1 ECOSYSTEM

Activity-1 : Transpiration And Water Cycle

Background/previous knowledge : Plants release large quantity of water vapour by transpiration into the atmosphere. Apart from direct evaporation of water from water bodies, transpired water also plays a major role in water cycle.

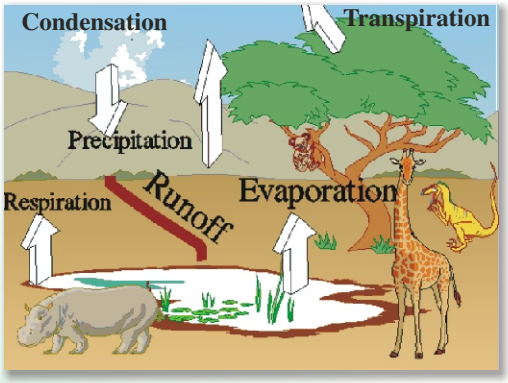
Methodology : Select an actively growing potted plant and keep it in direct sun light over a bench or stool. Cover the plant with a bell jar. The plant should be watered well. Leave this set up undisturbed for thirty minutes. (It would be better if the plant receives direct sunlight)

Observations: After thirty minutes, observe the bell jar. It would have collected lot of tiny droplets of water deposited on the inner surface of the bell jar.

Recapitulation: Transpiration plays a major role in water cycle .It transfers water from the soil to the atmosphere. In doing so liquid water is drawn by the plant's roots and is transformed into water vapors through transpiration. An average sized tree transpires around 50-70 gallons of water each day. The vegetation is not a mere passive beneficiary of a local climate but also helps to engineer it.
The high humidity in the tropical forest is largely due to transpiration from plant leaves.

Assessment:

- What is the role of transpiration in water cycle ?
- Trees that show higher rate of transpiration are in water logged soil. What could be the objective of this practice ?
- How does deforestation affect water cycle/rain?
- Why are tropical rain forests highly humid?
- What would you expect if the experiment is done with a cactus? Give reasons for your answer.



The Water Cycle

CONCEPT

Transpiration plays a major role in the maintenance of water cycle

OBJECTIVE

To understand the fact that transpiration releases lot of water vapour into the atmosphere.

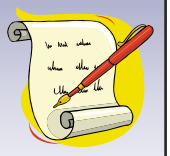
MODE

Individual activity.

TIME REQUIRED

30 minutes

MATERIAL REQUIRED



Large sized thin transparent belljar and fresh branches of trees or shrubs.

1 ECOSYSTEM

Activity-2 : Bottle Garden

Background/previous knowledge : An ecosystem as found in nature cannot be duplicated. However, a miniature model of ecosystem can be created in a bottle by providing all the required components of an ecosystem.

Methodology : Add a thick layer of garden soil over the bottom of the bottle. The soil in the bottle should be about 5" to 6" height. Add sufficient quantity of water to keep the soil moist. Disperse some seeds of grasses and small herbs on the soil surface and leave the bottle open for a few days. Sprinkle some water to maintain moisture. Once the plants grow with green leaves, close the bottle and make sure it is airtight. Leave the set up in light. Keep it in diffused sunlight if the sun is very hot and bright. Leave the set up undisturbed for few weeks.

Observations: Observe the plants once every day. The plants grow normally without water being added and air being let in. The soil remains moist though water is not added.

Recapitulation: The plants take carbon-dioxide from the air inside the bottle for photosynthesis and give out oxygen. These gases are exchanged during respiration. The major part of water that is absorbed by the plants from the soil is released as water vapour by transpiration. This vapour gets condensed into water drops and reaches the soil again.

The nutrients absorbed by plants are used for making their tissues. When these plants die the micro organisms in the soil (decomposers) break the dead organic matter into simple substances. Plants absorb these nutrients for their growth and development.

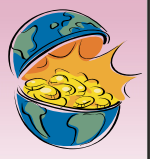
These explanations are applicable for sealed containers as well as our earth. Both receive light energy from the sun and do not exchange material with outer space. Both have environment that includes biotic and abiotic elements. In both cases the sun light acts as the source of energy. So our earth also can be compared with the transparent sealed jar that receives energy in the form of sun light from outside and recycles all materials within.

CONCEPT

An interaction between biotic and abiotic components maintains the balance in the ecosystem.

OBJECTIVE

To understand the fact that the ecosystem is self sustaining.



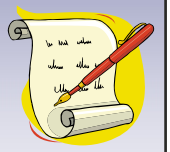
MODE

Group activity.

TIME REQUIRED

No specific time limit as it requires continuous monitoring.

MATERIAL REQUIRED

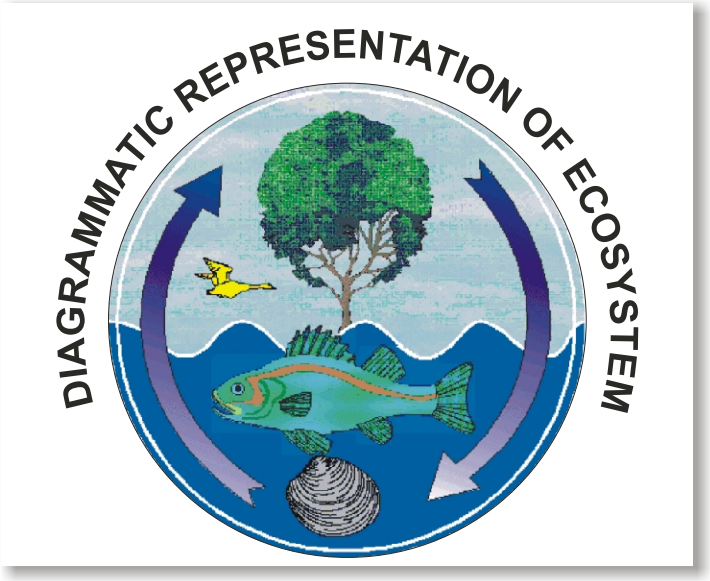


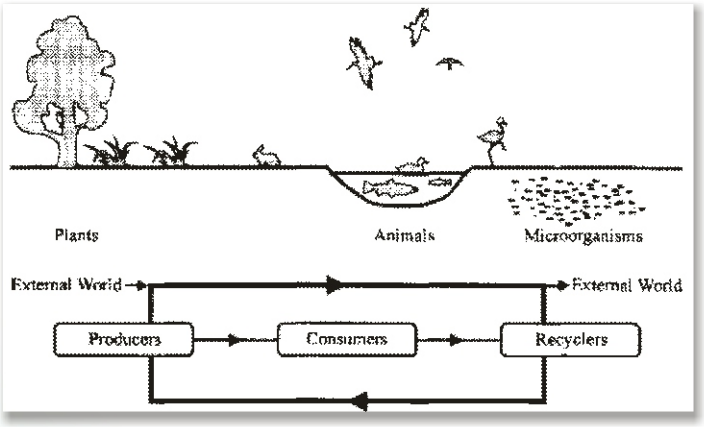
Big transparent bottle (around 10 to 15 litres capacity), garden soil enriched with humus, seeds of grasses and small herbs.

Activity-2 : Bottle Garden

Assessment:

- What will happen if the bottle is either painted black or covered with black paper?
- If the earthworms and insects are left inside, will they survive? Explain.
- Instead of adding garden soil with humus, if sand was added, will the result be the same?
- How does the nutrient supply continue in the jar?
- What will happen if the set up is kept in direct sunlight in hot summer days?





Main Processes of Ecosystem

1 ECOSYSTEM

Activity-3 : Vegetation And Seasons

Background/previous knowledge : The duration of light and the intensity of solar radiation control the temperature. The quality, intensity and duration of solar radiation are critical to biological activities. The distribution of flora and fauna in a region solely depends upon climatic factors.

Methodology : Observe the natural vegetation/ cultivated crops/ garden plants in your area in different seasons. If you are living in a region that experiences contrasting seasons (cold winters and hot summers, e.g.: many states in northern India) some of these plants can be seen growing only in winter and some can be seen in only summer and autumn. In addition to observing the vegetation, you can enquire from the gardener of your school about the flowering season of every plant. Prepare a table, showing the growth and flowering of plants and their seasons as follows.

No.	SPRING AND SUMMER		AUTUMN AND WINTER	
	Name Of Annuals	Name Of Trees and Flowers	Name Of Annuals	Name Of Trees and Flowers
1. 2. 3. 4. 5.				

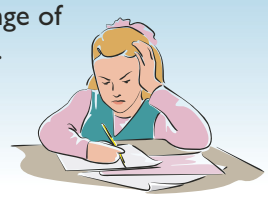
Observations: Seeds of some annuals (herbs) germinate only in spring and complete their life cycle in summer. Some germinate in autumn and complete their life cycle by winter. Some plants produce their flowers in spring and some in autumn.

Note: If you are living in hilly regions you can observe the differences in the vegetation depending upon different altitudes. Nature of soil also influences the type of vegetation that grows in a region.

Recapitulation: The germination, growth and flowering of plants depend upon climatic factors like duration of day and night, precipitation and temperature as plants are adapted to the specific conditions.

CONCEPT

Life activities of plants like seed germination, growth and flowering are influenced by change of seasons.



OBJECTIVE

To recognise the fact that different plants produce flowers in different seasons.

MODE

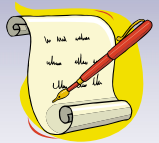
Individual activity

TIME REQUIRED

10 to 15 minutes in each season.

MATERIAL REQUIRED

Note book, and pencils.



Activity-3 : Vegetation And Seasons

Assessment:

- What are the major physical factors that determine the nature of vegetation in a region?
- Is the distribution of animals also determined by climatic factors? If so, give examples.
- Vegetables like cauliflowers are available during winter in northern parts of India. Give reasons.

Vegetables & Fruits

1 ECOSYSTEM

Activity-4 : Wildlife Animals And Their Food Habits

Methodology : Students can be asked to form small groups. Each group will be asked to observe different plants and animals in and around the school campus or in the nearby surroundings.

The following can be noted:

- Different types of trees, shrubs, herbs.
- Insects like ants, butterflies and spiders.
- Reptiles like lizards.
- Birds like crow, pigeon, sparrow and parrot.
- Mammals like squirrel.

Their food habits can be observed: Butterflies get food from flowers, they are herbivores. Lizards feed on insects, they are carnivores. Sparrows eat seeds and grains, they are herbivores. Crows are omnivores and act as a scavenger and they feed on plant materials, animal flesh, and dead animals like rats. Pigeons feed on seeds or grains, they are herbivores. Squirrels eat nuts, seeds and fruits, they are herbivores.

Observations: Butterflies and few other insects pollinate flowers when they visit them for food. These insects become food for lizards and some birds. Birds like sparrow and pigeon depend upon plants for their food. In this way, a variety of organisms in ecosystems are interdependent on each other for survival.

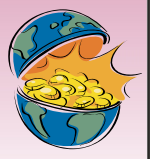
Recapitulation: Different food chains intermingle among themselves to form a food web. Animals assist plants in reproduction and dispersal of their seeds. The seeds of banyan and peepal trees are spread by birds which eat their fruits. Seeds present in the fruit are not digested and are eliminated along with excretion thus helping dispersal of seeds.

CONCEPT

Different species of plants and animals that form the vital component of an ecosystem

OBJECTIVE

To identify the wildlife found in our surroundings and also to learn about the food habit of wild animals.



MODE

In small groups.

TIME REQUIRED

40 minutes

MATERIAL REQUIRED

Note book, and pen.

Activity-4 : Wildlife Around And Their Food Habit

Assessment:

- Which of the following are found in large numbers in your locality? Birds/ insects? Give two reasons.
- Can you make a 3-4 step food chain based on the organisms found around you?
- Why are saplings of banyan and peepal trees often seen on old buildings and monuments that are not maintained properly?
- Mention the names of any two insects that are mostly found among flowers.
- How do the newly hatched chicks of pigeons and sparrows get food?

2 DEGRADATION OF ECOSYSTEM

Activity-1 : Loss Of Fertile Top Soil From Brick making

Methodology : The quantity of soil that is used for making bricks can be calculated by measuring (a) the volume of the brick or (b) the weight of the brick

Volume : The length, breadth and thickness of the brick are measured by using a scale. The volume of the brick is calculated. A standard baked brick measures 10 x 5 x 3 inches. So, each brick approximately requires 150 cubic inches of soil.

Weight : Each brick can be weighed by using a spring balance.

Observations: For making each brick, around 150 cubic inches of top soil is used. All the nutrients and the decomposing organic matter are lost in this process. Millions of soil micro-organisms are lost in the baking of each brick.

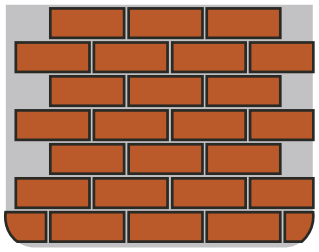
Recapitulation: The soil found upto a depth of a 25 to 30 cm is top soil. It is porous, contains nutrients, organic material and millions of micro-organisms in each gram. The microbes derive energy for their life activities by decomposing the organic matter and return valuable nutrients to the soil. The soil that is used for making bricks is thus a dynamic, living medium. Soil formation is a slow process. It takes hundreds of years for formation of soil from weathering of rocks. In a few hours, it is baked into bricks. The return of nutrients back to the soil thus gets affected. This affects the soil ecosystem and reduces the nutrients that were otherwise available to plants.

Suggestion:
If brick kilns are present around your town, then do try to :

- Visit to assess the amount of top soil used over the years.
- Assess the amount of vegetation that is cleared/destroyed because of the soil used for brick manufacture.

Assessment:

- What is top soil?
- Why is top soil important in maintaining ecosystem balance ?
- Why is soil considered as a dynamic medium?
- If brick is powdered, will you get the fertile soil back to support vigorous plant growth? Explain.



CONCEPT

Bricks are not only the basic requirement for construction of buildings but also a major cause of environmental concern. Large amount of top soil is used up in making bricks.

OBJECTIVE

To understand the extent to which the soil undergoes degradation due to brick making.

MODE

Individual

TIME REQUIRED

20 to 30 minutes

MATERIAL REQUIRED

Bricks, scale, paper, pencil, and spring balance

2 DEGRADATION OF ECOSYSTEM

Activity-2 : Conservation Of Top Soil

Methodology : Choose a place where short grasses are growing in plenty. Dig carefully into the soil with a trowel. Take out soil blocks of 4 to 5 inches thick deep. Place them in one of the trays with the grass side facing upwards.
Dig out a same size of soil block from the nearby area, where there is no growth of grass or other plants. Place this soil block in another tray.
Equal volume of water (around 5 liters each) is sprinkled at the same speed continuously.
The overflowing water from each tray is collected in separate containers.

Observations: The water collected from the tray with soil and grass block has much less mud. The water collected from the other tray has relatively much larger amount of mud.

Recapitulation: In the tray with grass, the roots bind the soil and prevent erosion by the flow of water. There is nothing to bind the soil when there is no plant. Top soil is nutrient rich. Plants add organic matter to the soil in the form of dead leaves. Soil organic matter formed from the decay of leaves and other dead material called humus, release nutrients for plants. So the top soil should be conserved. The nature's way of conserving the soil is by binding the soil particles with roots of the plants.

Note : The soil and grass should be replaced from where it was taken.

Assessment:

- Why is organic matter considered as an important component of the soil?
- Strong winds can shift large amount of soil/ sand from one place to another in a desert but not in a forest. What could be the reason?
- Mention any three advantages of afforestation.

Suggestion :
Instead of using water, fast blowing air also can be used to demonstrate the effect of soil erosion in both trays. Air from a table fan at high speed can be focused on the trays or air can be blown from the mouth strongly on the dry soil by using a straw/ small tube.

CONCEPT

The nutrient rich top soil can be conserved by growing plants on the soil.

OBJECTIVE

To prove that plants help in conserving nutrient rich soil.

MODE

Group of ten students.

TIME REQUIRED

30 to 40 minutes

MATERIAL REQUIRED

Trays/cardboard boxes 4 to 5 inches deep and 2 or 3 square feet size, (polythene sheets in the case of cardboard boxes to cover the inner sides) soil along with growing grass, soil without grass, trowel, water.

2 DEGRADATION OF ECOSYSTEM

Activity-3 : Can Construction LeadTo Destruction ?

Background/previous knowledge : Large numbers of buildings are constructed. Large numbers of old buildings are also demolished. The waste materials/debris formed as the result of these activities is not completely removed from the soil.The quality of the soil is damaged by the addition of these materials.

Methodology : The debris of building construction/demolition is collected in small packets.The texture and contents of the soil are analysed.The top soil from the garden is also collected. Its texture and contents are studied.The soil samples can be studied by spreading them on newspapers.

Observations: The contents of garden soil show variety of substances and particles of different size. The clay particles are very small, sand particles are slightly bigger and gravels and stones are much bigger in size. Along with the decomposed organic matter and decomposing organic substances little bits of leaves and branches are found.The analysis of construction debris show that the particles are big in size and they are rough. It does not contain any organic matter.

Recapitulation: Top soil is formed by nature.The process of soil formation is very slow and it takes hundreds of years to form few cm of soil.The texture of soil allows roots to penetrate and anchor the plant properly to the soil. The construction debris does not possess any such qualities and does not support vigorous growth of plants.

Assessment:

- What are the contents of the garden soil?
- How does soil maintain nutrient content?
- Does construction debris contain nutrients for plants? Explain your answer.
- Is there any difference in the chemical contents of the two soil sample ?
- Why does construction debris not support vigrous plant growth? Can earthworm survive in this ?

Suggestions :

As an extended part of the activity the two types of soils can be taken in different pots and plants can be grown in them to find out the difference.

CONCEPT

Building debris affects the nature of soil and ecosystem.

OBJECTIVE

To understand that debris formed from the demolition of a building has different texture and structure as compared to the garden soil.

MODE

Group work/ individual

TIMEREQUIRED

20 30 minutes

MATERIAL REQUIRED

The debris from demolition of an old building and garden soil (seeds of plants and pots are needed if the activity is extended).

3 CONSERVATION OF ECOSYSTEM

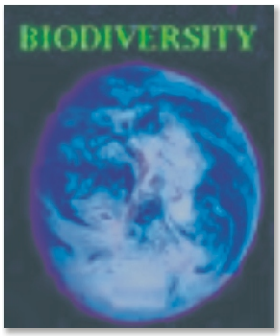
Activity-1 : Bio-diversity Account

Methodology : Seeds of different varieties of cereals, pulses are put into a box or paper bags and given to each group of students. The bag is passed on from one student to another after a gap of five minutes. In these five minutes the student has to put his hand into the bag and try to identify different varieties of pulses and cereals with his/her fingers. The student is not supposed to see the content of the bag.

After each student in the group has completed this exercise, the contents of the bag can be emptied on a newspaper/on a clean floor. Pulses and cereals are separated. Then different pulses are separated into different types (for e.g. all Bengal grams in one type and French beans in another type).
Based on colour, size and shape, these small groups are further divided into smaller groups (for any region of India, 7 - 10 varieties of paddy/wheat are available).

Observations: A great diversity of form, colour and size is observed among the seeds of cereals and pulses. Even the seeds of the same species of pulse or cereal exhibit different colours, shapes and sizes.

Recapitulation : The characteristics /trait of an organism are determined by the effect of genes it possesses. The vast diversity in the shape, size, colour and other characters of pulses/cereals reflect the fact that there is a great diversity at the gene level. Different species of plants and animals are related, dependent, and supporting each other. Plants produce food, fibers, dyes, fuel and medicines as a result of this diversity. The ecological balance in ecosystem is largely dependent on biodiversity.



Assessment:

- What do you mean by biodiversity?
- Collect ten different varieties of leaves (based on difference in shape, size, margin and tip).
- Identify any 10 different features between brothers/sisters.
- Some old varieties of paddy are no more cultivated, but they are still preserved by scientists. What could be the objective?
- Name any three wild life sanctuaries of India.

CONCEPT

Nature exhibits great diversity at different levels of organization. Wide variety of genes, species, families and ecosystem constitute the biodiversity.

OBJECTIVE

To observe diversity among seeds of food grains / pulses.

MODE

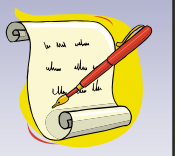
Small groups.

TIME REQUIRED

30 to 40 minutes

MATERIAL REQUIRED

Different varieties of paddy, wheat, maize or other cereals / bengal gram/rajma/french bean.



3 CONSERVATION OF ECOSYSTEM

Activity-2 : Travelling Carbon

Background/previous knowledge : Human beings travel by different methods. They may walk, cycle, use two wheelers, cars, buses, trains or planes. Each mode of traveling releases a specific quantity of CO_2 into the atmosphere.

Methodology : Draw a table as follows and calculate the total emission of carbon released when you travelled a distance of ____ km from your home to school by different modes of transport.

TRAVEL - CARBON CHART

Mode Of Transport	Quantity Of Carbon Emmission Per km	Distance Travelled	Total Quantity Of Carbon Emitted
1.Walking	3 gm	x.....km	=
2.Cycling	3 gm	x.....km	=
3.Two Wheelers	30 gm	x.....km	=
4.Car (diesel)	210 gm	x.....km	=
5.Car (petrol)	225 gm	x.....km	=
6.Bus	515 gm	x.....km	=
7.Train (diesel)	50 gm	x.....km	=

Note : The quantity of emission by car, bus and train should be calculated by dividing the carbon emission for each km by the number of passengers traveling.

Observations: Each mode of transport emits specific quantity of carbon compounds. Human beings emit carbon during respiration while walking and cycling. Cars and buses emit much higher quantities of carbon than two wheelers.

Recapitulation : Burning of fossil fuels emit carbon dioxide. Fossil fuels represent the carbon which was fixed by plants millions of years ago, and remained locked in the form of fossil fuels. It took millions of years to form fossil fuels but it is likely to be used up by humans with in a short span of few centuries. The increase in the concentration of atmospheric CO_2 increases green house effect which leads to global warming.

CONCEPT

Emission of carbon (CO_2 and CO) by different modes of traveling pollutes the environment.

OBJECTIVE

To calculate the quantity of carbon emitted by different modes of traveling.

MODE

Individual activity.

TIME REQUIRED

20 to 30 minutes

MATERIAL REQUIRED

Pen and paper.

Activity-2 : Travelling Carbon

An acre of forest area absorb approximately 1600kg of CO_2 every year. A bus emits 1600kg of carbon by running for 3200km. It will take one year for the trees grown over one acre to absorb this carbon. You can imagine how much carbon is emitted by the automobiles and aeroplanes throughout the world.

Assessment:

- An aeroplane approximately releases 180 gm of carbon compounds per passenger for flying over one km. How long it will take for trees planted on one acre of land to absorb the carbon released by an aeroplane carrying 300 passengers from Delhi to Tiruvananthapuram?
- How do plants help in controlling CO_2 concentration in the atmosphere?
- Do the domestic potted plants play any role in reducing CO_2 concentration?
- Which biological process of plants needs CO_2?
- Apart from transport, name few other human activities which use fossil fuels.

4 DEPLETION OF NATURAL RESOURCES

Activity-1 : A Visit To a Forest

Back ground/previous knowledge : All the green forest cover around human population is depleting because of the greedy human nature. It is very important that our students become sensitive towards larger interest rather than individual greed.

Methodology : Teacher may arrange for a trip to a near by forest. (e.g. ridge in New Delhi) Before taking the students for a field visit, it is advisable that the teacher in-charge visits the area beforehand to familiarize herself/himself and to select a most appropriate site in the field.

In the forest the sites should be selected to demonstrate the following -

- wild vegetation
- variety of wildlife animals
- encroachment
- degradation of landscape
- Different types of human activities in the forest.

Teacher may divide the class into seven groups and conduct an introductory session to assign each group a specific task.

Group 1 To make a map of the forest area showing various construction sites and buildings, which have come up in the forest area.

Group 2 To find out whether any NGO is working on this issue. Enquire from them about their findings and concerns. (In New Delhi an NGO, Kalpvriksh is actively involved in protecting the Ridge)

Group 3 To identify various human activities which may be the cause of forest degradation.

Group 4 To interview some senior citizens from around the area in order to collect information about the past status of the area regarding its fauna and flora.

Group 5 To collect information about present flora. Help can be taken from officers of Forest department.

Group 6 To collect information about present fauna. Help can be taken from the wildlife warden or any wildlife expert.

CONCEPT

Depletion of forest resources.

OBJECTIVE

To sensitize students about degradation of forest resources

MODE

Group work

TIME REQUIRED

1½ hr. (one practical session) and also collecting information during holidays

Activity-1 : A Visit To a Forest

The students may be asked to prepare an appropriate observation table to collect various information related to the specified tasks.

After assigning the task, teacher should arrange for a visit by the students to the identified location in the forest.

Preliminary information can be collected from the site and students may be asked to complete this project (collection of information) during holidays.

Observations : Teacher may help in developing an appropriate observation table.

Evaluation : At the end of the activity, a presentation of the project may be given at the student assembly.

Recapitulation : After the field visit, a meeting of the students may be called for and inferences may be drawn. A report must be prepared and recommendations may be sent to the concerned government department.

Assessment

1. Population explosion imposes severe strain on natural resources. Explain giving reasons.

A Degradation Of Forest Area

Illegal use of forest products

4 DEPLETION OF NATURAL RESOURCES

Activity-2 : Impact of human activity on vegetation

Background/previous knowledge : Green plants are the richest gift of nature. If proper and timely care is not taken, we may lose it in no time and be deprived of this precious resource.

Material required : 16 nails of 4" length, rope 20 meters, pencils, drawing sheets, newspaper, adhesive tape.

Methodology : Divide the students of the class in 6 groups. 3 groups may be asked to observe the vegetation on the margins of the play ground (where you find wild vegetation) and the other 3 groups may be asked to observe in the middle of the play ground (where most of the vegetation has disappeared because of trampling).

Each group must carry out the following activity:

Drive the four nails in the soil keeping a distance of one meter between the two nails to form a quadrat of one sq. meter (see diag.). Tie a cord around the nails and cordon off one sq. meter area.

Identify different plant species and enumerate the number of individual plants of each species.

Observations : Record the observations in the following table.

Sr. No.	Name of the species	No. of individual plants in one sq. meter
1.		
2.		
3.		
4.		
5.		

After collecting the data, calculate average number of individual plant belonging to one species present in one sq. meter area.

If students do not know the names of the plants then they can be labelled as 'a,b,c,d' and then one* sample specimen may be preserved by keeping it between two sheets of newspaper and pressing under the mattress for two weeks. The moistened newspaper is required to be changed after every two days. When the plant specimen is dry, it may be pasted on a drawing sheet and labelled.

(*Please ensure that only one plant of each of the unknown species is collected. When the identification is over, this sheet may be kept in the museum of the laboratory for future reference.)

CONCEPT

To evaluate impact of human activity on vegetation.

OBJECTIVE

To make the students aware about the loss of vegetation due to human activities

MODE

Group work

TIME REQUIRED

1 practical session i.e. 1½ hour

Activity-2 : Impact of human activity on vegetation

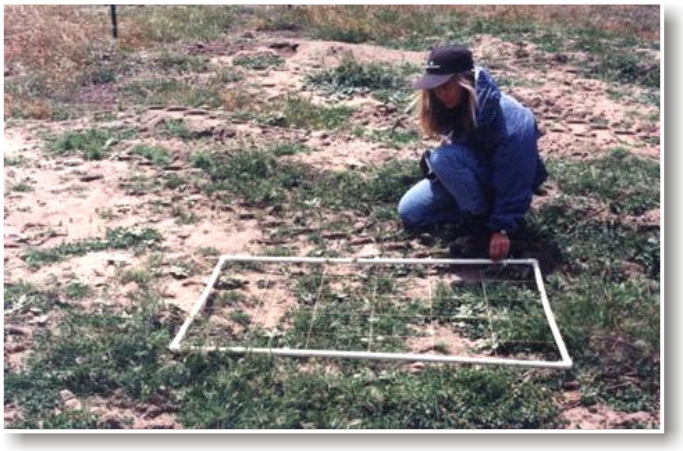
Students can consult the gardener, local people, teachers or librarian to find the botanical and vernacular names of the plant. Write the name on the herbarium sheet and put date.

Evaluation : Growth of the vegetation of two different locations of the same area can be compared and evaluated on the basis of the human activities taking place in each of the two locations.
Students should also compare the number of plant species found in each location.

Recapitulation : Human activity has a great impact on the growth of vegetation and biodiversity.

Assessment

1. What are the causes for depletion of vegetation and biodiversity?
2. Why is vegetations considered as a valuable resource?
3. In what manner does depletion of vegetation/biodiversity effect mankind? Why?



4 DEPLETION OF NATURAL RESOURCES

Activity-3 : Depletion Of Fossil Fuel

Background/previous knowledge : As the time passes by, we see more and more traffic snarls on the road due to growing number of vehicles. It is important to make children aware of rapidly growing use of fossil fuels.

Material required : Observation sheets

Methodology : Teacher can arrange for a brainstorming session and help children develop an observation table comprising the following details.

Name of Students Class-

Mode of transport	Type of Fossil Fuel (if any)	No. of km (One Way)	Total amount of fossil fuel consumed per trip (one way)	No. of students sharing the transport facility	Fuel consumed / student / trip

After collecting the information from the students, teacher may put a class students' list on the display board and ask individual student to write the amount of fuel he/she consumes per trip against his/her name, if they wish to write.

Evaluation : Discuss the following problems with students

- Growth of automobiles
- Depletion of fossil fuels
- Availability of limited resources
- how to conserve it

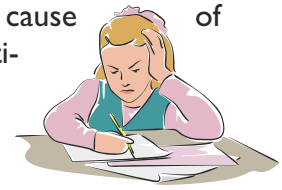
Recapitulation : Ask every student to analyze the situation. Invite suggestions from the students, for conserving the fossil fuel which can be communicated to all the parents. Students may be encouraged to make and put the following posters in the school and in their localities.

"Use Automobile Only When necessary."

"Walking or Cycling Can Be Fun"

CONCEPT

Industrialization, urbanization and expanding fleet of automobiles, aircrafts and ships depend on increasing use of fossil fuels. Galloping rate of fossil fuel use is a major cause of depletion of fossil fuel.



OBJECTIVE

To sensitize students towards judicious use of non renewable resources like fossil fuels.

MODE

Individual work

TIME REQUIRED

One week outside the school hours

Activity-3 : Depletion Of Fossil Fuel

Assessment

1. What is the reason behind Government's insistence on admitting students in the school from neighborhood localities in an urban scenario?
2. What are the major causes of depletion of fossil fuel?
3. What are the other environmental problems associated with consumption of fossil fuel in large quantities?

5 CONSERVATION OF RESOURCES

Activity- 1-Water Conservation

Background/previous knowledge : Due to casual approach we waste a lot of precious water. Students should be guided to put in conscious efforts to reduce, reuse and recycle wastewater.

Material required : Chart paper, crayons, A-4 sheet and pencils

Methodology : Divide the class into three groups and assign one specific task to each group.
Ask the class to adopt drinking water area and common toilets of any one wing of the school. Let each group take up the responsibility of the following activities.

Group 1 Collect information about leaking taps, faucets, flushes and careless attitudes of students.

Group 2 Measure water being wasted from one or two taps by putting measuring cylinders under such taps for ten minutes. Calculate average wastage of water per day.

Group 3 Discuss and suggest measures to help improve habits of students to prevent wastage of water.
Teacher can guide students to

- stick posters advising students to close the tap tightly after use
- make other students aware of wastage of water by announcements in the assembly.
- put one liter of plastic bottle filled with water and tightly capped in the flush tank. Every time you use flush, you will save one liter of water.

Observations : In the second EE period, teacher can collect information from the students and initiate a discussion in the last fifteen minutes. After going through the reports of group 1,2 and 3, a comprehensive report may be prepared informing about the students' concern and followed by their action. A list of suggestions and recommendations can also be added to the report and submitted to the school administration.

Some suggestions and recommendations are given below:

- Leaking faucets to be immediately repaired or replaced by efficient ones.
- Rainwater harvesting system may be developed.

CONCEPT

To reduce wastage of water

OBJECTIVE

To generate awareness about the need to conserve water.

MODE

Group work

TIME REQUIRED

One week

Activity- 1- Water Conservation

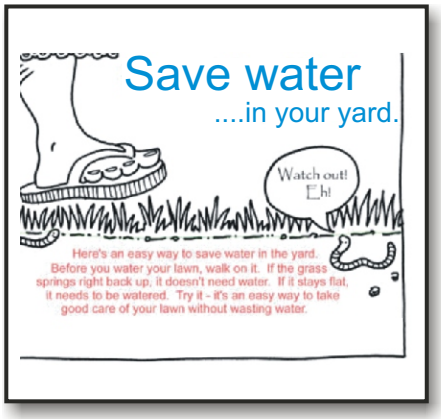
- A system may be developed to recycle wastewater from drinking water area, kitchen and from wash basins. The discarded water may be used for gardening purposes.

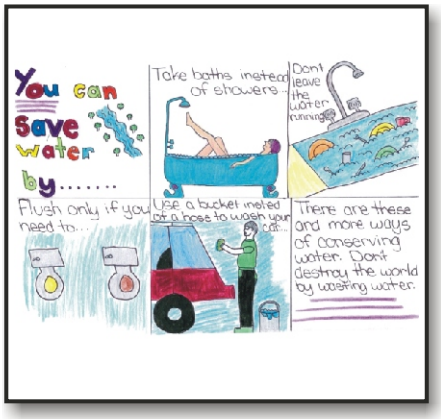
Evaluation : A similar activity can be carried out after six months to check if any improvement has taken place and if not, the groups can put in efforts once again to remind students and school authorities to conserve water.

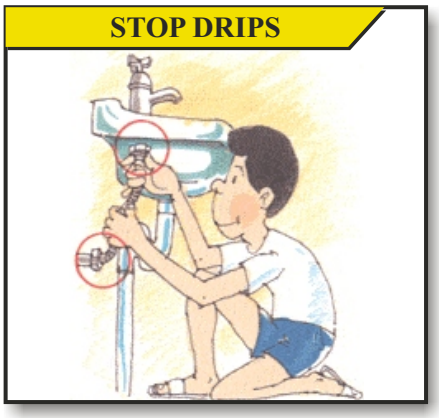
Recapitulation : Students can submit a report at the year-end about the amount of water they helped in conserving and thus saving the resource. This report can be put on the display board.

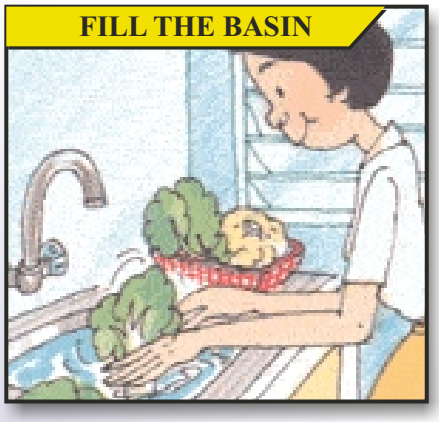
Assessment :

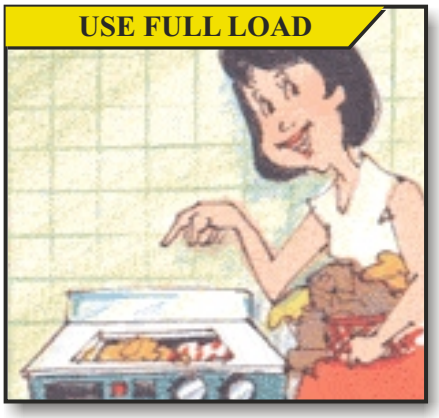
1. Find out the percentage of water available in form of fresh water on earth.
2. Why water is considered to be a renewable resource?
3. Prepare an imaginative and attractive poster for promoting water conservation. A few samples are given below.











Activity- 1- Water Conservation

5 CONSERVATION OF RESOURCES

Activity- 2 :Assessment of Energy Comsumption

Background/previous knowledge : Resources are depleting but the development of technology and marketing of consumer items are promoting an excessive use of electric appliances.

Methodology :

1. Make a list of the electrical appliances you have at home.
2. Find out the wattage of each electrical appliance.
3. Energy used for some of the appliances is given below

Sr. No.	Appliance	Electricity Consumption
1.	Bulb 60 watt	1 unit in 16 hrs
2.	Tube Light 40 watts	1 unit in 25 hrs
3.	Television	1 unit in 6.5 hrs
4.	Ceiling fan 48 watt	1 unit in 16 hrs
5.	AC 1 ton	2.5 units in 1 hr
6.	Room Heater	1 unit in 1 hr
7.	Geyser	2 units in 1 hr
8.	Electric Grinder	1 unit in 5 hrs
9.	Electric Iron	1 unit in 1 hr
10.	CFL 8 watt*	1 unit in 55 hrs

4. Find out the number of each appliance you have at home.
5. Find out number of hours each appliance is used per day.
6. Find out the rate of electricity per unit (from electricity bill)

*Compact fluorescent lamp of 8 watt give as much light as 100 watt incandescent conventional bulb

CONCEPT

To sensitize students about our increasing dependence on the energy resources.

OBJECTIVE

To generate awareness about the modern life style which is extremely dependent on electrical energy.

MODE

Individual work

TIME REQUIRED

Students can carry out this activity at home.

Activity- 2 :Assessment of Energy Consumption

Observation chart :

Calculate per day electricity consumed by each appliance and its cost

Sr No.	Appliance used	Energy used/hr	No. of hr	Total energy consumption	Cost @ Rs. _/unit

Evaluation : Students will become aware about the energy consumption by different appliances.

Recapitulation : This awareness will help students to take measures to keep a check on wastage of electricity.

Assessment:

1. Suggest few measures to conserve energy at home.
2. Can you think of replacing any of these appliances with eco friendly (non-conventional resources) gadgets? Why?

5 CONSERVATION OF RESOURCES

Activity- 3 : Energy Conservation

Background/previous knowledge : Rapid growth of energy demand is a major cause of power shortage leading to frequent power cuts. It is the duty of every citizen to put in conscious efforts to conserve and enhance the efficiency of energy use.

Methodology :

1. Note the meter reading of your electric meter on a particular day.
2. The next day at the same time note the meter reading again and find the electricity consumed per day.
3. Have a brain storming session with the family members and make a list of the various measures you can take to conserve electricity.
4. Start preparations to implement the measures to conserve electricity.
5. Request all the members of your family to use the electric appliances cautiously so that no electricity is wasted due to casual approach.
6. Determine electricity consumed in 24 hours after energy conservation measures were taken.

Observation : Find out the amount of the electricity saved due to energy conservation .

Evaluation : Inform the family members about the energy saved because of their conscious and co-operative efforts.

Recapitulation : Saving the energy at personal level will help in ultimately saving the energy at national level.

Assessment

1. Interview your neighbours or family friends to find out if they take any measures to conserve energy at home.
2. Can you share the measures you took to conserve energy to inspire others?

Solar Cooker

CONCEPT

Conserving energy

OBJECTIVE

To help students realize that conscious efforts help in saving energy.

MODE

Individual work

TIME REQUIRED

This activity can be carried out during holidays

6 WASTE GENERATION

Activity-1 : Waste Generation at Home

Background/previous knowledge : Waste management system plays a vital role in the development of a town or a village. Designing of the Waste management system entirely depends on the types of waste generated.

Material required : Pair of rubber gloves, a plastic sheet, dust bins, paper and pencil

Methodology :

- Put on a pair of rubber gloves.
- Collect dustbins with waste from different rooms and the kitchen in an open space (balcony or courtyard) of your house.
- Empty one dustbin at a time on a plastic sheet.
- Segregate all the components on the basis of their biodegradability.
- Biodegradable waste can further be separated into paper, natural fibers and kitchen waste.
- Non-biodegradable components can further be separated into plastics, metals, glass, ceramics and polyester cloth.

Observation : Make a list of the different types of waste generated at your home.

Recapitulation : This exercise will provide the students an insight into different types of waste generated at home. This will further help them to think critically about the proper disposal of waste.

Assessment

Q1. Find out the waste disposal system at your home.

Q2. Find out the waste disposal system of your colony.

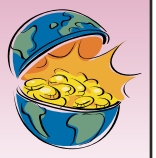
Q3. Visit the place where the waste of the colony is dumped. Write your observations.

CONCEPT

Awareness about the waste generated at home

OBJECTIVE

To make students aware about the types of waste generated at home.



MODE

individual

TIMEREQURED

30 minutes (at home)

6 WASTE GENERATION

Activity-2 : Newspaper in Environmental Education

Background/previous knowledge : It is important that students gain awareness about environmental matters. Newspapers carry many news articles related to environment. In order to make them concerned members of the society it is important that they discuss news related to environment among themselves and also try and find solutions.

Methodology:

1. Teacher may ask students to cut one news clipping related to waste and paste it on an A-4 sheet.
2. Read the news item and note down difficult words and queries on the same sheet below the news item.
3. The students should find out the meaning of the difficult words from the library or from the teacher.
4. During EE period, the teacher may take up the topic for discussion and clarify the doubts of the students.

Observation : The children can pin their sheet on a bulletin board and put it near the library for the school community to read.

Evaluation : Gradually students will develop interest and eventually awareness about the growing environmental problems related to waste.

Recapitulation : The awareness will motivate students to think critically and develop an attitude to look for solutions for environmental problems.

Assessment :

1. The monitor of the class can collect all the news clipping from the bulletin board and arrange a quiz for the class.
2. Discuss these environment related news items with your parents and other family members.

CONCEPT

Newspaper as a means to learn contemporary environmental problems.

OBJECTIVE

To familiarize students with current environmental problem

MODE

Individual Work / Group Work

TIME REQUIRED

One period

7 MANAGEMENT OF WASTE

Activity-1 : Design a waste management system.

Background/previous knowledge : Solid waste contains various components, many of them can be reused or recycled and thus reducing quantity of waste to be dumped.

Methodology :

1st EE period - Teacher can initiate a discussion through which students can successfully design a waste management system in the school.

The following points may be discussed

- Identity different types of waste generated in the school and their sources.
- find out what is the waste collection system in the school.
- measures to make the school a zero waste generating place.

Students of the class may be divided into three groups. Each group may be assigned the following specific task and asked to submit a report in the next EE period.

- **Group-1 :** Collect information about the type of waste generated in the classroom and the measures required to collect the waste separately. Make a list of things and changes required to achieve the goals.
- **Group-2 :** Collect information about waste generated in the school office and the measures required to collect the waste separately. Make a list of things and changes required to achieve the goals.
- **Group-3 :** Collect information about waste generated in the canteen and the measures required to collect the waste separately. Make a list of things and changes required to achieve the goals.

2nd EE period - Teacher can guide students in finalizing the plan and for arranging the required materials for implementation.

The following action plan may be suggested:

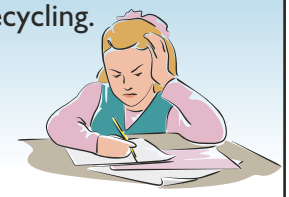
- Arrange blue bins for non-biodegradable and green for bio-degradable or simple dustbins with labels, so that children collect waste in separate bins.
- Instruct the children regularly in the assembly, in order to develop a habit of throwing waste in appropriate bins.

The following may be suggested for the school administration:

- Instruct the safai karamchari to sort and collect the waste separately.

CONCEPT

Segregation of waste helps in optimum utilization through reuse and recycling.



OBJECTIVE

To help students to develop an attitude to collect waste separately

MODE

Group Work

TIME REQUIRED

Four EE Periods.

Activity-1 : Design a waste management system.

- Paper from the waste can be sent to school paper recycling plant. If school does not have a recycling plant, a local rag picker could be arranged and paper and plastic could be sold on daily basis.
- Food waste can be dumped into a "compost pit" along with garden waste.

Observation : Individual groups may note down the observations/findings and report to the teacher in charge regularly.

Evaluation : In one of the EE periods, after every 2-3 months, teacher can take feedback about the effective implementation of the suggestions.

Recapitulation : Average quantity of paper, plastic and food waste generated per student per day may be calculated (once in a fortnight, students with the help of safai karamcharies can get these waste materials collected in separate gunny bags and weighed).

Assessment

Q1. Why is management of waste necessary?

Q2. List any five ways by which you can reduce the use of non-biodegradable materials and promote the use of biodegradable materials in your daily life?

7 MANAGEMENT OF WASTE

Activity-2 : Recycling of Waste Paper

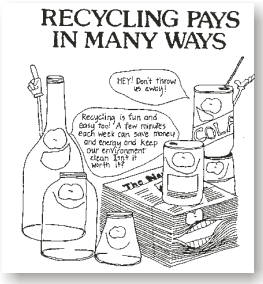
Background/previous knowledge : To help conserve forests and to reduce quantity of waste it is imperative to reuse and recycle paper as much as possible. The technique to make paper varies depending on the quality of paper. A simple technique is given here which students can practice at home.

Methodology : Paper Recycling

1. Shred the waste paper into very small size pieces and soak in water for 6-7 hours.
2. Remove excess of water and churn in a mixer. (In absence of a mixer, mash the paper with hand into pulp.)
3. Take a fine mesh and cut it according to the size of the paper required.
4. Put a muslin cloth on the mesh and hold it tightly.
5. Transfer pulp into a tub, which is bigger than the mesh.
6. Add water to the pulp depending on the thickness of paper you want.
7. Slide the mesh with the muslin cloth into the tub and move it around in the tub until pulp is evenly distributed on the mesh.
8. Lift the mesh and place it in the other tub for few minutes to allow excess water to drain off.
9. Very carefully transfer the cloth with the pulp on a previously cleaned cemented floor in the sun. After the paper is semi dry remove it from the cloth.
10. When it is semi dry, roll a roller-pin over it to straighten it.
11. Allow it to dry completely.

Observation : Paper made through this method could be used to make attractive greeting cards.

Evaluation : This experiment is a good demonstration to generate awareness about recycling of waste paper. This is a good example of transforming a waste into a usable material.



Recapitulation : Recycling reduces the amount of waste and helps in improving the environment.

Assessment

1. Why is it important to recycle paper?

CONCEPT

Saving paper is saving trees

OBJECTIVE

To make students aware of the importance of waste paper as raw material for making fresh paper.

MODE

Individual Work

TIME REQUIRED

One practical session (one and a half hours)

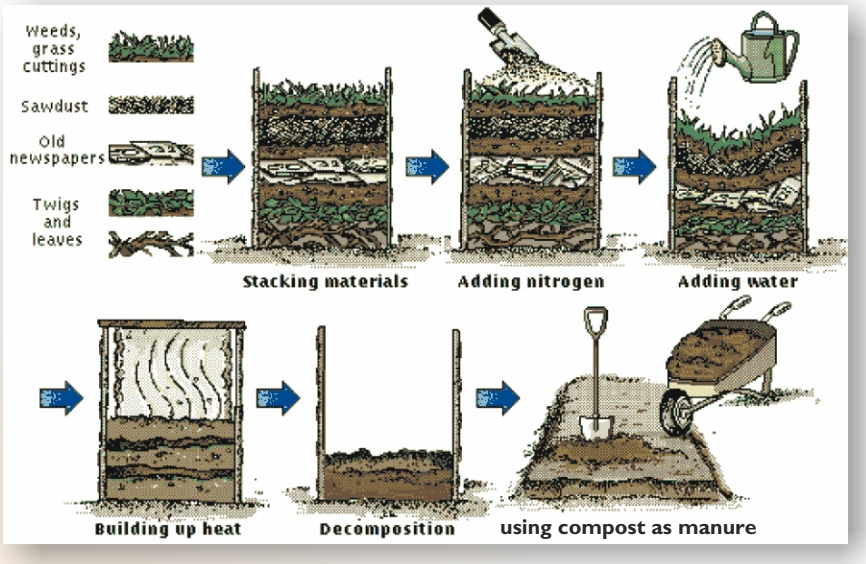
7 MANAGEMENT OF WASTE

Activity-3 : Compost Making

Background/previous knowledge : Dead plants, leaves and other plant parts as well as kitchen waste represent organic waste, which is generated every where almost on daily basis. Indiscriminate disposal or dumping of organic waste causes odour nuisance and unhygienic conditions. Moreover dumping or burning of organic waste represent a loss of the valuable material which can be converted into organic manure and used for enriching soil fertility.

Methodology :

- A compost pile may be built by layering different kinds of organic wastes in a bin. Between the layers either grass cuttings, saw dust, old papers or twigs may be placed in order to leave space for air to circulate.
- The pile may be turned up and down for better aeration for initial two to four days.
- Nitrogen is added to the pile in the form of bone meal, (grass from mowed lawns, leaves etc.) or cow dung to promote decomposition by microbes.
- Heat facilitates decomposition and kills the undesirable pathogenic organisms.
- Water is sprinkled and the pile is kept moist and not allowed to dry.

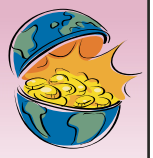


CONCEPT

Waste from kitchen and garden can be converted into valuable manure.

OBJECTIVE

To learn to convert waste into usable product.



MODE

A demonstration activity or group work.

TIME REQUIRED

3-4 months. This activity may be carried out during EE period.

Activity-3 : Compost Making

- As heat and steam build up, the waste decomposes over a period of 3-4 months into a nutrient-rich substance called compost.
- The compost is then applied to the soil as manure.

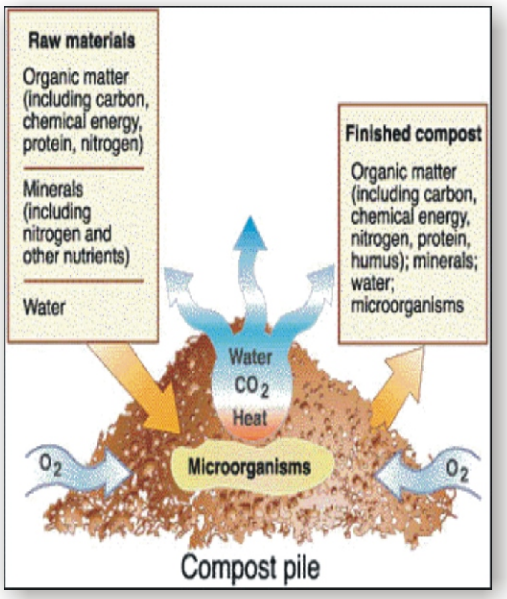
Observation : Waste material ,if not reused may cause problems for the environment.

Evaluation : Soil microbes decompose complex organic waste molecules releasing the nutrients locked in the organic wastes, which may be easily absorbed by the plants.

Recapitulation : It is not difficult to change the system if we change our attitude towards waste. This helps us to create a healthy environment. Waste can also be used as useful material.

Assessment-

1. Why should the compost pile be kept moist and not too wet ?
2. How is organic manure different from its raw material in its chemical nature?
3. What is the role of decomposers in maintaing soil fertility?



7 MANAGEMENT OF WASTE

Activity-4 : Best out of Waste

Background : Waste is becoming a serious environmental problem and can become a hazard if not treated suitably. In order to reduce generation of waste, it is essential that we find ways to reuse and recycle waste material to produce useful items.

Methodology : It is possible to convert waste through imaginative ways into useful materials.
We are often amazed to see people using locally available waste materials and creating wonderful utility items out of them. If we recall, we find many such instances around us**.** Like granny knitting a new design sweater from an old one, making dolls from worn out clothes or socks, small flower baskets from used wooden ice-cream spoons, decorative pieces from empty egg shells, sea-shells etc.
Some more ideas are given below:

- Small left over pieces of cloth (if you stitch at home) can be stitched to make bags and mats.
- Pencil shavings can be used to make decorative pictures.
- Waste paper may be rolled into fine cylindrical tube like structures and used for making either photo frames or pencil holders.
- The upper broken part of the Squash or Sauce glass bottle can be cut with the glasscutter, edges smoothened and then are used as flower vase.
- Weaving mats from left over pieces of wool or strips cut from unutilized poly-bags.

You may think of other activities suitable to your needs.

Observation : Creative ideas and skills convert waste into utility items. This not only helps to reduce waste but also helps in generating revenue and support families.

Evaluation : Waste should not always be considered as a problem, as some of it can be converted into a useful product

Recapitulation : Natural resources are limited and hence people in different parts have evolved different ways to optimally utilize resources. This also includes meaningful utilization of the waste generated by them. This helps is reducing unnecessary stress on nature by mounting waste generated by the society.

CONCEPT

Reuse and retrieval of waste material

OBJECTIVE

To learn to reuse waste material. To help students to develop an attitude to collect waste separately.

MODE

Group Work or Individual Work

TIME REQUIRED

40 minutes

Activity-4 : Best out of Waste

Assessment :

1. Collect information about various ways to use waste as raw material for making useful items.

   This information can be shared with other students in order to encourage them to reuse waste as far as possible and to change their attitude towards waste.

2. Students may be challenged to make useful items from the waste collected in the school. (See diagram)

Utility items made from waste

8 LEGAL PROVISIONS FOR MANAGEMENT OF ENVIRONMENT

Activity-1 : Regulation For Controlling the Sound Pollution

Background/previous knowledge : Music is soothing and relieving when it does not cause stress. Loud music can cause discomfort and it does not give relief to the listener. To prevent the nuisance of loud noise, the law provides a measure by which such offenders may be punished.

Methodology : The teacher may begin the class by asking some questions related to noise pollution.

- Which are the important sources of noise pollution in your neighbourhood ?
- What disturbs you when you are preparing for your examinations?
- Which types of noise irritate you ?
- Try to think of events that generate sound that is so loud that it causes discomfort.
- How many of you like to listen to music? How do you distinguish between comforting and discomforting sound / noise?

These questions arouse the interest of the students. Next, the teacher divides the class into 5 groups. Each group is provided with a question and the students in the group are allowed to discuss and elaborate on the contents. A group leader is selected who summarises and presents the views of the group. Finally, the teacher considers all the view points and tells the students that laws are provided under Environment Protection Act to safeguard and protect the well-being of the citizens. In this way, group discussion activity is carried out.

Observations: The Environment Protection Act was passed to overcome such occurrence. It is a comprehensive environment legislation and authorises the Central Government to issue specific notification to address environmental problems.

Recapitulation: The law helps to plan fixed timings so that nobody can play loud music which may disturb the neighbourhood.

Assessment:

- What is the unit to measure sound ?
- Who are the most vulnerable to noise pollution ?
- What is the time limit for the use of loud speakers ?

CONCEPT

Loud sound (more than 120dB)is a type of polluting factor which can be damaging to the ear and may cause serious health problems.

OBJECTIVE

The student will be aware of the noise causing pollutants. These can be exposed to legal provisions of noise pollution.

MODE

Group work

TIME REQUIRED

1 period

8 LEGAL PROVISIONS FOR MANAGEMENT OF ENVIRONMENT

Activity-2 : Wild Life Protection

Background/previous knowledge : Some people have a liking for wild animal fur, skin and trophies for which the animals are poached. The wanton killing of wild animals is a major cause of concern.
The Wildlife Protection Act prohibits the killing of wild animals. According to this Act hunting, killing and possession of wildlife products and trophies is a cognizable offence.
If we stop use of wild life product and discourage the use of fur, skin and wildlife trophies, then this would naturally prevent poacher from cruelty and help in conservation.

Methodology : The teacher selects three students from the class. One of them is given the role of Raju, the second student acts as his mother, and the third student plays the role of his visiting aunt. They are told to enact a short play.

Raju is seated in the drawing room of his house. There is a knock at the door. He opens the door.
He says "hello Aunty, good evening. Please be seated, I will call my mother."

Raju goes inside to call his mother.

His mother comes to the drawing room to greet her friend and exclaims "Oh, What a surprise ! I am so happy you have come. You are carrying a beautiful purse."

The aunt is delighted with the compliment. However, Raju feels very sad and says, "Mother, this is a crocodile skin purse. Do you know it is banned". The aunt replies, "I was not aware. I am happy that you made me aware of this. I will also inform my friends and advise against using articles made from wild life products. Is use of wildlife products a cognizable offence?"

"Aunty you could be punished by the court of law for possessing an article derived from wild animals. Possession and use of such a purse is prohibited. Do you know that the Wildlife Protection Act has banned these products, and it could be confiscated and you may run into serious trouble" Raju says.

Observations: The students watch the short play with interest. They realize that even adults are ignorant of these rules. Ignorance promotes poaching and smuggling of wildlife products. Use and patronage of wildlife products derived from wild animals is a major cause for depletion of wildlife.

Recapitulation: The Wildlife Protection Act of 1972 was passed for the protection and conservation of our rich wildlife heritage. The Act provides complete protection to wildlife in the country.

CONCEPT

The use of certain animal products is banned. There are laws to protect wild animals and the users are punished.

OBJECTIVE

After performing this activity students understand the use of the law to protect and conserve those animals which are endangered and facing extinction.

MODE

Group work

TIME REQUIRED

2 Periods

Activity-2 : Wild Life Protection

Assessment:

- Which wildlife animals are the major target of poachers ? Name any three.
- How would you react if a wild animal is to become extinct just because people would like to possess articles made from the fur of this animal ? Elaborate.

8 LEGAL PROVISIONS FOR MANAGEMENT OF ENVIRONMENT

Activity-3 : Vehicular Pollution

Background/previous knowledge : One of the main causes of air pollution is the gaseous emission from the exhaust of the automobiles.The Government has tried to effectively control this problem by enforcing the use of unleaded petrol, CNG and keeping a mandatory check on the emission level of vehicles so that the emissions are within the prescribed limit. In Delhi because of the rapid growth of automobiles, air pollution has increased to a dangerous level affecting health and well being of the people. The court intervention has helped in switching over from the use of diesel which is polluting fuel to CNG (Compressed Natural Gas) which is non-polluting fuel.

Methodology : The teacher may divide the class into 5 or 6 groups.
Each group may be asked to observe emission of smoke from exhaust of any one type of vehicle i.e. either car, bus, van, two or three wheeler for 30 minutes and note the number of vehicles in each category. Find a safe place (farthest side of the foot path) for your self from where you can watch and count the vehicles on the road.
Next, students prepare a chart as given below:

Type of the vehicle _____

Vehicles emitting less smoke		Vehicles emitting medium quantity of smoke		Vehicles emitting heavy black smoke	
Number	Percentage	Number	Percentage	Number	Percentage

Observations: Students should calculate percentage of polluting vehicles in each category.

Recapitulation: Vehicular pollution is one of the major contributer to urban air pollution.

Assessment:

- Find out from books in the library the name of gases present in automobile exhaust.
- Which make of car do you have? Do you remind your father to get a pollution check done ?
- Which automobile fuel produces minimum pollution?

CONCEPT

To monitor vehicular pollution

OBJECTIVE

To familiarise the students with the problem of air pollution caused by different types of automobiles.

MODE

Group work

TIME REQUIRED

The activity is partly done during a weekend and discussion is completed during the class periods.

9 ENVIRONMENTAL VALUES AND ETHICS-HUMAN RIGHTS, FUNDAMENTAL DUTIES AND VALUE EDUCATION

Activity-1 : A Visit to a Site of Environmental Interest

Background/previous knowledge : Each nation should have its own standards of managing the environment and every nation should have the freedom to draw from national resources without harming other nations. A visit to such a resource helps to understand the complexities involved in maintenance and conservation.

Methodology : The teacher selects a site of environmental interest. It could be a small lake, a monument, or a garden.

The site selected here is a monument.

The teacher divides the class into four groups depending on their interest.

Group 1: Collects the historical background of the site.

Group 2: Will find out about the ecological factors around the site like...
-How many people visit the site?

-Is the site facing any ecological threat?

Group 3 : Will find out architectural details, as that will be an indication of its relevance to that historical period.

Group 4: Comprises the aesthetic part. The students in this group will write articles, poems, or make a painting, or a poster giving general instructions to public so that they do not destroy it by inscribing their names or throw garbage (like plastics, wrappers, leftover food etc) during their visit to the site.

Each group must present their findings in the form of a report. Presentation can be made using multimedia support as well as other aids.

Observations: When all the information has been collected, a report is prepared which is discussed during the environment period so that all the students get to know the work done by the other groups.

Recapitulation: By visiting the site the students get an insight into the type of destruction that is caused by visitors due to their ignorance and irresponsible behaviour. Maintenance of an ecological site is a fundamental duty of all citizens of the country.

CONCEPT

A visit to a site is an enriching experience and helps to build an insight into environmental protection.

OBJECTIVE

After performing this activity, the students will be able to realise the significance of the site of visit and realise their duties to conserve it.

MODE

Group work

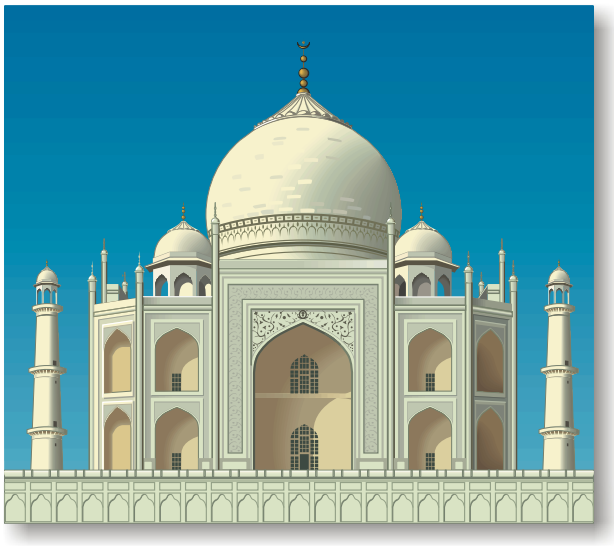
TIME REQUIRED

2 Periods (if the site is nearby)

Activity-1 : A Visit to a Site of Environmental Interest

Assessment:

- What type of destruction do you find in parks, lakes, or gardens?
- If we love our surroundings we will naturally protect and conserve it …do you agree? Elaborate.
- Do you think such activities which destroy the beauty of a site should be punished ?How?
- What is the type of ecological hazard Taj Mahal is facing?



9 ENVIRONMENTAL VALUES AND ETHICS-HUMAN RIGHTS, FUNDAMENTAL DUTIES AND VALUE EDUCATION

Activity-2 : Rights And Duties To The Environment : Conducting a Mock Parliament

Background/previous knowledge : Students are a precious resource for the future. Education brings in growing awareness about rights and duties towards the environment. They are also a link between the family, neighbourhood and the community. They are very important sector of the society. So, it is important that all students know their rights and duties related to the environment.

Methodology : The teacher first selects students to act as ministers and represent the Opposition.

The teacher tells the students to set up a MOCK PARLIAMENT.

Ministers with different portfolios take their place and the Opposition occupy their chairs. One student acts as the speaker. Students are asked to prepare their speeches in groups.

The Parliament session is on.

One Opposition member raises a point about the deterioration in the state of the environment. He says it is the duty of the State to provide wholesome food, clean air, potable water, power supply etc.

The minister of Environment replies that the Government has tried its best to provide the facilities. But it is also the responsibility of the citizens to perform their duties. He also makes a list by which laws are not followed and people are punished. The list is as follows :

- People cut down trees
- Throw effluents in the river
- Factories release harmful gases and chemicals into the air
- Car owners do not monitor pollution levels in their vehicles
- People do not heed 'No Parking Zones'
- Wastes are not segregated

To counter these problems a number of laws exist which are violated and they are punished.

Observations: By performing this activity, the students become aware of their rights and duties.

Recapitulation: There is no point in complaining about the sad state of affairs all the time. One should realise one's own duty and perform it to the best of one's ability. The Constitution has all the provisions and we should not only be aware of them but also practice them to the best of our ability.

CONCEPT

Rights and duties go hand in hand

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OBJECTIVE

To understand fundamental duties as a citizen of India featured in the Article 51(A) of the Indian Constitution. Of the ten duties, the one mentioned at point seven reads thus:
"To protect and improve the natural environment like forests, lakes, wildlife, river and compassion for all living beings."

MODE

Group work

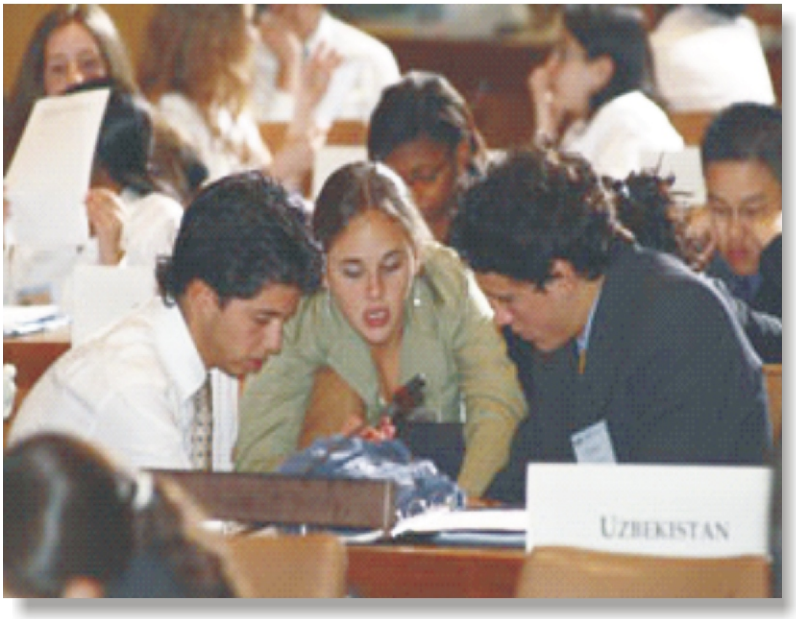
TIME REQUIRED

2 Periods

Activity-2 : Rights And Duties To The Environment : Conducting a Mock Parliament

Assessment:

- Are you aware of what is meant by a Mock Parliament?
- Read the newspaper during the parliament sessions and find out what type of issues are raised.
- What happens when a question is raised in the Parliament?
- Find out who is the Minister of Environment and Forests of your state ?



9 ENVIRONMENTAL VALUES AND ETHICS-HUMAN RIGHTS, FUNDAMENTAL DUTIES AND VALUE EDUCATION

Activity-3 : The Environment Club and Action Groups

Background/previous knowledge : One of the best ways to spread awareness about protection and conservation of the environment is by setting up an Environment Club in the school.The club will initiate and conduct activities.

Methodology : The teacher first introduces the activity and discusses the need to protect and conserve the environment. She /He takes the following decisions:

- Number of members in the club
- Appoints a president, secretary and a treasurer,
- Plans the programme and the activities.

For example: once a week a topic of environmental interest can be read out in the school assembly.

This way the awareness can be spread to the entire school.The club can conduct activities like Quiz, Slogan-contest, Poster making contest etc.

The club can get a newsletter printed with articles, poems, crosswords, games, and facts on plants and animals.

The club can put up posters on maintaining cleanliness, switching off lights and fans when not in use, closing taps after use and avoiding wastage. Two waste bins may be kept so that there is separate collection of degradable and non-degradable wastes.

During environment periods, these activities may be assessed and steps can be taken to improve them.

Observations: The students will actively participate and ensure smooth functioning of the club.

Recapitulation: Various aspects of the environment can be looked into like air, water soil, energy, noise and information can be provided.

Assessment:

- Do you have an Environment Club in your school? Is it important to have such a club and why?
- Can you suggest a list of activities you would like to do as member of Environmental club ?
- Will you be interested in watching a wildlife film as part of a club activity?
- You may plan a visit to other clubs and spread information. Remember this is a good way to start activities early in life.

CONCEPT

The best way to protect and conserve the environment is by forming an action group or an Environmental Club. This requires a lot of planning and systematic work.

OBJECTIVE

By organising an environmental action group every school or organisation can create environmental awareness and concern among children.

MODE

Group work

TIME REQUIRED

2 Periods

10 WOMEN AND CHILD WELFARE

Activity-1 : Child And Environment

Background/previous knowledge : In a developing country like ours, children suffer due to poverty. They become rag pickers, beggars or are initiated into child labour. They may fall into the trap of drug-peddlers and thieves. They are sometimes sexually exploited and become vulnerable to HIV/AIDS and other diseases – innocent as they are. They do not get any education and are vulnerable to exploitation.

Methodology : The topic for declamation given by the teacher is **'CHILD LABOUR'.** One student has to speak for and one against the topic

All the other students listen to them.

The students who speak for / against have some points as follows:

For-

- In poverty-stricken homes, the child can become a source of income by working in factories, construction sites, hotels etc,
- The child can look after his younger siblings when his parents go out for work
- The child looks after cattle as a shepherd boy

Against-

- The Constitution assures him/her the right to education
- He will be wasting his time - due to which he may get involved in anti – social activities
- He should enjoy his childhood years
- Poverty is not always the reason. Sometimes even children from affluent homes become dropouts
- The teacher listens to both the views and summarises the declamation activity

Observations: The reasons for becoming dropouts become clear. Due to malnutrition, undernutrition, ignorance, poverty, and mixed up values children suffer from ill- health and get into incorrect practice, thereby not being able to contribute their share of happiness to home and environment.

Recapitulation: The factors which impact ill-health include poverty and igno rance. Therefore, education must be promoted so that today's children become worthy citizens of the nation in future. This will ensure happy and healthy environment with disease – free life and a productive life span.

CONCEPT

Holistic and comprehensive health includes emotional, social and physical well - being

OBJECTIVE

After doing this activity students realise that:

- The conditions prevailing at home and in the environment are responsible for creating dropouts.

- Every child has a right to education

MODE

Group work

TIME REQUIRED

2 Periods

Activity-1 : Children And Environment

Assessment:

- Apart from poverty and ignorance, what other reasons have you come across for school dropouts?
- What is the link between education and health?
- How can children contribute to eco-preservation and eco-conservation?
- Is it wise to make children work to overcome poverty?

Education for a better life

10 WOMEN AND CHILD WELFARE

Activity-2 : Gender Inequality

Background/previous knowledge : Termination of female pregnancies, inequality in supply of resources like food or education, domestic responsibilities are some of the problems faced by the girl child. These factors affect the plight of women and their significant contribution to the environment.

Methodology : The teacher introduces the activity, which is a debate, with the rules to be followed.
Four students are selected.

Two students will talk *FOR* the topic and two *AGAINST* .

Topic of debate is: ***Is there a link between Gender Inequality and Environment?***

The student who speaks for the motion will say that the biotic and abiotic factors comprise the ecosystem. Unequal opportunities, lack of food and consequently poor health and lack of education will affect the biotic factor which can cause an imbalance to the ecosystem in the environment.

The student who speaks against the motion will say that disparity in sex ratio does not help or destroy the environment. There is no such link. There is no significant fallout due to the lopsided sex ratio.

The debate should be followed by rebuttal session. The teacher should ensure that all students participate in the healthy discussion that follows during the period.

Observations: Students understand gender inequality and realise its effect on the environment.

Recapitulation: Due to gender inequality, the girl child remains undernourished, prone to diseases, prone to exploitation and prone to marginalization.

Assessment:

- Do you believe in gender inequality? Give an example to support your belief.
- Do you think gender inequality affects the environment?
- Explain gender inequality with a case study.
- Suggest ways by which you could fight Gender Inequality

CONCEPT

Problems of a girl child and its impact on the environment.

OBJECTIVE

After completing this activity, students will be able to understand the link between Gender Inequality and degradation of the environment.

MODE

Group work

TIME REQUIRED

2 Periods

10 WOMEN AND CHILD WELFARE

Activity-3 : Women And Environment

Background/previous knowledge : Throughout history, we can find numerous instances of women who have made an impact on environment. Women have immensely contributed in maintaining the balance in the environment.

Material : Access to libraries.

Methodology : The teacher selects some broad references out of which students select specific case studies.
Narrate one incident where you can reveal womanpower to save environmental destruction. (ex. Chipko Movement, Narmada Bachao Andolan)

OR

Write about one woman environmentalist (eg: Medha Patkar, Vandana Shiva)

If the students have internet facilities, they can use it. They have to be provided with time so that they can collect enough information.

Observations: When students look into each other's work, they realise the contribution made by them to protect and conserve the environment.

Recapitulation: Jawaharlal Nehru, the first Prime Minister of our country had said "You can tell the condition of a country by looking at the status of women." Women play a vital role in protecting the environment. We have to change our attitude towards women and we must recognise their contribution towards environmental conservation.

Assessment:

- Do you think education helps woman's role as a homemaker?
- From your observation find out the differences that occur when women in the household are educated or uneducated with respect to the environment.
- Collect information on women's role in eco-preservation.
- Make a list of your grand mothers recipes / treatments based on things available in nature(like tulsi, turmeric)

CONCEPT

Contribution of women in protection and conservation of environment.

OBJECTIVE

To comprehend the role of women in environmental conservation and improvement

MODE

Individual / Group work

TIME REQUIRED

Four Periods

10 WOMEN AND CHILD WELFARE

Activity-4 : Role of Women In Protection And Conservation Of Environment

Background/previous knowledge : Women who are at home provide food, clean the house, look after children and family. In this process they closely interact with the environment by obtaining raw materials and producing wastes.

Methodology : The teacher tells the class to prepare for a street play highlighting ways in which the woman can contribute to conservation and protection of the environment.The different roles are:

Student 1- acts as a woman who discards the use of 'chulhas' which produce toxic gases and cause pollution.

Student 2- demonstrates the practice of recycling of kitchen wastes by composting for her kitchen garden.

Student 3- tries to reuse containers instead of throwing them after use.

Student 4- segregates the waste into bio-degradable and non-biodegradable.

Student 5- explains to other women why plastic should not be used as it spoils the environment.

Student 6- tries to educate other women on health issues, so that they can practice it in their homes and take care of children.

All these activities are ways by which women protect and conserve the environment.

Observations: The role of the woman in protection and conservation of the environment is amply demonstrated.

Recapitulation: Role of the woman should not be undermined. In traditional households, women still eat whatever is left after the men folk in the household have eaten—thereby depriving themselves of a balanced meal. Opportunities are primarily provided first to the growing boys and then the girls. The purpose of this activity is to gradually remove these root causes of discrimination and to recognise their contribution in protection and conservation of the environment.

CONCEPT

The activities with which women at home can protect the environment.

OBJECTIVE

With the help of this activity students can demonstrate the various functions performed by the woman in running the household and the manner by which she adds or removes things from the environment.

MODE

Group work

TIME REQUIRED

2 Periods

10 WOMEN AND CHILD WELFARE

Activity-5 : Making A Promotional Advertisement

Background/previous knowledge : Ministry of Environment and Forests and the Ministry of Health and Family Welfare have brought out a number of advertisements which have helped to create awareness among the masses. But most students seem to find these highly amusing and irrelevant.

Environmental issues are closely linked with our activities. The role of students in protecting and conserving the environment is undeniable.

Methodology : The class is divided into four groups. Each group is asked to select a topic and perform a small role-play to depict the topic. The topic should concern the environment. For example, students can enact an advertisement on the conservation of water, keeping in mind that it will be an advertisement for television. Since they find some advertisements which are condescending and tend to preach, let them think of ways to dispense the information in an innovative manner.

Observations: These advertisements have a tremendous impact and are of great educative value.

Recapitulation: Knowledge has to be spread among the masses and there are different ways of doing so. Ours is a big country and different methods have to be used to reach different types of audiences.

Assessment:

- Can you recall some environmental related advertisements, which have left an impact on you?
- After going through the process of advertisement-making, how difficult do you think it is to reach the masses with a social message?
- Try to collect many such advertisements from the newspapers.

GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT & FORESTS

CONCEPT

Spread of information through different ways has a greater reach across the masses.

OBJECTIVE

With the help of this activity students can demonstrate the various functions performed by the woman in running the household and the manner by which she adds or removes things from the environment.

MODE

Group work

TIME REQUIRED

2 Periods

GLOSSARY

- **Acid rain -** Cloud or rain droplets containing pollutants such as oxides of sulphur and nitrogen, to make them acidic.
- **Biodegradable -** capable of being broken down by microorganisms and bacteria.
- **Biodiversity Hot Spot -** A biogeographic region that is exceptionally rich in wildlife and threatened with destruction.
- **Biodiversity -** Biodiversity or biological diversity refer to the entire variety of living organisms. It is a measure of the relative diversity among plants, animals micro-organisms present in an area.
- **Biogeochemical Cycle**-movement of chemical elements in a circular pathway, from organisms to physical environment, back to organisms.
- **Biogas -** Biogas, also called digester gas, typically refers to methane produced by the fermentation of organic matter including manure, wastewater sludge, municipal solid waste, or any other biodegradable feedstock under anaerobic condition.
- **Biological Magnification -** A cumulative increase in the concentration of a persistent substance at successively higher levels of the food chain.
- **Biome -**A major regional group of distinctive plant and animal communities well adapted to the region's physical environment.The major biomes include aquatic, desert, forest, grassland, and tundra.
- **Biosphere -** The biosphere is that part of the earth — including air, land, surface rocks and water — within which life occurs.
- **Biosphere Reserve -** A natural area reserved for conservation of biodiversity where human interference is strictly prohibited. Only non-destructive scientific research and monitoring are permitted.
- **Coelenterata -** Radially symmetrical invertebrate animals including the corals, sea anemones and jellyfishes. invertebrates · coral · jellyfish.
- **Composting -** The controlled microbial decomposition of organic matter, such as food and other organic wastes, in the presence of oxygen, into humus, a soil-like material.
- **Decomposers -** Organisms (micro-organisms and bacteria) feed on decaying organic matter.
- **Disaster -** A disaster is a tragic event that disrupts the normal routine of life, causing loss of property and life and suffering.
- **Ecology -** The study of the relationships between living things and their environment.
- **Ecosystem -** A complex system including a community of organisms and its environment functioning as an ecological unit.
- **Effluent -** liquid discharged as waste from an industrial plant or sewage works.
- **Electronic waste -** (E-waste) includes computers, entertainment electronics, mobile phones and other items that have been discarded by their original users .
- **Environment -** Surroundings in which an organism operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation. The sum of all external conditions affecting the life, development and survival of an organism.
- **Ephemerals -** Plants that emerge/ bloom and complete their life-cycle during one season, for the remainder of the year they surive as seed. Many ephemerals bloom during rainy season.

Glossary

- **Eutrophication -** process where water bodies receive excess nutrients that stimulate excessive plant growth.
- **Extinct -** Extinction is the ceasing of existence of a species or a group of taxa.
- **Female foeticide -** Delebrate abortion of female foetuses.
- **Food chain -** Feeding relationships between species in a biotic community.
- **Fossil fuel -** A hydrocarbon deposit, such as petroleum, coal, or natural gas, derived from living matter of a previous geologic time.
- **Global warming -** A gradual warming of the earth's atmosphere due to the green house effect caused by growing concentration of CO_2 in th atmosphere. Burning of fossil fuels is mainly responsible for the emission of CO_2 into the atmosphere.
- **Green House Gases -** Greenhouse gases include carbon dioxide, methane water appear, nitrous oxide and ozone.
- **Incinerator -** a unit or facility used to burn trash and other types of waste until it is reduced to ash.
- **Leaching -** To remove the soluble constituents by the action of percolating water or other liquid.
- **National Park -** A natural area set aside by the Act of Parliament for conservation of wildlife or any other natural feature.
- **Nitrogen fixation -** the process by which nitrogen is taken from its relatively inert molecular form (N_2) from the atmosphere and converted into nitrogen compounds such as, ammonia, nitrate and nitrogen dioxide.
- **Non- Renewable resource** - a resource which cannot be replaced once it is used up, for example, fossil fuels (oil, natural gas and coal).
- **Ozone depletion -** Destruction of the stratospheric ozone layer which shields the earth from ultra violet radiation which are harmful to life.
- **Phytoplankton -** Microscopic single-celled aquatic plants that drift with water currents.
- **Primary producer** - Green plants manufacture carbohydrates from carbon dioxide, water and light energy through the process of photosynthesis.
- **Radioactive** : Capable of emitting high-energy rays or particles.
- **Renewable resources -** A natural resource that is capable of regeneration. Renewable resources can essentially never be exhausted because they are continuously produced (tree biomass, fresh water and fish)
- **Sludge -** Slushy matter or sediment that remains after waste water treatment.
- **Soil erosion -** The wearing away of the soil by wind or water.
- **Sponges -** The sponges or poriferans (from Latin porus "pore" and ferre "to bear") are animals of the phylum Porifera. They are primitive, sessile, radially symmetrical, e.g., sea anemones and jellyfishes.
- **Species -** A species is a group of individuals that can interbreed in nature to produce fertile offsprings.
- **Stratosphere -** A layer of the atmosphere that starts from just above the troposphere between 15 to 50 kilometers from the earth surface. Compared to the troposphere, this part of the atmosphere is dry and less dense.
- **Stillbirth -** A child or fetus dead at birth.
- **Succulents** - plants have leaves and/or stems which are thick and fleshy. They often have waxy outer layers-that allow the plants to retain water well.

Glossary

- **Suspended solids -** solids that are not in true solution and that can be removed by filtration. Such suspended solids usually contribute directly to turbidity. Defined in waste management, these are small particles of solid pollutants that resist separation by conventional methods.
- **Sustainable -** being able to continue into the future.
- **Threatened species -** animal and plant species under a serious but perhaps not imminent threat of extinction.
- **Toxic Chemical** : Chemical with harmful effects.
- **Tsunamis -** A very large ocean wave caused by an underwater earthquake or volcanic eruption.
- **Vermicomposting -** The process whereby earth worms convert vegetable and food scrap into a nutrient-rich soil.
- **Water cycle -** Transition and movement of water involving evaporation, transpiration, condensation, precipitation, percolation, runoff and storage.
- **Wild life Sanctuary -** A wildlife area set aside by the state legislature for conservation.
- **Xerophyte -** (dry + plant) plants which are able to live in very dry places.