Packaging

Before you Begin

"Packaging" is "material" used to wrap or protect goods. Packaging as a technology is used for enclosing or protecting products for distribution, storage, sale, and use. Packaging is used in different industries including aerospace, beverages, chemicals, hospital, pharmaceuticals, food, to name a few.

Packaging is also used as a means to provide information (contents of packaging, ingredients, quantity, date of manufacture and expiry and cost of product to name a few) to consumers. Packaging comes in different forms, in different sizes and uses different types of materials depending on the items or the products they are protecting. Packaging can be for a product as small as a tissue wrap for a burger or as large as a shipping container.

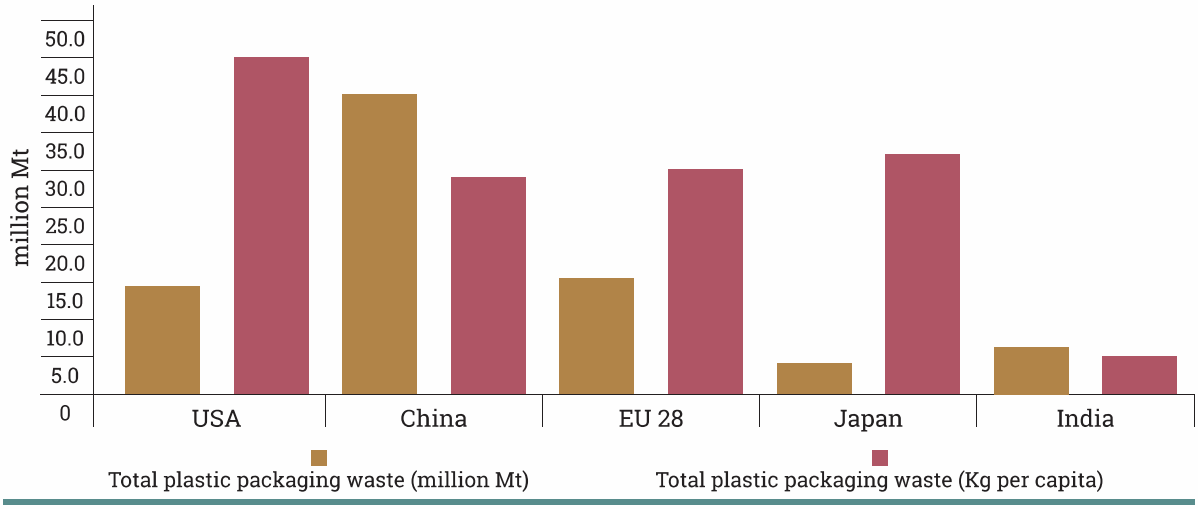
There are a number of benefits to packaging, some of these include

- barrier protection - packaging material serves as a barrier and protects the product from factors like dust, water, and other contamination.
- physical protection - is to product the packaged product from dropping, shock, extreme temperature and vibrations to name a few.
- convenience - in terms of distribution, handling, stacking, opening and closing, reuse, recycling, etc.
- security - to increase safety in terms of tampering, theft, etc.
- sustainability - returnable and reusable packaging could be used a number of times prior to recycling.

As per Eurostat website, in Europe during 2015, 166.3 kg of packaging waste was generated per inhabitant in the EU (varying from 51.2 kg per inhabitant in Croatia and 222.2 kg per inhabitant in Germany). From 2006 to 2015, paper and cardboard was the main packaging waste material in the EU (34.8 million tonnes in 2015) followed by plastic and glass (15.9 and 15.8 million tonnes respectively).

As per UNEP, The single use packaging is one the biggest environmental challenge. Plastic packaging is mostly single-use, especially in business-to-consumer product, and a majority of it is discarded the same year it is produced. Nearly 50 percent of the plastic waste generated globally in 2015 was plastic packaging. Much of this packaging, including polystyrene and other plastics, does not break down quickly and when they are disposed in landfills, they create long-term environmental problems. The production of of packaging uses natural resources including water, and electricity that has independent environmental impacts. By products of manufacturing are also a concern.

Plastic packaging waste generation, 2014 (million Mt)



Source: UN environment singleUsePlastic_sustainability

Purpose of Packaging

Lesson 1 Plan

INTRODUCTION

Packaging provide protection during transportation and storage, convenience as it makes the use easy and is important image or brand identity to create appeal to buy. One important aspect is the bundling of the product for different market segments. Sustainability is one important aspect that is seeing some positive action and commitment.

The lesson plans engages students in observation and exploration of the world of packaging and share their learning with students in different countries.

Objectives:

Students will be able to

- identify different types of packaging available for any given type of product.
- explain the reasons for different types of packaging.
- find examples of more sustainable types of packaging for select products.
- research the types of packaging available for some common types of products (share the same across two different YRE counterpart countries).

YRE steps: Investigate, Research Solution, Report, Disseminate

Curriculum Linkage: Science/ Environmental Studies/Social Science

Young Reporters for the environment

11-14 Years

Time required/ Duration:

- **Classroom Session 1:** 40 minutes classroom interaction including (20 min for background introduction & brainstorming, 20 min for group discussion).
- **Group Assignment 1:** 15 to 30 days in all (seven days for identifying a YRE counterpart school and seven days for research on packaging material).
- **Classroom Session 2:** 45 minutes for groups to present the findings of their research and classroom based discussions for the same.
- **Group Assignment 2:** Two to seven days for student groups to convert their research into an article.

Resources Required:

- A few examples of packaging. Some suggestions
  - Milk packaging (plastic pouches/ milk cans/ tetrapak/ glass bottles)
  - Juice (PET bottles/ Tetrapak/ etc.)
  - Cereals
- Student stationery
- Laptop/ computer with internet connectivity
- Resource - 2 (Worksheet for Packaging material) and Resource - 3 (Purpose of Packaging)

4 QUALITY EDUCATION

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Activity

Classroom session 1

- Brainstorm with students examples of different types of packaging materials (cardboard, glass, wood, hay, leaves, plastic, etc) and introduce to them the importance of packaging.
- Ask students to display to students some of the packaging material they have carried with them to class (as mentioned in resource required).
- Discuss with students the purpose of packaging. They could get students to look at different information available on the packaging including date of manufacture and expiry, contents, ingredients, weight in terms of quantity, costing, company and place of manufacture, etc.
- Assign students into groups of 4-5 members.

Group Assignment 1

- The group assignment is divided into two major assignments, to be undertaken over a period of 15 days.

(I) Twinning with a YRE counterpart school from a different country

- Simultaneous to forming student groups, with the help of the YRE National Operator, initiate the process of selecting a counterpart school in another country.
- Share with the counterpart school, the list of different products selected for the packaging research.
- Discuss with the counterpart school that the said research needs to be conducted over a period of seven days/ else discuss with the school and arrive at a suitable duration for undertaking the research.

(ii) Packaging material research by student groups

- Guide students groups to select one product. This product should also be discussed with the YRE counterpart school to ensure uniformity of the product being researched.
- Allocate one week time to student groups to research on the different types of packaging materials available for the product which has been selected by that group.
- Guide students to list the purpose of the different types of packaging. Resource 2 (worksheet for packaging material).

Activity

Classroom session 2

- Ask each group to present the findings of their research in 5 minutes each.
- Some points around which teachers should guide student discussions include purpose of packaging, environmental sustainability and alternatives students can think of (either in terms of material/ technology/ re-usability).
- This discussion will help students understand packaging which is essential and which can be done away with.

Group Assignment 2

- Allocate one week time to the groups for presenting their research as an article.
- Share the article with the YRE counterpart school. Explore possibility of a joint article.
- Share the article on other platforms including school website/ facebook page, school assembly, among others.

  - For article: Refer Lesson Plan 1 from chapter "Learning to be an Environmental Journalist"

Evaluation:

Evaluate student articles to understand how well they have understood and communicated the concept of packaging in terms of purpose of packaging and environmental sustainability.

Resource 3

Worksheet for Packaging material

(You must have seen your parents buying different things for the house? Try and find out what these things were packaged in. Look at the list below and tick the appropriate packaging item)

Name of the Product	Type of Packaging material				
	Paper	Plastic	Glass	Metal	Other (indicate what)
Chocolate					
Biscuit					
Cake					
Bread					
Eggs					
Vegetables Cereals and Pulses (Rice, Wheat, Maize) Milk					
Soap					
Toys					
Shoes					
Clothes					

Resource 4

Purpose of Packaging

Product	**Different**	**Types of packaging of the product**	**Purpose of Packaging**			
			Protection (transportation without spoiling and/ or breaking)	**Convenience** (ease of use)	**Image** (shelf-appeal, brand awareness)	**Sustainability** (reduction of environmental impact)
Milk	Tetrapak	Glass bottles Plastic (Milk packets, bottles, etc) Metal Cans No packaging				
Cereals (wheat, rice, ready to eat cereals)						
Juice						

Smart Shopping Choices

Lesson 2 Plan

INTRODUCTION

In any market, consumers decide what is sold to them in what quantities. Consumers by picking right can influence the producer in a big way. Advertising can manipulate consumers but a consumer who thinks critically with environmental consciousness can make lots of difference to shape the market.
The lesson plan take students through a process that would lay the foundation for values which can help them move from individual acts of consumption to broader changes influenced by collectives like any democratic processes that can lead to solving our environmental problems.

Objectives:

Students will be able to

- explain packaging waste has an impact on the environment.
- identify perspective and present consumers concerns about packaging waste.
- design and implement a campaign to address packaging waste.

YRE steps: Investigate, Report

Curriculum Linkage: Science/ Environmental Studies/Social Science/ Numeracy and Mathematics

Young Reporters for the environment

13-16 Years

Time required/ Duration:

- **Classroom Session 1:** 45 minutes for the teacher to do a background introduction on the impacts of packaging waste on the environment, and how to go about conducting the consumer survey.
- **Group Assignment 1:** One week time provided to each student to undertake the Consumer survey; each student group to undertake survey with at least 4-5 consumers.
- **Classroom Session 2:** 90 minutes for consolidating and presenting the student surveys.
- **Classroom Session 3:** 45 minutes for brainstorming campaign ideas (skit/ musical) for promoting information about responsible choices and disposal of packaging material.
- **Group Assignment 2:** 15 days for implementing the campaign (3-4 times over 15 days).

Resources Required:

- Resource 4 (Consumer Survey Form)
- Writing material
- Materials for implementing the campaign

4 QUALITY EDUCATION

11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Activity

Classroom session 1

- Brainstorm with students examples of different types of packaging materials (cardboard, glass, wood, hay, leaves, plastic, etc) and thereby introduce to them the importance of packaging.
- Discuss and introduce to students the impacts created by packaging waste on the environment.
- Explain to the students about the survey to be undertaken by them in individually/in groups to find out what consumers feel are the impacts of packaging waste. Discuss the survey sheet prior to undertaking the survey.
- Discuss and guide the students on how to approach consumers requesting them to help complete the survey.

Group Assignment 1

- Provide students one week time to get responses to the Consumer Survey Form.
- The Consumer Survey Form has 20 questions, students should be informed that it might take about 30 minutes for respondents to complete the survey.
- Each group could interview a minimum of 4-5 members.

Classroom session 2

- Ask the students to tabulate the findings and organize the response received.
- Ask the students to analyse and present the results. This should be done through classroom based discussions and student groups should be encouraged to represent the results in the form of a infograph.
- The infographs prepared should be displayed on the Eco-Schools bulletin board.

Classroom session 3

- Based on the survey results guide the students to identify key messages to develop a campaign plan for creating awareness about packaging waste.
- As part of the campaign plan let the students choose their media like short skit (7-10 min duration should be ideal) or create a musical (about 7-10 min) addressing the problem and highlighting some solutions.

Activity

Group Assignment 2

- The skit or the musical prepared by the students should be performed by them in front places like a shopping mall to create awareness regarding packaging waste.
- Teachers might have to take permission from the mall authorities for the same.
- The awareness should be created a minimum of 3-4 times over the duration of 15 days. A video can be made of the performance and shared on social media.

  - For video: Refer Lesson Plan 5 from chapter "Learning to be an Environmental Journalist"

Evaluation:

Subsequent to the surveys teachers/ facilitators should be able to help students conclude the consumer opinion about impacts of packaging waste on the environment.

Campaign evaluation: some of the bystanders who watched the student performance should be asked what they felt regarding the same.

Resource 4

Consumer Survey Form

1. The survey should help assess what consumers feel about packaging?
2. The survey should help understand whether consumers are concerned about how packaging waste affects the environment.
3. The survey should help understand whether the consumer plans to take any action to reduce packaging waste.

Are you a consumer?	Yes	No
Name any 3 products you consume regularly		
Do you think these products contain packaging?	Yes	No
Name 5 different types of packaging material that you can think of		
When you purchase milk, packaged in different forms like pouches, tretrapaks, or bottles, do you think of recycling any of these packaging	Yes	No
Do you think these packaging materials to package milk are harmful to the environment?	Yes	No
Why?		
Do you think of packaging when you buy a product e.g. shampoo? Would you opt for: sachets / small throw away bottles / larger containers		
Do you think your choice of purchasing a shampoo in one of the above packaged forms can make a difference?	Yes	No
Can you mention why and how?		
When you shop for vegetables would you buy fresh vegetables cut and cleaned vegetable stored in different packaged materials including plastic disposable trays, polystyrene trays, etc		

Do you think your choice makes a difference? How and Why?

When you go shopping, would you care to carry your bag Yes No

If No, choose one of the following:

- Do you go to a store and demand for a carry bag
- Do you think it is the responsibility of the store to give you a carry bag?
- Do you think it is your responsibility to take a bag with you when you go for shopping?

When you shop do you look for packaging which is made from recycled material? Yes No

Do you look at the packaging for any of the following? Grade them from 1-5 in the order of your priority

Expiry date

Recycling symbols

Contents of packaging

Material of packaging used

Cost of the product

Offers like buy one get one free/extra content for free

Do you save packaging material for recycling Yes No

How do you dispose different packaging items like plastic bottles, corrugated sheets, glass bottles, Tetrapak, Aluminium cans

Throw away as mixed garbage Segregate for recycling

What kind of packaging material are you most likely to return for recycling?

Plastic bottles Corrugated sheets Glass bottles Tetrapak Aluminium cans

Why?

Do you think you must help reduce packaging waste Yes No

Why?

Finding Solutions

Lesson 3 Plan

INTRODUCTION

Large scale production and transportation, safe and hygiene issues and changing lifestyles has made packaging a necessary component of the food industry. The Containers and packaging alone contribute over 23 percent of the material reaching landfills in the United States of America. Additionally, the food packaging waste is the most common litter that effects variety of fauna like cattle, fishes, birds, and other aquatic wildlife that ingest these.

Rethinking packaging can conserve energy and reduce greenhouse gas emissions apart from protecting our wild life. Design thinking is a critical skill to look for solutions that have been created and re-imagine our futures. The lesson plan gives an opportunity to children to look at the very common problem of food packaging waste and start the change process for a better world.

YRE steps: Investigate, Research Solution, Report, Disseminate

Curriculum Linkage: Global citizenship

Young Reporters for the environment

15-18 Years

Objectives:

Students will be able to

- research and understand local traditional and technological interventions to deal with food packaging waste.
- communicate local traditional and technological interventions to deal with food packaging waste.

Time required/ Duration:

- **Classroom session 1:** 45 minutes for the background introduction and round table group discussions.
- **Home assignment 1:** 12 hours over a month for students to undertake internet based search about solutions to food packaging and more.
- **Classroom session 2:** 45 minutes for discussion regarding research by students prior to putting a report as an article/video photo story.
- **Home Assignment 2:** One week for individual students to present their report.

Resources Required:

- Internet
- Computer/ Laptop
- Writing materials
- Resource 5 (Food packaging and more)

Activity

Classroom session 1

- Introduce students to food packaging and discuss various packaging material being used and what could be the plausible reason for the same.
- Discuss some existing practices and technologies related to waste associated with food items.
- Encourage them to identify problems with the current material/design of packaging and suggest solutions for the same.
- Facilitate a round table discussion of students, get them to go through each of the case studies mentioned in Resource 5 (food packaging and more).

Home Assignment 1

- Guide students to undertake an internet based study to understand the different traditions, current practices, technology and interventions which could help take care of packaging waste associated with food items.
- Agree with student groups on the time to undertake this research.

Classroom session 2

- Ask the student groups to present the outcome of their research.
- Engage students in a discussion to help summarise their research prior to guiding them to write an article/video photo story about the same.
  - For article: Refer Lesson Plan 1 from chapter "Learning to be an Environmental Journalist"
  - For photo: Refer Lesson Plan 4 from chapter "Learning to be an Environmental Journalist"
  - For video: Refer Lesson Plan 5 from chapter "Learning to be an Environmental Journalist"

Home Assignment 2

- Ask each student to work in groups for the reports.
- Encourage student articles to publish on different platforms - local newspapers, school website, or could briefed by students during the school assembly.
  - For article: Refer Lesson Plan 1 from chapter "Learning to be an Environmental Journalist"

Evaluation:

Student articles could be evaluated based on innovations/ technologies they have been able to research and put across in the same. Please note that some could be just conceptual ideas.

Resource 5

Food Packaging and More….

1. Story of the Mumbai dabbawala's:

"The 5,000 or so *dabbawalas* (Tiffin/Lunch Boxes Carriers) in the city have an astounding service record. Every working day they transport more than 130,000 *daabas* or lunch boxes throughout Mumbai, the world's fourth-most-populous city. That entails conducting upwards of 260,000 transactions in six hours each day, six days a week, 52 weeks a year (minus holidays)"

"On any given day, a *dabba* changes hands several times. In the morning a worker picks it up from the customer's home and takes it (along with other dabbas) to the nearest train station, where it is sorted and put onto a wooden crate according to its destination. It is then taken by train to the station closest to its destination. There it is sorted again and assigned to another worker, who delivers it to the right office before lunchtime. In the afternoon the process runs in reverse, and the dabba is returned to the customer's home".

Excerpts from a study by Stefan Thomke, professor from the Harward Business school, Source: https://hbr.org/2012/11/mumbais-models-of-service-excellence).

Professor Thomke's study was to analyse the amazing delivery system of the Mumbai *dabbawala's* which has been almost flawlessly executed for over a century now (since 1890). Beyond the excellent delivery system in place is the fact that these *dabbawala's* have been using reusable tiffin boxes for the delivery of lunch. Just imagine the volume of waste which will be generated each day, if instead of the reusable lunch boxes, food was transported around in disposable packaging material?!

2. Innovations and Technologies to deal with Packaging Food Waste

Plate bank:

Functions, parties and get-to-gathers at home have increasingly become a large source of waste, especially disposable plastic cutlery. Some individuals and organisations have now come up with innovative techniques as well as technologies to deal with this problem. The eco-friendly plate bank, initiated and maintained by Adamya Chetana, a charity is one of the largest of its types in the city of Bangalore, India. The plate bank has close to 10,000 sets of steel plates, spoons, glasses, cups, etc and can be borrowed by individuals, organizations and educational institutions for events at zero cost. The article by a leading newspaper, Hindu http://www.thehindu.com/news/cities/bangalore/plate-banks-try-to-reduce-disposables-by-lending-utensils/article22454225.ece covered other such initiatives in the city of Bangalore. The idea behind the plate bank in most of these cases is to bring down the volume of waste generated during such events and celebrations.

3. Edible solutions to packaging waste?

Edible spoons and forks manufactured from products including millets (jowar), rice, wheat and different types of spices for the flavouring http://www.bakeys.com/india-innovates-episode-4-edible-cutlery/ ; edible sachets (for beverages, instant mix for noodles) made from sea weed (Source: http://www.evoware.id/); bacteria to produce cellulose which is in turn used to manufacture edible food wrapper (https://www.natureasia.com/en/nindia/article/10.1038/nindia.2012.11) are some of the solutions different innovators are finding to problems associated with packaging of food itmes. These are smaller steps in the direction of reducing packaging waste… .what needs to be seen is how soon we are able to contain the problem in the times to come.

4. Traditional waste-free solutions:

Traditionally leaves of different plants, especially Sal (Shorea robusta) and banana (Musa species) have been in use in India and many other cultures in Asia to make plates and bowls for serving food, especially during functions and festivals. It is such a fantastic way to eat food on these leaves as both the leftover food on the leaf and the leaf itself are not just biodegradable but also consumed by cattle, completely doing away with the problem of disposal of waste.

5. Technology interventions:

MIWA (http://www.miwa.eu/about-us), based in the Czech Republic has initiated various technological interventions to take care of the generation of packaging waste in the first place, by encouraging "pre-cycling", they have approached the packaging problem in a different perspective.

Study the article "These 11 innovations will tackle the causes of ocean plastic pollution, not just the symptoms".

References

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(https://www.weforum.org/agenda/2018/01/these-11-innovations-will-tackle-the-causes-of-ocean-plastic-pollution-not-just-the-symptoms)