

Teacher's Guide

Garbage In, Garbage Out

Period 3

Based on the NCERT curriculum for Standard VI



JANAAGRAHA CENTRE FOR CITIZENSHIP & DEMOCRACY

Janaagraha's initiative to improve citizen engagement in India's democracy through their civic learning program

Developed in collaboration with Young Leaders for Active Citizenship (YLAC)

Garbage In, Garbage Out | Teacher’s Guide (3/3)

Period 3

Class VI
 Board – CBSE
 Subject – Science
 Textbook – Science Textbook for Class VI (NCERT)
 Chapter 16 – Garbage In, Garbage Out
 Number of periods – 03
 Length – 85 minutes

Section I: What are we going to learn and why is it important?

Lesson overview

The lesson introduces students to the recycling process for paper and plastic waste. Students will also learn the 4Rs — Refuse, Reduce, Reuse, and Recycle.

Learning objectives

- Learning the importance of recycling waste.
- Understanding the process by which paper and plastic is recycled.
- Studying the dangers posed by plastic waste, and why recycling plastics is not enough.
- Learning the 4 R’s of waste management—refuse, reduce, reuse, and recycle.
- Having knowledge of the best practices for responsible consumption.
- Understanding the role of the Government in responsible consumption.

Learning outcomes

- Moderating consumption to reduce garbage generation. Actively refusing the use of single-use plastics and reducing the amount of plastic consumed overall.
- Understanding the importance of 4 R’s (refuse, reduce, reuse and recycle) in managing waste and practicing it in their daily lives.

Key terms

Recycling	Plastic	Refuse	Reduce
Reuse	Single-use plastic		

Section II: How are we going to learn

Introduction

Time: 5 minutes

Facilitation notes:

- In the last class, we discussed how we should segregate and dispose organic waste.
- Today, let's talk about ways to dispose paper and plastic!
- Have you heard of the term recycling? What does it mean? *[Take a couple of responses]*
- Simply put, recycling is the process of converting waste into reusable material. For instance, taking old paper and making paper bags out of it is recycling and so is using old bottles to make lamps!
- Why should we recycle? One reason is of course, this :D *[Note to the teacher: Please show the following image to the students]*
- Why else should we recycle? *[Take responses from students, and add from the list below, wherever required]*
- It reduces the amount of garbage that would have been produced. Pollution of the air, water and soil is reduced.
- It conserves natural resources like minerals, trees, etc. used to produce these objects.
- It saves energy, since it takes more energy to produce items with raw materials than from recycling used materials.



Image source: [Goblyn Comics](#)

Recycling

Time: 5 minutes

Facilitation notes:

- What is the kind of waste that can be recycled? Can wet organic waste be recycled? What about dry waste like metal, plastic, glass?
- Wet organic waste cannot be recycled. It is best composted. Inorganic dry waste like glass, paper and plastic can be recycled. Even electronics like batteries, TV etc. can be recycled and the metal in these electronics and other parts can be reused to create new stuff!
- Let's start with paper and see how recycling works!

Activity – Recycling Paper

Time: 30 minutes



Objective: To demonstrate how paper can be recycled at home.

Link: [Youtube](#)

Materials needed:

- 4-5 sheets of newspapers
- Water
- Bucket
- Mesh/ Cloth fitted on a frame
- Old cloth

Approach:

- Tear a few sheets of newspaper into small pieces.
- Put these pieces in a blender and mix with water and let it soak for a while. Make a thick paste of paper by running the mixer.
- Spread the paste evenly on the mesh.
- Wait for the water to drain off. Use an old cloth to absorb any extra moisture.
- Carefully remove the layer of paste from the mesh and leave it overnight to dry.

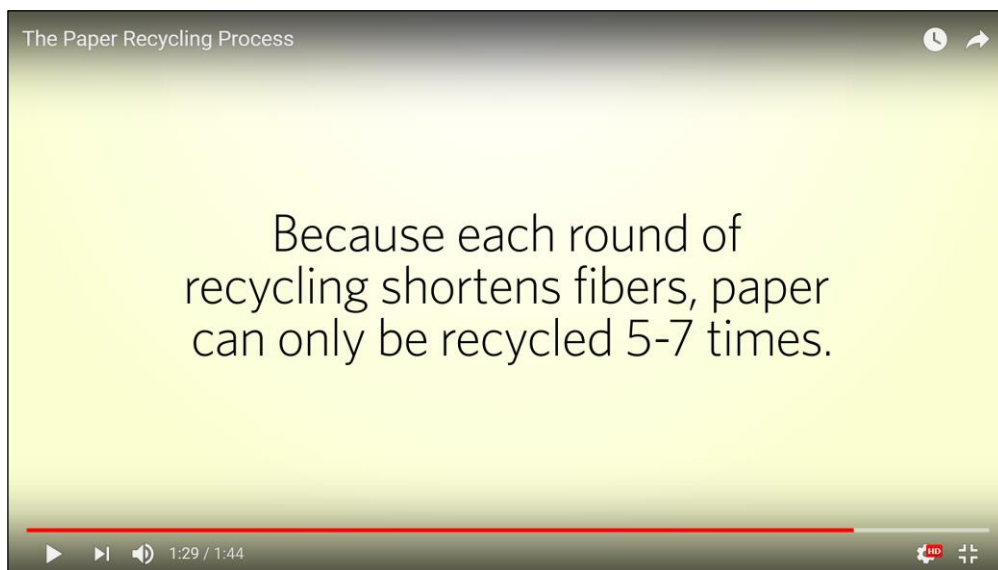
[Note to the teacher: In case it is difficult to run this exercise in class, please play the above video for the students to watch. They can use the steps demonstrated in the video to make their own recycled paper at home.]

De-brief:

- Each person in India consumes an average of 10 kg of paper every year. This includes the newspapers that come to our homes each morning. Like the newspapers, most of the paper used by us is used only once and thrown out soon after. While newspapers are thrown away almost daily, notebooks and other such stuff gets thrown away in 5-6 months!
- Recycling this paper will be hugely beneficial for the environment. We would save many trees!
- But unfortunately, we don't do this that well. India recovers only 20% of its paper waste through recycling. In countries like Germany, the number is much higher - 73%!



- So, it'll really help if we were to become more conscious of this. But, can a piece of paper be recycled endlessly? If so, we would never have to cut another tree!
- Let's see a video to understand this.



Video: The Paper Recycling Process

Link: [Youtube](#)

The main disadvantage is that paper can be recycled only 5-7 times. After that, it no longer is useful.

So, while we should definitely recycle paper, we should also try to reduce our consumption of it.

Recycling Plastics

Time: 10 minutes

Facilitation notes:

- Now let's talk about plastics. **Plastics** are all around us. Can you give examples of the different plastic items that we use everyday? *[Take responses from students]*
- We produce and use so much plastic that it forms the largest part of the garbage that we throw out of our homes and offices. Unfortunately, plastics are harmful to our health and the gases released when they are burned can even cause cancer. Moreover, plastic waste when consumed by animals, birds, and fish can be very dangerous to them.
- Have you ever wondered how plastic gets produced and what happens to it when we use and throw it away?



Video: What really happens to the plastic you throw away

Link: [Youtube](#)

De-brief

The increasing production and consumption of plastics is a great problem for the world. Fortunately, if properly recycled, plastic pollution can be contained and managed.

All of us must make a strong effort to make sure that we don't throw or burn plastics, but responsibly recycle them.

But, where should one go to recycle?

Who should I go to recycle my stuff?

Time: 5 minutes

Note to the teacher: Please show the following image and explain the different options. Please highlight that special care must be taken to recycle electronic items because the process is complicated and must be left to vendors who know how to handle it properly. [Image source: [Daily Dump](#)]



The 4 Rs of Waste Management

Time: 10 minutes

Facilitation notes:

- But, while recycling is a good thing, it takes a lot of energy to recycle material and the process is not 100% effective. For instance, paper cannot be recycled more than 5-7 times.
- While many plastics can be recycled, it is not enough to merely recycle plastic waste. In fact, a large amount of plastic waste cannot be recycled (Example: plastic packaging that is composed of layers of plastic as well as metal that cannot be separated).
- Therefore, to save our planet, we need to engage in more drastic action to decrease the amount of waste that we generate.
- The 4 Rs of waste management is one such method: **Refuse | Reduce | Reuse | Recycle** should be the mantra that all of us adopt!

<p>Refuse</p>	<p>Refuse disposable, single-use plastic whenever and wherever possible. Choose items that are not packaged in plastic, and carry your own bags, containers and utensils.</p> <p><u>Single-use plastics</u> are those plastic products, like straws and plastic wrappers, that are used only once before being thrown as waste. To the extent possible, try not to use single-use plastics. Say 'no straw, please' and 'no bag, please' when offered plastic straws and plastic bags.</p>
<p>Reduce</p>	<p>Reduce how much stuff you use, since that will reduce how much waste your produce. Buy only what is necessary and only if you will use all of it!</p>
<p>Reuse</p>	<p>Reuse items instead of throwing them away and buying new products. Take washable cups or mugs with you to the cafe instead of using disposable cups.</p> <p>When you do use disposables like plastic cups, plates, and utensils, don't throw them away! Wash and reuse them—most of them will last for a long time with many uses.</p>
<p>Recycle</p>	<p>Finally, recycle what you can't refuse, reduce or reuse. Lots of things (like cans, bottles, paper, and cardboard) can be remade into either the same kind of thing or new products.</p>



Let's see how this can be applied to our daily life and help us **Live the Zero Waste Life!**

Note to the teacher: Please distribute copies of the **Live the Zero Waste Life** section in the appendix or project it on the screen. Select 4 students to read out each of its sections - Zero waste by you; Zero Waste from your home; Zero Waste at the restaurant; and Zero Waste Buying tips. Conclude with the call for advocacy.

Image source: [Institute for Local Self-Reliance](#)

Role of the Government

Time: 5 minutes

Tamil Nadu to ban use of plastic items from 2019

PTI | Updated: Jun 5, 2018, 17:44 IST

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The ban would cover these plastic articles irrespective of their micron size. (Representative Photo)

CHENNAI: The Tamil Nadu government announced on Tuesday it would ban the use of plastic items, including non-biodegradable carry bags, from January 2019 to "gift a plastic-free" state to future generations. Chief Minister K Palaniswami's announcement in the state assembly coincided with International Environment Day.

The ban on manufacture, sale,

Image source: [Times of India](#)

Facilitation notes:

- The government has a big role to play in promoting responsible consumption. For instance:
- In many states in India, the government has banned the use of plastics, especially thinner plastics that are more harmful. For example, Maharashtra has banned all kinds of plastic bags, plastic cutlery such as spoons, forks, plates, and food containers, plastic packaging, and plastic bottles.
- The government also imposes taxes on items are considerable unfriendly to the environment

- It also supports organizations and makes recycling activities more easily available.
- But, while the government can form rules, it cannot be successful unless citizens offer support by following the 4Rs principle. This is where you and we come in.

Section III: Assessment

Time: 10 minutes

Give each student the following list of items of daily consumption and ask them to classify these under Refuse, Reduce, Reuse, and Recycle.

S. No	Item	Which R?
1.	Plastic straw	
2.	Newspaper	
3.	Coffee mug	
4.	Packaged food	
5.	Plastic bag	
6.	Broken glass bottle	
7.	Steel utensils	
8.	Plastic spoons and forks	
9.	Tissue paper	
10.	Soft drink cans	
11.	Cloth bag	
12.	Air-conditioning	

Correct answers are as follows:

S. No	Item	Which R?
1.	Plastic straw	Refuse
2.	Newspaper	Recycle
3.	Coffee mug	Reuse
4.	Packaged food	Reduce
5.	Plastic bag	Refuse
6.	Broken glass bottle	Recycle
7.	Steel utensils	Reuse
8.	Plastic spoons and forks	Refuse
9.	Tissue paper	Reduce
10.	Soft drink cans	Recycle
11.	Cloth bag	Reuse
12.	Air-conditioning	Reduce

Homework

- 1) Use existing plastic waste at home, like empty bottles, bottle caps, egg cartons, wrappers to make creative craftwork. It is important that the students use existing waste and not buy new items for the homework. Examples of possible craftwork can be found [here](#)

- 2) Ask students to visit ten families in their neighbourhood and find out whether they are reducing wastage by practicing the 4Rs. If they are, then students must note down the steps being taken by each of the families. Ask students to analyze if people are aware of the importance of 4Rs, and if not, what actions would they take to create awareness on the same.
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Section IV: Closure

Summary by students

Note to the teacher: Select a student at random to summarize the key points of the session and why this particular session is important.

Recap by the teacher

Time: 5 minutes

- Recycling is the process of breaking down waste material and converting them into reusable objects.
 - Inorganic waste, such as paper, plastic, metal, and glass, can be recycled.
 - However, recycling is not 100% effective and also consumes a lot of energy.
 - Plastics in particular are harmful to our health, dangerous to wildlife, pollute the environment and poison the food chain.
 - Given the massive amounts of garbage produced by us daily, it is important to follow the 4 Rs of waste management—refuse, reduce, reuse, and recycle.
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Section V: Field Visits

Students can be taken to the following units as field visits in **Bengaluru**:

Government-run Plastic Recycling Unit (through SWMRT)

Location: Yelahanka Town

Permissions: No permission is required. Organizers to be informed 2-3 days in advance for the visit.

The staff at the facility briefly explains the process.

Time: 45 minutes

Students can be taken to the following units as field visits in **New Delhi**:

MCD Waste-to-Energy Plant

Location: Narela–Bawana

[Note: This plant has received criticism for not meeting expectations. A news report on the same can be found [here](#)]

Students can be taken to the following units as field visits in **Mumbai**:

BMC Waste Management Centre (in partnership with Aasra Welfare Association)

Location: Bandra H/West Ward

Section VI: Additional resources

Resources for students

Video: Responsible recycling of e-waste

This video explains that kabaadiwalas are not the best people to recycle e-waste and we should take special care to dispose e-waste with special vendors.

Link: [Youtube](#)

Resources for teachers

1. Video: Paper recycling process explained

The video talks about the chemistry behind the paper recycling process

Link: [Youtube](#)

2. Video: Recycling of Paper in India

The process of recycling of paper at a plant in Meerut, Uttar Pradesh

Link: [Youtube](#)

3. Video: Plastics 101

This video talks about how plastic is created and what we can do to slow the lasting repercussions this material will have on both our planet and our lives.

Link: [Youtube](#)



4. Video: What happens to plastic we through away

Link: [Ted Ed](#)

5. Video: Takeout creates a lot of trash. It doesn't have to.

This video talks about environmental cost of food delivery at your doorstep



Link: [Youtube](#)

6. Video: Going green shouldn't be this hard

Link: [Youtube](#)

Appendix

Live the Zero Waste Life!

	<p>Zero waste by you</p> <ul style="list-style-type: none"> • When you step out, always remember to carry your water bottle • Always remember to carry a cloth shopping bag • Instead of tissues, wet wipes – use a handkerchief! • Use reusable steel plates/cups for parties instead of using disposables
	<p>Zero Waste from your home</p> <ul style="list-style-type: none"> • SEGERGATE your waste at source • Store your dry waste separately and give it to the kabadiwala or take it for recycling to an authorized dealer

	<p>Zero Waste at the restaurant</p> <ul style="list-style-type: none"> ● Avoid the use of straws ● Do not take extra ketchup/butter/jam/sugar sachets. Most of them end up in bins without even being opened. ● Be a little thoughtful about how many tissues you are using ● Use the hand dryer instead of the hand tissue in the washroom
	<p>Zero Waste Buying tips</p> <ul style="list-style-type: none"> ● Refuse carrybags ● Buy products with minimal packaging ● Stop using one-time-use-and-throw items like disposable cups and spoons ● Shoes and clothes have limited recycling potential.....REDUCE ● REPAIR instead of REPLACE



Finally, do talk about all of the above to people around you!

Source: Individual Waste Management by Saahas. [The above is an adapted version of the guidelines provided by Saahas on their website [here](#)]

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