

Ecology Note

Towards a Clean, Green and
Beautiful Bhutan





“where we live must be clean,
safe, well-organized and beautiful;
for national integrity, national
pride and for bright future. This
too is nation building.”



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Foreword

It is my pleasure to present this publication, 'Ecology Note: Towards a Clean, Green and Beautiful Bhutan', an educational material prepared by the National Environment Commission Secretariat, the IGES Centre Collaborating with UNEP on Environmental Technologies (CCET) and the Royal Education Council of Bhutan with support from all relevant stakeholders.

The National Waste Management Strategy 2019 identified the lack of public awareness as one of the barriers to achieving Zero Waste Bhutan by 2030. Therefore, engagement of educational institutions is a crucial strategic imperative to bring about behavioural change for successful waste management.

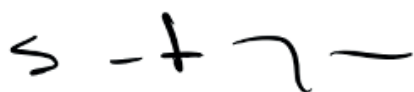
Educating the younger generation from an early age at individual and family level creates higher impacts in the society. Therefore, imparting education and awareness on waste management to our children and its inclusion in the education curriculum is necessary. The Ecology Note is well positioned in the science curriculum for classes 4-8 to better serve students and teachers to tailor their classroom activities with clear goals whereby students are expected to learn and acquire specific skills pertaining to sound waste management.

It is also expected that the waste management education will go a long way to assist students develop both life skills and scientific insights to innovate waste management strategies which subsequently contributes to achieving Gross National Happiness.

I would like to express my appreciation to the focal teachers of "Youth Action for 4R schools". Without their dedication and keen interest towards waste management practices in schools, the inspiration to drive for development of educational material in the first place would not have kindled.

It is my sincere hope that the Ecology Note will facilitate better teaching- learning process in schools, educational institutes, monasteries and other stakeholders of waste management in Bhutan.

Tashi Delek!



Sonam P. Wangdi
SECRETARY, NECS

Message from CCET

Bhutan has preserved highly valuable natural and cultural assets with its globally admired development philosophy - Gross National Happiness. However, like many other countries in South Asia, Bhutan also faces emerging environmental issues including growing waste generation. Waste management is designated as one of the national flagship programmes of Bhutan and environmental education targeting young generation has also been positioned to be an important approaches to achieve sustainable waste and resource management.

In this context, Ecology Note – Towards a Clean, Green and Beautiful Bhutan is developed to foster the ability of students to identify and analyse the issues and to support taking actions through the development of a sense of ownership and responsibility. It includes practical ideas to learn how to promote environmentally friendly and ethical actions for the use of our valuable resources and supports making the learning more alive. I am very pleased that CCET has had an opportunity to collaborate with the National Environmental Commission, the Royal Education Council and other stakeholders in developing this Ecology Note based on its previous experiences in other countries in Asia. I hope that this Ecology Note will be utilized broadly in both formal and informal education systems in Bhutan to support materialization of its national concept Gross National Happiness.



Kazunobu Onogawa

Director, CCET

Message from UNEP IETC

Most countries measure their economic success with a measuring stick called “GDP” (Gross Domestic Product). If a country extracts resources from its natural environment, sells them, and then throws them away, GDP registers this as positive economic growth. In fact, the faster a country uses its natural resources and throws them away, the higher its national economic growth, as measured by GDP, will be. As a result, for most countries, over most of human history, successful strategies to increase GDP growth have also led to increasing volumes of waste.

Unfortunately, the waste generated by all this economic activity can have substantial negative consequences on our climate, environment and human health, and these negative consequences are not captured by GDP measurement. Implementing many of the ‘eco choices’ such as those on page 34 of this report, like not wasting electricity or water in your everyday life, will actually decrease GDP! Luckily for the people of Bhutan, your government has decided to measure GNH (Gross National Happiness) as a more holistic measurement, instead of relying only on GDP to measure national wealth. Unlike ‘domestic product’, happiness increases when we reduce our waste. On behalf of the United Nations Environment Programme (UNEP), I very much hope this booklet will play a constructive role in educating young people on waste challenges in Bhutan and help the younger generation to design and implement solutions, and thereby contribute to Bhutan’s Gross National Happiness.



Keith Alverson

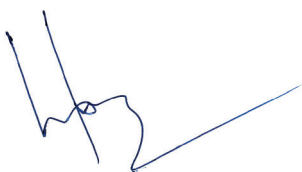
Director, UNEP IETC

Message from the Royal Education Council

Both the purpose and priority of education in the 21st century and beyond is placed on the development of transversal competencies and soft skills that empower learners with critical thinking, creativity, communication and collaboration capabilities. On the premise that conceptual knowledge and information are accessed readily through the ever expanding digital world and technological advancement, education epitomises the development of such skills to succeed in life, for peace and development in society, and in the conservation and protection of the fragile world. It is envisaged that this is better re-enforced through school curricula. Towards this, the Royal Education Council (REC), as the custodian of the Bhutanese school curriculum, endeavours to improve the relevance of Bhutanese education by contextualising learning contents and experiences to our immediate environment and to the larger outside world.

The conceptual ideas and strategies in this Ecology Note offers another alternative option of using environment towards transforming learning to competency based learning quintessential of the 21st century education. This is imperative in serving the humankind by promoting peace and harmony, and in the protection and conservation of their world. Underscoring its significance, there is every reason to integrate the practices of ecology note in relevant subjects like Science, Biology, Social Studies and Environmental Science and delivered through outdoor classes and learning activities, both formally and informally. The real time engagement and interaction with the nature in the efforts of learning and practice of waste management through such curricula bring changes in the perception and shift in the positive mind-set for nature in learners, at the same time immensely accelerating the learning.

The collaboration of REC with relevant agencies in its curriculum initiatives and innovations are proving effective in our efforts of transforming the curriculum paradigm to competency based education, which is the call of the nation and the time. The implementation of Ecology Note as an important supplement of school curriculum exemplifies the objective collaboration between the National Environmental Commission (NEC) and the REC. The REC remains optimistic of the outcome of the collaboration translated into behaviour change in learners on the environment.



Kinga Dakpa

Director General, REC



Waste management has become one of the most serious environmental and public health issues confronting cities and rural areas in developing countries. The twenty Dzongkhags and Thromdes are not an exception in Bhutan. Rapid urbanization, economic growth and changes in life styles and consumption patterns have resulted in a drastic increase of waste volume and variety during the past few decades. According to National Waste Inventory Survey (NWIS) 2019, the total solid waste generated in Bhutan is about 172.16 metric tons per day which corresponds to 0.23 kilogram of waste generated by per person in a day. Consequently, associated cost for the waste management are also increasing besides causing environmental degradation and increasing controversies over waste collection, choice of treatment technologies and location of new land fills.

Bhutan with its developmental philosophy of Gross National Happiness (GNH) is strengthening the conservation and protection of environment. One of the ways to promote sustainable waste management is through integration of 3R practices (Reduce, Reuse and Recycle).

During the Royal Bhutan Flower Exhibition on 1st April 2015, His Majesty the Fifth Druk Gyalpo addressed to the nation, **“where we live must be clean, safe, well-organized and beautiful; for national integrity, national pride and for bright future. This too is nation building”**. Drawing inspiration from the wisdom of His Majesty the King and conscientious of current issues related to waste, priority is to achieve sustainable waste management through integrated approach with the participation of relevant stakeholders including school children, who are next generation of decision makers.

This environmental learning booklet has been prepared based on the ecology note of Phnom Penh, the capital city of Cambodia to provide information, tools and guidelines emphasizing to reduce the amount of waste we generate; reusing and recycling whatever we can, before using landfills or other technologies.

The learning material in this booklet is aimed to provide students with valuable portable skills such as critical thinking, creativity, communication and collaboration in creating awareness and fostering behavioural change towards waste management in the society. Furthermore, it gives ideas on how to incorporate sustainable waste management as environmental education into different subjects such as Science, Social Studies, Economics, Arts, Mathematics and other relevant learning areas.

WHAT IS WASTE?

Waste is any material or substance, in whatever form, solid, liquid, or gaseous, hazardous or non-hazardous, organic or inorganic, that has lost its primary value and is disposed of, intended to be disposed of or recycled. Waste is produced in houses, shops, construction, industries, and hospitals, etc.

MANAGING WASTE IS OUR RESPONSIBILITY

Management of waste is important because it helps in maintaining the cleanliness of the environment we live in. Our health and well-being depends on the cleanliness of the place in which we live. Therefore, it is our responsibility to manage our own waste in a sustainable manner for healthy and happy life.



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Making a Green Map for Our Neighbourhood

Let's find out and discuss on how waste is generated and managed in our neighbourhood





Let's Find out the Present Solid Waste Management in Our Country

Our lives and waste

How much waste is produced around us?



The total solid waste generated in Bhutan in a day is about 172.16 metric tons.

This is equivalent to around 22 truckloads of rice in a Day!

That much solid waste is generated in one day.
What do you think will happen if this situation continues?



Landfill sites will be filled with our waste.

(It is said that landfill sites across Bhutan have already filled with waste and finding new sites is difficult due to lack of land.)



Resources on the earth may disappear.

(If we keep using fossil fuel, coal, and other natural resources, they will decrease fast.)



Learn More

In our society, many goods (things) are produced, used, and thrown away without being used for long time. Afterwards, they are usually collected and ends up in landfill. This type of society is sometimes called Throw-Away-Society. Every time, we throw something away, we are throwing away the materials, energy, money and water that took to produce it. Find out where do your belongings come from? What kind of and how much material it took to make them.

Waste Generation in Our Daily Life Activities

Let's think about all the products we use after we wake up in the morning until we go to bed at night. Imagine if each of these products cannot be used anymore and turn into waste.

Now put the waste generated from home in Home basket and the waste generated in school in School basket.

Toothbrush



Books



Clothes



Pen and pencils



Baby's diapers



Football



Electric bulb



Broken desk



Home



School

Shoes



Left over from packed lunch



Vegetables



Paper planes



Food wrappers



Cardboard boxes



Newspapers



Flower pots



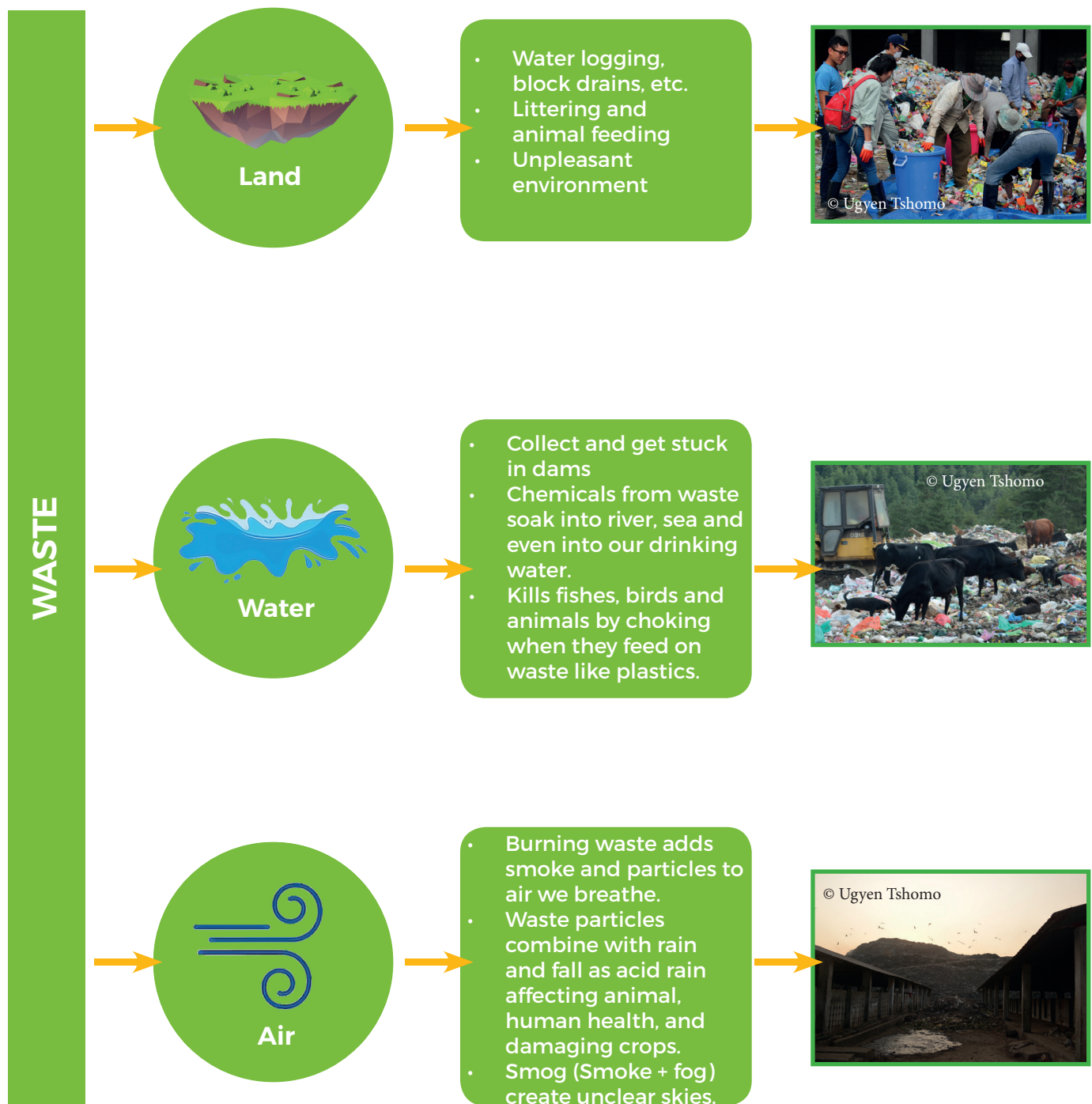
Learn More

Reflection:

Has anyone in the class used any of these items put in the baskets for other purpose? For example, old clothes for mopping floors or football for planting flower? If you have, you already care for our environment. Let's think of how we can use all of these items in the basket for other purpose. Using these again and again for different purpose means that we care for our environment and indirectly our health and well-being. Isn't it our responsibility to save the environment and live healthy?

Issues Related to Ineffective Waste Management

Do you know what happens to our environment as a result if you do not manage your waste at school/home properly?



Can We Identify the Issues Now?

Put a tick mark if you come across the following examples when you go back home or take a walk in the town/park. Discuss with your friends and identify the reasons for them.

☐

I saw plastics floating in the stream/river.

☐

I saw waste littered along the path/park.

☐

I saw smoke from burning waste.

☐

There were dogs/cows feeding on garbage.

☐

I smelt rotting vegetables and fruits.

☐

The streets has a lot of doma spit.

☐

I saw waste bin overflowing with mixed waste.

☐

I saw people wiping lime on walls/pillars while chewing doma.



How often do cleaning campaigns take place in your neighbourhood?

Do you think they are effective and help solve the above problems?

Whose responsibility is it to keep one's neighbourhood clean?

What do you suggest to keep your neighbourhood clean?

Gross National Happiness and Waste

Gross National Happiness (GNH) is the development philosophy of Bhutan which looks into a holistic development of the country and not just money as an indicator for success. The four pillars of GNH are: Sustainable and Equitable Socio-Economic Development, Environmental Conservation, Preservation and Promotion of Culture, and Good Governance.

The waste reduction, reuse, and recycle contribute towards fulfilment of the goals of GNH. Reducing waste helps in reducing expenditure, competition for resources and environment pollution. In many occasions, traditional methods are more sustainable and environmentally friendly compared to modern ways.

One of the indicators under the 9 domains of GNH is “**disposal of household waste**”. Good waste management would thus contribute to a happier, healthier and beautiful Bhutan.

Our Lives and Waste

How preservation of tradition and culture helps reduce waste?

Traditional

Doma carried in
chhaka and *timi*



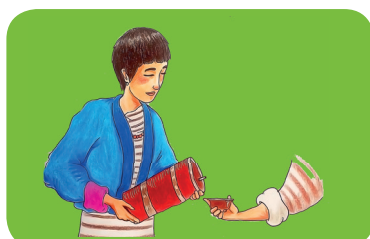
Fruits and
snacks served in
Bangchung



Carry personal
tora and *phob*

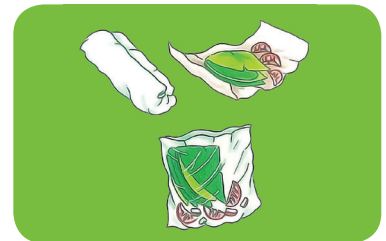


Traditional drink
served from *Palang*



Modern

Doma wrapped
in paper and
plastics



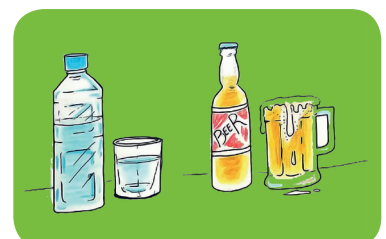
Serving
packaged food
and candies




Meals served in
single use plates
and cups



Juice and
water served in
glass and PET
bottles



Let's Draw Pictures of How Our Life-Styles have Changed

Traditional Lifestyle		Waste: No waste
Modern Lifestyle		Waste: PET bottles, bottle caps, plastic labels.
Traditional Lifestyle		Waste:
Modern Lifestyle		Waste:
Traditional Lifestyle		Waste:
Modern Lifestyle		Waste:



Learn More

Which one would you choose for your annual *choku/rimdro*?

1. Provide meals and drinks in single use plates and cups and packaged drinking water in PET bottles, and make lots of packaged offerings bought from the market.
2. Ask your relatives and friends to bring their own traditional *tora* and *phob* or their plates and cups for meals and make home-made offerings in traditional bamboo and cane baskets?

Do you feel happier if your home and school are clean and safe without waste?

Yes

No

Do You Know about the 3Rs?



What can we do?

Do you know about the 3Rs

First **Reduce** Reduce waste

Try not to generate waste
- use things with care
as much as possible.

Use your own shopping
bag and try not to ask
for plastic shopping bags
from the shopkeeper.

Ask for things you have
bought to be wrapped as
simply as possible.

Then **Reuse** Use things repeatedly

Use things again and
again by remaking or
repairing them.

Repair toys and
clothes instead of
throwing away.

Give old clothing and
toys to others when
you don't need them.

Lastly **Recycle** Turn waste into resources

Recycle waste into
different things to use
them again.

Remake old
newspapers, papers
cardboard boxes into
new products.

Make compost from
kitchen waste in a
compost treatment
container.

Check your “eco” level

Tick what you do from the following

☐

I eat meals without leaving anything behind.

☐

I separate PET bottles and cans.

☐

I give old clothing and toys to someone who wants them or use them differently without disposing of.

☐

I use old newspaper for wrapping.

☐

I use my own bag and don't ask for plastic shopping bags.

☐

I turn off the TV when doing other things.

☐

I don't let the water run when washing my face or brushing my teeth.

☐

I do not leave anything behind after a picnic or eating out.

Count your ticks and think of how you can increase your eco level. If you already have all ticks, what can you do next? Find out the positive impact you have made to the environment with your small steps towards managing your waste.

Religious Activities and Waste

There are 584 schools and around 388 monastic institutions in Bhutan. They can be found in almost every village and mainly on mountaintops across the country. Quite often, they are located in remote locations where waste collection service is limited or not available.

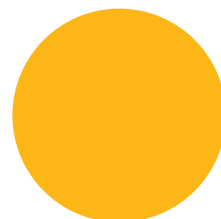
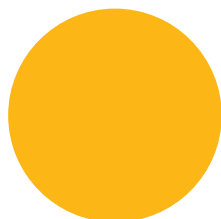
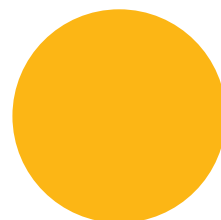
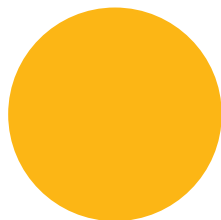
In addition to the religious personnel, the general public also visits religious sites in large numbers. People also attend various religious programs and perform religious rituals at homes. Huge quantities of goods are used for offerings in all religious centers and programs. Currently, some of these offerings and religious activities are not environmentally friendly and results in generating more waste.

What do you think are some waste generated from following religious activities?

Type of Religious Activities	Waste generated
Offerings in Temples	
Religious activities at homes	
Mass religious gatherings such as Wangs, Tshechus, Pujas, Moenlams, etc	
Others	

The waste from the monastic institutions is quite similar to those generated from our homes. Don't you think that we can reduce them?

Discuss with your friends and make a list on how we can do things differently to reduce the generation of waste from religious activities.



Offerings made for Religious Activities with less waste

Discuss the above list in your class as a group



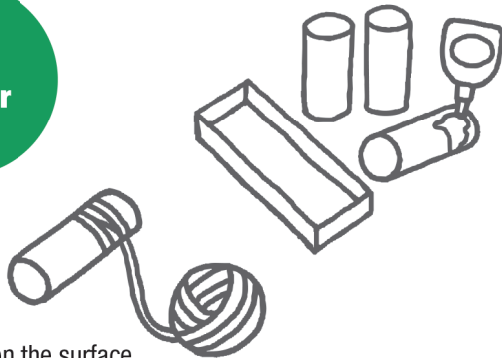
Ideas for Reducing Waste



You can still use them.
Let's try to make
new things
from old materials.

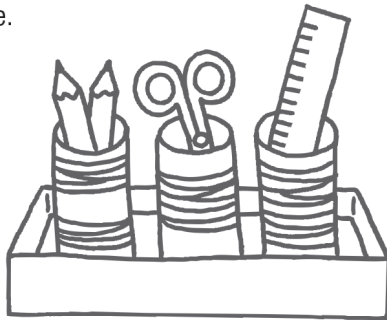


Pen holder

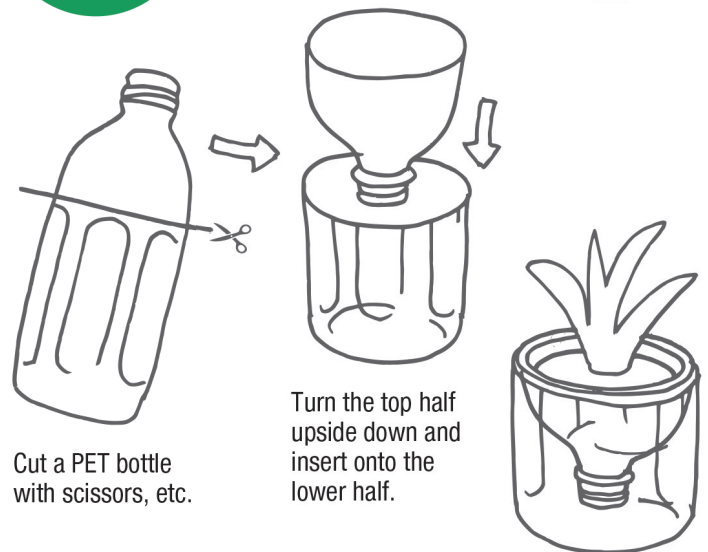


Apply glue on the surface
of used toilet paper core.
Decorate the core with
colorful yarns.

Put the cores in a box,
glue them to the base,
and organize your
stationaries.



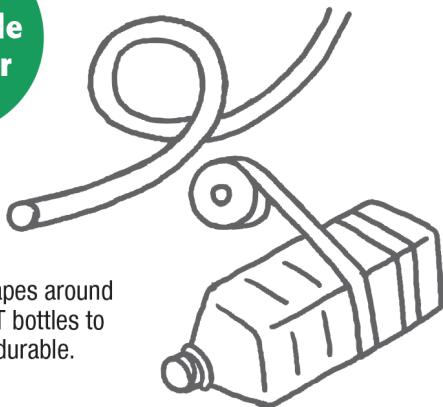
Plant pot of PET bottle



Cut a PET bottle
with scissors, etc.

Turn the top half
upside down and
insert onto the
lower half.

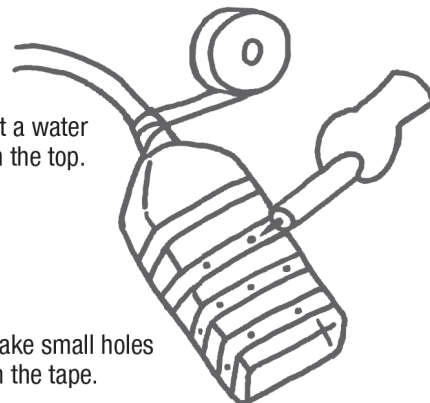
PET bottle sprinkler



Attach tapes around
used PET bottles to
make it durable.

Connect a water
hose on the top.

Make small holes
on the tape.





Accessory case

Cut out and paste your favorite pictures/drawings to empty glass bottles.



Paint the bottles.



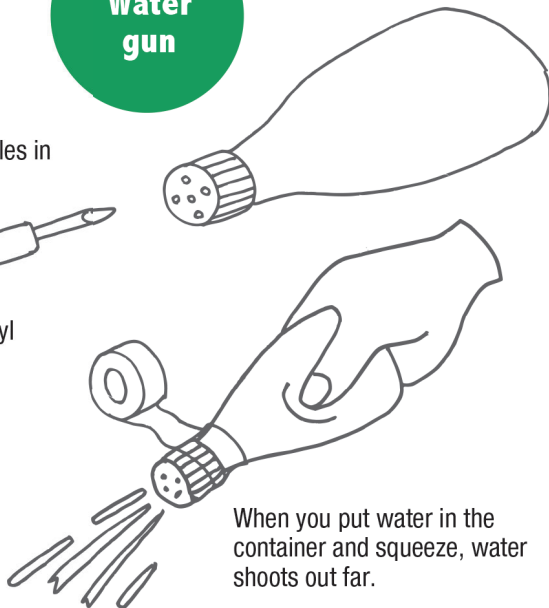
Use them as accessory case or flower vase.

Water gun

Empty plastic container of mayonnaise or ketchup.

Make holes in the cap.

Secure the cap with vinyl tape.



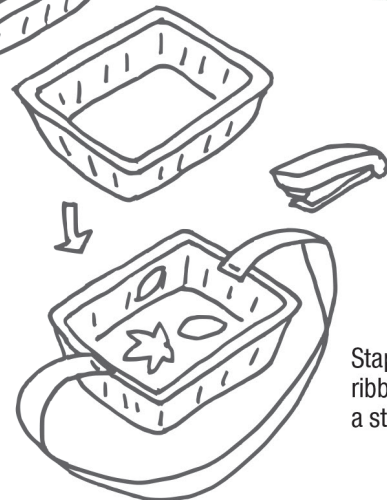
When you put water in the container and squeeze, water shoots out far.

Hand-basket

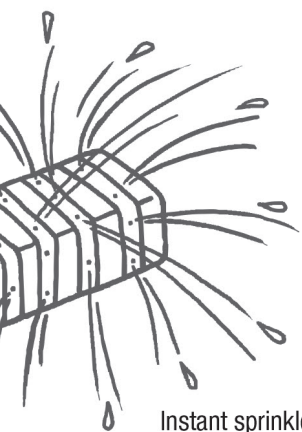
Paste patterns made from paper.



Lay another basket onto the top.



Staple ribbons with a stapler.



Instant sprinkler for watering plants or just for having fun.



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When we reuse or recycle materials, it helps to reduce the amount of solid waste that we throw away.

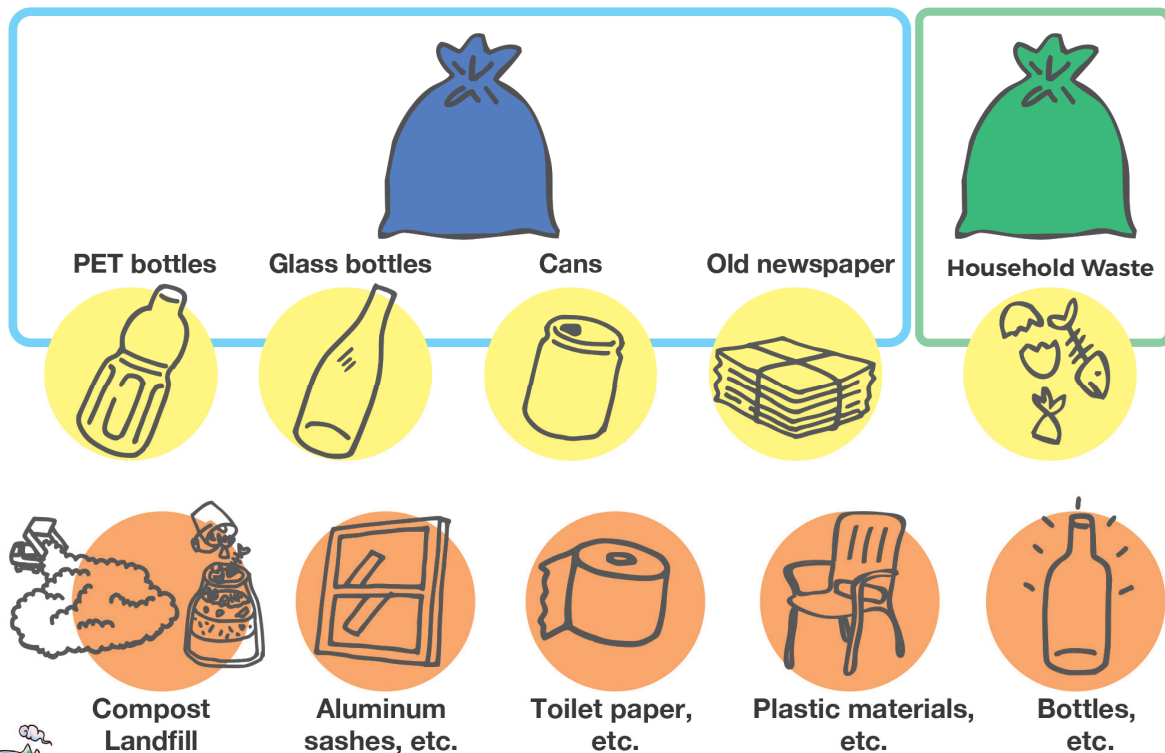
Be careful not to hurt yourself when cutting materials or making holes.



Let's Promote Waste Segregation and Recycling

Waste segregation is the process of separating different types of waste. It helps in better collection and disposal.

What will the following materials be changed to after separation and recycling? Let's find and connect them with lines.



Let's start to separate waste at home and school



Learn More

Our waste includes variety of things. The waste generated at households can be roughly divided into the following categories:

- (i) Wet / Biodegradable: waste typically originating from plant or animal source which may be broken down by other living organisms. Example: left-over vegetables and fruits, meat, rice, bread, fish, etc.
- (ii) Dry / Non-Biodegradable: things that cannot be broken down by natural organisms nor be decomposed or dissolved by natural agents. Example: plastics, cans, metals, etc.
- (iii) Hazardous waste: waste that has potential threat to public health or environment. Hazardous waste is characterized by their properties like ignitability, reactivity, corrosivity and toxicity. Example: electronic goods, oil paint, toilet cleaners, poisons, pesticides, batteries etc.

Many Thromdes and Dzongkhags often have separation rule for waste collection so that same category waste can be collected and later treated together. Find out what kind of rule does your community have? During weekend, empty your waste bin (both wet and dry) separately on a clean floor or large plastic sheet. Segregate each waste following the above categories. List down the various types of waste and present it to the class.

Recyclable: things that can be reused without being changed in any way and they usually have some value. Did you find any recyclable items in your waste?

Let's Think About the Waste Flow and Learn About What Happens to Waste That We Throw Away



Let's challenge quiz to find out how you can reduce waste through eco-friendly lives

Please read the following sentences and mark ✓ if correct and X if not correct in ☐, and then connect with an appropriate tip on the right.

<input type="checkbox"/>	The more detergent you use, the more dirt and stains are cleaned.	<input checked="" type="radio"/>	We can use our used kitchen water for gardening rather than throwing away.
<input type="checkbox"/>	It's better to use an iron by turning the switch on and off frequently.	<input checked="" type="radio"/>	Please use proper amount of detergent to wash your clothes or dishes. You do not need too much detergent to clean them.
<input type="checkbox"/>	We cannot use the used kitchen water for gardening.	<input checked="" type="radio"/>	Electric devices consume a lot of electricity when turning the switch on and off.
<input type="checkbox"/>	It is better to wrap a gift with excess packaging.	<input checked="" type="radio"/>	You may buy more goods when they are at cheap price, but please consider if those are really necessary.
<input type="checkbox"/>	You should buy goods and commodity on sale, even though you are not going to use them soon.	<input checked="" type="radio"/>	Packaging will become waste once it is opened, so let's try not to increase waste.
<input type="checkbox"/>	You'd better throw away clothes and toys after using.	<input checked="" type="radio"/>	Paper cups and paper plates are for single use, and will be waste after use.
<input type="checkbox"/>	It is better not to put a lid on a pot for boiling water.	<input checked="" type="radio"/>	Try not to throw away used clothes and toys. You can give them to your family members or friends to use again.
<input type="checkbox"/>	It is good to use paper cups and paper plates rather than your own dishes.	<input checked="" type="radio"/>	You can boil water faster by placing lids on pots to retain the heat.
<input type="checkbox"/>	A piece of soap will be thrown away because it is not easy to use up.	<input checked="" type="radio"/>	Chemical fertilizer may have negative impact on your health.
<input type="checkbox"/>	It is good to buy vegetables grown by using chemical fertilizers because they look more delicious.	<input checked="" type="radio"/>	A last small piece of soap bar can become larger by putting together with other small piece of soap bars. Please try to use up goods with your ideas



Learn More

Did you know such eco-friendly practices before doing this quiz?
Tell your friends in the class which ecofriendly practice in the quiz you found most useful at home that you are going to share with your family.

Let's Try Making Compost

Heap method (procedure given below) is a commonly practiced method in Bhutan for composting.

Required materials:

Organic material
(kitchen waste)



Stones



Tree pruning or any
available plants like
artemisia.



If possible, get
a brochure on
composting from the
nearest Renewable
Natural Resource (RNR)
extension center.

Procedure:

1

Choose a site with a sloping ground, shady place with windbreak (heap method is preferred over pit method).



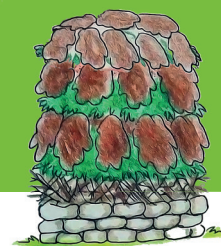
2

Collect organic materials (kitchen waste), chop if needed and mix thoroughly.



3

Build a heap by placing a layer of tree pruning/sticks/maize stalks/artemisia over a stone base.



4

Pile the chopped materials in layers of 10-15 cm. You can use dung slurry form and spray over each layer. This is done to moisten the organic material.



5

Once the heap has attained the height of your choice, cover with artemisia or gunny bags.



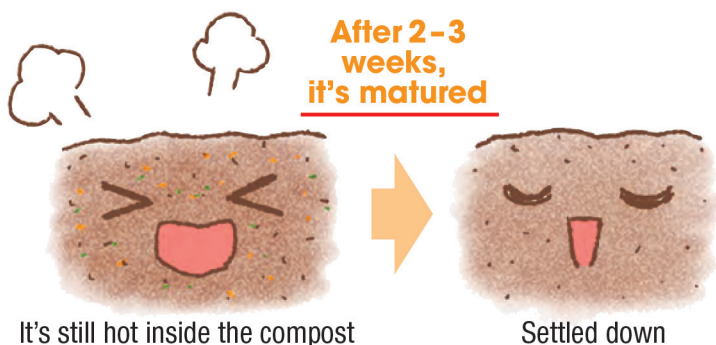
6

Turn the heap every 7 days. Your compost should look like dark crumbly soil mixed with small pieces of organic materials.



How to Use Compost

■ Compost is mixed with the soil



It takes 2-3 weeks for the compost to mature and be ready for planting.



Spread the compost on the whole area of a field, and plough it to a depth of about 10 cm.

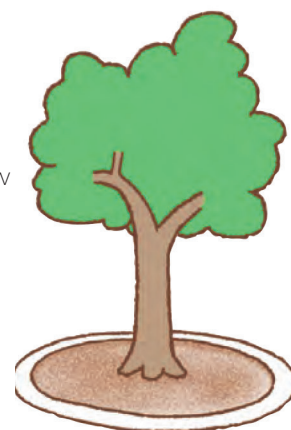
※ This method has the effect of improving the topsoil as well as softening the entire field.

■ When applying the compost in the planting area

Cover the soil with the compost after planting crops (Mulching).



Dig a 10 cm circular furrow around the tree (ahead of its root tips) and put the compost in the furrow.



※ The decomposition of the compost gets stimulated which gradually brings about the effect.



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© Ugyen Tshomo

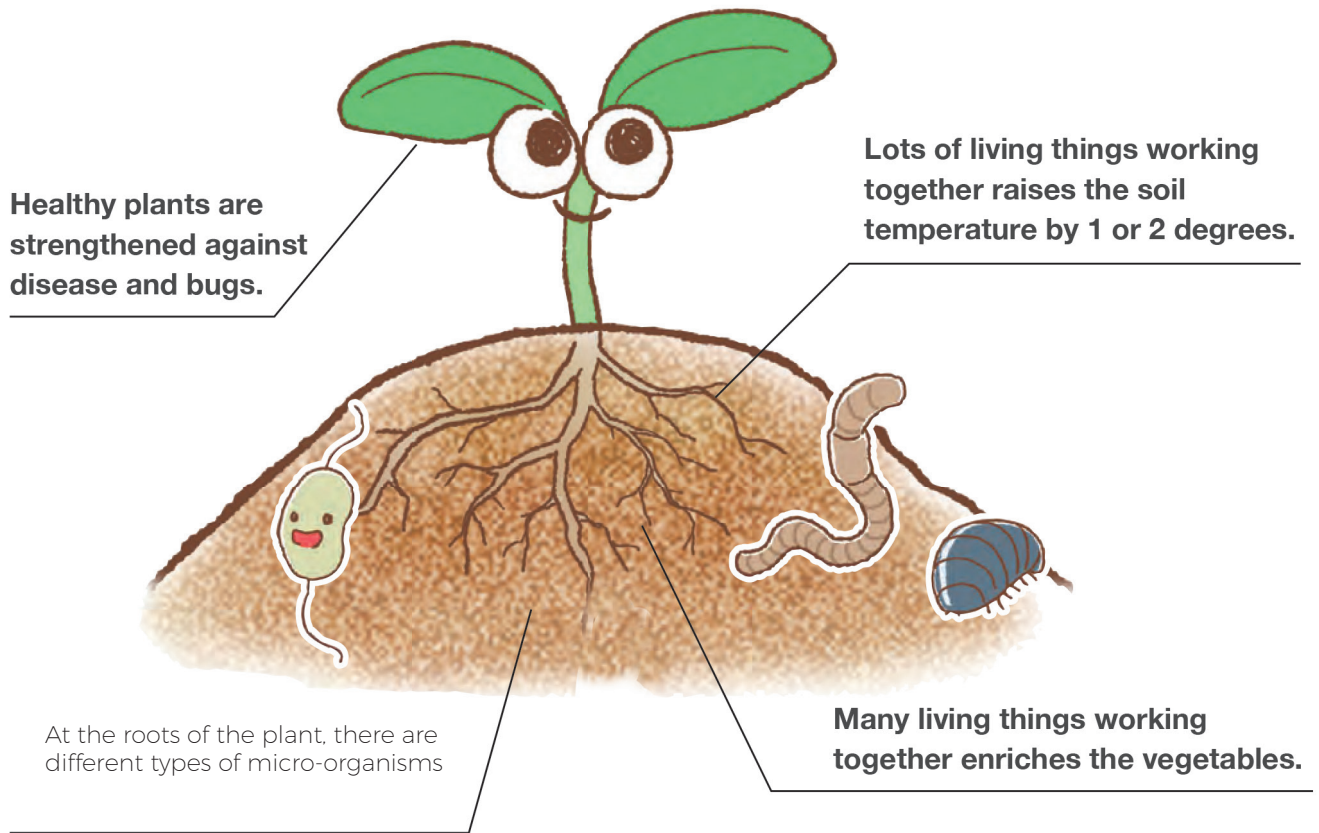


Learn More

Healthy soil makes healthy plants and vegetables. Learn how you can grow healthy plants using compost made from organic waste.

What are the differences between the chemical fertiliser and composting? Ask experts or visit libraries to find out more about eco-friendly farming.

How Compost Helps the Plants Grow



Waste to Energy Technologies

There are various ways to generate energy from wet waste. One of the technologies is biogas technology. Typically a biogas system uses food waste, animal manure and other organic waste and convert the biomass into energy and valuable bio-fertilizer.

Find out more about biogas and make a poster presentation in groups. Discuss the benefits of biogas technology.



Sustainable Development Goals (SDGs) and Waste



Sustainability is to avoid the over use of natural resources in order to maintain an ecological balance.

Globally there is a set of goals called Sustainable Development Goals (SDGs) adopted by all United Nations Member States in 2015. These are:

Goal 1 No poverty

Goal 2 Zero hunger

Goal 3 Good health and well-being

Goal 4 Quality education

Goal 5 Gender equality

Goal 6 Clean water and sanitation

Goal 7 Affordable and clean energy

Goal 8 Decent work and economic growth

Goal 9 Industry, innovation and infrastructure

Goal 10 Reduce inequalities

Goal 11 Sustainable cities and communities

Goal 12 Responsible consumption and production

Goal 13 Climate action

Goal 14 Life below water

Goal 15 Life on land

Goal 16 Peace, justice and strong institutions

Goal 17 Partnerships for the goals



Why Do We Need to Have Sustainable Development Goals (SDGs)?

We can have a world where everybody gets basic necessities they need to survive by adopting the SDG-12 which is responsible consumption (using) and production.

One of the pillars of GNH is sustainable and equitable socio-economic development. This aims to use resources sustainably and meaningfully so that it provides basic necessities to the present generation and is preserved for future generations.

Even with limited and basic necessities we can still be happy



Kid's toys with electronic gadgets



Kid's toys with natural and recyclable things

Gender and Waste Management in Bhutan

Men and Women have different roles in waste management with varying benefits. As per the National Waste Inventory Survey (NWIS-2019) Bhutan, about 90 percent respondents reported that their household waste was managed by female member.

As a group, discuss the following questions:

1. Who are the main workers in handling household waste in your home and community?
2. In your opinion, who should take the responsibility of managing waste at home and in your community?
3. Do you know that some people make a living by collecting and selling recyclable waste to recycling units and scrap dealers?

Plastic Waste Reduction and Management

At present, many products that we use in our daily life are made of plastic or packaged by plastic. So, increasing consumption results in more plastic waste. We all use plastic as it is cheap and convenient to use. However, plastics are harmful to the environment and remain for hundreds of years.

What steps can we take to reduce plastic waste?

- Refuse plastic carry bags from shopkeepers.
- Carry your own bag when you go shopping.
- Avoid wrapping *doma* in plastic packets.
- Carry your own water bottle and avoid buying packaged water.
- Avoid buying packaged food.

Learn More

- Think of new ways to reduce and manage plastic waste

Have you heard about how plastic waste is managed in our country?

Find out from your friends and relatives in other Dzongkhags what they do with their plastic waste. For example:

- Plastic is mixed with asphalt for paving road.
- Plastic is molded to make fencing poles

Explore more ideas on how to manage plastic waste at home and school.

1.

2.

3.

Negative Impact of Mismanaged Waste on the Hydropower Sector

Let's look into how much money will our country lose due to unmanaged waste in hydropower sector.

In 2019, hydropower earned more than Nu. 18 billion! That is the main source of money for our roads, schools and hospitals built by the government.

1billion=1,000,000,000

If waste gets into dams and reservoirs

Difficult to clean and require skilled workers

Huge maintenance cost



Danger of break down of turbines and generators

Huge revenue loss during shut down of hydropower plant

To remember

Even our daily commodities such as toothbrush or pens thrown away into rivers could cause serious damage to hydropower equipment and lead to breakdown of machines. Millions of ngultrums have to be spent repairing and replacing parts. We will also have to live in the dark when the hydropower plants breakdown.



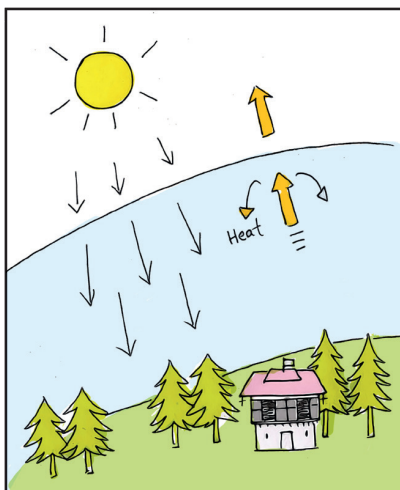
Help the Hydropower Sector to serve better by proper disposal and management of waste.

Let's Think About Global Warming and Climate Change

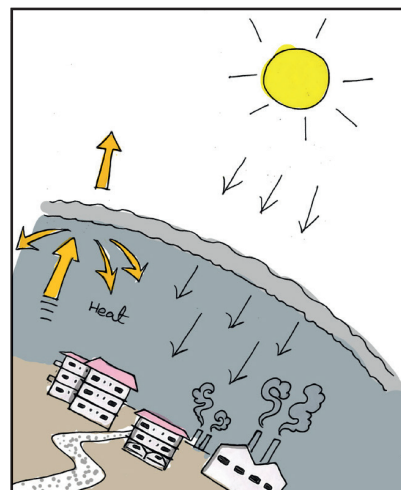
Global Warming

What is global warming?

The atmosphere wraps around the earth like a blanket. Thanks to the blanket, the earth catches a heat emitted from the sun and makes the temperature suitable for our lives. Sadly, now a days, the blanket of atmosphere is getting thicker and warmer due to excessive increased amount of gases called green house gases. This excessive green house gases around the atmosphere is causing rise in the temperature world wide and this phenomenon is called **global warming**.



The earth maintains the proper temperature by wearing the blanket of the atmosphere (without the blanket of the atmosphere, the average tempetarure would become -19 degree celcius).



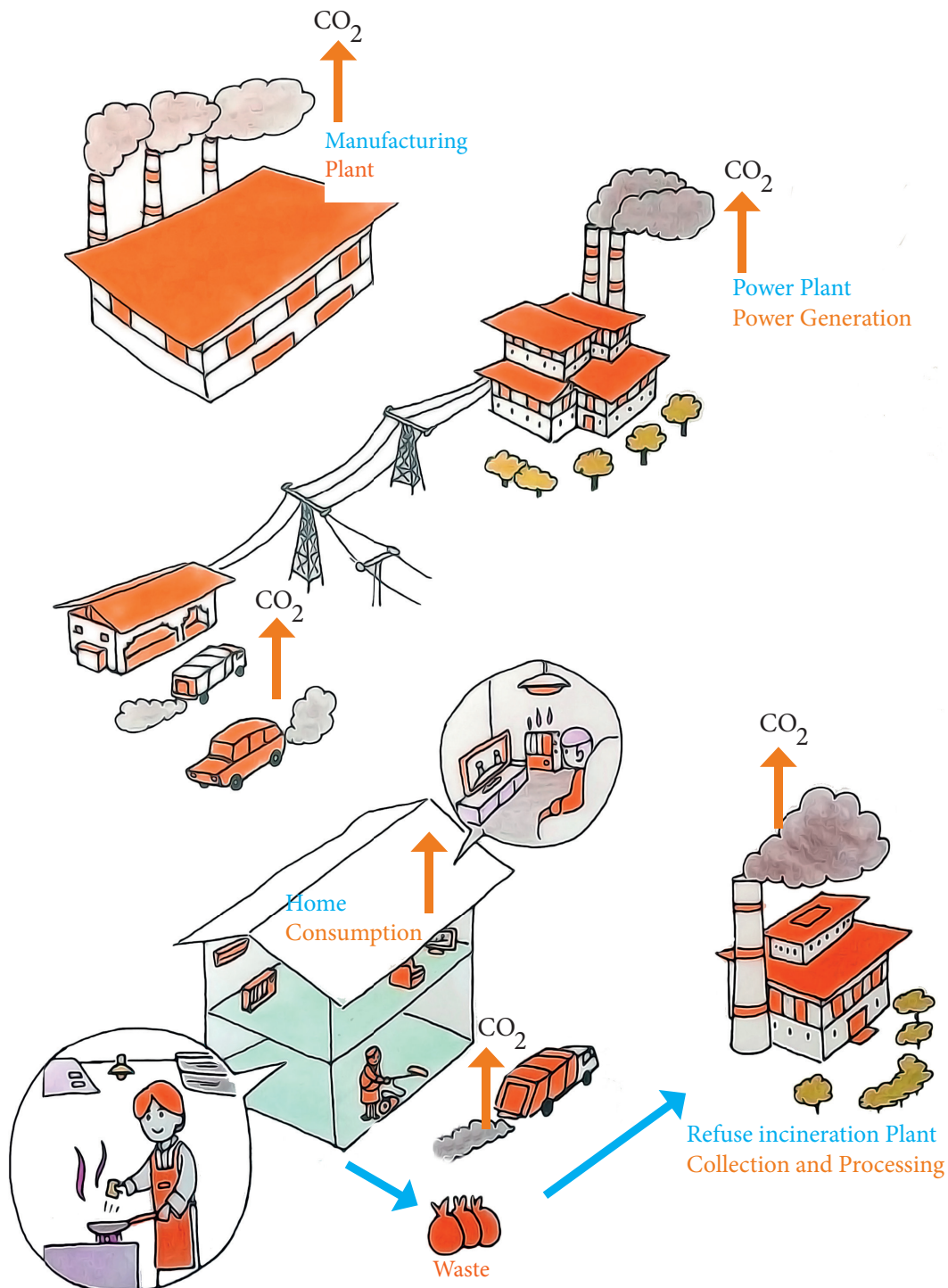
Now the blanket of atmosphere becomes thicker, because the gas warming the earth has increased excessively. This causes global warming.

Looks like our daily lives are directy connected to this global environmental issue.



On What Occasions is CO₂ Emitted?

CO₂ is emitted when we exhale, burn fossil fuel, fire wood and waste, set fire in agricultural land, etc.



Currently Bhutan is a carbon negative country.
What are the alternatives for above activities to ensure carbon negative status of Bhutan?

Looking Back on Our Lives

Mission: Let's reduce CO₂ by 1 kg per day per person!

In the "Until Today" column, please recall your everyday life until today, and mark a circle for the actions you are already doing.

In the "Challenge Days" column, write down the date you took the challenge and mark the circle on the item you challenged.

Eco check items		Until Today	The day you challenged		
			/	/	/
1	Turn off the TV when not watching.	80	80	80	80
2	Pull the TV or PC cord out of the wall before you go to bed.	20	20	20	20
3	Do not leave the air-conditioner or fan turned on.	60	60	60	60
4	Turn off the lights of the rooms not being used.	40	40	40	40
5	Try not to put too many things in the refrigerator and try not to overcool.	110	110	110	110
6	Store hot water in the thermo flask after boiling in the electric pot.	110	110	110	110
7	Don't waste water when you shower.	80	80	80	80
8	Don't let water run when you wash your face or brush your teeth.	10	10	10	10
9	Bring your own bag and try not to ask for supermarket plastic shopping bags.	70	70	70	70
10	Sort our waste in accordance with disposal rules of the City.	30	30	30	30
11	Walk or use a bicycle instead of using an automobile when you go out or go to work.	170	170	170	170

If all items are marked with a circle, you can achieve CO₂ reduction by 780g per day per person!

Write down the total amount of CO₂ emissions circled.→

/780g

/780g

/780g

/780g

* The values shown above are rough values.



How much CO₂ can you reduce from your daily life?

Teacher's Guide



About Ecology Note

Ecology Note : Towards Clean, Green and Beautiful Bhutan – is a supplementary material for primary school teachers who wish to introduce environmental education for the first time, or for those who want to enhance the scope of educational work in addition to what is already taught in the classrooms. It can also be used for informal and non-formal education activities as a material for children and adults to learn how to be an environmentally friendly citizens.

The scope of environmental education is wide, including various environmental issues from climate change, biodiversity, pollution of air, land, water, sustainable management of waste and finite resources including those exhaustible and renewable. In this note, waste/resource management and climate change issues are given special attention as environmental issues most close to students and most pressing to Bhutan. It is recommended that the schools and teachers would gradually expand the range of topics to be treated in the school curriculum in the future.

For the Ecology Note to better serve students and teachers, it is crucial that the concept of sustainable waste management is well embedded in a wider curriculum design with clear goals and directions. Therefore, specific skills and approaches addressing the expected learning outcome should be used along with appropriate pedagogies.

Designing an Effective Class for Effective Learning

In order to allow teachers to tailor their classroom activities to suit their needs, any component of this booklet can be photocopied and distributed in the classroom as handouts.

The underlining concept behind Ecology Note is education through active learning – an approach that values spontaneous interests of students as the foundation of learning. It promotes experiential learning where learning is guided by discovery from experience and reflecting on the experience. Field works, group discussions, report writing, and presentation are some of the examples of methods in this tool which encourage students to develop the skill to observe, analyze, organize, and communicate the acquired information to others.

The Ecology Note also encourages teachers and students to explore the environment and connect to classroom learning. Using locally available resources and engaging experts and practitioners in the local community is an effective way to enhance students learning through social interaction. For instance, inviting waste management experts to your classroom as guest lecturers, or visiting recycling companies as an educational field trip would help enhance student's understanding on subject matters, going beyond what they have learnt in their classroom. Schools can also consider university professors, officers of local administrations, farmers, companies and community groups as resource persons to support their learning.

Aim:

This exercise is intended to give students a better understanding of the community resources for preserving natural environment, through exploring their own community with fresh eyes. The activity can also help students to develop the ability to organize, analyze, and communicate the discovered information to others. More importantly, this activity will help develop ownership and understand their responsibility in the locality.

Required materials:

Map of the neighborhood (a small area around the school), drawing papers, pencils, camera (if possible)..

Procedure:

1. Divide students into groups (maximum 5) / Ask them to walk their neighbourhood with the map and identify the eco resources (dustbins, recycling shops, bike lanes), people (farmers, waste collectors) and places (agriculture land, greenspace) along with cultural sites that make their neighbourhood a special place / Ask them to take notes, sketch or photo of these places.

2. In the class room, they draw a map of the area/ Different groups can present their maps to other groups and discuss what they have found and their importance.

Follow-up:

Display the map and write a report about their neighbourhood using the information. During/ after the discussion, it is important to highlight what community resources/ actions (and which aspect) are considered supportive to environmental protection.

Curriculum linkages:

Social Studies, Science, Art, Agriculture



Lesson 2 Let's Think about Waste Generation and Management Issues in Our Country

(2 class period)

Aim:

This section encourages students to become aware of the basic facts about waste problems of the country, the direct linkage between their daily lives, and to think about the consequences of lifestyle on the environment. Thus, highlighting the connection between environmental problems and student's personal life is one of the first steps to nurture the sense of responsibility, attitudes, and behavior for environmental protection.

Required materials:

Papers and pencils

Procedure:

1. Ask students to think about how much garbage they, their family and community produce daily, weekly, monthly or annually. Average daily waste generation in Bhutan is: 230grams per person per day and 172.16 metric tons per day in the whole country.

2. At the end of the day, study the waste collected in the classroom waste bin and discuss the effect on the environment based on the following questions. Is the waste bin empty? Why?

Where did the waste in the bin come from?

Did you throw any waste in the bin today?

Would it make any difference in the amount of waste collected if one or two students did not throw any waste?

Would it make any difference in the amount of waste collected if half of the class did not throw any waste?

What would happen if all the students in the school throw waste in your classroom waste bin?

What is your conclusion?

Follow-up:

Share your findings to the class and discuss on “**my waste, my responsibility**”.

Can an individual make a difference in managing your own waste?

Curriculum linkages:

Social studies, Science, Mathematics

Let's Find out the Present Solid Waste Management in Our Country

Our lives and waste
How much waste is produced around us?

The total solid waste generated in Bhutan in a day is about 172.16 metric tons. This is equivalent to around 22 truckloads of rice in a Day!

That much solid waste is generated in one day. What do you think will happen if this situation continues?

Landfill sites will be filled with our waste.
We should keep separate bins for different types of waste (plastic, paper, metal, etc.) and dispose them properly.

Resource on the earth map diagram.
All the waste coming from our daily life and other natural resources, they will generate heat.

Learn More
In our society, many goods (things) are produced, used, and thrown away without being used for long time. Afterwards, they are usually collected and end up in landfill. This type of society is sometimes called Throw-Away Society. Every time we throw something away, we are throwing away the materials, energy, money and water that took to produce it. Find out where do your belongings come from? What kind of and how much material it took to make them.

Waste Generation in Our Daily Life Activities

Let's think about all the products we use after we wake up in the morning until we go to bed at night. Imagine if each of these products cannot be used anymore and turn into waste. Now put the waste generated from home in Home basket and the waste generated in school in School basket.

Home	School
Teethbrush	Shoes
Books	Left over from packed lunch
Clothes	Vegetables
Pen and pencils	Paper planes
Baby's diapers	Food wrappers
Football	Cardboard boxes
Electric bulb	Newspapers
Broken dish	Flower pots

Learn More
Reflection:
Has anyone in the class used any of these items put in the baskets for other purpose? For example, old clothes for mopping floors or football for planting flower? If you have, you already care for our environment. Let's think of how we can use all of these items in the baskets for other purpose. Using these again and again for different purpose means that we care for our environment and indirectly our health and well-being, let's to our responsibility to save the environment and live healthy!

Aim:

This discussion is to create awareness among students on the issues that arise when waste is not managed in a proper manner as required by local authorities or national law. This can be an effective means to advocate on waste management as the students will be sharing the information with their family and relatives back home about the waste issues.

Required materials:

Photographs of waste disposal and open burning, animals choked with plastic bags, etc. Teacher may use internet to show pictures and video clips.

Procedure:

1. Group the students into three (land, water and air) groups.
2. Ask them to list down the types of waste dumped on land/water or burnt in their community. Guide them with real examples in the community of a disposal site or open burning pit.

3. Let the students identify the effect/issues of each type of waste dumped or burnt in the form of drawings and exchange information among the three groups.

Follow-up:

Compile all the issues students come up with and display on the classroom wall or school bulletin. Ask the students to find out from their family members if they knew about these issues and get assurance that they will reduce waste and minimize waste related issues.

Curriculum linkages:

Social studies, Art, Science

Issues Related to Ineffective Waste Management

Do you know what happen to our environment as a result if we do not manage your waste at school/home properly?

Land

• Water logging, flooding and the resulting impact on the environment
 • Animal feeding

Water

• Collect and get stuck in drains
 • Chemicals from waste leak into our sea and drink the water and animals by eating when they find waste like plastic

Air

• Burning waste emit smoke and particles to air we breathe
 • These particles combine with water droplets in the air forming aerosols affecting our health and damaging crops
 • Ring (Climate) fuel responsible also

Can We Identify the Issues Now?

Put a tick mark if you come across the following examples when you go back home or take a walk in the town/park. Discuss with your friends and identify the reasons for them.

<div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px; background-color: #F0F0F0;"> <input type="checkbox"/> I saw plastics floating in the stream/river. </div> <div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px; background-color: #F0F0F0;"> <input type="checkbox"/> I saw smoke from burning waste. </div> <div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px; background-color: #F0F0F0;"> <input type="checkbox"/> I smell rotting vegetables and fruits. </div> <div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px; background-color: #F0F0F0;"> <input type="checkbox"/> I saw waste bin overflowing with mixed waste. </div>	<div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px; background-color: #F0F0F0;"> <input type="checkbox"/> I saw waste littered along the path/park. </div> <div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px; background-color: #F0F0F0;"> <input type="checkbox"/> There were dogs/cats feeding on garbage. </div> <div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px; background-color: #F0F0F0;"> <input type="checkbox"/> The streets had a lot of domestic dust. </div> <div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px; background-color: #F0F0F0;"> <input type="checkbox"/> I saw people spitting on walls/pillars while chewing gums. </div>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

How often do cleaning campaigns take place in your neighbourhood?

Do you think they are effective and help solve the above problems?

Whose responsibility is it to keep our neighbourhood clean?

What do you suggest to keep your neighbourhood clean?

Aim:

This lesson is aimed at introducing the safe disposal of household waste as an indicator of Gross National Happiness. Students will be able to understand the importance of culture and tradition in reducing waste that ultimately leads to happiness.

Required materials:

Paper, pencil

Procedure:

- This activity can be performed in two forms. In one activity, let the students consider and notice which lifestyle produce more waste, particularly plastic waste, also why people prefer modern lifestyle etc. In addition, teacher can mention that packaged food/junk food often have negative effect on health due to chemical additives, preservatives, etc.
- In a different activity, let the students carry out a survey on happiness and waste by asking at least ten individuals they meet in the school campus and ten others outside the school campus using the standard question "Do you feel happier if your home and school are clean and safe without waste?" Or "Are you satisfied with the current cleanliness in your

community?". Only Yes/No answer is expected.

Teacher may let students create their own questions which are suitable for the survey.

Follow-up:

From the findings in activity 1, emphasize on the increasing waste (types and quantity) on moving from traditional customs to modern lifestyles.

Explain the inclusion of preservation of culture in minimizing waste.

From the findings in activity 2, make a pie chart or a bar graph on yes or no answers for the survey question and relate the concept of happiness with waste.

Curriculum linkages:

Social studies, Science, Mathematics

Gross National Happiness and Waste

Gross National Happiness (GNH) is the development philosophy of Bhutan which roots into a holistic development of the country and not just money as an indicator for success. The four pillars of GNH are Sustainable and Equitable Socio-Economic Development, Environmental Conservation, Preservation and Promotion of Culture, and Good Governance.

The waste reduction, reuse, and recycle contribute towards fulfillment of the goals of GNH. Reducing waste helps in reducing expenditure, competition for resources and environment pollution. In many occasions, traditional methods are more sustainable and environmentally friendly compared to modern ways.

One of the indicators under the 9 domains of GNH is "disposal of household waste". Good waste management would thus contribute to a happier, healthier and beautiful Bhutan.

Our Lives and Waste

How preservation of tradition and culture helps reduce waste?

Traditional	Modern
Dress carried in drums and cane	Dress wrapped in cloth and plastic
Fruits and snacks served in clay pots	Serving packaged food and snacks
Carry personal items in cloth	Make use of single-use plastic and cans
Traditional craft items and old clothes	Junk and waste items in glass and PET bottles

Let's Draw Pictures of How Our Life-Styles have Changed

Traditional Lifestyle		Waste: No waste
Modern Lifestyle		Waste: PET bottles, bottle caps, plastic labels
Traditional Lifestyle		Waste:
Modern Lifestyle		Waste:
Traditional Lifestyle		Waste:
Modern Lifestyle		Waste:

Learn More

Which one would you choose for your annual checkup/visit?

1. Provide meals and drinks in single-use plates and cups and packaged drinking water in PET bottles, and make lots of packaged offerings bought from the market.
2. Ask your relatives and friends to bring their own traditional box and plate or their plates and cups for meals and make home-made offerings in traditional bamboo and cane baskets?

Do you feel happier if your home and school are clean and safe without waste?

Yes
No

Aim:

This exercise encourages students to understand the importance of lifestyle based on 3Rs in order to reduce waste and conserve resource use.

Required materials:

Papers and pencils

Procedure:

1. Ask students to think about variety of household items that are thrown into the garbage. Discuss which of the items can be reduced, reused, or recycled for making new products.
2. Motivate students to take simple individual actions using a check list of eco-actions and discuss how these simple actions can protect our environment.

Follow-up:

Develop a checklist to motivate students to take eco-actions at schools, homes and neighbourhoods. Ask them to present what activities they have taken. Produce a bulletin board or display the results, or organize them into a report/fact sheet.

Curriculum linkages:

Social Studies, Science, Mathematics

Do You Know about the 3Rs?

What can we do?
Do you know about the 3Rs

Reduce
Try not to generate waste. Use things with care as much as possible.

Reuse
Use things again and again by mending or repairing them.

Recycle
Recycle waste into different things to use them again.

Check your "eco" level
Tick what you do from the following

- ☐ I eat meals without leaving anything behind.
- ☐ I separate PET bottles and cans.
- ☐ I give old clothing and toys to someone who wants them or use them differently without discarding it.
- ☐ I use old newspaper for wrapping.
- ☐ I use my own bag and don't ask for plastic shopping bags.
- ☐ I turn off the TV when doing other things.
- ☐ I don't let the water run when washing my face or brushing my teeth.
- ☐ I do not leave anything behind after a picnic or eating out.

Count your ticks and think of how you can increase your eco level. If you already have all ticks, what can you do next? Find out the positive impact you have made to the environment with your small steps towards managing your waste.

Religious Activities and Waste

There are 584 schools and around 388 monastic institutions in Bhutan. They can be found in almost every village and mainly on mountainsides across the country. Quite often, they are located in remote locations where waste collection service is limited or not available.

In addition to the religious personnel, the general public also visits religious sites in large numbers. People also attend various religious programs and perform religious rituals at homes. Huge quantities of goods are used for offerings in all religious centers and programs. Currently, some of these offerings and religious activities are not environmentally friendly and results in generating more waste.

What do you think are some waste generated from following religious activities?

Type of Religious Activities	Waste generated
Offerings in Temples	
Religious activities at homes	
Mass religious gatherings, such as Wangs, Tshachus, Pujas, Monlam, etc.	
Others	

The waste from the monastic institutions is quite similar to those generated from our homes. Don't you think that we can reduce them?

Discuss with your friends and make a list on how we can do things differently to reduce the generation of waste from religious activities.

Offerings made for Religious Activities with food waste

Discuss the above list in your class as a group

Aim:

Through this exercise students will learn the different categories of waste produced in their daily lives as well as the disposal methods.

Required materials:

A sample of waste collected from households or classroom, face masks, gloves and tools to handle waste.

Procedure:

1. Collect different types of waste from school campus.
2. Take 3 boxes and place them at the end of the room and ask the students to label them as recyclable, biodegradable and hazardous waste.
3. Let the students sort the garbage by taking one item at a time and place it in the appropriate box. .
4. Explain why did they place the waste in respective box and why some waste fall in more than one box.

Follow-up:

Discuss the following questions:

Discuss the idea of waste segregation and reduction.

Based on the waste collection discuss the following questions:

Why are those waste generated?

How can you reduce the generation of those waste?

Write down the segregation rules of waste in your community.

Curriculum linkages:

Science, Social Studies

Let's Promote Waste Segregation and Recycling

Waste segregation is the process of separating different types of waste. It helps in better collection and disposal.

Which will the following materials be changed to after separation and recycling? Sort and connect them with lines.

Let's start to separate waste at home and school

Learn More

Not every household has all things. The waste generated at households can be roughly divided into the following categories:

- (i) **Recyclable waste**: Items that can be reused or recycled. Examples: PET bottles, glass bottles, cans, old newspaper, etc.
- (ii) **Biodegradable waste**: Items that can be broken down by natural organisms. Examples: food waste, vegetable scraps, etc.
- (iii) **Hazardous waste**: Items that pose a threat to public health or environment. Examples: sharp objects, chemicals, etc.

Many households and communities often have separate bins for waste collection so that some category waste can be collected and not mixed together. Find out what kind of bin does your community have? During weekends, bring your waste to the bin and put separately in a bin that is designated for that category. Segregate the waste following the above categories. List down the various types of waste and present it to the class.

Recyclable items that can be reused without being changed in any way and they usually have some value. Did you find any recyclable items in your waste?

Let's Think About the Waste Flow and Learn About What Happens to Waste That We Throw Away

Who collects your waste? → Where it goes after collection? → What happens to your waste in the end?

Let's challenge quiz to find out how you can reduce waste through eco-friendly lives

Please read the following sentences and mark '✓' if correct and 'X' if not correct in 'X' and then connect with an appropriate tip on the right.

<input type="checkbox"/> I always use paper bags for shopping.	<input type="checkbox"/> I always use paper bags for shopping.
<input type="checkbox"/> I always use paper bags for shopping.	<input type="checkbox"/> I always use paper bags for shopping.
<input type="checkbox"/> I always use paper bags for shopping.	<input type="checkbox"/> I always use paper bags for shopping.
<input type="checkbox"/> I always use paper bags for shopping.	<input type="checkbox"/> I always use paper bags for shopping.
<input type="checkbox"/> I always use paper bags for shopping.	<input type="checkbox"/> I always use paper bags for shopping.
<input type="checkbox"/> I always use paper bags for shopping.	<input type="checkbox"/> I always use paper bags for shopping.
<input type="checkbox"/> I always use paper bags for shopping.	<input type="checkbox"/> I always use paper bags for shopping.
<input type="checkbox"/> I always use paper bags for shopping.	<input type="checkbox"/> I always use paper bags for shopping.
<input type="checkbox"/> I always use paper bags for shopping.	<input type="checkbox"/> I always use paper bags for shopping.
<input type="checkbox"/> I always use paper bags for shopping.	<input type="checkbox"/> I always use paper bags for shopping.

Learn More

Did you know such eco-friendly practices before doing this quiz? Tell your friends in the class which eco-friendly practice in the quiz you found most useful at home that you are going to share with your family.

Aim:

To learn about different recycling methods and recycling units in Bhutan. Students can also find out how their waste can still be used as a resource for producing various products.

Required materials:

Paper, pencil, waste management facilities (landfill site, waste disposal facility, recycling facility, composting center. etc.)

Procedure:

1. Draw a community map and mark the waste disposal locations in your community.
2. Find out what recycling and composting options are available in your community.

Follow-up:

Further discussions can be facilitated by asking questions such as: "Are there any other options that would be desirable to manage your garbage? If so, make a list of recommendations". Students can also use the information gathered to write a report on waste disposal or create a bulletin board or exhibit.

Curriculum linkages:

Social Studies, Science, Mathematics

Let's learn how waste can be changed into resources

Are you and your family separating waste at source? Do you know what kinds of waste are converted into resources? What is the right combination of waste and products made from this waste?

Recycled products

Compost

Household waste → Put kitchen waste in the compost → Add soil and water → Then compost will be produced from the bottom → You can use compost for vegetable and flower gardens.

Learn More

Different methods are utilized to convert recyclable waste into resources. Find out what kind of recycling is in your city. What kind of recyclable waste do they collect, and what are they converted into? Find out what kind of other recycling methods are there in the world, which are not available in your city.

Aim:

This exercise is aimed at advancing understanding on the basic steps of composting, and its mechanism through an experiential learning.

Required materials:

Fresh sample of organic material (kitchen waste), stones, tree pruning or any available plants like artemisia. If possible, get a brochure on composting from the nearest Renewable Natural Resource (RNR) extension center.

Procedure:

1. Choose a site with a sloping ground, shady place with windbreaks. (heap method is preferred over pit method).
2. Collect organic materials (kitchen waste), chop if needed and mix thoroughly.
3. Build a heap by placing a layer of tree pruning/ sticks/maize stalks/artemisia over a stone base.
4. Pile the chopped materials in layers of 10-15 cm. You can use dung slurry and spray over each layer. This is done to moisten the organic material.
5. Once the heap has attained the height of your choice, cover with artemisia or gunny bags.
6. Turn the heap every 7 days. Your compost should look like dark crumbly soil mixed with small pieces of organic materials.

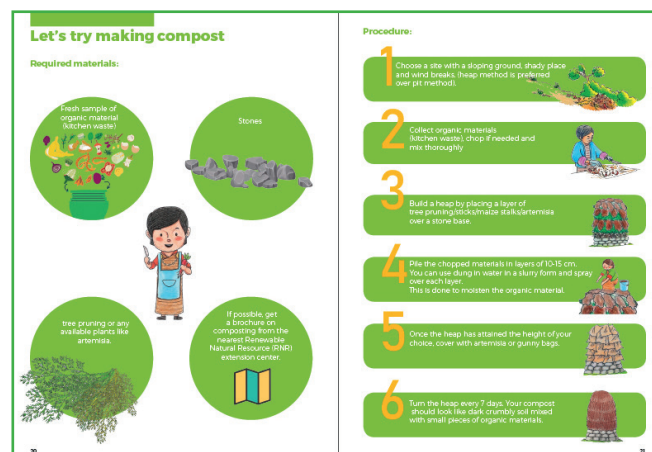
Follow-up:

Develop a checklist to motivate students to take eco-actions at schools, homes and neighbourhoods. Ask them to present what activities they have taken. Produce a bulletin board or display the results, or organize them into a report/fact sheet.

Teacher can emphasize the importance of biodiversity through composting, the role of micro-organisms in the ecosystem, relating to that of human body in which micro-organisms live and perform various functions.

Curriculum linkages:

Social Studies, Science, Mathematics



Aim:

To understand why we need global, national and local Sustainable Development Goals. Students should be able to distinguish between needs (basic necessities) and wants (over use of resources).

Required materials:

Papers, pencils

Procedure:

1. Let students write down one goal each for school and home related to sustainable waste management. For example, "zero PET bottles at home by December or Zero waste annual concert".
2. Ask them how they are going to achieve their goals. Remind them that all goals may not be achieved 100%.
3. Ask students to set goal for their country to manage plastic waste or electronic waste (e-waste) and the steps they would take to achieve it.

Follow-up:

Make a flyer for the most common goal for school and home and hang it or tie it to a tree in the school campus. Monitor the students regularly if they are working toward achieving it. Teachers may mention and let students create "Garbage bank" at school to set an

example on how to earn money from waste. Business to reduce and recycle waste is one of the ways to turn 'trash into cash'.

Inform the students about the harmful effects of mercury on environmental and human health if we throw away mercury containing electric bulbs and batteries into the river and open dumps.

Curriculum linkages:

Social studies, Science

Sustainable Development Goals (SDGs) and Waste



Sustainability is to avoid the over use of natural resources in order to maintain an ecological balance.

Globally there is a set of goals called Sustainable Development Goals (SDGs) adopted by all United Nations Member States in 2015. These are:

- | | |
|-------------------------------------------------------|-------------------------------------------------------|
| Goal 1 No poverty | Goal 10 Reduce inequalities |
| Goal 2 Zero hunger | Goal 11 Sustainable cities and communities |
| Goal 3 Good health and well-being | Goal 12 Responsible consumption and production |
| Goal 4 Quality education | Goal 13 Climate action |
| Goal 5 Gender equality | Goal 14 Life below water |
| Goal 6 Clean water and sanitation | Goal 15 Life on land |
| Goal 7 Affordable and clean energy | Goal 16 Peace, justice and strong institutions |
| Goal 8 Decent work and economic growth | Goal 17 Partnerships for the goals |
| Goal 9 Industry, innovation and infrastructure | |



Aim:

This section is aimed at developing basic understanding about the mechanism of global warming, and to highlight the direct link between the problem and student's everyday lives.

Required materials:

Paper, pencils, checklist

Procedure:

1. Discuss what you know about global warming, and how our daily activities emit CO₂, which is the primary source of warming.
2. Discuss what kinds of things will begin to occur in the world if global warming advances.
3. Encourage students to find out what counter- actions are taken by your community, country and around the world, through books, videos or internet. Request parents and other resource persons around school to assist in providing such information.

Follow-up:

Motivation students to take climate actions in reducing the CO₂ at home with the family

using the checklist. Calculate how much reduction can be achieved from their simple actions and motivate them to practice environmentally - friendly life-style. Let students discuss and exchange their ideas for reducing CO₂. The result of the procedure 3 above can be shared in a follow-up discussion, or can be assigned as report writings.

Curriculum linkages:

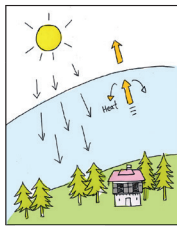
Science, Social Studies

Let's Think About Global Warming and Climate Change

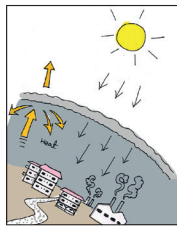
Global Warming

What is global warming?


The atmosphere wraps around the earth like a blanket. Thanks to the blanket, the earth catches a heat emitted from the sun and makes the temperature suitable for our lives. Sadly, now a days, the blanket of atmosphere is getting thicker and warmer due to excessive increased amount of gases called green house gases. This excessive green house gases around the atmosphere is causing rise in the temperature world wide and this phenomenon is called **global warming**.



The earth maintains the proper temperature by wearing the blanket of the atmosphere (without the blanket of the atmosphere, the average tempetarure would become -19 degree celcius).



Now the blanket of atmosphere becomes thicker, because the gas warming the earth has increased excessively. This causes global warming.



Aim:

This activity is aimed at giving students a better understanding about different quantity and types of waste that remain unnoticed. The treasure hunt activity can help student to develop the sense of responsibility and belongingness of the place where they live in by exploring every inch of their school campus.

Required materials:

A light bag or sack and disposable gloves.

Procedure:

1. Ask students (individual or a group of 3-4) to explore the school campus and collect all sorts of waste. Their waste collection will be assessed at the end of a certain time (depending on availability) for diversity and weight.
2. To make waste treasure hunt more interesting, hint the students that they may find valuables and their long-lost pens or hair clips in the trash piles across the school campus.
3. After the allocated collection time, let the students sit down (individual or groups). Assign assessors to award points and keep a record. Waste which has more negative impact on the environment be given higher points (e.g. 10 points for plastic and plastic products, 5 points for metal items, 2 points for paper and cardboard).
4. Talk about whose "responsibility" is it to collect and dispose waste. Emphasize on the "source separation" after they collect everything together.

5. Recyclables may be sold to local recycling unit or scrap buyers to promote recycling. The collected garbage can be used to create art works in the school campus.

Follow-up:

Display the results of waste treasure hunt on the students' notice board. Award them with credits in their diaries for Socially Useful and Productive Work (SUPW) rating. The cumulative score of half yearly activity can be used to reward the students with prizes and certificates to further encourage them to minimize waste in the school campus.

Curriculum linkages:

Social studies, Science, Mathematics.

Looking back on our lives

Mission: Let's reduce CO₂ by 1 kg per day per person!

Eco check items

Mark the circle if you are trying to do it in your daily life. Also, mark the circle if you don't have an electric appliance mentioned in each item.

In the "Until Today" column, please recall your everyday life until today, and mark a circle for the actions you are already doing.

In the "Challenge Days" column, write down the date you took the challenge and mark the circle on the item you challenged.

Eco check items		Until Today	The day you challenged			
1	Turn off the TV when not watching.	80	80	80	80	80
2	Put the TV or PC card out of the wall before you go to bed.	20	20	20	20	20
3	Do not leave the air-conditioner or fan turned on.	60	60	60	60	60
4	Turn off the lights of the rooms not being used.	40	40	40	40	40
5	Try not to put too many things in the refrigerator and try not to overcool.	110	110	110	110	110
6	Put boiled water into the flask after you boiled water using an electronic pot.	110	110	110	110	110
7	Don't waste water when you shower.	80	80	80	80	80
8	Don't let water run when you wash your face or brush your teeth.	10	10	10	10	10
9	Bring your own bag and try not to ask for supermarket plastic shopping bags.	70	70	70	70	70
10	Sort out refuse in accordance with disposal rules of the municipality.	30	30	30	30	30
11	Walk or use a bicycle instead of using an automobile when you go out or go to work.	170	170	170	170	170

If all items are marked with a circle, you can achieve CO₂ reduction by 780g per day per person!

Write down the total amount of CO₂ emissions circled.→

/780g

/730g

/700g

/750g

* The values shown above are rough results.

How much CO₂ can you reduce from your daily life?

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