scraps can become useful for the soil. I can see how composting helps the environment."

"Yes, and it's so easy to do! We're not just throwing away waste; we're turning it into something valuable."

With their new knowledge and hands-on experience, Lofu and Kofu felt more empowered to take positive actions for the environment. They knew that by composting, they were making a meaningful contribution to reducing waste and improving soil health.

Test your knowledge

Submit your responses using the QR code on the next page.

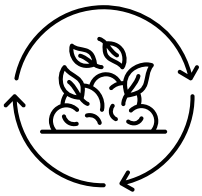
1. Match the following

(i) Composting

(ii) Green Waste

(iii) Brown Waste

(a)



The process of breaking down organic waste into compost.

(b)

Biodegradable waste that's mostly rich in nitrogen, and is often moist in nature.

(c)

Biodegradable waste that's mostly rich in carbon, and is often dry or woody in nature

2. Fill in the blanks

(i) Composting turns _____ waste into rich soil that benefits plants.

(ii) A compost bin should be placed in a _____ and shaded area.

(iii) Adding _____ materials like leaves helps balance the compost.

3. Tick the correct answer

(i) What is the primary benefit of composting?

(a) Reducing energy use
(b) Creating nutrient-rich soil
(c) Reducing plastic waste

(ii) What should not be added to a home compost bin?

(a) Vegetable peels
(b) Meat scraps
(c) Coffee grounds

Activity 6

Composting all the way

Instructions:

- *Create a small composting system at home using the step-by-step guide for home composting.*
- *Click a picture and submit it through the QR code.*

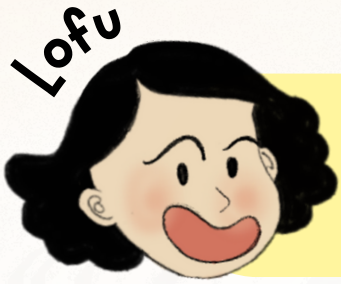
Use Technology to report waste problems

You can help make your city cleaner by reporting waste issues! Here's how:

- **Swachhata-MoHUA App**: The official app of the Ministry of Housing and Urban Affairs. You can post photos of problems like garbage dumps, and the authorities will act on them.
- **Noida and Greater Noida Authority Websites**: Report areas needing cleaning directly on their websites.
- **Twitter**: Take a photo of a problem, tag the city authority on Twitter, and they'll take notice!

6. Introducing "Kuda Daan"

Lofu and Kofu had come a long way in their journey of understanding waste and its impact on the environment. After learning about the 3 R's and composting, they were eager to share their newfound knowledge with their community.



"We learnt so much about such a big problem!"

"Yeah! Few days ago, we didn't even know it was a problem."

"Well, there's one more thing that I should tell you guys about."

"What's that, sir?"

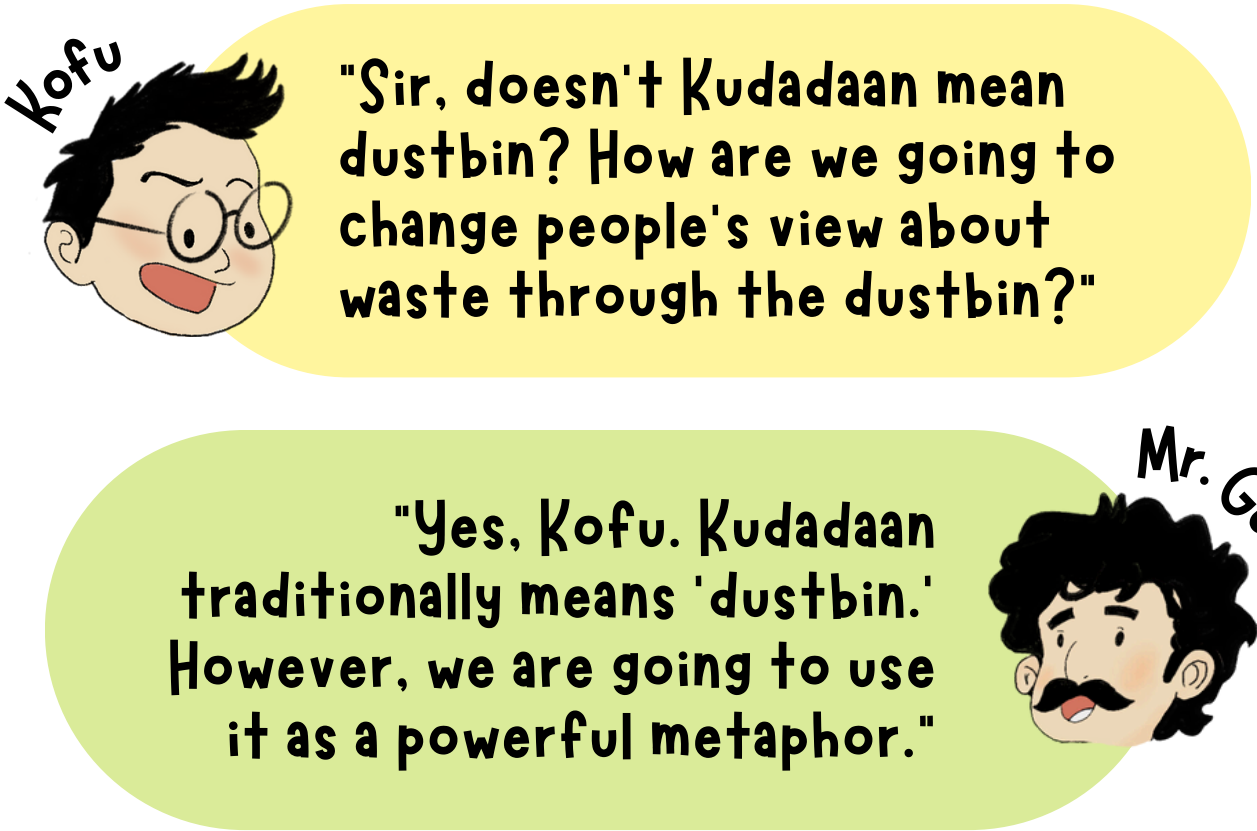
"Maybe it's time we change the way we look at the waste and not just look at it as a problem."

Both Lofu and Kofu looked at each other muddled.

As the class began in the classroom, Mr. Guru explained, “People look at the waste like a problem, and they want to get rid of it in a hurry, without realizing that untreated mixed waste may have consequences, like putting the health of waste collectors at risk.”, Mr. Guru continued. “We need to change the way people see waste.”

Lofu and Kofu couldn't help but think about how they could change the way people viewed waste in their neighborhood. “How are we going to do that, Mr. Guru?”, Lofu asked.

“Through Kuda Daan!”, Mr. Guru replied.



The word "daan" in Sanskrit and Hindi refers to the act of giving or donating something valuable, often with a sense of humility, responsibility, and gratitude.

Just as "Rakt Daan" (blood donation) or "Ann Daan" (food donation) symbolizes a selfless act for the greater good, by giving our waste, or "kuda," with gratitude and care, we acknowledge its potential to be transformed into something valuable through recycling and composting.

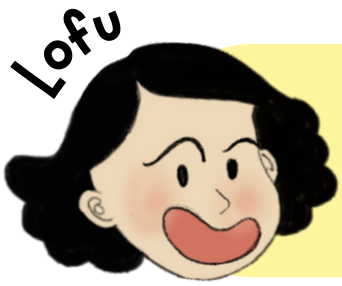
How does it help?

Kofu was patiently listening to Mr. Guru, trying to understand everything he told. Kofu asked, “Mr. Guru, how does reimagining waste as ‘daan’ help?”

“Great question, Kofu!”, Mr. Guru answered in excitement. “This cultural reimagining encourages us to see garbage not as something to be discarded but as a resource that can contribute to a cleaner, healthier environment.”

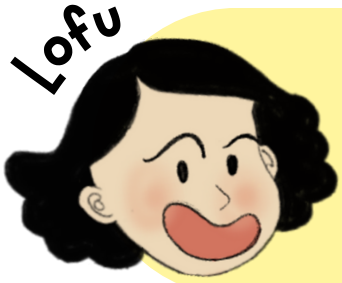
It can lead to:

- **Mindful Disposal:** By changing the way we view waste disposal, "Kuda Daan" encourages people to be more thoughtful and deliberate in how they manage waste.
- **Promoting Sustainability:** It highlights the importance of seeing waste as part of a natural cycle, where what we discard can be transformed into something valuable, thus promoting recycling, composting, and other sustainable practices.
- **Dignity of Garbage Pickers and Collectors:** It promotes respect for garbage pickers and collectors, recognizing them as vital members of society. By treating waste disposal as a mindful act, we honor their contribution, helping them live with dignity and respect.



"I have seen people mistreat garbage collectors."

"Yes! I too have seen people throw garbage at them from their floors that often falls on the roads."



"Also, I feel it's not right to call them 'Kude wale/Kabadi wale' as most people do."

"You are right, Lofu."

Even in today's society, despite their important role in maintaining cleanliness, there exists a stigma associated with the job that they do. This results in disrespectful behaviour towards them, such as stopping them from entering homes, making accusations of theft, and denying them basic social dignity.

Use of terms such as 'Kude wale/ Kabadi wale' dehumanizes sanitation workers, and fails to recognize their valuable contritubition to our community.

A small step going forward could be encouraging people to use the term **'Safai wale'** instead.

How is donating waste, a 'daan'?

Mr. Guru continued, “Garbage without its stigma of being dirty and undesirable is a daan or a gift towards a better society.”
With the help of ‘Kuda Daan’, we can:

- **Recycle and Repurpose**: When waste is properly segregated and recycled, it becomes a resource that can be reused to create new products, as part of giving back to the environment.
- **Transformation for Garbage Collectors:** Garbage has the power to transform the lives of thousands of garbage collectors when segregated properly.

Glossary

The Sanskrit word **"daan"** means "gift" or "donation," highlighting the cultural importance of giving with a pure heart. When applied to waste, it transforms the act of disposal into a mindful practice.

Actionable Points

Here are simple ways to make a big difference:

- Start small: Segregate your waste at home.
- Inspire others: Encourage your family and friends to recycle and compost.
- Report issues: Use apps and websites to highlight waste problems in your area.

Together, we can move closer to a Zero-Waste Society!

Benefits of Kuda Daan

By adopting this cultural perspective, we can begin to see waste not as a burden, but as a source of good. This shift in mindset can lead to more responsible and sustainable behaviors, such as:

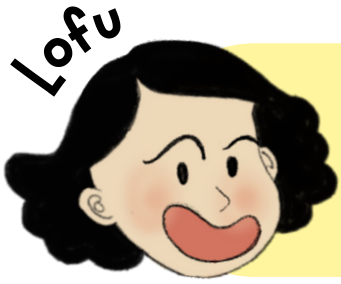
- **Increased Recycling Rates:** When people see waste as something valuable, they are more likely to take the time to recycle it properly.
- **Community Involvement:** Viewing waste as a donation can inspire community initiatives, such as clean-up drives, recycling programs, and composting projects.
- **Environmental Stewardship:** By treating waste with respect, we contribute to the well-being of the planet, ensuring that resources are used wisely and sustainably.

Did you know? # 13

In some Indian villages, traditional practices involve offering organic waste to animals or composting it in communal pits, showing that the idea of waste as a resource has long been a part of rural life.

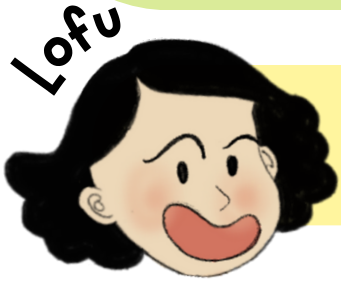
Source: ICAR

A list of tips...



"We have learned so much about waste management!"

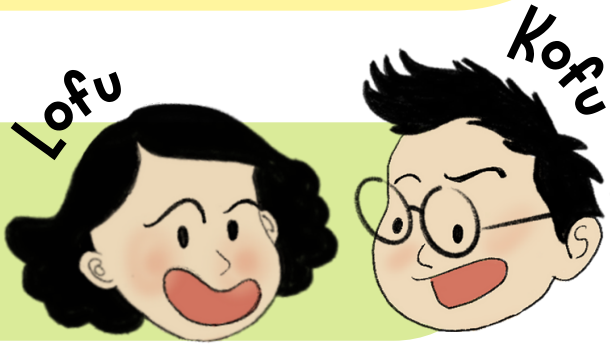
"Yes, I have even created a short list of tips and tricks for myself to remember most of it."



"Really? Do you mind sharing it?"

- **Waste at Source:** Always segregate your waste into wet, dry, and hazardous categories. This makes it easier to recycle and compost.
- **Think Before You Throw:** Before discarding an item, consider if it can be reused, recycled, or composted. Ask yourself if it can be donated to someone who may need it.
- **Reduce single-use items:** Avoid using single-use plastics and other disposable items. Opt for reusable alternatives whenever possible.
- **Compost Organic Waste:** Start a compost bin at home for food scraps and yard waste. It's a great way to give back to the Earth.
- **Educate Others:** Share the "Kuda Daan" concept with your friends and family. Encourage them to view waste as a resource, not a burden.

"There is a small pledge that I'd like you to take with your families as you continue this journey of protecting the environment."



"Sure, sir. Please tell us the pledge."

"So here it goes..."

We pledge to...

- Reduce the waste we produce by making mindful choices.
- Reuse items whenever possible to minimize our environmental impact.
- Recycle responsibly and sort our waste correctly.
- Respect the work of waste collectors and treat waste with dignity.
- Protect our environment by participating in community cleanup efforts.
- Together, we will make our home and our world a cleaner, greener place!

Reflection with Lofu & Kofu

After learning about Kuda Daan, Lofu and Kofu felt inspired to make a change in their own lives and community. They started practicing mindful waste disposal and encouraged their friends and neighbors to do the same. They realized that by treating waste with respect and responsibility, they were not just cleaning up - they were contributing to a healthier, more sustainable world.

"It's amazing how something as simple as waste can make such a big difference if we handle it properly."

"Yeah, and it's not just about us. It's about showing respect for the Earth and all living things. 'Kuda Daan' has really changed the way I think about waste."

With this new understanding, Lofu and Kofu were more committed than ever to being responsible stewards of their environment. They knew that by spreading the message of "Kuda Daan", they could help create a cleaner, greener future for everyone.

Test your knowledge

Submit your responses using the QR code on the next page.

1. Match the following

(i) Kuda Daan	(a)Conserving resources through minimal use
(ii) Upcycling	(b) Respectful donation of waste
(iii) Reduce	(c) Transforming old material into something new and useful

2. Fill in the blanks

(i) The concept of _____ reimagines waste disposal as a respectful act.

(ii) By adopting the mindset of "Kuda Daan," we can shift our perception of waste from a burden to a _____.

3. Tick the correct answer

(i) What does the term "Kudadaan" traditionally mean?

(a) Composting

(b) Dustbin

(c) Recycling

Activity 7

Parent-Student Activities

- **Home Waste Audit:** Spend a weekend tracking all the waste your family produces. Identify what can be reduced, reused, or recycled. Discuss how you can make better choices as a family.
- **Composting Project:** Start a compost bin in your garden or balcony. Use kitchen scraps like vegetable peels, fruit skins, and coffee grounds to create rich compost for your plants. It's a great way to reduce waste and nourish your garden.
- **DIY Reuse Crafts:** Get creative with your waste! Use old newspapers to make paper mâché, turn empty jars into storage containers, or make bird feeders out of plastic bottles. These fun projects not only reduce waste but also bring the family together.
- **Neighborhood Clean-Up Drive:** Organize a clean-up drive in your local park or beach. Invite neighbors and friends to join. It's a great way to keep your community clean and show everyone the importance of waste management.

Moral of the Story

Lofu and Kofu's story teaches us that small actions can create big changes. Initially unaware of how their habits affected the environment, they learned about the importance of waste segregation, composting, and reducing plastic use under the guidance of Mr. Guru. These simple practices not only helped them reduce waste but also made their surroundings cleaner and healthier.

A key realization they had was the importance of respecting waste collectors, who often go unnoticed despite playing an essential role in keeping our communities clean. Lofu and Kofu learned that by showing appreciation and understanding the dignity of their work, we can foster a more respectful and responsible society.

The journey also highlighted the power of community effort. Lofu and Kofu involved their families, friends, and even their school to bring about change, proving that when people work together, they can achieve great results. This collective effort makes a lasting difference in protecting the environment.
They also embraced the 3 R's—Reduce, Reuse, and Recycle. These three simple steps helped them minimize waste, conserve resources, and reduce pollution. By incorporating these into their daily routines, Lofu and Kofu learned how easy it can be to make a positive impact.

Ultimately, Lofu and Kofu's journey serves as a reminder that anyone, no matter how young, can become an environmental steward.

Through small, thoughtful actions, we all can be role models for our community. Their story also encourages us all to take responsibility for our planet, showing that anyone can contribute to a cleaner, greener future.

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"Lofu and Kofu's - Wonders in Waste" follows two curious children as they learn about waste management and environmental responsibility. Guided by Mr. Guru, they explore the impact of waste, the importance of waste management, and see waste in a new light.

www.hclfoundation.org