



# Children's Activity Booklet on Climate Change



This Activity Book is recommended for children in **Standard 7 to 10**

We all use energy all day, every day...

Most of our energy comes from burning fossil fuels,  
such as coal, oil, gas...

Fossil fuels are polluting our World  
and causing it to get hotter...

Our climate is already changing!

If you don't care, who will?

© Any part of Children's Activity Booklet on Climate Change  
may be freely reproduced with the appropriate acknowledgement

Compiled & developed by



**Environmental Management Centre LLP**

Project Team:

Sonu Agarwal, Amruta Nigade, Madhura Karnik

Project Supervision:

Shantanu Roy

Guided by:

Prasad Modak

Layout & Design:

Studio Inspira



This guide has been compiled and produced with financial support  
from **Mumbai Metropolitan Region – Environment Improvement Society**

Disclaimer :

While every effort has been taken to present accurate information, MMR-EIS and EMC disclaim any responsibility for possible inaccuracies or omissions and consequences, which may flow from them. Neither MMR-EIS nor EMC accepts responsibility for any consequence of their use.



# Introduction to Climate Change

## Impacts of Climate Change

# Climate Change

## Response to Climate Change

What is your city doing for Climate Change?

# What you can do

## About This Booklet

The **Children's Activity Booklet on Climate Change** guides teachers and trainers in schools to create awareness amongst their students about climate change – its basics, how it affects their lives and how their own lifestyles affect it. The booklet aims to inculcate in the students a sensitivity so as to make them proactive agents to help in reducing the impact of climate change.

The booklet is part of the series **Climate Change related Resources and Tools** (CCRT) developed to spread awareness on climate change and related issues as well as to facilitate actions. As part of the series various other booklets, posters, factsheets, presentations, etc have been created. To know about these resources, visit [www.mmr-ccrt.org.in](http://www.mmr-ccrt.org.in). The portal also has online carbon footprint calculators and a map on climate change related institutions.

# A Note to the Teachers

Here is a booklet which is designed to help you in sensitizing children on the various topics related to climate change. The booklet starts with introduction to climate change and then tells about the impacts of climate change. Next it introduces the responses that are being taken to lessen the impact of climate change (mitigation and adaptation). Finally the children are led to understand how their city is responding to the threat of climate change and how they can contribute. And all this through fun filled activities.

Various activities, both indoor and outdoor have been designed to give children learning through fun. While activities have been graded to show their suitability to a particular age group, the teacher may use it as per their convenience.

It is not expected that teachers should follow the activities serially but they may design their own curriculum. For every activity the preparation for the teacher has been indicated. Wherever Activity sheets are to be used, the teacher may make copies to distribute among the students.

**Quick grabs** and **Fast Facts!** are aimed at giving the students focused learning. Many resources for further learning have been included as **Learn more @**.

Hope this booklet is useful for fun-filled learning about one of the burning topics of our times, climate change and helps in bringing up a generation sensitive to mother earth.

We would love to hear from you about your experiences and suggestions. Please write to us at [shantanu.roy@emcentre.com](mailto:shantanu.roy@emcentre.com).



## Table of Contents

03

Chapter Activity

Grade

**I**

### **Introduction to Climate Change**

05

1 What's in the Air?

07

7<sup>th</sup> to 9<sup>th</sup>

2 Watch Out!

11

9<sup>th</sup> to 10<sup>th</sup>

3 Connect with the Community!

15

8<sup>th</sup> to 9<sup>th</sup>

**II**

### **Impacts of Climate Change**

19

1 Know Impacts Using Word Search

21

7<sup>th</sup> to 10<sup>th</sup>

2 Map Making!

25

8<sup>th</sup> to 10<sup>th</sup>

3 Chit Chat with Grandparents!

29

7<sup>th</sup> to 8<sup>th</sup>

**III**

### **Response to Climate Change**

33

1 Know Your Energy Consumption

35

7<sup>th</sup> to 9<sup>th</sup>

2 Time to Change

39

7<sup>th</sup> to 9<sup>th</sup>

3 Stop The Disaster!

43

8<sup>th</sup> to 10<sup>th</sup>

4 In Their Shoes!

47

7<sup>th</sup> to 9<sup>th</sup>

5 CO<sub>2</sub> in your Shopping Bag

51

8<sup>th</sup> to 10<sup>th</sup>

6 What's Happening Around You?

55

7<sup>th</sup> to 9<sup>th</sup>

**IV**

### **What is your City doing for Climate Change?**

59

1 It's Voyage Time!

61

7<sup>th</sup> to 10<sup>th</sup>

2 Tête-à-tête with the Expert!

65

7<sup>th</sup> to 10<sup>th</sup>

**V**

### **What you can do**

69

1 What's Your Carbon Report Like?

71

7<sup>th</sup> to 10<sup>th</sup>

2 Compost It!

75

7<sup>th</sup> to 9<sup>th</sup>

3 Star Ratings!

79

8<sup>th</sup> to 9<sup>th</sup>



# Chapter 1 • Introduction to Climate Change

What are greenhouse gases?

What is Global Warming?

How is Global Warming influencing Climate Change?





Activity 1 **What's in the AIR?****Activity**

Purpose	To learn more about the greenhouse gases present in the atmosphere
Duration	30 mins to 1 day
Location	Classroom
Number of students	Minimum 6
Age group	7 <sup>th</sup> to 9 <sup>th</sup> std.
Materials required	Black board, activity sheets
Is guidance from teacher required?	Yes

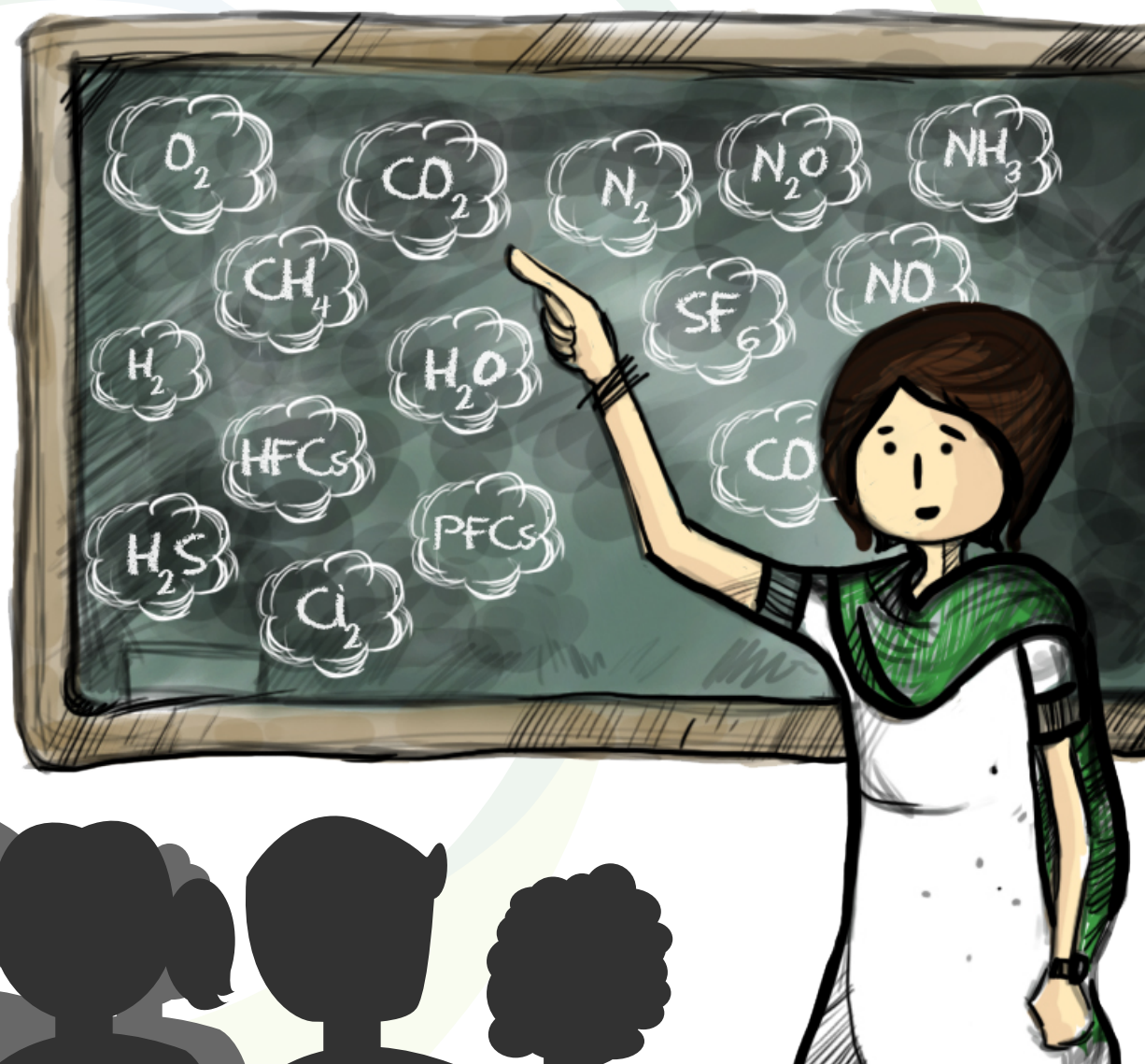


## Activity

Divide the students in 6 groups. List down names of 20 different gases (some examples are mentioned on the black board to the right) and ask the students to pick out the correct names of the greenhouse gases. The group with maximum number of correct answers gets maximum points. After this round, discuss the abbreviation of the gases with the students.

Now provide each group with an activity sheet. You may use the activity sheet given on the facing page.

Ask each of the groups to find information on any one greenhouse gas based on the questions asked in the activity sheet. In the next lecture, ask a student representative from each of the group to present their information in front of the class.





Name of the students:

Class:

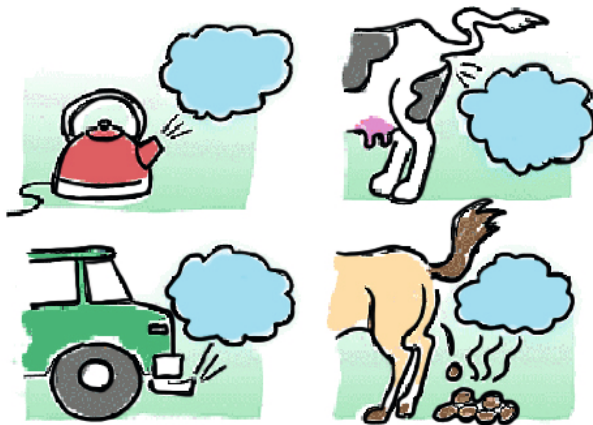
Date:

## Activity

Trace gases in our atmosphere act like the glass in a greenhouse. These trace gases trap much of the heat from the sun close to earth at night.

These gases are called Greenhouse Gases (GHGs) and they help keep our world's temperatures in balance. Without these GHGs, our planet might be like a freezer.

But too much of a good thing can turn into a bad thing! Today, unfortunately we are putting too many GHGs into our atmosphere and these gases are trapping too much heat.



Source:  
[http://www.climatechangenorth.ca/section-BG/BG\\_HS\\_03\\_O\\_E.html](http://www.climatechangenorth.ca/section-BG/BG_HS_03_O_E.html)

So let's find answers to the following questions and get details on some of the key gases floating about above our heads.

**Name of the gas:**

---

**What is its global warming potential?**

---

---

**List the key properties of this gas**

---

---

**Where does it come from? Mention the major sources of this gas**

---

---

**Enlist the items you use on day-to-day bases that lead to the emission of this gas.**

---

---

**What are the impacts of the gas on the environment?**

---

---



## Quick Grabs

A greenhouse gas (sometimes abbreviated GHG) is a gas in an atmosphere that absorbs and emits radiation and these gases are important to keep our planet warm. The primary greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, and nitrous oxide.

The problems begin when human activities distort and accelerate the natural process by creating more greenhouse gases in the atmosphere than are necessary to warm the planet to an ideal temperature. The major reasons of the greenhouse gas emission are:

- Burning natural gas, coal and oil -including gasoline for automobile engines-raises the level of carbon dioxide in the atmosphere.
- Some farming practices and land-use changes increase the levels of methane and nitrous oxide.
- Many factories produce long-lasting industrial gases that do not occur naturally, yet contribute significantly to the enhanced greenhouse effect and "global warming" that is currently under way.
- Deforestation also contributes to global warming. Trees use carbon dioxide and give off oxygen in its place, which helps to create the optimal balance of gases in the atmosphere.
- As more forests are logged for timber or cut down to make way for farming, however, there are fewer trees to perform this critical function.
- Population growth is another factor in global warming, because as more people use fossil fuels for heat, transportation and manufacturing the level of greenhouse gases continues to increase.
- As more farming occurs to feed millions of new people, more greenhouse gases enter the atmosphere.

The warming impact of different types of greenhouse gases varies according to the warming power of the gas and the length of time it stays in the atmosphere.

## Fast Facts

Although water vapor represents the earth's most significant greenhouse gas, accounting for about 95% of Earth's greenhouse effect, the scientific evidence suggests that the warming is caused mainly by man-made emissions of CO<sub>2</sub> and other greenhouse gases which increase the amount of water vapor in the air by boosting the rate of evaporation.

To understand more on water vapor as a greenhouse effect contributor, check out this **fun, informative video**:

URL: <http://www.youtube.com/watch?v=LAtd9aZYXAs>

## Learn More

**Edugreen, Teri:**

<http://edugreen.teri.res.in/explore/climate/greenhs.htm>

**Climate Change North website**

[http://www.climatechangenorth.ca/section-BG/BG\\_HS\\_03\\_O\\_E.html](http://www.climatechangenorth.ca/section-BG/BG_HS_03_O_E.html)

**EEKs! - Environmental education for Kids**

<http://dnr.wi.gov/org/caer/ce/eeek/earth/air/global.htm#gas>

**Understanding greenhouse gases**

[http://ec.europa.eu/clima/sites/campaign/pdf/gases\\_en.pdf](http://ec.europa.eu/clima/sites/campaign/pdf/gases_en.pdf)

**YouTube video on GHGs :**

<http://www.youtube.com/watch?v=GBQ8-zEcE9w>

Log on to : MCCC website link for the web-game





## Activity

Purpose	To understand the concept of Global Warming
Duration	2 hours
Location	Classroom, audio-video room
Number of students	Entire classroom
Age group	9 <sup>th</sup> to 10 <sup>th</sup> Std.
Materials required	Black board, audio-video player
Is guidance from teacher required?	Yes





## Activity

Students understand what Global Warming is by watching the following videos.

Global Warming : <http://www.5min.com/Video/What-Is-Global-Warming-38356558>

After showing the video divide the class into two groups.

Allow them to discuss for about 30mins and then conduct classroom debates for 10mins on the following topics :

1. Is Global Warming a human induced problem or a natural phenomenon?
2. Is Global Warming an imminent world threat?
3. Global Warming is not a crisis.

Note down the points mentioned by each group during the debate on the black board. The group with maximum convincing points gets the maximum scores.







## Quick Grabs

By now the children must have understood the key concept of **Global Warming**. Once the debate is over, the teacher may discuss global warming in detail with the children. A quick grab on Global Warming:

**Global Warming** is the rise in temperature of the earth's atmosphere. It happens when greenhouse gases (carbon dioxide, water vapor, nitrous oxide, and methane) trap heat and light from the sun in the earth's atmosphere, which in turn increases the temperature.

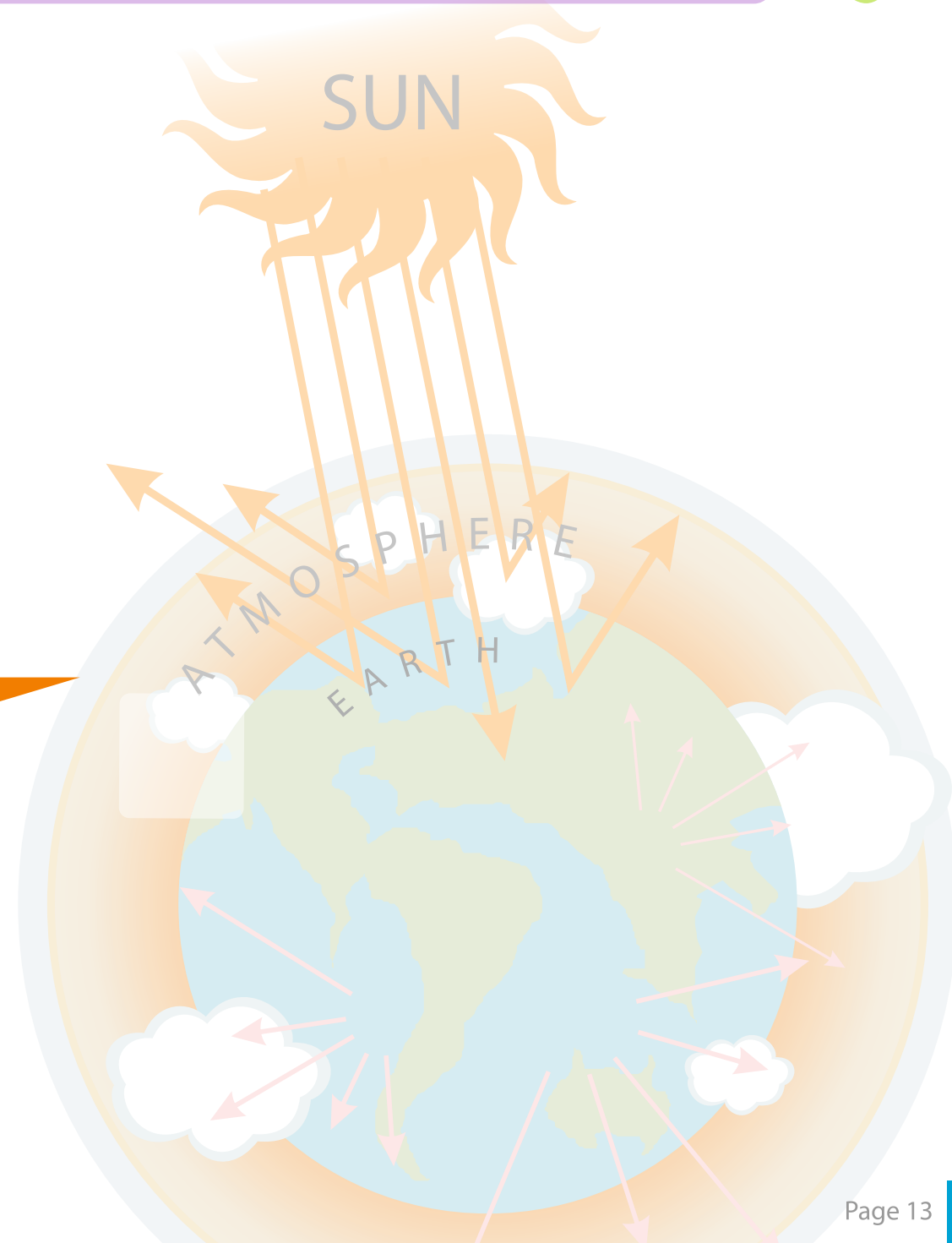
### Global Warming effect

Source: <http://www.moreinterestingfacts.com/global-warming-facts>

Major causes of Global Warming:

- Industrialization**
- Burning of Fossil fuels**
- Transportation**
- Aviation**
- Agricultural Practices**
- Deforestation**

Let's find out the impacts of the warming of the globe on us and our surroundings.





## Learn More

### GLOBAL WARMING:

#### Oracle Think quest

[http://library.thinkquest.org/CR0215471/global\\_warming.htm](http://library.thinkquest.org/CR0215471/global_warming.htm)

#### New Mexico Solar Energy Association

[http://www.nmsea.org/Curriculum/Primer/Global\\_Warming/fossil\\_fuels\\_and\\_global\\_warming.htm](http://www.nmsea.org/Curriculum/Primer/Global_Warming/fossil_fuels_and_global_warming.htm)

#### An animated film on Climate Change

<http://www.cere-india.org/>

## Fast Facts

**Every single day, 70 million tons**  
of carbon dioxide is released into  
our world's atmosphere.





## Activity 3 Connect with the Community!

**Activity**

Purpose	To learn about the level of awareness on Climate Change in your neighborhood
Duration	2 to 3 days
Location	Classroom, your neighborhood
Number of students	5 to 6 students per group
Age group	8 <sup>th</sup> to 9 <sup>th</sup> std.
Materials required	Survey sheet
Is guidance from teacher required?	Yes



## Activity

Once the teacher has discussed with the students regarding Climate Change, the following activity can be performed.

Ask students to design a survey sheet for understanding the level of awareness on Climate Change in their neighborhood. They may use the sample survey sheet on the facing page.

Once the survey sheet is designed, divide the students in groups of 5 or 6 (preferably living in the same locality) and ask them to conduct a survey of about 20 households in order to understand the level of awareness on Climate Change in their neighborhood.

Once the survey is conducted, survey sheets shall be analyzed by the students with the help of the teacher. Based on their analysis of the survey, students with the guidance of the teacher may conduct a small presentation for their neighbors to create awareness on Climate Change. For this presentation, students may use resources from **Activity 1** and **Activity 2** of this chapter.





# Activity

Name of the person :

Number of family members :

Have you heard about the term Climate Change? If yes, what do you know about it?

Anything in the news that you have heard about Climate Change?

How long you have been living in Mumbai?

Do you feel the climate in Mumbai is changing?

Would you be interested in knowing more on Climate Change?



## Quick Grabs

### What is Climate?

**Climate** is defined as an area's long-term weather patterns. **Climate** depicts the average weather for a certain region over a much longer timescale, usually over 30 years.

Our **Climate** is dominated by two major factors:

- **The sun**
- **The atmosphere, which is made up of various gases**

### What is Climate Change?

The Earth's climate is changing, but in ways that we can't easily see.

Climate Changes may occur due to natural influences like volcanic eruption, variations in energy input from Sun etc. or man-made influences causing increase in the release of greenhouse gases in the atmosphere.

The Earth is getting warmer and warmer due to the greenhouse effect of the greenhouse gases thus causing drastic changes in climate.



## Fast Facts

Mumbai is highly vulnerable to the climate hazards as shown by the large scale flooding during 2005. The most vulnerable are those 54% people living in slums, many of which are located in low-lying areas without adequate sanitation and water supplies.

### What is Weather?

**Weather** includes elements which we see daily, such as temperature, rain and wind. These can change hour by hour, day by day.

## Learn More

**Eschooltoday.com**

[http://www.eschooltoday.com/climate\\_change.html](http://www.eschooltoday.com/climate_change.html)

**Weather Wiz Kids**

<http://www.weatherwizkids.com/weather-climate.htm>

**Climate kids – NASA's eyes on the earth**

<http://climate.nasa.gov/kids/>

**A students guide to climate change by Environment Protection Agency**

<http://www.epa.gov/climatechange/kids/>



# Chapter 2 • Impacts of Climate Change

What are the impacts of Climate Change?

Who will be impacted most in the process?





## Activity 1 Know Impacts using Word Search!

**Activity**

Purpose	To get introduced to the impacts of Climate Change at the global level
Duration	30 mins
Location	Classroom, Home
Number of students	Individual or in smallgroups
Age group	7 <sup>th</sup> to 10 <sup>th</sup> std.
Materials required	Activity book, pen
Is guidance from teacher required?	No



## Activity

### Instructions to Students :

Study the grid of alphabets carefully, spot meaningful string of alphabets forming a word relevant to Climate Change. Mark the word with a pen.

The words could be present in multi-directional ways e.g. left -> right, right -> left, top -> bottom, bottom->top or diagonally in the grid.

*Hint:* There are 10 words in the grid on the facing page.

To make the activity interesting, time the activity and see how quickly you can finish the activity.





S	P	I	U	V	E	U	D	O	I	A	A	L	C	D	D
N	U	I	R	I	G	U	U	Z	K	N	T	Y	N	A	T
D	H	S	E	S	N	U	A	A	O	I	H	O	D	D	E
W	E	A	S	S	D	R	O	U	G	H	T	P	N	E	M
A	A	S	I	M	W	E	E	Y	E	E	I	R	O	A	P
T	L	D	R	W	D	V	U	L	S	R	T	N	G	G	E
M	T	R	L	T	E	N	I	N	U	O	I	F	A	N	R
O	H	V	E	U	I	A	X	O	N	R	I	U	W	G	A
S	E	G	V	C	M	L	T	I	H	U	L	I	C	S	T
P	T	P	E	X	P	U	F	H	P	W	S	R	N	U	U
H	A	S	L	E	A	I	U	E	E	S	B	O	Q	G	R
E	M	U	A	S	C	Y	E	S	E	R	E	N	R	E	E
R	I	P	E	O	T	I	R	A	S	Y	U	S	A	U	R
E	L	I	S	Y	T	I	S	R	E	V	I	D	O	I	B
A	C	W	E	S	U	O	H	N	E	E	R	G	H	C	I
R	E	E	O	S	A	R	U	E	S	A	O	Q	Y	F	O

**Answers :**

1. ATMOSPHERE
2. HEALTH
3. CLIMATE
4. SEA LEVEL RISE
5. WEATHER
6. DROUGHT
7. IMPACT
8. GREENHOUSE
9. TEMPERATURE
10. BIODIVERSITY



## Quick Grabs

The entire globe is facing the impacts of Climate Change. As the Earth continues to warm, impacts will vary widely across the globe.

The probable effects of Climate Change are:

### Rising temperatures

Globally, 2000 to 2009 was the warmest decade since records began in 1850. The average temperature of the atmosphere near the Earth's surface has risen by about 0.75 degree Celsius since around 1900.

### Rising sea levels

Rising sea levels could swamp some small, low-lying island states and can harm the population living in low-lying areas.

### Weather

The weather is changing! Globally, continuing warming means that extreme weather events – like severe floods, droughts and tropical storms – are likely to become more frequent.

### On plants and animals

Further changes in rainfall and temperature will affect many animal and plant species around the world. Some species might be unable to adapt quickly enough and they will be left without habitats to live in. If global temperatures rise by two degree Celsius, 30 per cent of all land-living species could be threatened by an increased risk of extinction.

### On food and water

Water availability for irrigation and drinking will be less predictable because rain will be more variable. It is also possible that salt from rising sea levels may contaminate underground fresh water supplies in coastal areas. Droughts are likely to be more frequent. Up to three billion people could suffer increased water shortages by 2080.

## Learn More

**NASA:** <http://climate.nasa.gov/effects/>

**Windows to the Universe:** <http://tiny.cc/BjXf2b>

**EPA:** <http://www.epa.gov/climatechange/kids/basics/concepts.html>

## Fast Facts

The five hottest years on record have all occurred since 1997 and the 10 hottest since 1990, including the warmest years on record – 2005 and 2010.



**Yes the globe is really WARMING!**







## Activity 2 Map Making!

**Activity**

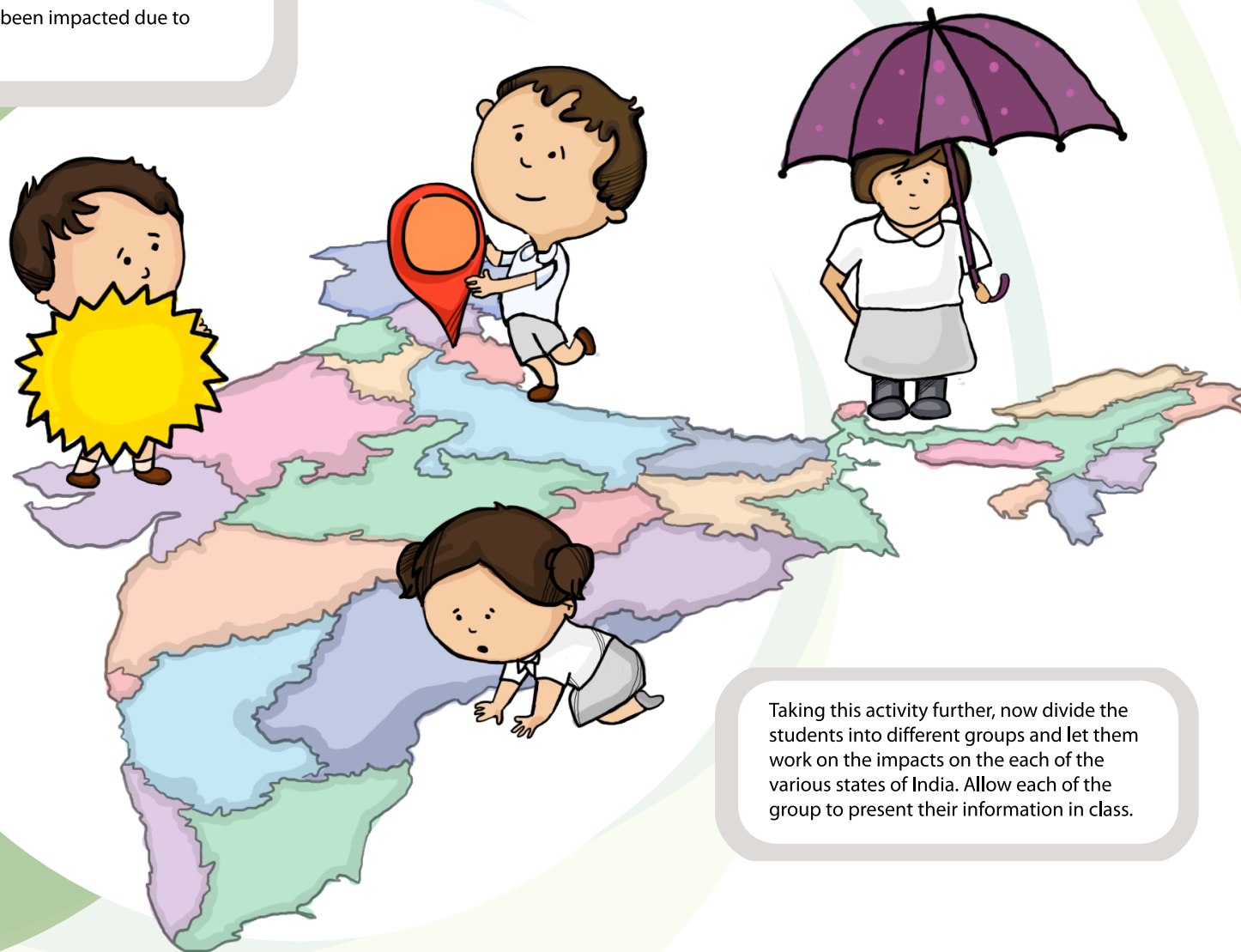
Purpose	To understand the impacts of Global Warming in our country
Duration	2-3 Lectures
Location	Classroom
Number of students	Entire classroom
Age group	8 <sup>th</sup> to 10 <sup>th</sup> std.
Materials required	Map of India, Color pencils / crayons
Is guidance from teacher required?	Yes



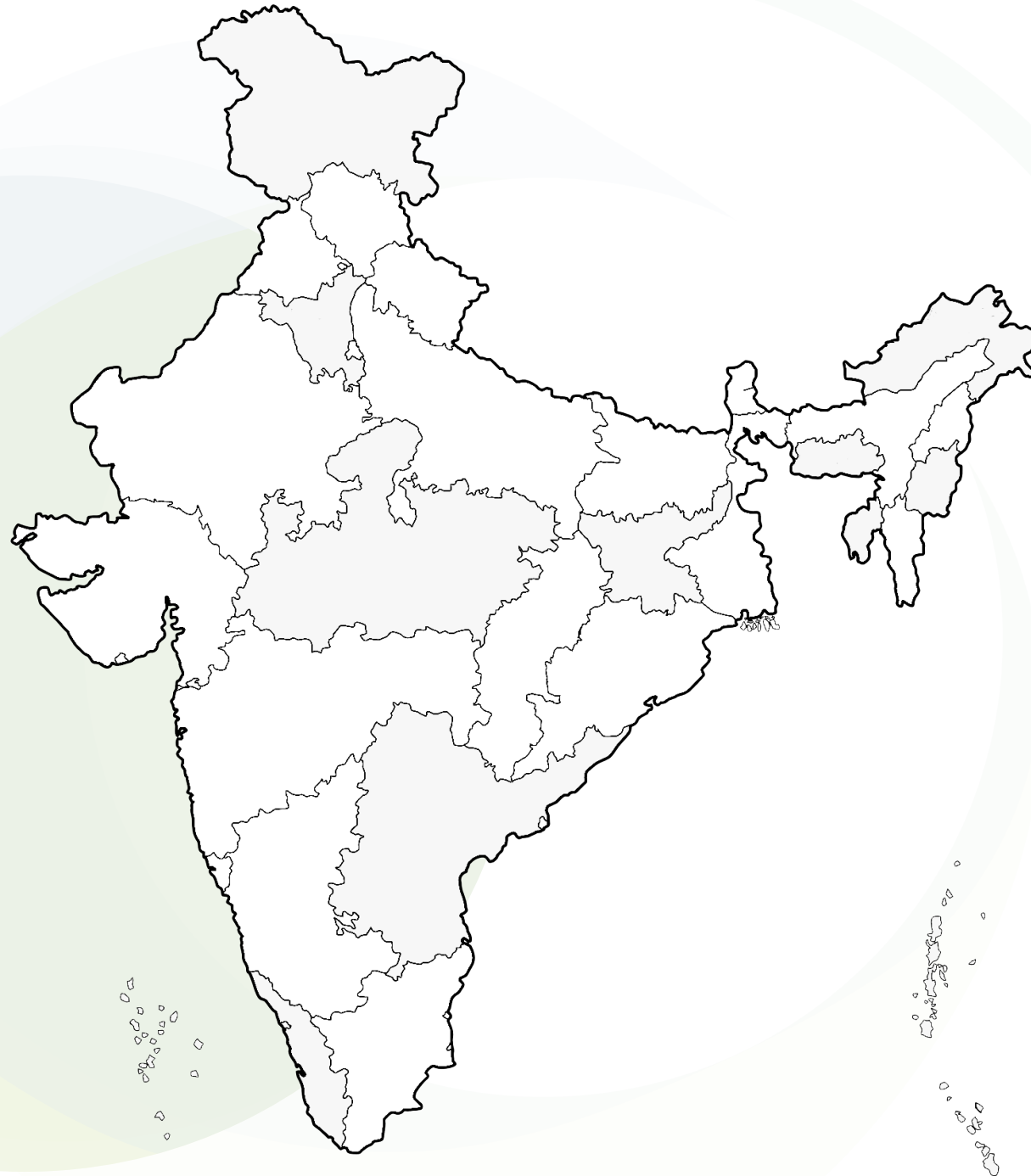
## Activity

This is an interesting activity for learning more on the impacts of Global Warming in our country. Inform the students about the impacts of Climate Change observed in India over the years.

Now distribute amongst the students the map of India. Ask the students to find out the states on the map of India that have been impacted due to Climate Change and color them accordingly.



Taking this activity further, now divide the students into different groups and let them work on the impacts on the each of the various states of India. Allow each of the group to present their information in class.





## Quick Grabs

India is among countries most threatened by climate change resulting from rising temperatures. The change will lead to more floods, heat waves, storms, rising sea levels and unpredictable farm yields.

Here are the main potential effects of climate change on India, some of which you have already studied in the previous activity. But it is important to understand what our nation is suffering from.

### Potential effects of Climate Change:

#### Change in Weather

A warmer climate has resulted in change in rainfall and snowfall patterns leading to increased droughts and floods, and melting of glaciers.

#### Lowered Agriculture Production

India is an agricultural country; however, higher temperatures reduce the total duration of a crop cycle, leading to a lower yield per unit area, especially for India's wheat and paddy crops. Soil erosion, increased numbers of pests and weeds increased by Climate Change are also affecting agriculture in India.

#### Rise in sea-levels

A trend of sea level rise of 1 cm per decade has been recorded along the Indian coast. The major delta area of the Ganga, Brahmaputra and Indus rivers, which have large populations reliant on riverine resources, are being affected by changes in water regimes, salt water intrusions and land loss.

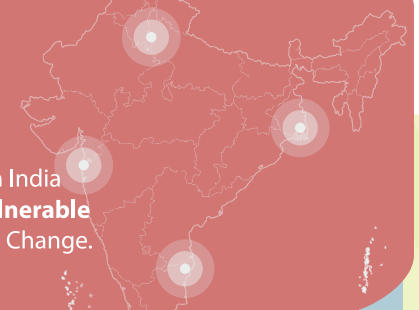
#### Health

Rise in temperature and change in humidity is adversely affecting human health in India. The increasing heat stress could result in heat cramps, heat exhaustion, and heat stroke and weaken immune systems. Increased temperatures are increasing the range of vector-borne diseases such as malaria, particularly in regions where minimum temperatures currently limited the spread of such diseases. Unexpected monsoons are also affecting the health graphs of children and aged people.

## Fast Facts

Delhi,  
Mumbai,  
Kolkata and  
Chennai

are the four megacities in India which are particularly **vulnerable** to the impacts of Climate Change.



## Learn More

Edugreen, TERI

<http://edugreen.teri.res.in/explore/climate/impact.htm>



## Activity 3 Chit-Chat with Grandparents!

**Activity**

Purpose	To learn about the level of awareness on Climate Change in your neighborhood
Duration	2 to 3 hours
Location	Your neighborhood
Number of students	Individual or groups of 2 members
Age group	7 <sup>th</sup> to 8 <sup>th</sup> Std.
Materials required	Note book and pen
Is guidance from teacher required?	Yes



## Activity

By performing the **Activity 1** and **Activity 2** of this chapter the students will be well acquainted with the impacts of Climate Change at a global and national level.

This activity will help students understand the scenario at the local level.

Ask the students to go and have an interactive session with their grandparents or senior citizens in the locality pertaining to their observations about the changes in the climatic conditions over the decades. This is one way of qualitative perception about the scenario by interacting with the grandparents who have been residents of Mumbai or its surroundings for at least last 20 years.

The students could be guided by the teachers regarding the points that they need to discuss about. The following points can be taken up for the discussion:

- What was the weather like in your youth (during summers, winters and monsoon)?
- What do you feel about the current weather conditions?
- Did you see any changes in the climate in the last 1 or 2 decades?
- Can you give any examples? (Like changes in rainfall patterns, summers and winters etc.)
- Do you observe any changes specifically in your locality?

Then the students can also share with them some information on Climate Change and why it is happening, based on the students' knowledge obtained from the previous activities.

This activity may be extended by asking the students to compile all the information procured from the discussions, jotting down the common observations. Based on this, students may conduct a short workshop for grandparents on the 'Grandparents' day' celebrated in most schools.







## Quick Grabs

The Climate Change is a prolonged event which can be felt through long change in the weather condition. The Earth's climate has changed in the past and is expected to change in the future. We will experience these changes through the day-to-day weather. It is natural to want to ascribe a cause to any perceived unusual weather, and "Climate Change" is often espoused by the popular press as a possible cause. In some cases this inference may be correct—but proving it to be correct is exceedingly difficult. More often, extremes of weather occur simply as a manifestation of various interacting atmospheric processes. In other words, extremes are generally nothing more than examples of the tremendous natural variability that characterizes the atmosphere.

## Fast Facts

The Intergovernmental Panel on Climate Change, in its 2007 report, predicts that **global temperatures will rise by 2-4.5°C** by the end of this century, with a **2.7-4.3°C increase over India** by the 2080s. The panel also predicated an increase in rainfall over the Indian sub-continent by 6-8 percent and that the **sea level would rise by 88 centimetres** by 2100.

## Learn More

### Climate Change

<http://www.youtube.com/watch?v=ko6GNA58YOA>  
<http://www.youtube.com/watch?v=N0CpH71pydQ>







# Chapter 3 • Response to Climate Change

How can Climate Change be mitigated through energy efficiency technique?

What are effects of Climate Change on different continents of world and adaptation tools and techniques used by people?

Climate Change mitigation and adaptation through disaster management



Activity 1 **Know your Energy Consumption****Activity**

Purpose	To know electrical consumption in the house and analyze it.
Duration	1 day for preparing the table and 30min in class
Location	Home and Classroom
Number of students	Individual activity
Age group	7 <sup>th</sup> to 9 <sup>th</sup> std.
Materials required	Activity sheets, internet
Is guidance from teacher required?	Yes
Is guidance of an adult at home required?	Yes



# Activity

This is an individual activity. Students will list all the electrical appliances in their house and fill in the table as given on adjoining page and find the total electricity consumption and GHG emission.

- Student should list down all the electric appliances present at their house in the provided activity sheet.  
**Wattage** can be found at the back of every appliance. They are given as \_\_W.  
**Hours of operation** will be time for which the equipment is used (2hrs, 3hrs etc).
  - **Consumption** can be calculated using following formula:  
**Electricity used (kWh) = Hours of Use x (Wattage of Appliance/1000)**
  - Once the consumption is calculated, further step is to calculate **CO<sub>2</sub> emissions**.  
Multiply the monthly consumption by 12 (No. of months in a year).  
**CO<sub>2</sub> emission(kg) = electricity used (in kWh/Yr) X 0.00082 (Emission Factor<sup>1</sup>)**
  - Divide this value with 1000 to get total carbon footprint in ton of CO<sub>2</sub>.  
Final carbon footprint is in tons of CO<sub>2</sub> (tCO<sub>2</sub>).
- Note: 1 kWh of electricity = 0.00085 kg CO<sub>2</sub> per kWh,  
<sup>2</sup>Source: Central Electricity Authority, Ministry of Power, GoI
- After calculating the consumption and GHG emission students will compare their energy consumption with other students and analyze it in terms of:
    - Number and type of appliances present in each house with respect to the number of people in the house
    - Usage pattern (lifestyle)
  - Students will then have a discussion about reasons of the difference/similarities.
  - Parents should supervise the student while noting down the wattages of appliances.

<sup>1</sup> Emission factor is defined as the average emission rate of a given GHG for a given source, relative to units of activity.

<sup>2</sup> Activity related to carbon footprint calculation- [www.greencleanguide.com](http://www.greencleanguide.com) – GHG accounting



- Distribute one activity sheet to each student.
- Ask each student to tick in front of the appliance present in their house and fill other information in the table.
- In the next lecture, teacher will help the students to calculate the consumption and CO<sub>2</sub> emission with help of an example.
- The students will then complete the sheet and present it in front of entire class.
- Tick in front of the appliances present in your house in the following table:



Name of the students:

Class:

Date:

## Activity

Sr.No.	Tick	Name of appliance	Hours of operation (Hr)	Wattage (W)	Consumption (WHr)	CO <sub>2</sub> emission
01		Tubelights				
02		Bulbs (Incandescent)				
03		Bulbs (CFLs)				
04		Refrigerator				
05		Mixer/ grinder/ food processor				
06		Microwave/ oven				
07		Toaster				
08		Water Purifier				
09		Electrical chimney				
10		Air conditioner				
11		Fan				
12		Television				
13		Music system				
14		Geyser				
15		Pressing Iron				
16		Washing machine				
17		Computer				
18		Laptop				
19		Hair dryer				
20*		Any other				
21*		Any other				
22*		Any other				

\* Other appliances if any should also be listed in the given blank rows.

### Note :

To estimate the number of hours that a refrigerator actually operates at its maximum wattage, divide the total time the refrigerator is plugged in by three. Refrigerators, although turned 'on' all the time, actually cycle on and off as needed to maintain interior temperatures.

Wattages are usually written at the back side of the appliance. In case a student is not able to find it for a certain appliance, teacher will help the student with that. Check wattages for few appliances on the link : [www.consumerreports.org/cro/resources/images/video/wattage\\_calculator/wattage\\_calculator.html](http://www.consumerreports.org/cro/resources/images/video/wattage_calculator/wattage_calculator.html)





## Quick Grabs

The primary **environmental impact** of electricity consumption by the different appliances is the production of **greenhouse gases** that contribute to **global warming**. Temperature control meaning heating and cooling our house account on average for 60% of the energy used within an average household. The problem with older appliances is not only that we don't realize they are a problem but that they consume more energy throughout the day.

## Learn More

### EPA website:

<http://www.epa.gov/climatechange/wycd/home.html>

### Energy basics:

[http://www.eia.gov/kids/energy.cfm?page=about\\_home-basics](http://www.eia.gov/kids/energy.cfm?page=about_home-basics)

<http://www.kids.esdb.bg>

## Fast Facts

About 10 percent of your home's electricity goes toward lighting, and upgrading to newer, more efficient bulbs, fixtures and controls can reduce that by up to 75 percent. The first step in increasing the energy-efficiency of your home's lighting, however, is to reduce your dependence on artificial lights.

To understand more on energy efficiency in lighting watch :

<http://www.youtube.com/watch?v=3OEU1oAEIIE>





## Activity 2 Time to Change!

**Activity**

Purpose	To understand about mitigating Climate Change effects through more climate friendly ways over conventional ways.
Duration	2 classroom sessions
Location	Classroom, Computer room
Number of students	Group of 4 students
Age group	8 <sup>th</sup> to 10 <sup>th</sup> std.
Materials required	Activity sheet, internet
Is guidance from teacher required?	Yes



## Activity

Analyzing and comparing the advantages and disadvantages of conventional ways producing GHG emission with alternate climate sensitive ways.

In the activity, students will learn about various alternate tools and techniques of reducing GHG emissions and facts about conventional ways which will help in mitigation of Climate Change.

**Details:**

The students are to be divided into 10 groups. Provide following list of various conventional and climate sensitive ways to each group of students and ask them to fill the required information as mentioned in the activity sheet.

**List:**

1. Incandescent bulb v/s CFL OR CFL v/s LED
2. Solar water heater v/s conventional geyser
3. Biofuel v/s CNG OR CNG v/s Petrol
4. Wind power v/s conventionally generated power
5. Solar power v/s conventionally generated power
6. Biomass energy v/s conventionally generated energy
7. Private v/s public transport
8. Imported food v/s locally grown food
9. Star rated v/s non rated equipments
10. Recycled products v/s non recycled

The final output will be submitted in form of a report covering all points as given in the reference report format below. Teacher should evaluate the report based on depth and quality of research done and score the report accordingly.





Name of the students:

Class:

Date:

## Activity

### Reference Report Format

The report should contain information as given in the table. Students should fill the information and make a report.

	CONVENTIONAL WAY	CLIMATE SENSITIVE WAY
<b>Photo</b>		
<b>Facts-</b> general information		
<b>Effects on climate change</b>		
<b>Advantages of use</b>		
<b>Disadvantages of use</b>		
<b>Case study if any</b>		
<b>References</b>		

\*Students may add any other information about both ways. The structure of the report can be changed according to convenience.



## Quick Grabs

Global warming is increased due to the emission of greenhouse gases and one of the major sources of the emission is fossil fuel burning. Almost 90 percent of the world's energy is supplied through the combustion of fossil fuels, and every time we burn these fuels to make energy we release carbon dioxide into the atmosphere.

In order to ensure healthy air and a stable climate for our future generation, we must make responsible decisions about our energy sources. Renewable energy plays a role in reducing Climate Change. Renewable energy includes hydroelectric power, tidal power, wind, solar, geothermal and biomass. These are not depleted when we use them.

## Fast Facts

The Indian Ministry of New and Renewable Energy (MNRE) estimates that there is a potential of around 90,000 MW for power generation from different renewable energy sources in the country, including 48,561 MW of wind power, 14,294 MW of small hydro power and 26,367 MW of biomass.

## Learn More

<http://epa.gov/climatechange/kids/solutions/technologies/index.html>

<http://www.energysavingsecrets.co.uk/publictransportvsprivatetransportthedebate.html>

<http://www.ecoevaluator.com/lifestyle/smart-food/benefits-of-locally-produced-food.html>

<http://www.sustainabletable.org/issues/eatlocal/>

[http://www.energystar.gov/index.cfm?c=kids.kids\\_index](http://www.energystar.gov/index.cfm?c=kids.kids_index)

[http://www.afdc.energy.gov/pdfs/afv\\_info.pdf](http://www.afdc.energy.gov/pdfs/afv_info.pdf)

<http://greenliving.nationalgeographic.com/energy-efficient-bulbs-halogen-vs-fluorescent-vs-incandescent-3228.html>



Activity 3 **Stop the Disaster!****Activity**

Purpose	To learn about management of disaster resulting due to Climate Change.
Duration	3-4 class sessions
Location	Classroom, internet room
Number of students	4 to 5 students per group
Age group	8 <sup>th</sup> to 10 <sup>th</sup> std.
Materials required	Computer with internet facility, big chart papers
Is guidance from teacher required?	Yes





## Activity

Play the game **Stop Disasters** and make charts explaining various mitigation and adaptations ways that can be used during a particular disaster.

### Details:

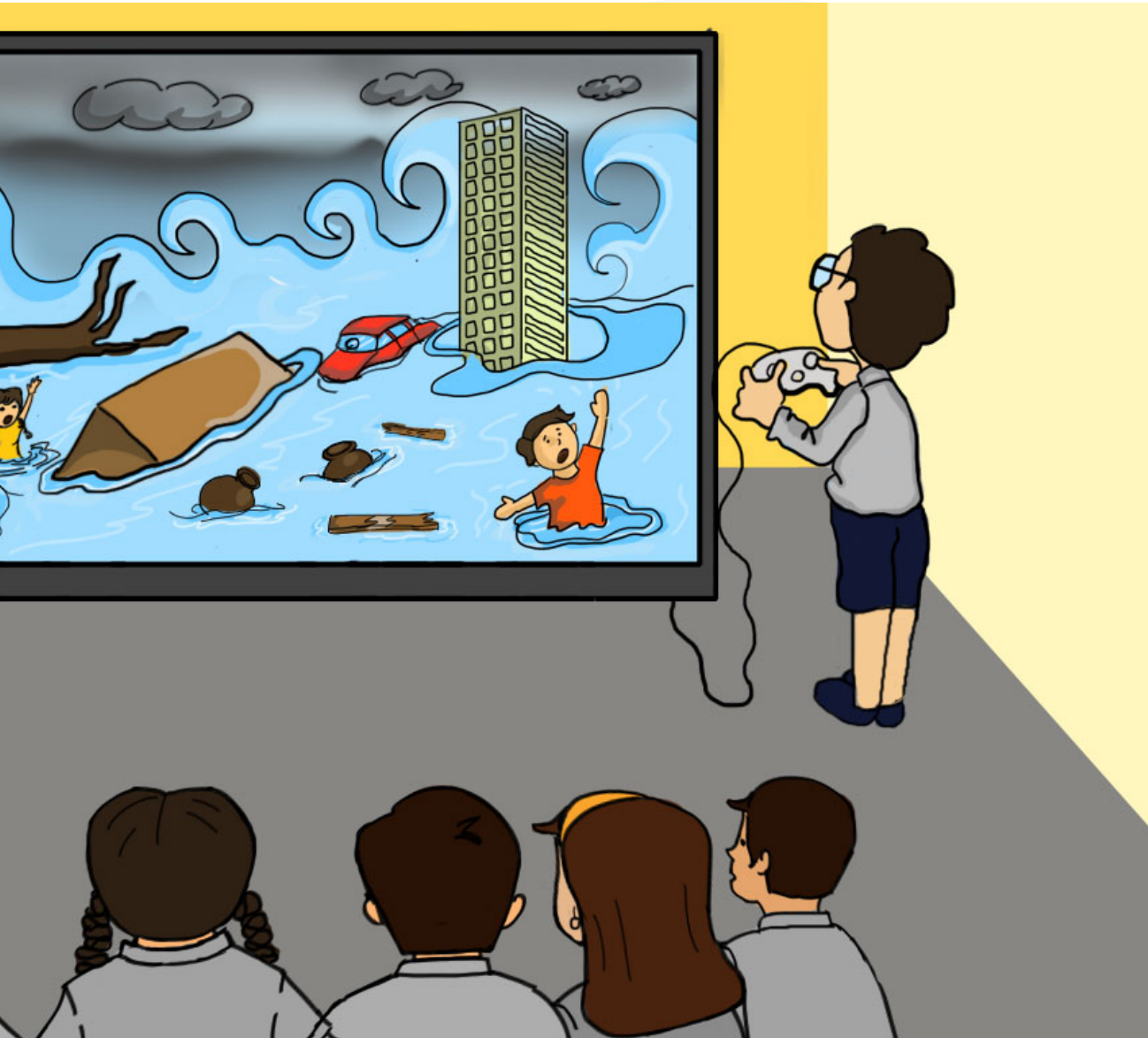
Visit the website **[www.stopdisastersgame.org](http://www.stopdisastersgame.org)** and explore the website.

○ **For teachers :** Go to information section of the website. Download the fact sheets related to each disaster. Provide the relevant fact sheet to each group and explain to them the disaster. Monitor the groups when they are discussing what action to take and while they are playing the game. Help them in making the charts.

○ **For students :** Each group will take one disaster (there are total 5 disasters) and play various levels (easy, medium, and hard) of the game. They will discuss among themselves about the best possible ways to manage the disaster for minimum damage. After finishing the level they will save the reports. Each group will then prepare a chart explaining the various mitigation and adaptation ways for their respective disasters. They will present this chart to the whole class and discuss about the disaster and protection measures against it. The charts can be presented to the whole school for educating other kids and teachers.

○ **Note :** If there are no resources available for playing the game, read and research on the particular disaster and make charts.







## Quick Grabs

### Understanding the connection between Climate Change and natural disasters:

Scientists are putting forth a theory stating there is a strong connection between Climate Change and natural disasters. The increasing instances of floods, droughts, hurricanes and forest fires are all the result of increasing temperatures. Climate Change, caused by rising outputs of carbon dioxide from vehicles, factories and power stations, not only affects the atmosphere and the sea but also alters the geology of the Earth.

**Hurricanes<sup>3</sup>:** Oceans are getting warmer with increasing temperatures due to global warming. When the sea surface temperature reaches 26°C or higher, it crosses a threshold for hurricane formation. Enough moisture evaporates into the atmosphere to trigger thunderstorms, which can in turn become tropical storms and hurricanes.

**Floods:** Climate Change is resulting in sea level rise and change in precipitation pattern (severe rains or no rains), thus causing floods and drought conditions.

**Wild fires:** More fires are occurring due to increase in temperatures and lightning.

3 : <http://www.ucar.edu/communications/staffnotes/0410/hurricane.html>

## Fast Facts

During the period 1987 to 2006, the number of reported weather-related disasters increased significantly, from an average of 195 per year between 1987 and 1998 to 365 per year between 2000 and 2006.

## Fun Activity

Students can form groups of 3-4 and play **Riskland** - a fun game to learn about disaster management.

Check out

<http://www.unisdr.org/we/inform/publications/2114> for rules and other required resources to play this game.

Copyright information-

Both the above games are created by ISDR secretariat and UNICEF.

## Learn More about Natural Disasters @

**Tsunami :** [goo.gl/YRnee](http://goo.gl/YRnee)

**Hurricane :** [goo.gl/6Eb4g](http://goo.gl/6Eb4g)

**Earthquake :** [usgs.gov/shakeout](http://usgs.gov/shakeout)

**Floods :** [www.floodsmart.gov](http://www.floodsmart.gov)



Activity 4 **In Their Shoes!****Activity**

Purpose	To learn about Climate Change, its effect, and adaptation and mitigation techniques used, through group skit.
Duration	4-5 class sessions
Location	Classroom, auditorium
Number of students	4 to 5 students per group
Age group	7 <sup>th</sup> to 9 <sup>th</sup> std.
Materials required	Reading material, script.
Is guidance from teachers required?	Yes
Is guidance from parents required?	No



## Activity

To prepare a skit and present it in front of the class/ school. The play will be related to Climate Change, its causes, its effects and mitigation and adaptation techniques used by people from various countries to combat Climate Change.

### Details:

- **For teachers** : Divide students in groups of 4-5. Give them topics to create the play and help them with research work on the topic and writing the play. Supervise their practice for play.
- **For students** : Students will write a play on given topic. They have to first read various materials and carry out internet research on the given topic. The play will be written and rehearsed in 3-4 class sessions and 1-2 class sessions can be utilized for presenting it. The play should be maximum 15 min long.
- The **topics for plays** can be:
  - **If animals could talk**  
A play where students can be various animals affected by Climate Change talking about how the change is affecting them. Students can be animals like polar bear, penguins, sea seals, turtles, whales etc.
  - **(K)No(w) more !**  
Play describing causes of Climate Change.
  - **Earth cries !**  
Play providing information about temperature rise and its effects (sea level rise, greenhouse effect, melting glaciers).
  - **Be the change**  
Play containing information on ways to reduce GHG emission at personal level.
  - **Together we cope !**  
Play about how people from various countries are adapting to Climate Change.  
e.g. Bhaira technique in Bangladesh to cope with regular floods.
  - **Speak up**  
Explore your surroundings and create a play on what is wrong in relation to Climate Change.  
e.g. waste is not managed properly, open burning etc.
- Have a **discussion** about the students' experience while writing and performing the play.
- Things to note for play - **costumes** can be used if readily available, or they can be made from trash.









## Quick Grabs

Global warming is threatening wildlife, fish and plants which are already on the brink of extinction. Melting sea ice, warming ocean and river waters, shifting life cycles and migration are impacting endangered species, including polar bears, penguins, coral, salmon and migratory birds. A recently released report from the United Nation's Intergovernmental Panel on Climate Change (IPCC) states that 20-30 percent of animal and plant species could be at an increased risk of extinction. The Endangered Species Coalition is working to protect endangered species from the impacts of global warming.

Many animal species like Arctic fox, polar bear, whale, flamingos, turtle, penguins, etc. are already on the verge of extinction and need attention.

## Fast Facts

15 to 37% of all the species in the biodiversity rich regions could be driven to extinction by the climate changes likely between now and 2050.

## Learn More

For plays and other activities:  
[www.paryavaranmitra.in](http://www.paryavaranmitra.in)

Wildlife conservation society:  
[goo.gl/Igvlc](http://goo.gl/Igvlc)

About global warming:  
<http://www.kidsforsavingearth.org/>

Videos related to all above topics:  
[goo.gl/nnMgY](http://goo.gl/nnMgY)

[goo.gl/xSsTE](http://goo.gl/xSsTE)

[goo.gl/PBzez](http://goo.gl/PBzez)

[goo.gl/VOh64](http://goo.gl/VOh64)

[goo.gl/7w8J7](http://goo.gl/7w8J7)

[goo.gl/JO1u8](http://goo.gl/JO1u8)



Activity 5 CO<sub>2</sub> in your Shopping Bag!**Activity**

Purpose	To learn about food miles (how far food has traveled to reach the customer) and calculating CO <sub>2</sub> emissions due to that and doing a local market survey to know whether the food miles can be reduced.
Duration	1 week
Location	Classroom, local market, any supermarket
Number of students	even number of students per group
Age group	8 <sup>th</sup> to 10 <sup>th</sup> std.
Materials required	Camera (optional), blank A4 paper, calculator, world map
Is guidance from teachers required?	Yes
Is guidance from parents required?	No



## Activity

To visit a nearby supermarket and list down items which are imported though locally available, map them and calculate **food miles** of those items. Do a market survey for the same items in a local market.

### 1. For teachers :

Divide students in groups with even number of students. Provide them with a tentative list of items as given below to be looked at in the market. Guide them with food mile calculations and surveys.

- |                                     |                           |
|-------------------------------------|---------------------------|
| • Fruits                            | • Juice                   |
| • Vegetables                        | • Jam                     |
| • Fresh and processed meat and fish | • Sauces                  |
| • Dairy products                    | • Sugar and Confectionery |
| • Cheese                            | • Honey                   |
| • Butter                            | • Oil                     |
| • Ice-cream                         |                           |
| • Processed fruits and vegetables   |                           |

### 1. For students:

#### Part 1:

- Visit the nearby supermarket and note down the places from where the food item is imported by looking at the label. Also note down the price and any other details.
- Talk to the manager of the supermarket and try to get information on how much cooling is required for keeping the products fresh. Also note down the packaging style of the produce.
- Take a picture if possible. Fill this information in table format.
- On a world map, indicate the places from where these food items are imported. Find the distance they have travelled to reach the supermarket.



e. Calculate **Food Miles** using following method:

- Note product weight in kilograms (kg)
- Find out product transport route via various modes in kilometers (km): Air, water, rail, truck (as this exercise is for students, only air travel and local travel if known will be considered for calculating CO<sub>2</sub> emissions)
- Calculate food miles using formulae<sup>4</sup>:

#### Air:

\_\_\_ kg x (\_\_\_ km x 1.10 g CO<sub>2</sub>/km ÷ 1000 g/kg) per kg of food = \_\_\_ kg CO<sub>2</sub>

#### Truck:

\_\_\_ kg x (\_\_\_ km x 0.27 g CO<sub>2</sub>/km ÷ 1000 g/kg) per kg of food = \_\_\_ kg CO<sub>2</sub>  
Total = \_\_\_ kg CO<sub>2</sub>

#### EXAMPLE :

Consider 100kgs of product weight, 5000km air travel and 150km truck travel:  
RESULTS

#### Air:

100 kg x (5000 km x 1.10 g CO<sub>2</sub>/km ÷ 1000 g/kg) per kg of food = 550.0 kg CO<sub>2</sub>

#### Truck:

100 kg x (150 km x 0.27 g CO<sub>2</sub>/km ÷ 1000 g/kg) per kg of food = 4.0 kg CO<sub>2</sub>  
Total = 554.0 kg CO<sub>2</sub>

- Note CO<sub>2</sub> emissions for all items.

<sup>4</sup>Source: <http://www.fallsbrookcentre.ca/cgi-bin/calculate.pl>





### Part 2:

- Visit local market and note down the place from where the same items come from.
- Talk to the shop owner regarding price and other maintenance procedures.
- Take pictures if possible.
- Calculate food miles and CO<sub>2</sub> emission using the above method for these items as well.
- Compare the locally available and imported product.

### Things to note –

- The even number of students in each group will help in terms of even distribution of work. Half students can do supermarket survey while half of them can do local market survey.
- Students can also include items they found at home which are imported.
- Distances can be measured using Google Earth: <http://earth.google.com/>
- Assume food products weight to a higher side than a student will see in the supermarket as it will be imported in large quantities. (Teacher will help in making these assumptions)
- Important things to look at apart from the place the product comes from are price, packaging, maintenance, hygiene etc.





## Quick Grabs

Due to the burning of the fossil fuels such as gas, coal or oil, carbon dioxide is released into the atmosphere. In a natural carbon cycle, carbon dioxide is re-absorbed by plants and trees. However, we are burning fuels where the carbon dioxide has been trapped under the earth's surface for millions of years, and we are doing it so quickly that plants and trees that are alive now have no chance of soaking it up. Fossil fuels are also burnt at various stages in the process of creating food, products and services for our consumption.

Through this activity students will learn whether locally available food is more environment friendly or imported food. It will be a useful lesson which will help them in changing their lifestyle and food habits.

## Fast Fact

Gas by Gas emission distribution shows that amongst other greenhouse gases CO<sub>2</sub> emission is highest (65 percent)

## Learn More @

Food mile calculator:  
[goo.gl/jq9WM](http://goo.gl/jq9WM)

Food maps:  
[www.climatechoices.org.uk](http://www.climatechoices.org.uk)

Other reading material:  
[www.organiclinker.com](http://www.organiclinker.com)

India's market opportunities for imported fresh and processed foods report by Madras Consultancy Group, Chennai for Department of Agriculture and Food.

Find the report on- [goo.gl/7myFq](http://goo.gl/7myFq)





## Activity 6 What's Happening Around You?

**Activity**

Purpose	To learn about the importance of different areas of the earth to Climate Change events
Duration	5 class sessions
Location	Home & Classroom
Number of students	Minimum 5
Age group	7 <sup>th</sup> to 9 <sup>th</sup> std.
Materials required	Chart Paper, Internet
Is guidance from teachers required?	Yes
Is guidance from parents required?	Yes





## Activity

To examine the impact of Climate Change predicted for different continents of the World. Divide the students in 7 groups. List down names of the seven continents and assign each group a continent

Students will design a poster or prepare a chart which will have the map of each continent and list down the possible impacts of climate change on that continent. The following impacts like, Global warming, Glacier melting, Sea-level rise, Increased precipitation, Increased events of drought, Extinction of important plants and animal species has to be described by students in the chart.

Second, the students will also list the Climate Change related global conventions that have taken place in the different countries of each continent.

The enumeration of the possible Climate Change adaptation tools and techniques present/used in various countries has to be done in the charts.

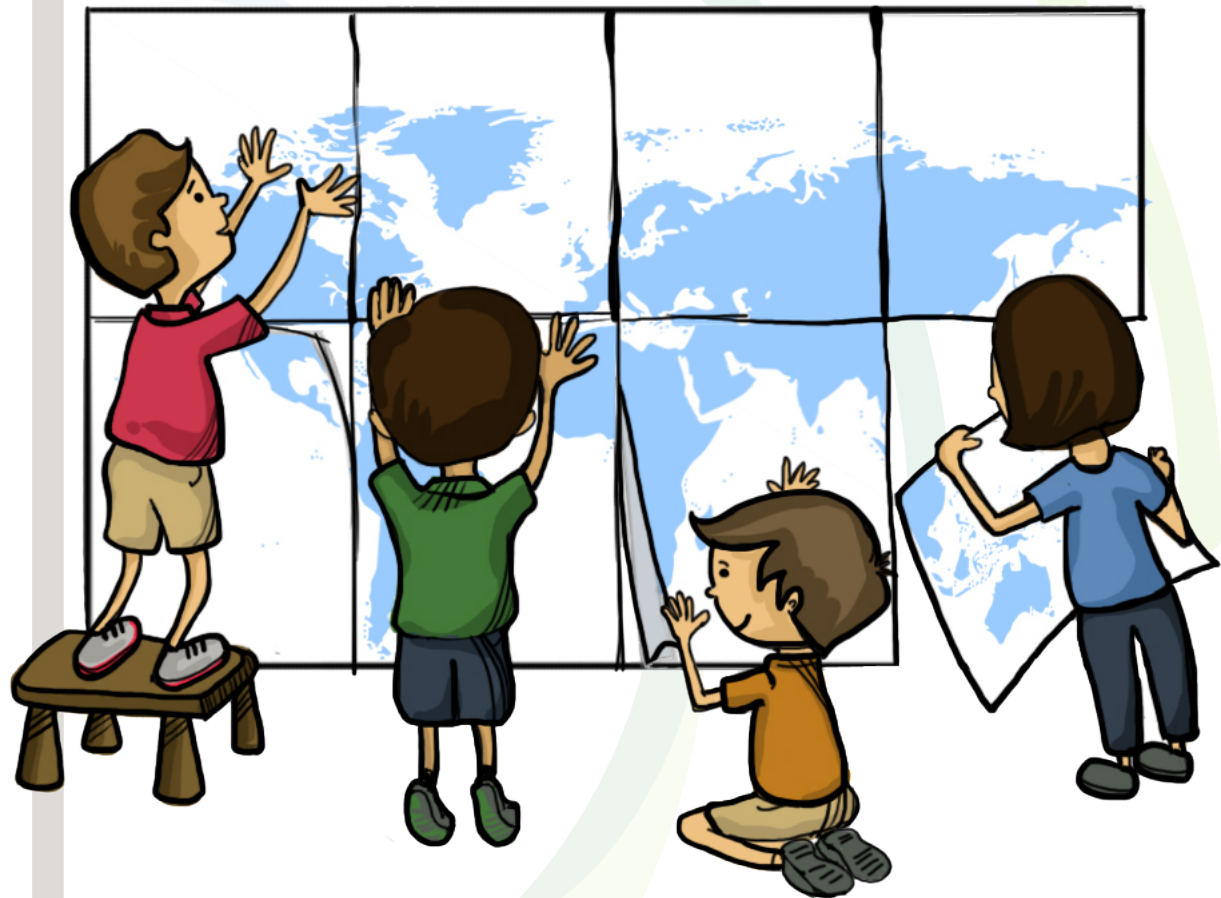
Two to three sessions can be assigned to each group for the collection of the data and materials. An interim check by the teacher could be made to ensure that the information collected by students is correct and relevant. The teacher can further advise the groups on the sources and links to collect information.

Students can also propose by themselves the possible adaptation strategies which should be adapted by people in the continents to protect themselves from the adverse impacts of Climate Change.

A student representative from each of the group has to present their information in front of the whole class.

Follow the final output as chart or poster and also as a presentation made by the whole group.

The teacher has to discuss with the students after the presentation of the whole class, on the listed possible impacts of Climate Change and where our country stands, which areas will mostly be affected by Climate Change, what will be possible impacts on India, who are the most vulnerable people in the country to Climate Change, what are the adaptation strategies present in India.





## Activity

### Details:

Visit and explore the website for reference to the activity:

### Teaching and Learning for a Sustainable Future : Activity 3

Visit :

[http://www.unesco.org/education/tlsf/mods/theme\\_c/mod19.html?panel=3#top](http://www.unesco.org/education/tlsf/mods/theme_c/mod19.html?panel=3#top)

### For teachers :

Go to information section of the website. Download the fact sheets related to each continent. The teacher before assigning the task gives an introductory lecture to the students to make them understand the relation between the Climate Change impacts and what adaptation means in respect to Climate Change. Monitor the groups when they are discussing which action to take and help them with making of charts.

### For students :

Each group will take one continent and elaborate about it. They will discuss among themselves about the impacts and should also come up with the best possible ways to manage the Climate Change. Each group will then prepare a chart explaining the continents, various impacts on it and methods of adaptation for their respective continents. They are also required to list the Climate Change and environment related conventions held within the continent. They will present this chart to the whole class and discuss about the adaptation measures. The charts can then be presented to whole school for educating other kids and teachers.

### Example for teacher's reference: Asia



Students will find maps or draw maps related to the physical feature of each continent

They will show the impacts of Climate Change in different parts of the continent from the enlisted impacts. This will include vulnerability of continents to major Climate Change related events.

Species which are special to the continent and vulnerable due to Climate Change have to be listed.

Climate Change conventions held in the continent to be listed.

### Reference:

1. Impact of Climate Change

[http://know.climateofconcern.org/index.php?option=com\\_content&task=article&id=106](http://know.climateofconcern.org/index.php?option=com_content&task=article&id=106)

2. Reference to the activity can be made from the study done - Kirby, A. (2008) Climate in Peril, UNEP/GRID-Arendal and SMI Books, pp. 32-38

[http://www.unesco.org/education/tlsf/mods/theme\\_c/mod19.html?panel=3#top](http://www.unesco.org/education/tlsf/mods/theme_c/mod19.html?panel=3#top)



## Quick Grabs

Many global issues are climate-related, including basic needs such as **food, water, health, and shelter**. Changes in climate may threaten these needs with increased temperatures, sea level rise, changes in precipitation, and more frequent or intense extreme events.

Climate Change will affect individuals and groups differently. Certain groups of people are particularly sensitive to Climate Change impacts, such as the elderly, the infirm, children, native and tribal groups, and low-income populations.

## Fast Fact

Seven out of the 10 nations at greatest risk to Climate Change and natural disasters globally are in Asia and the Pacific, and 3 of these are small Pacific island states.

(Source: UNU-EHS)

## Learn More @

Possible impacts of Climate Change  
[http://www.youtube.com/watch?v=CqMaDc4G\\_vs](http://www.youtube.com/watch?v=CqMaDc4G_vs)

Climate Change impact on biological diversity  
<http://www.youtube.com/watch?v=Xra87liAopM&feature=related>

Climate Change and Antarctica  
<http://www.youtube.com/watch?v=6nBtXEzM8Y>

Impact of Climate Change in Bangladesh and related issues  
<http://www.youtube.com/watch?v=YPEHJ3USE10>



# Chapter 4 • What is your city doing for Climate Change?

How much will my city be affected by Climate Change?

What are people doing around us for it?





Activity 1 **It's Voyage Time!****Activity**

Purpose	To visit various places in and around Mumbai to know efforts done in response to Climate Change in the city.
Duration	As required for each visit. Can be 3-4 visits.
Location	Site and Classroom
Number of students	Entire Class
Age group	7 <sup>th</sup> to 10 <sup>th</sup> Std.
Materials required	Activity sheets, Camera (optional)
Is guidance from teacher required?	Yes
Is guidance of elderly person at home required?	No





## Activity

Field visits to expose children to the different initiatives taken by people, government and others to protect our surrounding. This educates them about the importance of the natural forest, conservation of water bodies, waste management, energy conservation and green buildings etc.

Visit various places which are environmentally important or where Climate Change related initiatives are being undertaken.

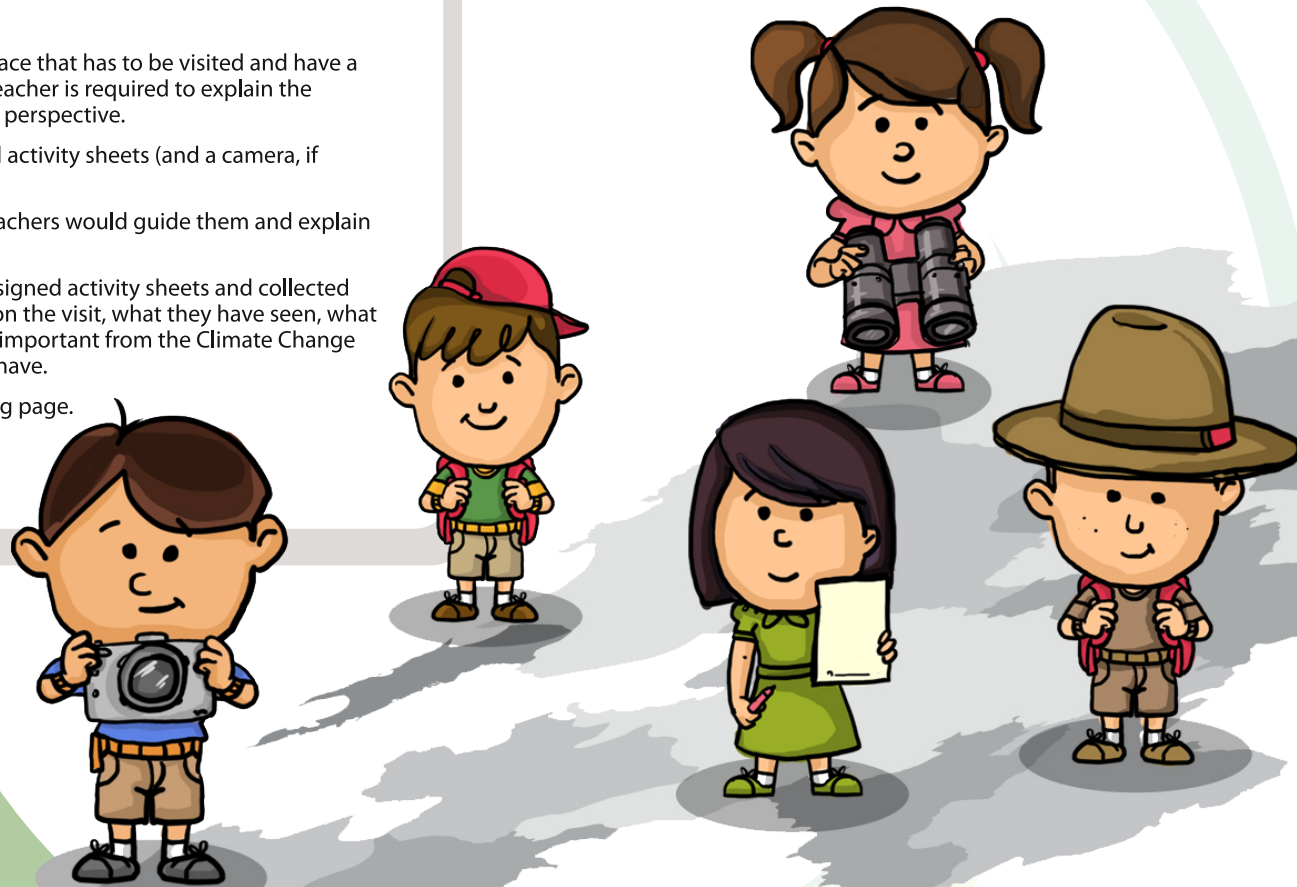
The teacher should introduce in class the place that has to be visited and have a discussion with students about the place. Teacher is required to explain the importance of that place from environment perspective.

Students are required to carry self-designed activity sheets (and a camera, if available)

They would go around the place and the teachers would guide them and explain about the place.

Students will prepare a report using self-designed activity sheets and collected information. The report will contain a note on the visit, what they have seen, what they have understood and why the place is important from the Climate Change perspective and any suggestions they may have.

A sample activity sheet is given on the facing page.





## Activity

List of the theme-wise possible destinations that children could visit.

### Biodiversity Conservation

1. Sanjay Gandhi National Park	Western Express Highway, Borivali East, Mumbai-400066	The park is home to diverse flora and fauna and includes several species such as spotted deer, porcupine, leopards, macaque, crocodiles and also has birds like hornbill, peacock, dove etc.
2. Tungreshwar Wildlife Sanctuary	Vasai-Virar	This pristine forest is home to several animals and birds
3. Karnala Bird Sanctuary	Near Panvel	The sanctuary is home to 147 species of resident and 37 species of migratory birds who visit the sanctuary during winter
4. Matheran Eco-Sensitive Zone	Matheran	There are around 38 designated look-out points in Matheran, including the Panorama Point, Monkey Point, Porcupine Point, Rambagh Point, and more.
5. Bombay Natural History Society	Kala Ghoda, Fort, Mumbai	The society's has collection of flora and fauna of over hundred years. There are also collections of some rare and extinct species. The organization also organizes one day trails to various places.
6. Reptile Rescue and Study Centre	Kedar Bhide, 802, Siddhi Height, Plot 2, Sector 8, Charkop, Kandivali (W), Mumbai- 400067	Research and awareness centre for reptile conservation
7. Jijamata Udyan	Byculla, Dr Ambedkar Road, Mumbai, MH 400027	Zoo, which houses of many animals and rare species
8. Maharashtra Nature Park	Near Dharavi Bus Depot, Opp PMGP Colony, Dharavi, Mumbai- 40017	Nature trails, theme parks, workshops and seminars. Demonstration of solar energy, vermicomposting, RWH,. Art Gallery,. Nursery.
9. Sewri Mangrove Park	Near Sewri Station on the Harbor Line	Seven species of mangroves and several hundred species of birds can be seen in this fifteen acre reservation
10. Kamla Nehru Park	BG Kher Road, Malabar Hill, Mumbai	The park is a pleasant place with foliage all around and well-maintained green lawns
11. Mahim Nature Park	Mahim	Once the site for city garbage, it is now is a forested area and has 200 species of trees, 38 species of butterflies and 80 species of birds.



## Activity

List of the theme wise possible destinations that children could visit.

### Waste Management

- |   |  |  |
|---|--|--|
| 1. Gorai Landfill Site                        | Gorai  | Conversion of the landfill site into well-preserved green land.    |
| 2. Godrej & Boyce Nursery                     | Pirojshanagar, Hillside Colony, LBS Road, Vikhroli | Establishment of vermi-compost units, Selling of earthworms        |
| 3. DTS System at Adarsha Vidya Mandir College | Badlapur, Thane                                    | System of toilet blocks for students with treatment of waste water |

### Water Management

- |   |  |   |
|---|--|---|
| 1. Total Water Management(TWM) Centre by Asian Paints | Asian Paints, LBS Road, Bhandup(W) Mumbai 400078 | The TWM centre showcases live working models on water conservation and rainwater harvesting.  |
| 2. DTS System at Adarsha Vidya Mandir College         | Badlapur, Thane                                  | Eco-Sanitation: System of toilet blocks for students with treatment of waste water  |
| 3. Masunda Lake                                       | Thane  | The restored lake is now a recreational place. There is also a separate section in the lake for the immersion of idols during Ganapati Festival so that the whole lake does not get polluted. |

### Energy Initiatives

- |                                   |   |  |
|-----------------------------------|---|--|
| 1. Solar ATM                      | Indus Bank Ltd. at its Grant Road branch      | Solar powered ATM which reduces CO <sub>2</sub> emission by 1900 kg annually                   |
| 2. TISS 'Nisargruna' Biogas Plant | V N Purav Marg, Deonar, Mumbai 400 088, INDIA | Municipal wastes are converted to good manure and the methane is tapped to convert into energy |



## Activity

List of the theme wise possible destinations that children could visit.

### Green Buildings

- |                             |   |   |
|-----------------------------|---|---|
| 1. Orchid Hotel             | 70-C Nehru Road, Vile Parle (E),<br>Mumbai – 400099 | Ecotel has Solar Panels, Sewage Treatment Plant, Atrium, Energy Efficient Lighting, low flow flushes and shower heads, four bin segregation systems for waste in kitchens, recycling bin in guest rooms, Vermiculture pits to decompose organic waste.<br><br>Eco Button in all guest rooms which increases room temperature to reduce air-conditioning usage which saves energy. |
| 2. Godrej Plant 2 - IT Park | Godrej & Boyce Compound,<br>LBS Marg, Vikhroi West, | Green Building (LEED Certified Platinum rated IT Park)  |





## Quick Grabs

Forests can mitigate Climate Change by absorbing carbon dioxide. Climatic Changes will lead to forest degradation or loss – which exacerbates Climate Change further. Today Climate Change is one of the main threats to biodiversity. Up to a quarter of mammal species (about 1,125) (IPCC, 2002) and about 20 percent of bird species (about 1,800) (IPCC, 2007) are at risk of global extinction because of Climate Change.

Biodiversity conservation is important from Climate Change perspective because it is crucial in:

- representing distinct natural communities within conservation landscapes and protected areas networks;
- maintaining ecological and evolutionary processes that create and sustain biodiversity;
- conserving blocks of natural habitat large enough to be resilient to large-scale disturbances and long-term changes

## Learn More @

Forest Natural Defence against Climate Change

<http://www.youtube.com/watch?v=jD8JobDDnVg>

## Fast Facts

"Since Mumbai has reclaimed ocean land substantially, they are going to have a tough time. Though the average rainfall would reduce, yet flash rains will be the major cause of worry for urban populace in Mumbai"

-IPCC chairman R K Pachauri told IANS.



Activity 2 **Tête-à-tête with the Expert!****Activity**

Purpose	To have a discussion with local NGO or Climate Change experts in city about Climate Change issues
Duration	1-2 classroom sessions
Location	Classroom
Number of students	Individual
Age group	7 <sup>th</sup> to 10 <sup>th</sup> std.
Materials required	Computer for presentation if required
Is guidance from teacher required?	Yes
Is guidance of parents required?	No





## Activity

Interact with the expert on Climate Change issue and submit a write-up on what you have understood from the discussion.

Through this activity students will learn more about Climate Change issue and will also get acquainted with experts /NGOs, their method of working and will know what the city is doing to tackle the issue.

### For teachers:

Invite a city based NGO/expert to interact with the students on Climate Change issue. Ask the NGO/expert to talk about their work, their campaigns and what the city is doing for the issue.

### For students:

Discuss Climate Change with the expert. Prepare a write-up on what you have understood from the interaction.



## Quick Grabs

List of city based NGOS to approach:

1. Greenpeace India
2. Bombay Environmental Action Group (BEAG)
3. Indian Centre for Plastics in the Environment (ICPE)
4. Centre for Environmental Research and Education (CERE)
5. Bombay Natural History Society (BNHS)
6. ENVIS- Environment Department, Government Of Maharashtra
7. Centre for Education and Documentation (CED)
8. Clean Air Island (CAI)
9. Save Bombay Committee Prakruti
10. Reef Watch Marine Conservation
11. Sanctuary Asia- Bittu Sahgal
12. Enviro-Vigil

## Learn More

Learn more about the NGOs mentioned @:

[www.greenpeace.org/india](http://www.greenpeace.org/india)  
[www.cere-india.org](http://www.cere-india.org)  
[www.envis-icpe.com](http://www.envis-icpe.com)  
[www.bnhs.org](http://www.bnhs.org)  
<http://envis.maharashtra.gov.in>  
[www.doccentre.net](http://www.doccentre.net)  
[www.cleanairisland.org](http://www.cleanairisland.org)  
[www.reefwatchindia.org](http://www.reefwatchindia.org)  
<http://envirovigil.org>  
[www.sanctuaryasia.com](http://www.sanctuaryasia.com)

## Fast Facts

In December 2005, in the aftermath of the unprecedented Mumbai floods, Government of India enacted the Disaster Management Act, under which the National Disaster Management Authority and State Disaster Management Authorities have been created.

In Maharashtra, the state government accordingly has prepared the Greater Mumbai Disaster Management Action Plan (DMAP) in 2007 which identifies the risks and vulnerabilities associated with floods, cyclones, earthquakes, etc., and outline the measures to deal with these vulnerabilities<sup>5</sup>.

<sup>5</sup>Mumbai City Report Prepared by Archana Patankar, Anand Patwardhan, Janki Andharia, Vikas Lakhani, Presented at International Workshop on Climate Change Vulnerability Assessment and Urban Development Planning for Asian Coastal Cities, Bangkok, Thailand, August 2010

# Chapter 5 • What Can You Do?

How can we measure our impact?

What can I do for adaptation and mitigation of Climate Change?



Activity 1 **What's your Carbon Report like!****Activity**

Purpose	Get your Carbon Grade by using the Children's Carbon Calculator on CCRT website.
Duration	1-2 Classroom sessions
Location	Classroom and Computer Room
Number of students	Individual activity
Age group	7 <sup>th</sup> to 10 <sup>th</sup> std.
Materials required	Computer with Internet Facility
Is guidance from teacher required?	Yes
Is guidance of elderly person at home required?	No



## Activity

Students to visit [www.mmr-ccrt.org.in](http://www.mmr-ccrt.org.in) and get their carbon report to know their carbon performance and awareness.

Through this activity students will learn how much they are aware of environment and learn about ways to reduce their carbon footprint.

### For teachers:

Supervise students when they are using the Children's Calculator. Conduct a discussion amongst students to discuss their reports.

### For students:

The students will go on the website and calculate their carbon footprint through **Children's Calculator**.

Students will then have a discussion about their reports and discuss various ways to reduce their carbon footprint.





HOME

# The Children's CarbonFootprintCalculator

This **Children's Calculator** will give your **Carbon Grade** and **Carbon Performance** based on your response to a few easy questions.

All you have to do is answer these questions on your everyday activities, habits and choices, and knowledge.

Unlike other Carbon Footprint Calculators, this calculator will not compute the GHG emissions due to your actions.

An honest answer will help you know how your choice of transport, the way you use electronic and electrical appliances, your 3R (Reduce, Reuse and Recycle) habits and your awareness could influence your carbon grade.

## The Children's CarbonFootprintCalculator

Tell us how you reach your school daily

5. To go to school, I usually ... (select one option from the ones given)

- ☐ Take the school bus or the school van
- ☐ Take an auto or a taxi
- ☐ Go with my dad/mom/guardian in our car
- ☐ Go with my dad/mom/guardian on a bike/scooter
- ☐ Take public transport like train or bus
- ☐ Cycle
- ☐ Walk

Carbon Grade & Carbon Performance

→

←

no. of friends join me in my private car/taxi/auto

5-6/23

Your Carbon Grade is **D**

Your Carbon Performance is **Poor**

Check how your activities rank in terms of GHG emission

- Transport
- Electricity
- 3R Practices

Your Carbon Awareness is **Excellent**





## Quick Grabs

Your **'Carbon Footprint'** is a measure of the impact your activities have on the amount of carbon dioxide (CO<sub>2</sub>) produced through the burning of fossil fuels and is expressed as a weight of CO<sub>2</sub> emissions produced in tonnes.

The major activities which lead to carbon emission by us in the atmosphere are:

### Transportation

Try one of the following ways to get to work or school: cycling, walking, car-pooling, and public transport. On average, for each litre of fuel burnt in a car engine, more than 2.5 kg of CO<sub>2</sub>.

### Food

Eat local and seasonal produce. Fresh, locally grown, seasonal food generally uses less energy to produce. It burns up fewer food miles, as the distance it has to travel from farm to plate requires less fuel.

### Energy Use

Install good home appliances which have star rating, avoid wasting electricity, switch off appliances when not required.

### Water Use

Conserve water and do not waste it, use water judiciously in kitchen and for washing purposes.

## Fast Facts

For 10,000 years, from the end of the last glacial maximum, until 1750, carbon dioxide emissions remained between 260 and 280 parts per million (ppm).

Then, between 1750 and 2005, emissions increased to 387 parts per million.

## Learn More

### Carbon Footprint Facts

<http://www.carbonearth.co.uk/carbon-footprint-facts.htm>



Activity 2 **Compost it!****Activity**

Purpose	To learn about managing biodegradable waste generated at school.
Duration	2 classroom sessions + regular maintenance
Location	School garden or campus
Number of students	Entire class or 2 groups
Age group	7 <sup>th</sup> to 9 <sup>th</sup> std.
Materials required	Waste collected from school, earthworms, digging equipments.
Is guidance from teachers required?	Yes
Is guidance of parents required?	No



## Activity

Creating a vermi-composting pit for managing waste created at school (by students, from school activities, school garden etc.)

Through this activity students will learn about waste management through composting at school.

### For teachers

Help students with collection, identification and segregation of degradable and non-degradable waste. Identify a suitable place for creating the compost pit and direct the students on digging of the pit and overall process.

### For students

The students, with the help from teachers will prepare a compost bed in school campus. The steps below have to be followed:

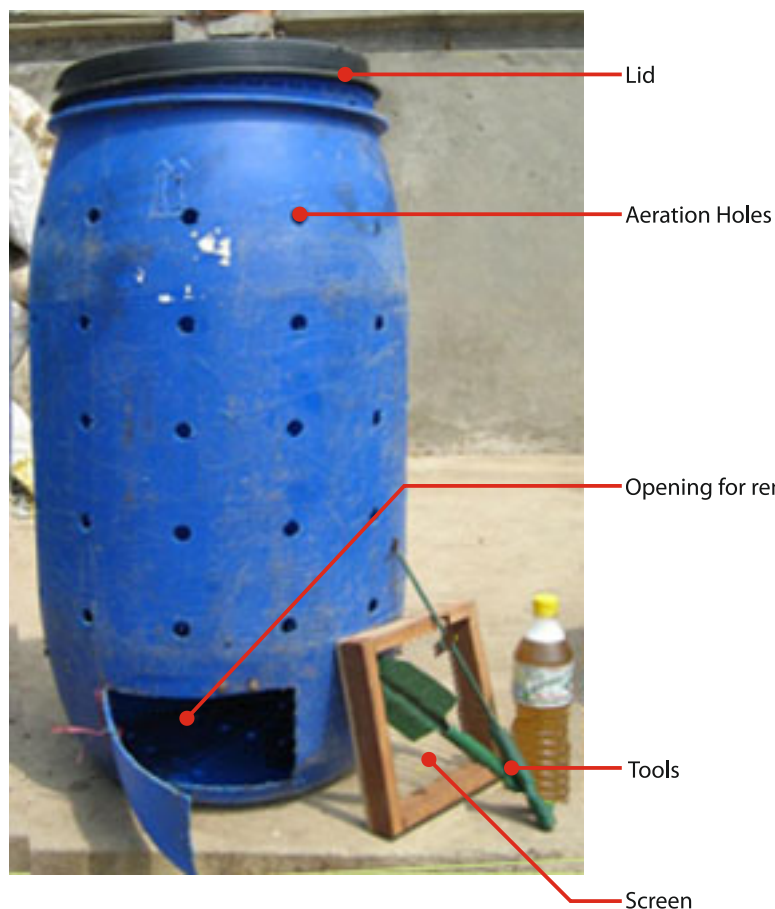
- i. Segregate the waste
- ii. Construct a vermi-compost pit or bin as shown in the figure on opposite page.
- iii. Keep the containers clean
- iv. **Size** : one square foot of surface area per 1/2kg of waste in your bin
- v. The bedding material should be thoroughly moistened before adding the worms;
- vi. **Space** : 1 cu. ft. of bin/500 worms.
- vii. Approx. 1 kg of earthworms to recycle 1 kg of food waste
- viii. Students can add food waste from their lunch box, leaves and other garden waste, waste generated at school due to cleaning.
- ix. **Temperature range** : 5°C – 26 °C
- x. Bury the food in the bedding, at least 3" deep.
- xi. The compost is usually ready in 3-4 months.
- xii. The compost can then be used as fertilizers for plants or can be sold by students.





## Activity

### Vermicompost Bin



#### Points to take care:

##### Audio Visual Introduction

Make it easy for the teachers and students to understand the concept of composting by providing a video or PowerPoint presentation.

##### Curriculum Materials Display

Reading materials related to composting should be available in library.

##### About maintenance of bin

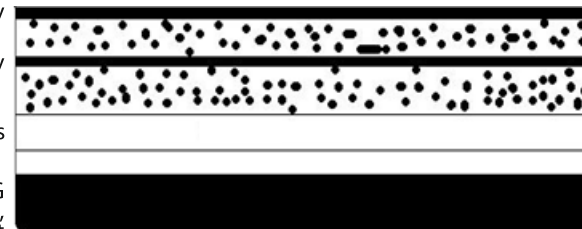
Keep the compost bin in partly sunny location.

To avoid foul smell problem turn the compost regularly and keep its moisture content right.

Avoid putting meat, dairy products, plastics, bones in the compost bin.

If possible grind the food waste before adding. This will speed up the process.

Cardboard/Straw/Hay  
Food Waste  
Cardboard/Straw/Hay  
Food Waste  
Worms  
Soil/Sand Layer  
BEDDING  
Cardboard, Shredded Leaves,  
Straw, Hay, Sawdust







## Quick Grabs

A **composting pile** helps turn old plants and things like vegetable peelings, dead leaves and grass clippings into food and soil for new plants to grow.

Compost helps plants grow because it supplies nutrients to feed plants. These nutrients were originally part of living plant tissues, but they are released when the plants are broken down. In this way, composting is an important kind of recycling. Worms and insects are an important part of composting because they help to create air pockets for air and water. Air and water in the soil benefits plant roots and creates a healthy environment for soil animals and beneficial **microbes**, and all of these help plants grow.

Much of what we throw away can either be recycled or composted, so composts also mean there is less garbage that ends up in **landfills**.

## Learn More @

Composting at school  
[www.recyclenow.com/schools](http://www.recyclenow.com/schools) - compost section

Young Person's Guide to Vermicomposting  
[www.wormdigest.org](http://www.wormdigest.org)

Zero waste practices  
[www.ecocycle.org](http://www.ecocycle.org)

Indian Pollution Control Association - Projects  
Garbyhog Home Builder project at- [www.ipcaworld.co.in](http://www.ipcaworld.co.in)

Clean India website- waste watch section  
[www.cleanindia.org](http://www.cleanindia.org)

Green Schools Mumbai  
[greenschoolsmumbai.weebly.com](http://greenschoolsmumbai.weebly.com)

Centre of Science and Environment (CSE)-  
Gobar times- Green schools program  
[www.gobartimes.org](http://www.gobartimes.org)

Reading Material-  
Green Schools Manual by CSE

## Fast Facts

About 50% of landfilled waste is biodegradable. The waste rots, decomposes and produces GHGs like methane and carbon dioxide, adding to global warming.

Methane is a very powerful GHG. One tonne of methane traps about 25 times more heat in the atmosphere than 1 tonne of carbon dioxide.



Activity 3 **Star Ratings!****Activity**

Purpose	To learn about the level of awareness on energy efficiency, star rating and consumer performance
Duration	2-3 days
Location	Classroom, your neighbourhood
Number of students	4 to 5 students per group
Age group	8 <sup>th</sup> to 9 <sup>th</sup> std.
Materials required	Survey sheet
Is guidance from teacher required?	Yes





## Activity

### For Teacher

The star rating of the electronic product has to explain to students by teacher, why star rating is important for reversing the impacts of the climate change and which products need star rating etc.

### For Students

Visit electronic shops like Croma, Vijay Sales, E-zone etc and observe various electronic products kept for sale.

**Note** down following things:

- What brands and type of electronic devices (e.g.- home appliances, kitchen appliances etc.) are available in the shop?
- Types of star rated appliances.
- Price of rated and non-rated appliances
- Details of appliances. E.g.- for air conditioners, things to note down would be energy efficiency ratio, capacity, power consumption and any other features.

Through this activity, students will know about star rated appliances and level of awareness amongst today's consumers regarding energy efficiency and star rating equipments.





Name of the students:

Class:

Date:

A survey sheet is provided at the end of the activity. Fill in the provided sheet by asking the given questions to the customers in the shop and prepare a report of your interpretation and observations with help of teachers.

**1. Name**

-----

**2. Electronic appliance to purchase**

-----

**3. What features/ qualities are you looking for while buying the particular appliance?**

-----

**4. Do you know about star ratings?**

-----

**5. Are you particularly intending to buy star rated equipment?**

-----

**6. Why yes or no-**

-----

**7. Do you have similar equipment already at home?**

-----

**8. Do you already have any other star rated equipment?**

-----

**9. If yes do you find any difference between non rated and rated equipments?**

-----

**10. Will you research about rated equipments if you are not aware?**

-----



## Quick Grabs

### What is energy efficiency?

Energy efficiency means using the less energy for providing same services. For example, a compact fluorescent bulb is more efficient than a traditional incandescent bulb as it uses much less electrical energy to produce the same amount of light.

### What is star rating?

The star ratings given to electronic appliances indicates the power efficiency of the electronic machine. Higher the rating, more energy efficient the product is and vice versa. The ratings given to them depends upon the machinery installed in the particular product, which decides the power consumption of a particular electronic appliance, this is the basis on which the ratings are given to electronic appliances

### Why is star rating important?

Using Energy Star compliant home appliances results in significantly reduced energy costs. It also saves our planet by reducing emission of the greenhouse gases. In India Bureau of Energy Efficiency develop minimum energy performance standards and labelling design for equipment and appliances.

## Fast Facts

The difference between energy consumption of a 1-star and 5-star rated refrigerator of a 200 Litres capacity is approximately 320 units annually which save you more than Rs1600 per year. Mumbai alone has more than 15 lac refrigerators. Hence the annual saving if all refrigerators are converted to 5-star from 1-star comes out to be 480 million units! This is equal to the annual electricity consumption of more than 2.5 lac small families. It also slashes the CO<sub>2</sub> emission by nearly 380 million tons<sup>6</sup>.

<sup>6</sup>[www.reli.co.in/HTML-money\\_savers\\_section](http://www.reli.co.in/HTML-money_savers_section)

## Learn More @

[http://www.teriin.org/ResUpdate/reep/ch\\_7.pdf](http://www.teriin.org/ResUpdate/reep/ch_7.pdf)

Bureau of energy efficiency (BEE) website-  
[www.beeindia.in](http://www.beeindia.in)







This booklet is developed as part of the program for creating awareness on Climate Change  
To know about this program and for more resources, visit:

[www.mmr-ccrt.org.in](http://www.mmr-ccrt.org.in)

