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"What we are doing to the forests of the world is but a mirror reflection of what we are doing to ourselves and to one another."

– Mahatma Gandhi

State Council of Educational Research and Training
Telangana, Hyderabad

FREE

ENVIRONMENTAL EDUCATION

CLASS 9

Published by
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Our Future

Yes....!
It's all in our hands...! It's all in our acts
Birds, worms, ducks, flies, apes, crocodiles
Whatever....!
They may not be intelligent , perhaps not think brilliant
They live just their lives
at the most , die filling others bellies. But,
Neither snakes think of destroying birds, nor eagles try to ruin snake pits
They live just their lives, they live and let others live
They store their grain, their nests they retain
They save for their child, but not rob the world
They struggle for their existence , but do not add pollutants
Who taught them to follow the path of light
Who tuned them to the rhythm of life
Why are we so brutal among the children of mother earth
Is it for being human? or for being smartest on earth?
How wise are we !
In jabbing our own legs , killing the goose for golden eggs
Before nature roars and smashes, and the earth turns into ashes
let's wake up! let's clean up
let's save tomorrow
Yes..! truly...! It's all in our hands, It's all in our acts.

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ENVIRONMENTAL EDUCATION

CLASS - 9

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Foreward.....

Many rules...! Many more successions...? countless interdependencies...! innumerable accumulations of life...! Disclosure of multiple varieties as we dive in. Nature is the most wonderful manifestation of creativity. The most innovative creator has principled it to be a miracle. new terms / words must be coined to describe nature , Charles Darwin spell bound in his book "Origin of Species". It is true! countless species of plants and innumerable species of animals found everywhere adds an enchanting element to the nature. Life is found in ocean depths, snow peaks, sandy deserts and where not! Perhaps only the earth exhibits such a vast variety of life in the universe.

Nature is stable yet dynamic, varied but interdependent. Home of all organisms. Each organism has its own habitat, its own food chain. They are knit together but they maintain their identity. They follow rules not to intrude others paths. A tree is a common habitat for an ant a snake a worm and a bird. Nature provides shelter in the form of forests, mountains hills and lakes. Organisms live there abided by rules. Wonderful lessons are taught by each and every creature living in nature, provided we are patient enough and recipient to them. Let's give this a thinking! A serious thinking in fact?

What are we a negligible part of millions of species, doing when compared to the other organisms? Misusing the boons of nature, wasting natural resources and becoming greedy robbers of nature. No other organism has this credit of destroying mother nature except we, the human beings. Nothing human. We claim to relish the beauty of greenwoods but we manage to cut them down in the name of development. We are fond of giving lecturers at every possible opportunity about water being the life giver life saver etc., but we never bother to stop a leaking tap. What an irony! We plunder minerals, we multiply factories polluting the environment in all the ways we can. We face the result in the form of contaminated air and infected food. We are inviting the disaster by piercing the Ozone layer that safeguards the earth. Just think! what are we aiming at?

Do we want earth to be turned into ashes? or is it that we want the next generations to inherit hunger, thirst and screams of helplessness?

No! Absolutely not! It is high time to know our mistakes! Let's realise them! Let's be grateful to the environment! Let's be wise in sustaining the development! What is the fun if the development, costs us our life! We can no more do that! We shall save the beautiful and fertile mother earth not for the sake of earth but for us to live on it.

'Environmental Education' the book in your hand lets you know about the do's and don'ts hence forth. Values cannot be taught, they have to be caught. Caught while acting. Therefore many activities are imparted in this book. Do them with the help or your teacher. Share your Ideas thoughts with all. Hope you'll inculcate eco friendly behaviour.

Director
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What we do, whom to do

To reach the goals of environmental education which was implemented as a school subject in our school, teachers and students should implement, it with personal responsibility, ownness and by adding some other concepts and strategies.

For teachers…

- To act as a responsible citizen towards environment concepts discussed in the syllabus are all treated as environmental education.
- Topics are identified based on different themes – food, health, agriculture, industries, natural resources, natural world.
- Before starting every chapter teacher would discuss about the topic with students. So there is a need for teacher to collect some other source material. Activity performance is totally based on these discussions only.
- Collection of data, interview, field trips, projects etc. Strategies are useful to conduct activities.
- Make your students to talk about their observations and presentations. Teacher should add some more questions along with text book, for value discussions.
- The topics in environmental education is not like other subject areas, so don't relate this with exams, slip tests, marks etc. Presentation may be in a free and joyful environment. You should award marks or grades to the students, based on your observation.
- Based on resources, local conditions teacher have freedom to select topics in the book. There is no compulsion to follow only the order mentiond in text book.

For students…

- Relate these items to your local environment and conduct activities.
- Participate in pre and post discussion of every activity and express your feelings and possible solutions.
- Perform activities in groups. Collect whatever information necessary and prepare required reports on them.
- Conduct school level seminars, symposiums, prepare slogans related to environmental awareness every day in school assembly and display it on bulletin board.
- Collect different news items on environmental awareness from news papers, magazines and display them on wall magazine.
- Ask your head master to pay subscriptions for Down to Earth, My school, Readers digest Chekumuki, Prerana and other science magazines.
- Prepare your own activities and implement at your school or village.
- Conduct environmental awareness programmes at factories, fields, slum areas etc.
- Tomorrow is yours only, you are the future nations wealth. You are the responsible persons than your teachers to implement this book. So dear students think scientifically, behave ecofriendly.

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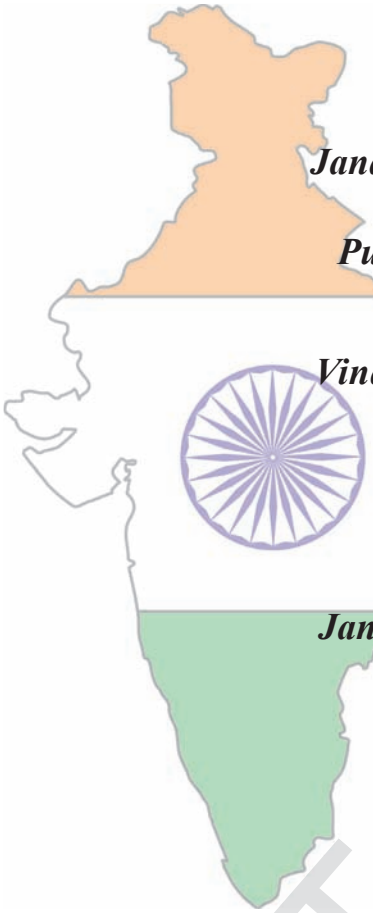
OUR NATIONALANTHEM

- Rabindranath Tagore



Jana gana mana adhinayaka Jaya he
Bharatha bhagya vidhata!
Punjab Sindh Gujaratha Maratha,
Dravida Utkala Banga!

Vindhya Himachala Jamuna Ganga,
Uchchala Jaladhi taranga!
Tava shubha name jage!
Tava shubha asisha mage!
Gahe tava jaya gatha!

Jana gana mangala dayaka jaya he!
Bharatha bhagya vidhatha!
Jaya he! jaya he! jaya he!
Jaya jaya jaya jaya he!

PLEDGE

- Pydimarri Venkata Subba Rao

"India is my country; all Indians are my brothers and sisters.
I love my country, and I am proud of its rich and varied heritage.

I shall always strive to be worthy of it.

I shall give my parents, teachers and all elders respect,
and treat everyone with courtesy. I shall be kind to animals.

To my country and my people, I pledge my devotion.

In their well-being and prosperity alone lies my happiness."

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Item: 1

Rain water harvesting

Objective

(i) To understand the importance of water.

(ii) To participate in spreading awareness campaigns about rain water harvesting.

Background

There cannot be life without water. Rain and snowfall are the two sources of fresh water which replenish underground water, lakes, rivers, and other water bodies. But a lot of rainwater also goes waste. Water being a scarce resource, and its ever increasing use with the growing population and development, it needs to be utilised judiciously. Every drop of water is precious and one of the ways to meet the growing demand for water is through rainwater harvesting.

Methodology

1. Find out different methods of rainwater harvesting in different parts of the country from different sources like magazines, newspapers, internet, etc.
2. Find out the current methods of water harvesting practised in your state.
3. Compare two households/localities one practising rainwater harvesting and the other not, in terms of water availability for domestic purposes.

Conclusion

1. We cannot manage our daily routine without water. We know that water is very precious. Hence using water carefully is

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saving our water resources. We knew that water is a precious resource. If we have a habit of water saving, it leads to conservation of water resources. These simple actions gives maximum results.

Let's think what else can we do to save the rain water.

Let's divert the rain water to the plants in the kitchen garden instead of leaving it into the streets and canals through water pipes.

Let's arrange water harvesting pits in houses, streets and schools.

Lets store the rain water in cans and use them for house hold purposes. Through water is available in our houses, we can save power by doing like this.

Let us see some other water saving habits.

- Do not touch glass tumbler to your mouth while drinking water. If not, another glass of water is required to wash the glass tumbler.
- Wash your hands and legs at a plant or tree. That water is useful to the plant.
- If we wash our clothes by using mild soaps, that water may be useful for kitchen garden. Keep used water in a bucket for sometime to settle down soap particles. This water may useful in toilets.
- Water from bathrooms also useful for kitchen garden.

Write a report based on the information that you have collected.

Follow-up

1. Based on your comparative study of different rainwater harvesting methods, recommend the most suitable method for your area.
2. Advocate the practice of rainwater harvesting in your school/home/ locality.
3. Why should we store rain water ? If we do ot store what will happen ? What is your action plan to store the water ?

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Item: 2

Exploring Local Artisans

Objective

(i) To be aware about local crafts.

(ii) To appreciate the skills of the craft person.

Background

Pottery, woodcarving, glass painting, metal work, weaving, colouring (*Addakam*), bathic work, kalankari, cane work, making toys are some of the examples of crafts which require specific skills. A craft is a skilled trade. India has a wide variety of traditional crafts. A large number of persons are engaged in various crafts. In our State Pochampally is famous for handloom saries and kalankari work. Nirmal is famous for painting and making toys. Kondapally, Bidri work, Terrakota is famous for toys and metal work. Many craft persons run their lives totally depend on handicrafts only.

Methodology

1. With the help of elders and teachers identify some crafts that are popular in your city or village.
2. Select anyone of the crafts that interests you and locate a craftsperson skilled in that particular craft.
3. Collect the following information about the craft by asking craft person questions such as:

(a) How did he or she learn the craft?

(b) How long has he or she been practising the craft?

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(c) Write the step by step processes involved in making the finished items. If you have a camera, take photographs of the entire process.

(d) Collect information about the tools and the materials used for the craft.

To collect more information about the craft you can look for learning material in the school library, internet and crafts museum also.

Conclusion

Prepare a brief report preferably along with paintings , diagrams or photographs.

Handicrafts are suitable for environment. The equipments, methods and the productions which are used in making handicrafts do not pollute the environment. We use earthen pots if they break they will be easly degradable in the soil. Let's save our handicrafts and handicrafts productions. Saving handicrafts is saving our cultures and traditions and it makes the environment pollution free.

Follow-up

1. You are selected and observed the handicraft which you are intrested in. Make your own handicraft and display in your school project day.
2. Try to find out whether the families involved in that craft are now going for other ocupations. If so, why?
3. What are your suggestions to the craft persons to continue or improve their methods of marketing.

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Item: 3

Re use plastic and other waste material

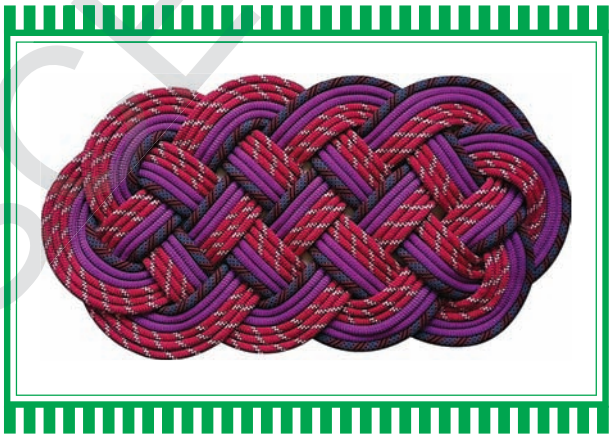
Objective

(i) To be aware about re using methods of plastics, unused cloths and other material.

(ii) To be aware of how to make creative articles by using waste materials like plastic and unused cloths.

Background

Plastics are non degradable solid materials. It is very easy to use and produce. So these plastic material are produced enormously and we use the same which leads to environmental pollution.Genarally we throw out these material after using them. We should reuse these waste material to prevent environmental pollution.We should reuse these waste material in a creative manner. It is a good and healthy habit also. we can make door mats, wall hangings, hand bags, mats, door curtains etc by using waste material. It becomes a habit of proper utilisation of our leisure time also.



Methodology

1. Collect plastic and other waste material (bags, cloths etc)
2. Make ropes by using plastic and cloth pieces.
3. Show your creative ideas to make different articles by using these ropes made by you.
4. Display your articles in your class. Encourage your school mates through eco-clubs to make such kind of articles by using plastic s, cloths and other waste material.Prepare door mats, pen stands, dust bins, light hangings etc which reflects your creativity.

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Conclusion

It is better to prevent production of waste instead of using it in different or creative manner. If we should carry a cloth bag with us, we may reduce more than fifty percent of usage of plastic bags. We are advised to use steel plates and glasses instead of plastic or disposables.

If we use any article or object for a long time on the other hand this helps to preserve our natural resources. Think! which pen is better refill change pen or use and through pen.so if we use any material for a long time it may reduce environmental pollution and preserve natural resouces also.

Prepare a report on un wise usage of plastics and it's hazards, Recycling process. Display your report in your school.

Follow-up

1. Why should we reuse the articles ? Discuss its merits and demerits in your school?
2. Prepare your own cloth bags by decorating glass beeds. Encourage your friends using cloth bags instead of using plastic covers.
3. Prepare decoratives by using plastic, saline bottles and display them on theatre day.
4. Make different articles like pen stands by using waste paper instead of wood.
5. Visit hand made paper industry. know how to prepare beautiful greeting cards.

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Item: 4

Reducing wastage of cooked food

Objective

To understand the need to reduce wastage of food

Background

It is commonly observed that food is wasted or thrown away in many households. hotels, restaurants. parties, etc. This wastage could be reduced if proper practices are followed during preparation and serving of food. It is important that each one of us tries to reduce wastage of food on every occasion.

Methodology

1. Select a place of study according to your convenience. This could be your home, a party or a celebration. etc. If you decide to do this exercise at home. note your observations for at least three days. Howmany persons attended? What food materials were prepared? How much was utilised? How much was remained? What did they do? Collect information.
2. Decide a convenient measure to estimate the quantity of wastage. This could be measured by litre, K.G, bowl or number of pieces depending on the type of dish.
3. Enter your observations in the given table. To find out the reason for the wastage. talk to the people who decide the quantity of food to be prepared.

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S.No	Situation for study	No of Guests	Food Material	Prepared Quantity	Wastage Quantity
1					
2					

Collect reasons for wastage of food, discuss with to the persons who prepare the food. who serve it. who eat it. and those who waste it.

Conclusion

Wastage of food materials is of two types. Before cooking the food and after cooking the food. According statistics out of 10 kgs harvested grain 3 kgs are eaten by rats and bandicoots, and worms are damaging 2 kgs grains in godowns. Two kilos of grains are wasted after cooking. It means only three kilos of grains remained for eating. Instead of developing hybridization using of excess fertilizers and pestisides to increase crop production and making the environment polluted, it is better to concentrated on preservative methods of food grains already are have produced.

Let's use a dissert spoon to serve the food so that the food doesnot waste. And serve as much as you need. The seeds are being produced and preserved by the farmers through traditional methods so that we can save our local crops.

Write a short report giving reasons for the wastage of food. Suggest measures to reduce the wastage.

Follow -up

I. Try to spread the message that food should not be wasted.
2. Try to find out what does a restaurant do with the surplus food or food that is left unconsumed in the plate or serving dishes.
3. Find out what is done with the food that is wasted in the home and food that is surplus.
4. Measure the quantity of food is wasted during midday meal in your school. (Per day, per month, per year). Try to think of preventive measures.
5. Discuss various ways for proper utilization of circulus food.
6. Create awareness in masses about the need of controlling food wastage.
7. Some NGOs work in these lines. Collect information and phone numbers and make a call whenever you need their help.

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Item: 5

Wastage of water due to negligence

Objectives

(i) To bring into notice how water is being wasted in our daily life activities.

(ii) To be sensitised about judicious use of water.

Backgroud

"If you have water, you can think of the future", The amount of water recommended by the United Nations for drinking, washing, cooking and maintaining proper hygiene is a minimum of 50 litres per person per day, i.e. approximately $2^{1}/_{2}$ large size buckets of water per person per day, Millions of people in our country do not get enough water to meet their requirements. The problem is likely to worsen. It is therefore important that we should use it judiciously and conserve it. We are neglecting water leakages, collect and just thrown out water used more amout water for brushing and washing clothes are all the situations where water is wastage because of our negligency. If we avoid these situations we can save water.

Methodology

1. Notice whether there is any leakage of taps at your home/ school. If there is any leakage put a bucket under it and collect the water leaked.
2. Observe for a period of a week and estimate the amount of water wasted due to negligence, such as leaving the tap open during washing, shaving, while collecting water, washing of vehicles.
3. Calculate approximately how much water is wasted per day or week.

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S.No	Date	Situation (How wastage of water)	Quantity (Wastage of water)

4. Select any leakage tap. Collect water from the leakage for a minute by using a measuring jar. Confirm your observations by measuring another five minutes.

- Calculate how much water will be wasted in one hour.
- In the same way calculate water wastage per day, per month, per year.
- Calculate how much quality of water is being wasted because of their negligency.

Conclusion

Conclude by writing a paragraph about your findings.

1. If you drink water putting it into your mouth, you need one more glass of water to wash it. These simple habits learnt us to save water.
2. Instead of using water direct from the tap, fill the water in a bucket and use it with a small tumbler.
3. Prepare a questionaire report based on two three activities or carelessness and water wastage.
4. What are the causes of neglegence to waste water. Discuss.
5. Prepare a report on precautionary measures to save water and display it in your class.

Follow -up

1. Prepare a slogan on conservation of water.
2. Take initiative to repair leakage of water from pipes, tanks, etc., in school, home or in the colony.
3. Talk about the need of prevention of water wastage in morning assembley.

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Item: 6

Preventing wastage of electricity

Objectives

(i) To create awareness about the need for conservation of electricity.

(ii) To be sensitised about avoiding excessive use of electricity.

Background

Electricity is a very convenient and flexible form of energy. However, it is often not used judiciously by most of us. Electricity is a scarced resource which is produced by burning coal at a thermal power station. It is also generated at nuclear power stations and hydel power plants. Irrespective of the ways in which it is produced it affects our environment. Conserving electric energy not only saves our money but also helps in increasing its availability. By proper planning and a little awareness, we can save a substantial amount of electricity in our schools, work places and homes.

Methodology

1. Visit all the classrooms of your school with a few of your friends during recess time and after the school is over.
2. Observe whether all the fans and bulbs/ tubelights are switched off, when no one is there.
3. Note down how many electric fans and bulbs are switched on in vacant classrooms. If you come across any such classrooms, turn off all the switches.
4. Also in a similar way try to find out whether electricity is being wasted at home.
5. Find out about energy saving devices available in the market, for example, compact fluorescent tubes (CFLs).

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Conclusion

Prepare a report citing instances of wastage of electricity. Prepare a plan for conserving electricity at your school/home.

Electricity is very precious. Let's measure how much current do we use consume in our house or in the rooms of our schools. Let's notice the reasons of much power consumption in particular room. Let's reduce the power consumption and follow the methods such as switching off the fans when there is nobody in that room and use fans instead of ACs, Let's switch off the lights and fans compulsorily while going out of the room.

Tips on energy saving:

The Domestic Sector accounts for *30%* of total energy consumption in the country. There is a tremendous scope to conserve energy by adopting simple measures.

This information is a guide, which offers easy. practical solutions for saving energy in Home Appliances. Please, take a few movements to read the valuable tips that will save energy and money and ultimately help conserve our natural resources. It would be useful to know which gadget consumes how much electricity. Economic use of home appliances can help in reducing electricity bills. The following table shows the energy consumption of various appliances normally used at home:

S.No.	Appliances	Rating (watts)	Operating (hrs/day)	Units per month
1.	Incandescent Bulbs	40	6	7
		60	6	11
2.	Fluorescent Tube lighl	40	10	12
3.	Night Lamp	15	10	4.5
4.	Mosquito Repellent	5	10	1.5
5.	Fans	60	15	27
6.	Air Coolers	175	8	42
7.	Air Conditioners	1500	6	270
8.	Refrigerator	225	15	101
9.	Mixer/Blender	450	1	13.5
10.	Toaster	800	0.5	12
11.	Hot Plate	1500	0.5	22.5

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12.	Oven	100	1	30
13.	Electric Kettle	1500	1	45
14.	Electric Iron	1500	1	45
15.	Water heater instant type - 1 to 2 ltr capacity	3000	1	90
16.	Water heater storage type - 10 to 20 ltr capacity	2000	1	60
17.	Immersion rod	1000	1	30
18.	Vacuum Cleaner	700	0.5	11
19.	Washing Machine	300	1	9
20.	Water pump	750	1	22.5
21.	TV	100	10	30
22.	Audio system	50	2	3

Useful Tips to Save Energy

By following these simple tips one can save energy to a large extent.

Lighting

Turn off the lights when not in use. Take advantage of daylight by using light coloured. loose-weave curtains on your windows to allow daylight to penetrate the room. Also, decorate with lighter colours that reflect daylight. De-dust lighting fixtures to maintain illumination Use task lighting, instead of brightly lighting an entire room, focus the light where you need it Compact fluorescent bulbs are four times more energy efficient than incandescent bulbs and provide the same lighting. Use electronic chokes in place of conventional copper chokes. Fan:- Replace conventional regulators with electronic regulators for ceiling fans. Install exhaust fans at a higher elevation than ceiling fans

Electric iron:-

Select iron boxes with automatic temparature cut off

Use appropriate regulator position for ironing

Do not put more water on clothes ironing

Do not iron wet clothes

Kitchen Appliances

Mixers

Avoid dry grinding in your food processors (mixers and grinders) as it takes longer time than liquid grinding.

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Microwaves ovens

- Consumes 50 % less energy than conventional electric / gas stoves. Do not bake large food items.
- Unless you're baking breads or pastries. you may not even need to pre-heat.
- Don't open the oven door too often to check food condition as each opening leads to a temperature drop of 25'C.

Electric stove

- Turn off electric stoves several minutes before the specified cooking time
- Use flat-bottomed pans that make full contact with the cooking coil

Gas stove

- When cooking on a gas burner, use moderate flame settings to conserve LPG
- Remember that a blue flame means your gas stove is operating efficiently
- Yellowish flame is an Indicator that the burner needs cleaning
- Use pressure cookers as much as possible
- Use lids to cover the pans while cooking
- Bring items taken out of refrigerators (like vegetables, milk etc), to room temperature before placing on the gas stove for heating
- Use Solar Water Heater good replacement for a electric water heater.

Electronic Devices

Do not switch on the power when TV and Audio Systems are not in use i.e. idle operation leads to an energy loss of 10 watts/device.

Computers

Turn off your home office equipment when not in use. A computer that runs 24 hours a day, for instance, uses - more power than an energy-efficient refrigerator.

If your computer must be left on, turn off the monitor, this device alone uses more than half the systems energy.

Setting computers, monitors, and copiers to use sleep-mode when not in use helps cut energy costs by approximately 40% .

Battery chargers, such as those for laptops, cell phones and digital cameras, draw power whenever they are plugged in and are very inefficient. Pull the plug and save.

Screen savers save computer screens, not energy. Start-ups and shutdowns do not use any extra energy, nor are they hard on your computer components. In fact, shutting computers down when you are finished using them actually reduces system wear - and saves energy.

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Refrigerator

Regularly defrost machines, defrost refrigerators and freezers, frost buildup increases the amount of energy needed to keep the motor running.

Leave enough space between your refrigerator and the walls so that air can easily circulate around the refrigerator.

Don't keep your refrigerator or freezer too cold.

Make sure your refrigerator door seals are air tight.

Cover liquids and wrap foods stored in the refrigerator. Uncovered foods release moisture and make the compressor work harder

Do not open the doors of the refrigerators frequently

Don't leave the fridge door open for longer than necessary, as cold air will escape. Use smaller cabinets for strong frequently used items

Avoid putting hot or warm food straight into the fridge.

Washing machines

Always wash only with full loads.

Use optimal quantity of water.

Use timer facility to save energy.

Use the correct amount of detergent.

Use hot water only for very dirty clothes.

Always use cold water in the rinse cycle.

Prefer natural drying over electric dryers.

Air Conditioners

Prefer air conditioners having automatic temperature cut off.

Keep regulators at low cool position.

Operate the ceiling fan in conjunction with your window air conditioner to spread the cooled air more effectively through out the room and operate the air conditioner at higher temperature. Seal the doors and window properly

Leave enough space between your air conditioner and the walls to allow better air circulation.

A roof garden can reduce the load on Air Conditioner.

Use windows with sun screan filims or curtons.

Set your thermostat as high as comfortabley possible in the summer. The less difference

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between the indoor and outdoor temperatures, the lower will be energy consumption.

Don't set your thermostat at a colder setting than normal when you turn on your air conditioner. It will not cool your home any faster and could result in excessive cooling. Don't place lamps or TV sets near your air conditioning thermostat. The thermostat senses heat from these appliances, which can cause the air conditioner to run longer than necessary.

Plant trees or shrubs to shade air conditioning units but not to block the airflow.

A unit per rating in a shade uses as much as 10% less electricity than the same one operating in the sun.

1. Prepare report on the situations where electricity is misuse.
2. Prepare an action plan to implement energy saving in your house.

Follow -up

1. Make a talk to your headmaster or teacher to get your plan implemented.
2. Keep on monitoring activities and communicate with your school mates during morning assembley.
3. Make a list of things how you can minimise the usage of energy consumption in your house or school.

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Item: 7

Locally available medicinal plants

Objective

To develop appreciation for medicinal qualities of plants

Background

Vegetation consists of different types of trees, shrubs and herbs. Many of these plants have medicinal qualities and are used to treat different types of diseases. We may find some such plants in our locality or neighbourhood.

Methodology

1. Talk to your teacher. elders in the family or neighbourhood and identify plants which are used as medicines traditionally or locally.
2. Note the special features of the medicinal plants that would help in their identification.
3. Gather the following information through interaction with knowledgeable persons. You may take the help of local medical practitioners (Ayurvedic doctors)
   a) Which part of a particular plant is used for treating a disease or disorder?
   b) How is it processed for use for a particular ailment?
   c) How many medicinal plants could you find in your locality.
   d) Are these medicinal plants cultivated or do they grow in the wild?

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S.No	Name of the medicinal plant	Part of the plant	Desease / Treatment

e) Are these plants, or their parts. used with out concern for their survival and growth?

f) Has there been any effort for consevation and propagation of these medicinal plants?

4. Make drawings or take photoframes of the plants that you have studied.

Conclusion

Conclude your observations in the form of a report with drawings and photographs of the parts of the plants used for medicinal purpose. Give the local as well as the scientific names, if possible, of each plants.

S.No	Local Name of Medicinal plant	Scientific name

Follow-up

1. Display the report with photos and drawings in your class.
2. Organise an awareness campaign for conservation of medicinal plants at the local level to emphasize on their judicious use and plantation.
3. Grow at least one medicinal p;ant in your house or llschool or the neighbourhood.
4. On special occations like birthdays, marriages present a gift in the form of plants like alovera, mint, tulasi, etc., to your friends and relatives.
5. Prepare herbarium of medicinal plants.

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Item: 8

Alternate croping

Objective

1. To develop understanding about alternative patterns of cropping for sustainable agriculture.
2. Know about benefits of alternative patterns of cropping.

Background

Increasing demand for food due to ever raising population has created a pressure on agriculture for more production. Excessive use of fertilisers and water for increasing production may be counter productive for sustainable agriculture. There is a need, therefore, to adopt alternative methods so as to make agriculture more productive. Cropping patterns such as mixed cropping and inter-cropping are alternatives to monocropping and are helpful in retaining the fertility of the soil. There is also a possible solution to farmer's woes of crop failure.

Methodology

1. Visit a crop field nearest to your village or locality and talk to the farmers.
2. Interview them and find out the types of crop they sow in their farms and also the area they cultivate.
3. Find out what each farmer is growing and note if they are growing one or many crops.
4. Find out if any farmer has switched over to mixed cropping and intercropping in recent past. If so, what were the reasons and how has that benefited the farmer.
5. If they are growing more than one crop, ask the farmer about the pattern of sowing. Is it at random or in rows?
6. Enquire from the farmers the yield they obtain per unit area in each case.

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7. Ask them about the type of fertilizers or manures they use and the amount of each type used. Also find out the type of irrigation used.
8. Find out the various alternatives that farmers plan in case of a crop failure.
9. Tabulate the information.

Farmer No	Cultivation patterns	No of Crops	Names of Crafts	Natural / Chemical fertilizers used(Yes/No)	Yeilding (Quintals)

Conclusion

Though you have a very little farmland it is better to harvest different crops like paddy, Jowar, ragi, greengrams, berngal grams, vegetables, fruits and flowers. Through mixed cropping we can arrest the spreading of diseases from one crop to another crop. Moreover, one type of disease can be prevented through another type of insects. Diseases will be reduced so that the capital, and the usage of pesticides will also be reduced hence environment will not polluted.

Prepare a report based on your observations and collected data about different forms of cropping, which gives more yield, more economical.

Follow-up

1. Findout other practices which can make agriculture in a sustainable manner.
2. Prepare oppropriate methodology for a project to wheather genetically modified crops cultivated or not.

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Item: 9

Water supply and waste-water disposal systems in the past

Objective

To study water supply and waste water disposal systems that were in use in earlier times.

Background

There are many forts, palaces and monuments of historical importance. Detailed information of famous monuments is available on the period when these were constructed, who constructed them and the architecture of that period. However, not much is known about the life style and civic facilities available in that period. It may be interesting to study about water supply and drainage systems prevalent at that time.

Methodology

1. Select a historical place that is accessible easily or close to your place of stay.
2. Collect information related to the monument, such as:

a) When was it built?

b) What was the material used for construction?

c) Who built it?

d) What was the purpose for its construction?

e) How were water requirements of the people living/working/ guarding in and around the place met with when it was built?

f) What were the arrangements made for safe disposal of waste-water and to drain out rain water?

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Information can be collected from the Department of Archaeology (if any), archaeological books or local guides.

Conclusion

In ancient construction there was a wonderful fresh water supply system as well as waste water flowing system. Hence in those days, there were no floods.Waste water flowing facilities shows impact on the health of that particular area people. If there are appropriate facilities, mosquitoes and bacteria will not be developed hence, people can lead a healthy life. Diseases will be reduce so that the medicine usage. Medicure production will also be reduced so that the pollution. It is necessary to think the causes of the pollution.

Prepare a report based on your study. The report should highlight the merits and shortcomings of the systems and also their impact on important. historical events, if any.

Follow-up

Share the information with your peers.

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Item: 10

Rainfall and soil erosion in the mountain region

Objective

To identify the relation between rainfall and soil erosion in mountain ecosystem.

Background

There are many natural and manmade factors which are responsible for soil erosion. Precipitation - rainfall and snow-fall - is one of the prime factors for such erosion. Soil as a resource supports human survival in so many ways. When erosion takes place it leaches away the valuable top soil of the area. The eroded materials that fall into rivers make the water turbid. Silting results in floods and even changes the course of the river.

Methodology

1. Go to a nearby river site and collect samples of water in transparent bottles from the river before rains, during the rains and after the rains.
2. Make sure that the sample of water collected each time is collected in similar containers and the volume of the sample is also the same.
3. Keep the samples undisturbed and find out the time the solid particles take to settle down in each case.
4. Decant the water after the solid particles settle down and compare the amount of sediments for each sample.

Conclusion

Prepare a report on our study giving possible reasons for variations in the amount of where there are more trees the

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soil erosion will be reduced there. On the areas of the trees, there will be more shrubs and bushes. The roots of the trees keep the earth particles together. So, the wind and the rain do not spoil the soil. Tree wastes reach the soil and makes the soil fertile.

Let's grow tall trees in the school premises. And save the earth layers not to be spoiled by winds.

Think! why the farmers plant tall trees like toddy around their fields.of sediments in different samples.

Prepare a report on our study giving possible reasons for variation in the amount of sediments in different samples.

Follow-up

Find out the various reasons measures by which soil erosion can be checked.

In India about 130 million hectare of land (45% of total geographical area) is affected by serious soil erosion thorough shifting cultivation, cultivated wastelands, sandy areas, deserts and water logging

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Item: 11

Service providers in our village

Objective

To know about the social lives and environment of people with different occupations and trades.

Background

All of us know about various basic service providers and helping hands without whom our lives would be very difficult. The mechanic who fixes electrical appliances. water lines; the mason who constructs houses for living; the vendors who bring things of requirement are some of the very important household service providers. There are also others like doctors. engineers. lawyers. teachers. shopkeepers and domestic workers whose services are very important.

Methodology

This can be a group project. The class can be divided into groups and collect data from different service providers based on the given questionnaire.

Questionnaire

1. What is the average income of the family?
2. Do they have any additional source of income?
3. What type. of house do they live in?
4. Are water, electricity and other amenities available to them?
5. How do they go to their workplace?
6. How many hours do they work in a day?
7. What are the major occupational hazards and difficulties they face?
8. Do they enjoy a weekly off?

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9. How do they spend their leisure time?
10. Who takes care of the children in case the mother is also working?
11. What about their children's education?

Conclusion

If anything damages in our house, a repair increases its lifetime. No need of buying a new one. If a shirt tears mend it at a tailor. In the same way mend your chappal at a cobbler. So that we can use them for some more time. It is eco-friendly activity. By repairing the things which we can make use of makes the people who render their services continue their professions. Everybody get work. Moreover, these people will stay local and provide their services at low cost.

Based on the data collected, prepare a brief report.

Follow-up

Reports can also be shared with other classes of your school.

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Item: 12

Our rural life

Objective

1. To find out distribution of land and other resources in rural areas.
2. To find out the status of employment in the area.

Background

Most of the people in the rural areas are engaged in primary activities such as farming, keeping livestock, fishing or other related small scale and cottage industries.

A large number of people may also be landless farm labourers, daily wagers and service providers. Basic facilities like safe drinking water, medical facility, education, transportation, etc. may not be easily available to them.

Methodology

This is a group project. The students can collect data about the people living in the village based on the following questionnaire.

Questionnaire

1. Collect the land utilisation data from the Panchayat, Revenue or Mandal Development Office.
2. How many roads lead to the village? How many pass through it?
3. What is the occupation that the villagers are commonly engaged in?
4. Find out the different welfare schemes running in the village.

   (you can get this information from the Panchayat, Revenue or Mandal Development Office) and enquire whether they know about those welfare schemes.

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5. Is there any person getting any benefit from such schemes?
6. Is there any health centre, doctor or school?
7. Is there doctor in health center?
8. Prepare a list of facilities available, not available in the selected village by using the following table.

S.No	Facilities available in village	Facilities not available in village

Conclusion

In rural life agriculture and cattle rearing are lined with each other we connot see them separately. Pet animals like hens, cows, buffalos, goats, cats and dogs are very helpful to us. Think, why there are no worms in the grains in houses where there are hens. By doing agricultural works and cattle rearing the rural people can utilize their leisure time. People engage in one of the productive works like leaf plate making in their leisure time. There will be a close relationship between the human beings and animals. Growing vegetables in the kitchen garden and poultry makes the people financially strong.

Based on the study of different groups, prepare a brief report on life in that village.

Follow-up

1. Display your report in your class or the bulletin board of your school.
2. Draw a topographical map of the village. which shows roads and other developments.

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Item: 13

Availability of food for all

Objective

To be sensitised to the subject of food insecurity among the vast section of the people.

Background

India is an agricultural country. Food is essential for life and as such necessary amount of food should be available to all the people. However, a large section of our population is deprived of adequate food supply due to different reasons such as less production, unavailability and non-affordability. Whatever the reason, it leads to malnutrition and other nutritional disorders among those who are deprived of adequate food.

Methodology

This project can be done in a group. Data can be collected based on the given questionnaire. Respondents could be both male and female, mainly from economically weaker sections.

Questionnaire

1. What is the gross income of the family?
2. What is the household expenditure pattern on different items such as food, clothing. housing, fodder, medicines, entertainment, education, transport?
3. Is the expenditure marked for food items enough to meet the food requirement?
4. Is enough food available for all the persons? If not, why?
5. From where do they get the food items?

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6. What is the approximate cost and affordability of nutrition per person in the family?

Monthly income of a family =

S.No	Items	Monthly Expenditure(In Rupees)
1	Food	
2	Cloth	
3	Domestic Expenditure	
4	Medicines	
5	Education	
6	Transport	
7	Entertainment	
8	Others	
Total expenditure in month =		

7. Which deficiency disease is prevalent? Is malnutrition prevalent?

Conclusion

Eating different varieties of food lead to the way to grow different crops. If we want to take nutritious food we should recognize that they are cheaply available in leafy vegetables and vegetables we should eat different leafy vegetables, pulses and fruits. Locally available fruits like Guava, Mango, Custard apples, are less expensive as well as healthy.

In our weekly menu there should be rice, jowar, ragi, wheat, different types of vegetables and fruits. Though we spend more money on healthy food, it helps in keeping a health in our health in good condition so that we can avoid expenses in ill-health.

Write a report about the food scarcity of the respondents based on your observation.

Follow -up

1. Organise a campaign to sensitise people and make them aware of less expensive nutritious food.
2. Organise a campaign to sensitise people about consuming locally available food items.
3. Cultivating the habit of eating different varieties of food material is also an eco friendly activity. Is not it? Why?

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Item: 14

Our people are our resource

Objective

To appreciate the impact of investment in education and health of people.

Background

Expenditure on education and health of the people is a good investment. Investment in human capital yields a return similar to investment in monetary capital. The society gains directly and indirectly in terms of the standards of skilled manpower for industry, farming, low mortality rate, better spread of education, etc. An educated and healthier population is an asset of a country and can lead to the progress of the nation.

Methadology

Students can do this project individually or in groups. The data can be collected based on the suggested questionnaire. The survey should be done randomly for 20 individuals.

Questionnaire

1. How many members are there in the family?
2. How many schools (primary, upper primary, secondary) are there in the neighbourhood?
3. How many earning members are educated?
4. What is the level of their education and income?
5. Do all the children including girls go to school?

6 What measures are taken when any member of the family falls sick?

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7. Is medical facility easily accessible?
8. What are the practices followed to keep the family healthy?

No. of Family Members	Educational Status	Monthly Income (In Rupees)

Conclusion

Compare the information collected by different group members. Also write a brief note on how income is related to education and health.

We think that it is enough to keep our houses clean and tidy. We throw the garbage into the streets and fill them with rubbish and drain water. So, mosquitoes and flies develop and the diseases spread. We use sprays and repellents to reduce the mosquitoes and become cause for pollution. Not only individual health but also peoples health is important. If a person gets a contaminated disease even in a nook and corner of a village, it spreads throughout the village.

Consolidate the collected data by an individual or group. Write the report based on their education and health how it is related to family income.

Follow-up

1. Share your findings with your classmates. Display them on the bulletin board.
2. Do you think that all should be healthy and educated ? What do you do for it ?

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Item: 15

Modern Agricurlture and its impact on environment

Objective

To investigate the impact of modern agricultural practices on the environment.

Background

With the advent of technological advancements in agriculture such as better irrigation systems, use of high yielding seeds, fertilizers. pesticides, multiple cropping system, etc. farmers are getting better yields and profits. However, most of these practices, if not properly monitored or judiciously practised, can have an adverse effect on the quality and fertility of soil. water table, quality of water in river and lakes and others.

Methodology

The project should be carried out in groups.

1. Select an area where modern agricultural practices are being followed.
2. Select another area where traditional practices of agricultural farming are followed.
3. Find out the yield per unit area in each case for the same crop.
4. Collect samples of water from ponds, wells, lake or tanks, if any, from the area surrounding the agriculture fields. Test the water samples with the help of pH papers.
5. Find out the alkalinity or acidity of the soil with the help of pH paper.
6. If a microscope is available, examine a drop of each sample for presence of living organisms.

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7. The above information can be further substantiated from the village elders, agriculture scientists, and Block Development Officers of the area.
8. Obtain more information about soil and water.

Conclusion

At present we are habituated to harvest any one type of the crops in form area we have. All the farmers are harvesting the same crops in their fields. If the crop is affected by any disease in a field it spreads to all the fields. Preventing it also becomes difficult. For this we use pesticides beyond the limits, and use hybrid seeds which harm the environment. If people cultivate same kind of crop in a place, they have to use some machanisms like harvesting, planting at a time which makes the agricultural labourers to lose their lively hood. If the production increases automatically the rates drop down. Sometimes people suffers to purchase because of production drops drastically. Hence, let us recognise that we should grow different kinds of crops.

Compare the two situations and present your report based on the data collected.

Follow-up

Share your experience with your classmates, and the people involved in agriculture and users of the water

Agriculture implements and machines such as tractor, power tiller, power threshers, sprinklers, drip irrigation, animal drawn implements self propelled reaper, paddy transplanter, etc are available on subsidy at the rate of 25% of the cost of equipment subject to certain ceiling limits under Central sector plant schemes.

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Item: 16

Lifestyles of people in different regions of India

Objective

(i) To identify the characteristics of physiographic division of India.

(ii) To Indentify the impact of this division on the lifestyle of the people living there.

Background

Physical features of land are diverse like mountains, plains, deserts, and coastal areas. These physical features have an impact on the lifestyle of people inhabiting them. Trade, agriculture and other modes of livelihood, and other cultural aspects like festivals, clothing, shelter, music, etc., are all affected by the physical features of the area.

Methodology

1. Choose anyone physiographic division of India, preferably in which your school is located.
2. Identify the geographical characteristics of that region.
3. Find out which aspect of life is influenced by the physical environment and the reasons for its influence.
4. Are these aspects also reflected in song, dances, festivals. food habits,clothing or costumes, shelter, etc., of the place?

S.No.	Physiographic divisions	Reasons for life style

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5. Collect photographs, audio, video tapes, post cards, which reflects different life styles.

Conclusion

Usually we feel that civilization developed along the riverside. The pollutions created by these people reach the down side places of the river. So that their life styles are different. Festivals, traditions and customs of a place depends on its geographical situations. Lifestyle in the hilly areas is different from that of the forest area, and again it will be different in plain areas. The songs, dances and dressing reflect those situations. Kerala lined with boats and coconut trees where as Rajasthan with decorations. Our life style should be helpful to the environment. Rangolis are part in our lifestyle and if we use natural colours in making rangolies it will be ecofriendly.

Prepare a report on how the physical environment influences the lifestyle of people based on your study.

Follow-up

1. Display your study in the form of a wall magazine on your school bulletine board.
2. Share the audio and video tapes with your classmates and friends.

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Item: 17

Use and misuse of water bodies

Objective

To realise how changes in the utilization pattern of water have affected water bodies.

Backgroud

Quality and quantity of water flowing through a river determine its sustainable usefulness or value as a resource. Due to several human activities, for example, agricultural run off, industrial effluents and domestic discharges, rivers are getting polluted. Sometimes water is diverted through canals for agricultural and other activities, thereby reducing the flow of water downstream. As river water is a vital resource for humans, livestock and vegetation, it needs to be conserved and used judiciously.

Methodology

1. Choose a river or any water body such as lake, pond, etc. in or near your village.
2. Mark it's location of water resources on the maps of India, state, district.
3. If you have chosen a river, mark its course on the map of India, state, district. Find out information related to the river such as its source, destination, major cities all along its bank, etc. and also mark them on the map.
4. Select 200 to 250 km stretch of the river and find out the cities and industrial units such as power plants, breweries, tanneries, textile mills located in the selected area which utilize the river water and discharge their effluents in the river.

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5. Find out if the water is diverted to any irrigation canal in the selected regions.
6. Find .out how the water bodies are being polluted. What are the major pollutants discharged into the water bodies?
7. If you have chosen any other water body, collect information about the various sources of pollution that is deteriorating the quality of water.
8. Information can be obtained from various sources like newspapers, magazines, government agencies, such as those involved in River Action Plan, NGOs, etc.

Conclusion

Rivers are becoming causes not only for civilizations but also for pollution. For example, the pollutants which are released into Godavari by Sirpur people effecting the people of Eturu Nagaram which is very far from Sirpur and the pollutants of these two people effecting Bhadrachalam and on the whole Rajahmundry. Hence, when we compare upper places with down side places, later is becoming more dirty. Even in towns and cities the dirt reaches from upside places to down side. Slums doesn't mean that a place of dirt but a place people live where upper places people creates the dirt. Whoever might be but in producing dirt, missing water resources is the main causualty.

Based on the information collected by you, prepare a report and present it in the class

Follow-up

Prepare charts to show the different ways in which water bodies are polluted and display them on your school bulletin board.

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Item: 18

Reduce paper usage - Reduce pollution

Objective

To practise economy on use of paper.

Background

Present developments determine the course of the future to a large extent. We all know that paper is made out of wood, and we get wood from trees. However, we often waste paper. At the rate at which we are consuming paper, we may end up exhausting our valuable resource trees. It is, therefore, essential to adopt economical means of using paper not only to conserve trees but also to reduce the production of effluents from paper factories.

Methodology

1. Collect information about the process of making paper.
2. Find out what are the various resources used in making paper. Also find out the quantities of these resources.
3. Find out the effect of the process of making paper on the environment.
4. Collect information about the approximate amount of paper used by a student of Class IX in terms of sheets used in notebooks.
5. Think of different ways of using paper judiciously, like using both sides of sheets, and make a list.

Conclusion

People say that the whole knowledge is preserved in books. Hence, books and papers are valuable. We use notebooks and while papers to write. Let's bind big new

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books with the pase left over in the last year notebooks. It will be useful for rough work and for drawing. Writing on both sides of a paper, using paper for compulsory work and not wasting the papers and one side written papers are eco friendly habits. Wasting a paper is indirectly cooperating to chop down a tree. This act not only missing the resources but also making the environment polluted.

Write a report on consumption of paper, analysing the information that you have collected.

Follow-up

1 Present your report in your class. Presentations can be in the form of powerpoint or using charts.

2. Your project may be extend, and students may write articles to news papers on these issues.

3. Make boxes, covers and other useful materials by using used papers.

4. Is there any relationship between wastage of paper and environmental pollution? What are they?

5. Most of the times we burnt papers, leaves, boxes, etc., is it a correct practice or not? Why?

Recycling of paper produces the greatest overall reduction in the emission of green house gases. This is because decomposing matter in land fills causes the emission of methane gas, which is a major green house gas.

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Item: 19

Our lifestyle and its impact on environment

Objective

To understand the lifestyles of people and thier interaction with the environment.

Background

Love and respect for the environment and the ideas of conservation and preservation have made possible the preservation of habitats and heritage through generations.

This approach to life has undergone a change in both urban and rural areas.

Methodology

1. Choose a place, preferably a village or a rural habitat, to find out how life is lived there and its interconnection with nature.
2. Collect information about how lifestyles have changed in the last 25 years, of the people living in that area, through interactions and interviews with elders. Information can be collected about consumerism, wasteful habits, generation of waste and pollutants, etc.
3. Compare the changes that have taken place over a period of time.

Conclusion

Changing modern life styles have greater impact on environment and these become cause for pollution. If we wash our hands with a glass of water at a flower pot, the plant absorbs the water but if we wash our hands under a tap the soil becomes muddy. This

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becomes pollution. Larger the usage, longer the trash. Watching TV, using computers and mobiles for time pass sake is wasting the resources.

Instead of fresh food we buy preserved food. The preservations in these foods affect our health. The plastic covers in which these foods are preserved will remain in the soil for hundreds of years. We are giving priority to use and throw things than durable. These use and throw things do much harm to the environment. We are using our own vehicles for a very near distance too and becoming cause for the traffic jam. Think, how much fuel is being wasted at the traffic signal when the vehicles stop for ten minutes and how many polluted gases are releasing into the air. It is necessary to recognise from the morning to evening how our activities are making harm to the environment.

Sum up the ideas based on the information you have collected and your interactions with local people and prepare a report on how human activities have changed the environment.

Follow-up

Students may bring it out as a publication of the school.

On an average, each individual produces 500g of waste every day. Urban India produces 1,20,000 tonnes of waste each day: Delhi :7405 tonnes, Mumbai, 7025 tonnes, Chennai, 3500 tonne, Kolkata, 3200 tonnes. What about your village.

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Item: 20

Care for animals

Objective

1. To appreciate the bond of love beween man and animals.
2. To become aware of animal rights and the need to protect them

Background

It is not strange to notice people and animals living together and displaying their love and affection. We also see that people are very fond of their pets and love to spend time with them. One might have heard or read many stories of animal-human love and relationships which are very interesting and, sometimes, fascinating. Animals and humans are equal occupants of this planet. Many animals need our care or protection. But some people are indifferent to the pain and misery of animals around them and are sometimes even cruel to them. There are also organisations which are working for animal rights, prevention of cruelty to animals, etc.

Methodology

1. Collect anecdotes or stories about human animal friendship from friends, elders, other animal lovers in your locality, books or magazines.
2. Also collect information, episodes or experiences in which cruelty towards animals led to harmful consequences for humans or animals.
3. Find out about animal rights and also find out the activities of organisations working for animal rights.

Conclusion

The persons who love the nature can love their fellow beings. Our house is habitat not only for pets like cows and hens

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but for lizards, rats and cockroaches also. Our street dog does not bark even thousand of our street people passes by but bark at even a single stranger goes by. Recognizing our street people and unknown person is the speciality of the dog. Activities like feeding birds and keeping water in bowls for them. In the same way increase concern towards serving injured cats and dogs. It also help us to show sympathy towards them. That's why we should tame the animals flowers and fruits of the plant we planted, gives us immense pleasure.

Write a report on animal-human relationships and conclude how animal-human friendship enriches animal rights and prevents cruelty on animals.

Follow-up

1. Visit a zoological park and find out how the animals there are taken care of.
2. Visit any voluntary organisation which works were protection of animal rights and welfare. Appreciate their services.
3. We may harm chameleons sometimes by hitting stones;
   make a fly by tying thread to the tail of dragonfly;
   we kill green snakes just for the sake of our enjoyment.
   Are all these actions really gives us joy and pleasure? Think and reflect.
4. Do you have any pet animal? Is it shows it's affection towards you? Share your experiences with your classmates.
5. Observe any insect, ant or bird for ten minutes. How it moves? How it's shape? How are it's actions? How it pick up it's food? etc. Are there any things amazing you? Record and discuss your observations.

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Item: 21

Our responsibilities in tourism

Objective

1. To understand the importance of tourism for individual and economic purposes.
2. To understand excess human activities to related to tourism can have adverse effects on the environment.

Background

Tourism is beneficial to both the tourists and the people associated with the trade. Tourists undertake travel for recreation, aesthetic satisfaction, appreciation of beauty, culture and for religious purposes. Health tourism and adventure tourism are becoming popular. Tourism brings prosperity, employment and professional progress to tourist spots. It also promotes understanding between people of different regions. But excess human activities cause damage to the environment and put pressure on civic amenities of tourist spots and places.

Methodology

1. Choose a tourist place preferably close to your locality.
2. Find out when and why it is visited by tourists.
3. How do local people benefit from the tourist activity?
4. Find out the adverse effects on the local people and the environment.
5. Collect the above information through personal observation, interview of local people and other sources such as newspapers, magazines and the media.

Conclusion

We jump up and down when we see the beautiful nature. That's why we recognize

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hills and plains, steams, springs, canals, waterfalls, seashores, gardens, buildings and constructions as tourist places. But all these tourist places are becoming pollution centres. Let's recognise what should we do to avoid this situation.

- Don't throw plastic covers, papers, glasses and waste here and there in the tourist places, keep them in a bag and throw it in the dust bin only.
- Don't write anything on walls and trees.
- Urinate in the toilets only.
- We waste the water and electricity in the hotels where we stay in the tourist places. Don't switch on the fans to dry the clothes in rooms.
- Don't fill the tourist places with crowd. Let's develop our surroundings as tourist places.
- Don't damage the plants and trees and don't pluck the flowers in the gardens of tourist places.

Write a report of the activities you carried out and present it in your class.

Follow -up

1. The report may be sent to the tourism department, environment ministry and local Panchayat with a request to take preventive measures.
2. Students can be asked to write poems, articles or paint on the theme "Man versus Nature".

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Item: 22

Our kitchen garden

Objective

1. To udnerstand the economics of a kitchen garden.
2. To encourage the utilisation of leisure time for productive purposes.
3. Whatever vegetables we want, we can grow them in our house. It saves money and protect health too.

Background

Many houses/homes have ample free space. As a hobby people tend to make use of this freely available space for kitchen gardens. Kitchen gardens have a variety of seasonal vegetables which can, to some extent, meet the requirements of the family without completely relying on vegetables from the market. Besides involving the family members in physical activity, this practice also helps the family in saving money and keeps them physically active and healthy.

Methodology

1. Find out in your neighbourhood the homes that have kitchen gardens and those which do not have a kitchen garden even though they have open space.
2. Find out from those that have kitchen gardens, the different kinds of vegetables they grow.
3. Find out the amount of money they spend on seeds, saplings, manure, pesticides and irrigation.
4. Also find out from both kinds of households about the vegetables they buy from the market.
5. Enquire from each of the households the amount of money they spend on vegetables per week.

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6. Tabulate your data and compare the expenditure incurred by the households.
7. Find out the creative pleasure they derive from a successful production.
8. Prepare a report of your study.

Conclusion

The greenery around our house looks clean and gives us pleasure. Let's utilise the place around our house. Plant tall trees one side and vegetables another side. In the same way plant the plants which grow under the shade and climbers. Let's divide the open place in our house and plant different varieties of plants like. Fruit giving flower bearing leafy vegetables etc. Plant climbers like bottle gourd, pumpkin which climb on to the terrace. If we do not have open place in our house we can grow them in large pots. And we can grow roof gardens. The vegetables that grow in our kitchen garden are healthy we do not use chemicals and pesticides, hence the environment will not be polluted. We will be healthy and there will not be any medical expenses. All these activities are eco friendly.

Based on your study conclude whether having a kitchen garden is economically beneficial or not.

Follow-up

1. Present your report in the class or in the morning assembly.
2. Grow vegetables and leafy vegetables in your house. If there is no place try to grow them in pots filled with soil. If not possible fill plastic covers with fertile soil and grow small plants like coriander, mint, menthi, tomato, etc.
3. Insert a sweet potato in a narrow necked botle which filled with water. Observe how it grows. Write your feelings in a notebook.
4. What is your favourite vegetable? Collect information about that vegetable from news papers, magazines and prepare a scrap book.

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Item: 23

Quality of water

Objective

To study the presence of dissolved matter in water from different sources and relate it to its suitability for drinking purpose.

Background

The drinking water that we get is contaminated with various dissolved substances such as calcium, iron, aluminiumsalts, etc. which often cross the permissible limits. The water in extreme cases may receive effluents from factories, small textile, printing and dyeing units or farm run- offs. Outright harmful constituents such as arsenic, fluorides, copper, mercury and lead are also present in drinking water in wide parts of India. These substances cause serious ailments. It is worthwhile to find out by simple means the presence of the various impurities.

Methodology

1. Collect samples of water (about 200 ml) from different sources, e.g. handpumps, wells. tube wells. tanks. ponds. rivers and taps.
2. Filter the suspended matter from the water samples by passing through a cotton plug kept in a funnel.
3. Now take 100 ml of each sample separately.
4. Evaporate water from each sample till dry. For this, take water in a steel vessel and heat gently till all the water has evaporated.
5. Collect the dry mass separately and weigh it.

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6. Identify the impurities by analysing the solid residue, if possible.

Conclusion

Drinking water should be safe. The water supplied through safe drinking water system is good for health. Now a days we are using water which is stored in plastic bottles. It is our responsibility to check whether this water is good or not. Impure water leads to many diseases. Not only the pollutants from the facilities but the salts in the soil, wastes that join in the water flow also cause pollution. The water is being polluted in so many ways, so let's drink water after boiling only.

Draw your conclusion about the amount of dissolved matter in water.

Follow-up

1. If possible, find out with the help of experts/scientists the harmful constituents present in the dry mass and present it before the class and community.
2. There is no supply of pure drinking water for all. Why? Discuss about reasons, suggest your ideas to over come this problem.

Idols made from non biodegradable, hazardous materials like plaster of paris and coated whith toxic paints containing mercury, cadmium, lead and carbon when immersed into gases and other water bodies contaminate the water.

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Item: 24

Protecting endangered species

Objective

To become aware of the need to save endangered species.

Background

All the living organisms, be it plants, animals or microorganisms, have a specific role to play in the ecosystem in which they exist. Some of these organisms face the risk of becoming extinct because of decreasing numbers that are caused by destruction of their habitat, hunting, poaching, excessive utilisation, etc. These are called endangered species. Many countries, including India, have laws that forbid hunting of such species. Endangered animals are also preserved in reserved forests. However, some species are also dying silently. We need to do something to prevent their extinction in order to maintain the ecological balance.

Methodology

1. List ten endangered species, each under the categories of birds and other animals of both land and water in our country.
2. Locate and describe the regions to which they belong (for example on a map).
3. Find out the causes of their declining numbers.
4. Prepare a flow chart to show the decrease in their numbers over the past ten years.
5. List the sanctuaries, national parks and reserve forests where these endangered species are looked after.
6. List steps which can save them from extinction.

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Conclusion

Every creature in nature is valuble. Extinction of even a single creature shows intense effect in the food web. If all the sparrows disappear from our surroundings, insects will increase tremendously. It shows impact on crops. Yielding will be reduced. Hence, our activities should be helpful for all the creatures to live.

Prepare a report on the basis of your study giving pictures and habitats of the animals.

Follow-up

1. Try to publish your study report in a magazine or a newspaper.
2. Try to find out the reasons why certain species have become extinct in the past.
3. Organise a debate in your class on whether cloning of endangered animals is an appropriate solution for their conservation.

About 500 one horned rhinoceros have been killed by poachers over the past 20 years in the kaziranya ANational Park in Assam, Experts believe that the rhinohorns, purported to have aphrodisiac properties, are smuggled to China or sold in other Asian markets. In the Middle East the horns are used to make ornamental dagger hadnles. A kilogram of horns can sell for upto 35000 US dollars.

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Item: 25

Animal breeding for increased production

Objective

To find out the quality of milk production in different varieties of cattle.

Background

With the rise in the demand of milk and milk products, the production of milk has increased enormously. These have been made possible due to animal breeding. Different high yielding varieties of animals are breed so as to increase the production of milk and meat.

Methodology

1. Visit a cattle farm where milk is produced in large quantities.
2. Speak with the manager or caretaker of the farm and find out the following:

(a) The varieties of animals that are reared in the farm for increased milk production.

(b) From where do they get such varieties of animals?

(c) The amount of milk produced per high yielding cattle per day in the farm.

(d) The amount of milk produced per cattle per day by ordinary cattle.

(e) Find out if any artificial methods are adopted to increase the production.

Conclusion

We try to porduce more meat the food needs of increasing population. High meat giving sheep, hen, and milk giving buffaloes are foreign cross breaders. These are not

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suitable for our weather conditions and maintanance is also too expensive. Hence, it's true to rear our local varieties like murra buffaloes and bangoro hens, etc. These can resist different diseases. Though local varieties yield less. It is easy to rear them.

Conclude your study by writing a paragraph about the varieties of animals that produce more quantity of milk.

Follow-up

1. Visit a poultry farm and find out the varieties that are reared for egg and chicken production.
2. Eggs and meat of local varieties are said to be tasty. But now a days it's cost become high. What can we do to provide this kind of local food for all.

The per capita availbility of the milk in India is about 2.21 g per day but this is still very low as compartd to devoloped nations or the world average of 285 g per day.

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Item: 26

Home remedies for insects sting

Objectives

1. To become aware of the various home remedies available for treatemnt of bee sting
2. To appreciate and uphold parctice of traditional knowledge for treatment of various ailments

Background

Various home remedies are still used as first-aid for wounds or common ailments. These practices help in finding quick solutions in times of emergency. Understanding these practices helps in deriving the science involved in it and also keeps the traditional knowledge of medicine alive. Bee or wasp sting is one such wound for which cost effective home remedies are available.

Methodology

1. Consult the elders in your family or neighbourhood and find out how a bee sting can be treated.
2. List down the remedies suggested by them.
3. Collect the materials used.
4. Test the pH of each by making a paste or solution whichever is appropriate. Find out whether they are acidic or alkaline and the range of acidity/ alkalinity.
5. Record your observations and categorise the materials in order of preference of their usage in your area.

Conclusion

Usually insects attack for self defence. Though their bite is not life threatening it

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gives great pain. We should not damage the hives of honey bees and wasps. We will be so wondered, if we observe their habitats very keenly. Even though snakes, scorpions, centipedes and some varieties of spiders are dangerous, there is no need to kill, whenever we find them. They may cause danger, so it is better to catch and leave them at very faraway places. Snakes are entering into human habitats as they are losing their own. Corms and leaves. Which are found in the nature are used in medicine. So conserving the flora is our responsibility.

From your study find out the desired pH of materials for treatment of bee/wasp sting. Also try to guess the pH of the chemical in the sting.

Follow-up

1. Share the information with your classmates by presenting your study in the form of a chart.
2. Find out the diseases or ailments which are to this day treated through traditional knowledge.
3. Find out the first-aid treatment for dog or cat bite or scratch.

Medicinal plants are very important because more than 60% of the worlds people depend directly on plants for their medicines

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Item: 27

Save Electricity

Objective

Electricity is one of the powerful energy resources in our daily life. So we have to save electricity.

Background

We are producing electricity in different ways.

Through water - Hydro electricity,

Through Coal - Thermal electricity,

Through Radio activity - Nuclear electricity,

Through Air - Wind power,

Through Tides - Tidal electricity.

If there is no electricity Our daily life activities will we be disturbed. We are wasting so much of electricity and paying more money to electricity department. If we provide awareness to people on this issue they can reduce their electricity bills and can save electricity.

Methodology

1. Make the list of students houses with the help of class leader
2. Know the situation in which students are using electricity in their houses.
3. Collect details of monthly electricity bills.
4. Find out in which month electricity bills are more.
5. Find the electricity saving situation.

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6. We should give awareness to the children as if they reduce stop the unnecessary use of bulbs, fans, air coolers, fridges they can save electricity.
7. Collection of electricity bills after the awareness class.
8. To know about savings in electricity bill electricity based on the awareness of how to prevent electric wastage.

Conclusion

Electricity, Gas, Petrol are wisely utilizable energy resources. If we use without any limitations these resources should be disappear within nearer 5 decades so we should search for other ways to protect these resources. For this purpose only we are utilizing Solar Energy, Tidal Energy, wind power and other forms of energy resources. There is a need to search for alternate energy resources along with the proper (habituated) utilization of present resources. So much of electricity is becoming waste by unnecessary use of lights and fans in the offices and street lights lighting in the day. We, Eco friendly students must reduce the unnecessary use of TV, Computer and Movies. We should have to follow the habit of switching off fans, lights whenever leave the room.

1. Make a report on electricity wasting situations.
2. Write plans about "How to save electricity.

Follow -up

1. Discuss with in the class- How your classmates save enegry in their houses? In what way they reduce their electricity bills?
2. Participate in BECON activities. Collect information form elecrticity bills of your classmates, record the difference in reduction in electricity charges.

NEDCAP conducted awarness compaigns and programmes for school children on consumption of energy sources by the programme called "Children energy conservation project (BECON)". Let us about them.

- Awareness on cunsumption and saving of fuel in domestic purpose.
- Awareness on cunsumption and saving of fuel by agriculturists.
- Awareness on cunsumption and saving of fuel by community.
- Awareness on effluents produced during natural fuel production and utilisation.
- Awareness on sustainable development of non conventional energy resources.
- Awareness on energy savings, capacity and auditing.
- Conducting energy savings weekly festivals.

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Fuels in future

The need of energy or fuel in the modern society is drastically increased day by day. According BECON present resources will be exhausted within 100 years. So this is a high time to think of proper utilization of fuels. We should ready to produce and utilize geothermal energy, solar energy, wind power, hydal power. These are all energy giving resources. But not pollute our environment. These are cheep and renewable also. Bio gas plants also eco friendly in nature. So we should promote all these resources.

Some realities about fuel

More than 50% of commercial fuel produced in our country is utilized in industrial sector only. Sometimes it may be more than 65%. The details are as follows.

- Alluminium - 40% of production cost is invested on fuel. Coal and oil are also utilized as fuel in alluminium production.
- Textiles - 12 - 15% of production cost is invested on Coal, electricity, Furnace oils etc. They may save energy up to 23%.
- Paper mills - 30% of production cost is invested on fuel. Chemical recovery systems, co generation systems have much fuel capacity than small scale industries or mills.

Collect information about the following

- B.E.E. (Buero of Energy Efficiency) - Power saving guide, star grade appliences.
- E.C.B.C. - Energy conservation building codes.
- Collect information from the following websites.

  www.mnre.gov.in

  www.hareda.gov.in

  www.energyconservationworld.com

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Item: 28

Fluorosis

Objective

1. Know about reasons and symptoms of fluorosis disease.
2. Know how to implement precautionary measures.
3. Inculcate awareness campaign on fluorosis.

Background

Fluorosis is the dangerous disease which enters our body through the water we drink and the food that we eat. In 1925 scientists christiny and Galier said that the excess amount of fluoride in drinking water causes fluorosis. In 1930 French Scientist 'Feel' announced that fluorosis is also a disease. This disease is spread over India except Himachal Pradesh and other Eastern states. Some other countries like India also affected by this disease. In 1937 this was first identified Yellareddyguda, Narkatpally mandal of Nalgonda district and Kanigiri, Pamur areas of Prakasam district. According to National reports more than 3 crores of population live in these areas. More than 25 lack people, suffer with bone level Fluorosis (Skeletal Fluorosis). There is no specific medicines and treatment for this disease. Actually they are not discovered. There is no surgery for this disease. If fluorosis disease spread up to bone level there is no remedy for it.

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Fluoride in Nalgonda District:

Geographically the fluoride levels in ground water is very high because of the following reasons.

- Naturally the element fluorine exists in higher quantities in Bedrock.
- The forest area spread only 5.8%. The maximum temperatures are gradurally increased. That results in reduction of rain fall finally all the above factors leads to decrease the ground water levels.
- Digging more than 5 lakhs of bore wells also a major cause for the decrease of ground water levels.
- 'WALTA' act is not strictly implemented.
- Cultivating paddy requires huge amounts of water. The underground water resources contains fluoride.
- There is less rain water in harvesting places like ponds, soak pits and no renovations takeup.
- Less water required crops (Arutadi Pantalu) are not cultivated in wide range.

Is fluoride really harmful?

According to WHO. Fluoride content levels in drinking water per litre is in between 0.5 mg to 1.5 mg is not harmful for our health. If it is increased it leads to fluorosis. Nalgonda, Rangareddy districts have high fluoride levels in drinking water so people of these places are effected by fluorosis disease. People in affected areas of Nalgonda district receives 5.0 mg to 100mg of fluoride daily through food and water. This is 6 to 12 times higher than the desired quantities. Fluorosis appears in different forms because of intake fluoride levels. Let us observe the following table.

Fluoride Quality	Symptoms of the disease
1.50 mg	Tooth decay, enamel become reduced
2.00 mg	Yellow colour spots, scars appears on teeth (Dental fluorosis)
5.00 mg	Austio fluorosis, bones became hallow
8.00 mg	Skeletal fluorosis (leads to handicap)
20 - 80 mg	Changes in thyroid gland
100 mg	Bending in spinal cord
125 mg	Kidney failure
250 – 500 mg	Death

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Based accumulation of fluoride in the body fluorosis gradually develops stage by stage.

How to recognise fluorosis

There are three different tests for identification of fluorosis

1. Yellow, black, brown colour spots or scars appears on tooth is the first symptom of fluorosis.
2. We can identify by blood and urine test at pathology labs.
3. To identify the stage of fluorosis we may use coin test, stretch test, chin test.

- Ask the patient to pick coin on the floor with out bending knee. If he can't he is effected by fluorosis.
- Ask the patients to keep both palms at the back of his head . If he feels pain in shoulder he is effected by fluorosis.
- Ask the patient to touch his chin to the chest if he feels any pain in neck he is effected by fluorosis.

Tooth decay

Dental fluorosis

Astio fluorosis

Skeletal fluorosis

Changes in thyroid gland

Decay

Kidney failure

Death

Some preventive measures

- Drink pure and safe drinking water only.
- Use water from tanks and wells instead of deep bore wells
- Do not drink bore well water while working in the fields.
- Actually 70-80% accumulation of fluoride is because of food. So take care while taking food materials.
- Do not drink even tea prepared by using fluorinated water.

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- Do not cook food in aluminium vessels. It is better to use pots, steal , indalium vessels for cooking.
- Eat fruits and vegetables which contain vitamine C, E and minarals like calcium magnesium.
- Ragulu, Avisha, Thotakura, Chema, Karivepaku, Gasaalu, Bellam, Nuvvulu, Jonnalu, Jeera, Mirchi, Chintha, Jama, Nimma, Narinja, Tomato, Munaga, are all important food materials that we should eat.
- We should take atleast ¼ ltr of Milk regularly.
- Do not use fluorinated tooth paste, mouth wash etc.
- Do not eat tobacco chewing materials like panparag

If we follow the above preventive measures we may reduce the affects of flourosis.

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Annexure

Respected Teachers we should add some other activities which are related to nature and environment along with given projects. Here are some activities mentioned in the annexue. We should utilize these activities where ever neccessary. These activities are flexible ,we have an oppartunity to add and delete things

1. BIRDS AROUND US

Objectives

1. To increase students' skills of observation.
2. To enable them to learn the behavioural and feeding patterns of birds.

Activity

Take the students to a park or any secured area where it is quite, where trees and water are present. Divide the class into groups of four or five and let them settle down in different places.

They should close their eyes and sit quietly for five minutes and concentrate on various bird sounds they may hear.

They should then attempt to trace each call to the bird making it and with the help of a bird guide, the bird should be identified.

Having located the birds and identified them, each group should then carefully observe the habits of one particular type of bird which should be assigned to the group by the teacher.

On return to the class room each group should provide their observations to the rest of the class.

Variation / extension

Having got to know particular types of birds, the students should be asked to maintain a diary of regular observations throughout the year.

2. OIL AND WATER NEVER MIX

Objectives

To explain how feathers keep birds dry.

Activity

Ask the students to take two small pieces of brown paper and rub oil on one of them. Let them sprinkle water on both the pieces and observe.

Which piece of paper gets soaked by water and which does not? Discuss the reasons.

Now ask them to sprinkle water over a feather. Discuss the possible reasons as to why

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the feather does not get wet. Water and oil do not mix. Make the students observe pigeons or sparrows preening and explain that birds have oil glands and they keep applying oil on their feathers with the help of their beak. Tell them where the oil gland is situated. You may also mention that water-birds such as Cormorants and Darters, which do not have oil glands, have to dry their wings by holding them outstretched when wet, while ducks which have plenty of oil do not need to dry their feathers.

Discuss this phenomenon is helpful to birds when it rains, or to water-birds such as ducks.

Variation / extension

- Pour oil and water in a transparent glass and see that they do not mix.
- If you go on an outing to a lake see if you can find a Cormorant or a Darter drying its wings.

3. WATER DROPS ON LEAVES

Objectives

To compare what happens to water drops which fall on different types of leaves.

Activity

Take the students to a place where they will come across various plants including water plants. Carry some water with you. Ask the students to take a leaf from each plant and sprinkle few drops of water on the upper surface of the leaf.

Move the leaf gently. See what happens to the water. Students should observe the shape of the drops and hear they move on the leaf.

The water may either stay as a drop (like a mercury globule) or spread over the surface.

Repeat this with different leaves. Note what plant the leaf comes from and what happens to the water on its surface.

Does the water drop on the leaves of the water plants behave differently from the drop on the leaves of other plants?

Does the presence of dust on the leaves make a difference?

Variations-extension

Observe how a drop of water behaves on a piece of ordinary paper and a piece of waxed paper.

Evaluation

Ask the students why the drops of water move freely on the surface of some leaves.

Explain that the leaf has an upper waxy surface. The stomata (openings for breathing) are on the lower surface which is not waxy.

Lotus leaves are often used to pack fresh flowers. As the moisture does not escape

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from the waxy surface, the flowers remain fresh. This is a traditional practice but has a scientific basis.

4. MY TREE

Objectives

1. To enable students to identify the different parts of a tree.
2. To help students understand that the different parts of a tree contribute to its shape.
3. To develop in students the skills of observation/recording and illustrating.

Activity

Let the students observe a few trees and recognise the main parts of a tree. Let the students practise drawing/sketching the main parts of a tree separately.After the students have finished drawing the main parts, let them look at different types of trees, e.g. trees which are tall or short trees with maximum and with minimum branches trees with many leaves or few leaves trees with large leaves or with small leaves, etc. and observe the variations.

The students can be encouraged to discuss among themselves how the different parts of a tree contribute to its shape.

The students can be asked to sketch the shapes of the trees highlighting the positions of the different parts.

Paste the sketches in a scrap-book.

Students should cut colour pictures of different types of birds and insects from old magazines, and stick these at appropriate places on the sketches of trees they have made.

Variation / extension

The trees the students have observed should be checked by them at different times of the year, and notes kept of the changes observed.

The students should be encouraged to reason out the various factors that may have contributed to these changes.

5. TREE AS A HABITAT

Objectives

To make students aware that trees harbour a rich and complex variety of life.

Activity

Ask each student to select a tree for himself and observe it carefully.

The students should draw an outline of the shape of the tree to mark what they see on it.

They should note down whatever life they are able to see on or around that tree. They

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should note down the details like: what types of birds, insects and other animals did they see on the tree and where? How many were there? Did they notice any nest? What were the birds, animals, insects doing?

The students may go for observation more than once to notice the patterns of life on and around the trees.

They should then return and present their drawings to the class.

What kinds of trees have a greater variety of life on them and why?

Variation / extension

Discuss the possible relationships these life forms have with one another and with the tree. Draw lines connecting the things which are inter-related.

6. FLOATING ON WATER

Objectives

To find out how insects float on water.

Activity

Take students to a pond or still water body and show them floating insects.

Ask the students the following questions:

- How do these insects float on water?
- Why do they not sink?

Then ask them to do the following:

Fill a glass or tumbler with water. Take a blade and put it in the water vertically. Note what happens. Now remove the blade and dry it thoroughly. Take a small piece of blotting paper or newspaper smaller than the mouth of the glass. Place the blade on it horizontally. Then place the paper and the blade very gently on the surface of the water. Observe what happens. When does the paper sink? What happens to the blade?

Variation / extension

The same experiment can also be done with a needle instead of a blade.

Evaluation

Through this experiment students understand the role of surface tension which enables some animals and objects to float on water.

7. SUN DIAL

Objectives

To understand how the lengths and directions of shadows vary according to the position of the sun.

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Activity

A few days prior to carrying out this activity the teacher should ask the students to observe the shadows cast by them at different times of day when walking to and from school, when playing outdoors etc. They will quickly register that shadows are long when the sun is low and short when it is high.

Now ask them to select an erected stick or pole or any similar object which is possible to observe at frequent intervals throughout the day.

Let them mark the length and the direction of the shadow before the first period of the day, and again after every period. Any one student at a time can go out and do this so that the schedule of classes is not disrupted.

At the end of the day take out the whole class to see the result of the day's work. At the end of each shadow mark you may put down the time at which that reading was taken, i.e. the time at which each period began or ended.

Now ask the students:

- What was the time when the shadow was the longest?
- At what time was the shadow shortest?
- What time was noon?

The students may repeat this activity over the next two or three days to find out if the positions and the lengths of the shadows vary at the given points of time.

Variation / extension

- By doing this exercise four times in the year, i.e. on or around the 23rd of March, June, September, and December, the students can begin to understand how the apparent track of the sun across the sky varies around the year.
- Let the students build their own sun-dial by driving a stick into the ground and marking its shadows by the hour. This can be used for three to four weeks to tell the time. After that correction factors will have to be applied.

8. DIFFERENCES IN TEMPERATURE

Objectives

1. To make students understand the effect of water on the surrounding temperature.
2. To make them sensitive to micro-climate changes around them.

Activity

Take students to a pond. Ask them to approach the pond slowly. Do they feel a difference in temperature as they move towards the pond?

If there is a breeze, let them stand in different directions around the pond and see if they can sense temperature differences. Ask the students to gauge differences in temperatures at other places.They can stand under a tree, crawl under a bush, climb onto a

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tree. They can put their hand into the water at the surface and deeper down. They can put their hands under a stone and on the stone's surface. Dig a small hole in the soil and compare it to the surface layer of soil. Are there differences in temperature? Caution: There may be scorpions or snakes under the stones.

Variation / extension

Introduce the concept of microclimate, the climate in a very limited space explored by the students. Ask them to relate each of these spaces with the insects, birds or other animals that inhabit that space.

9. IMPORTANCE OF FINGURES

Objectives

Familiarising the students with the various uses of the human hands in life, in arts and in understanding.

Activity

The hands, which may include the arms, are the most important and expressive limbs of the body. The teaching of the use of the hands should be through Movement, Expression.

The students can be asked to use only their hands in the activity.

Ask them to think of the various activities the hands can do picking. flicking, clapping, etc. with one finger and then with all the fingers. Let each student act out one use and the others to guess what the activity is.

Then go on to expression with the hands questions like what? (open hands), numbers one, two...., etc. how? No! etc. can be equally well expressed with hands.

Counting with the fingers is almost like having a calculator in your hand. Cupping of the hands for drinking water is like having a cup.

Go on to the wrist, its flexibility. The thumb. Ask students to write without using their thumb. Let them realize how each part is vital.

Tell the students about thumb and fingerprints. How criminals are often found out by their fingerprints. Make an exciting story. Use an ink pad and ask students to make thumb and fingerprints. Can they recognize their own?

Variation / extension

- Continue into arm movements. History of the hands in Indian dance. What is a mudra? Teach them mudras for animals, birds. trees, etc. Mudras for worship are used in all civilizations.
- In which sports are hands essential and in which sports are they not so important?
- How do animals use their hands and limbs?

Certain mudras are good for health. Teachers can read and show the children how to perform these mudras. Make them enjoy creating new images. Shadow play of hands could also be of interest.

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10. SOUND AND NOISE

Objectives

To make students aware of the concepts of sound and noise and realise that these are relative terms.

Activity

Ask students to make a list of sounds they hear. These may be sounds from nature like falling water, a wind blowing or thunder; they may be sounds made by animals like a dog barking, a bird chirping or a donkey braying; or sounds of man like singing, shouting, scolding etc. Ask them to sort out these in terms of pleasant sounds and unpleasant sounds. Are the sounds classified perceived the same way by all the students?

Ask each student to make some sound. You can tell them to make animal sounds, or any other sounds even an unusual one which is not generally heard. They may also make sounds using another object, like rubbing two things or banging one against another. Let the other students say whether they felt the sound was pleasant or unpleasant.

Ask students to indicate what functions sounds made by animals perform. Do they think these sounds are pleasant or unpleasant to the animals?

Variation / extension

- What are different animal sounds called?
- Can you make a sound that a cat would not like, or a dog would like?

11. SWOOP-IN

Objectives

To appreciate how difficult it is to catch things while moving.

Activity

It is easy to pick up things or catch objects when one is stationary but much more difficult if one is moving fast and even more difficult if the object is also moving.

Yet this is the standard way in which many birds catch their prey. Kites and birds of prey swoop down on small animals or birds. Bee- eaters and drongos manoeuvre their flight to catch moving insects in the air.For the activity, ask students to pick up a small pebble. They can do this easily. Now get them to come running from a distance, as fast as they can, pick up the same pebble without stopping, and run on. It is not so easy.

One can take a ball and roll it on the ground or throw it up in the air and the student should catch it while running. This is a standard practice exercise for cricket, and children should have fun doing it.

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Variation / extension

Now try and locate some birds like the bee-eater or drongo and let the students observe how skillfully the bird catches its prey.

12. BUILD A PYRAMID

Objectives

To understand the concept of hierarchies.

Activity

Ask the students to do the following:Take the empty matchboxes and build with them a pyramid. This can be done in many different ways (which the students may explore for themselves).When the pyramid is built, ask the students to note -

- How many rows of boxes are there?
- How many boxes are there in each row?

Each row is a level, each box is a unit or component of its level. The structure you have built has a single component at the highest level and increasing numbers of units as you go lower. Each unit has connections with the level above and below it (except of course the top and bottom levels). Any structure with such qualities is called a hierarchy. Carefully remove a box from your structure, without disturbing the other boxes around it. The structure from that level up collapses. Rebuild the structure and remove another box.Repeat this a number of times. Observe what happens each time. Observe how the breadth of the base affects how much damage is done each time you remove a box.

Variation / extension

During your P.T. class, get together in a group of ten and form a human pyramid. What happens if one of you moves?

From these two experiments, can you say which is the most important component in a hierarchy and why?

On Janmashtami day organize a "Utti" game at school as is done in some parts of the country. Can you see how hierarchies work?

Evaluation

- Can you think of hierarchical structures other than a pyramid?
- Can you think of examples of hierarchies in nature?

13. NOTHING IS USELESS

Objectives

To understand how even small parts of the body (in this case, our fingers), perform an important function.

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Activity

- Ask a student to pick up one object at a time, like a pen, a tea-cup, a knife, a ball etc.
- The other students should observe closely which fingers are being used in holding and picking up each of these objects, and in what manner (i.e.gripping, propping up, manipulating, propelling etc.)
- Through this observation they should be able to identify which fingers are used for which specific activity.
- Once the use of particular fingers for holding a particular object is identified, students should be asked to try to hold that object without using one of the fingers normally used. For example, try to hold a pen and write without using the thumb. Students will discover how difficult it is to do this and in this way learn that each finger has a specific function to perform. This will also sensitize them to the difficulties that handicapped persons face. Efforts and skills needed to train other parts of the body to substitute for the missing parts would now be appreciated.

Variation / extension

- Ask students to imagine what it would be like to have a different type of hand. Take some card paper and make 5 tubes of 15 cms each to fit each finger. Now ask the students to use these extended fingers for various purposes and compare with their earlier experiences.
- While eating students should observe in how many different ways fingers are used with different food items.

14. USING THE WASTE MATERIAL

Objectives

To encourage students to learn to use waste material for craft activities.

Activity

Ask each student to bring an empty dropper bottle with a nozzle (as in eye or ear drops) to the class.

The plastic lid with nozzle should be turned into the bird's head and beak. For eyes, two bits of coloured paper should be stuck on either side of the nozzle. The nozzle should be covered with coloured paper to resemble a bird's beak. The bottle itself should be made into the bird's body by wrapping it with coloured cloth, coloured cotton wool, etc. Let each student use her imagination in creating a beautiful bird. The wings can be made out of stiff paper and stuck to the body.

The bird is ready to fly!

Different colours could be used to make different birds.

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Variation / extension

Discuss the major types of wastes generated in a home. The wastes could be segregated into biodegradable, reusable and recyclable wastes. Collect the reusable wastes like plastics, paper, bottles, bottle caps, toothbrushes, etc., and try to use these as craft materials to make birds, animals, etc.

15. MOSQUITO MEAL

Objectives

To demonstrate the role of fish in controlling mosquitoes.

Activity

Set up two aquarium tanks. Fill both with clean water. Set up one of the aquaria with a few fish, e.g., guppies. Leave both the tanks undisturbed outdoors in the shade.Mosquitoes will lay their eggs in the tanks and these can be seen on the surface. Once the eggs are laid, these will hatch into larvae in about 2 days. Ask the students to observe the two tanks at regular intervals. When the larvae are seen, students should cover both the tanks with a mosquito net to trap the adult mosquitoes so that they can be observed later. Discuss with the students the role fish play in controlling mosquito populations and how this can be applied. Explain how polluted water (where fish cannot easily exist) enables mosquitoes to breed freely.

Variation / extension

Let students walk around the school to make a list of large as well as small water bodies which seem to be breeding mosquitoes and those which do not.In the school where students come from different parts of the city, ask whether students have observed mosquitoes in their residential areas. From those students whose areas have many mosquitoes, find out whether there are ponds of stagnant water nearby.

16. DRIP IRRIGATION

Objectives

To demonstrate the effectiveness of dry farming techniques through pitcher irrigation.

Activity

Divide the class into three or four groups. Contact the nearest forest department office and get 6-8 saplings of a fast growing tree species such as *Subabul, munaga* (drumstick) or *Neem.* The saplings should be 60-90 cm high. Give each group two saplings. Ask each group to dig two pits measuring 45 cm x 45 cm x 45 cm. These pits should be at least one metre apart.

Let them fill half of each pit with the dug-up soil, hold a sapling in the middle of the pit and fill the pit with the remaining soil, pressing it down to hold the sapling firmly.

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Students should take care not to damage the roots while planting the sapling.

About 25-30 cm from the base of one of the two saplings planted, ask each group to dig a pit large enough to hold a pitcher. Let them punch a few holes in the base and one side of the pitcher by gently tapping a nail into it.

Now ask them to bury the pitcher so that only its mouth remains above the ground. The punched side of the pitcher should face the plant. The pitcher should be filled with water and its mouth covered with a lid.

Of the two saplings planted by each group, the one with the pitcher should be watered only by filling the pitcher once a week. The other one should be watered directly once a week. Let each group measure and note the amount of water used for watering the first sapling once a week. They should also note the amount of water needed to fill the pitcher to its rim every week. Let the students monitor the growth of the two sets of trees for at least four months.

Variation / extension

Ask the students to locate a tree in the neighbourhood which seems to be drying up. Let them bury a pitcher or drum with small holes next to it. Let them pour water into the container at regular intervals and observe what happens to the tree.

Evaluation

Which of the saplings is growing the best?

If there are differences in the rates of growth of the saplings grown by different groups, what could be the reasons for these differences?

How does the pitcher provide water to the plant?

Why is the pitcher buried in the root zone of the plant?

17. TREE KEEPS US COOL

Objectives

To understand how evaporative cooling works in different ways to create comfortable conditions.

Activity

Ask the students to blow their breath on the back of their hand. Now ask them to wet the back of their hand with water and then blow on it. Ask them to describe the difference between the two sensations.

Now discuss the following in the class:

- How does a pot cool water?
- How does a wet vattivellu curtain cool the room?
- Why does one feel refreshed after taking a cold bath on a hot day?

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- Why does the breeze that has come across a river or a lake feel cooler than the breeze that has come from land?
- When a pre-monsoon thunderstorm approaches at the end of summer, why does the temperature suddenly drop before the beginning of rain?
- If you walk or cycle past a dense growth of trees on a hot day, that stretch of road feels cooler even when you are not in the shade. Why does this happen?

Ask students to suggest how buildings, neighbourhoods and cities can be made more comfortable by having lots of trees.

Variation / extension

If there is a wooded area or a forest easily accessible from the school, the class may be taken there on a hot afternoon on a picnic-cum-learning session. In addition to the cooling effect of trees, their role in hydrological cycle and in controlling climate may also be explained.

Take two identical mud pots with lids. Fill both with an equal quantity of water. Wrap a wet cloth around one. The cloth should preferably be folded in layers. Leave the two pots standing in an open place for 3-4 hours. Keep the cloth wet by sprinking some water on it periodically. In which pot is the water cooler?

Evaluation

Ask the students:

Our elders often grumble that the climate has become warmer from the time they were young. Is this mere nostalgia or is there some truth in it? If you think they are right, what could be the reasons?

18. ENERGY FLOW

Objectives

To demonstrate that with every energy transfer, a loss occurs.

Activity

The students should be divided into two equal groups. Each group should form a row, standing one behind the other. The rows should be parallel to each other. Each student should stand two paces away from the next student.

Give a cup full of water and a teaspoon to the first student in each row and a similar empty cup to the last student in each row. All the other students should be given a spoon each. The first student with her cup of water stands facing her row. The second student moves to the cup bearer who takes a teaspoonful of water and transfers it to the spoon of the second student.

The second student then takes the spoonful of water and transfers the water to the spoon of the third student. Then the second student goes back to the first student for another

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spoon of water. In the meanwhile, the third student carries the teaspoonful of water to the fourth student and transfers it to his spoon. The fourth student takes it in his spoon and transfers it into the spoon of the fifth student and so on, till the water reaches the last student. The last student receives the water in his empty cup.

When the leader's cup is empty, let the students see how much water there is in the tail-ender's cup.

You could generate a discussion on what happens to the missing spoons of water. Tell the students that each spoonful of water represents a quantity of energy and that loss of energy takes place at every transfer.

Variation / extension

The students can play the same game again, taking care to minimize the loss of water (energy) in transfer.

19. POWER FROM DUNG

Objectives

- To demonstrate that energy can be generated from waste material.
- To demonstrate that animal dung can be used for making biogas.

Activity

Arrange for a tin / can of 10-15 litres capacity to be placed in the school compound or laboratory. The tin should not have any holes except the opening. Also arrange for a rubber cork which fits this opening. This should have one hole just large enough to take a tube with a hypodermic needle attached at one end (the tube used for blood transfusion would do).

Ask students to collect and bring 3 to 5 kg of wet cowdung. Put this in a container, pour 3 litres of water and stir well with a stick.

Pour the mixture into the tin can with the help of the funnel. Fit the tube into the opening of the one-holed rubber cork and close the can with this cork. The outer end of the tube has a hypodermic needle attached to it.

Tie the tube with a string to prevent the escape of biogas through the hypodermic needle. Allow the tin can to stand for 24 hours.

Keep the windows of the room open during this time so that if there is a leak of biogas, this can escape. The next day, loosen the string on the tube. The students should be able to smell the gas. Tell a student to bring a lighted matchstick near the opening of the needle.

The gas will burn with a tiny flame.

This activity should be done with extreme caution.

Variation / extension

Biogas can be prepared from the dung of other animals. In several rural areas, biogas is made from animal dung and human excreta.

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The gas production in the tin can be slowed down by immersing it in cold water for some time. This shows that gas production is lower at lower temperature and higher at higher temperatures.

Evaluation

Discuss how biogas is an important renewable energy source and what kind of uses it can be put to, e.g. for heating, lighting or running engines.

20. CREATING A WHIRLWIND

Objectives

To demonstrate how a whirlwind is created by unequal heating of ground by sunlight.

Activity

Ask the students to place the smaller black sheet at the centre of the white one. These should then be placed in full sunlight.

After a few minutes, it will be noticed that the air over the black surface is shimmering the teacher should suggest that the air is rising because it has been heated. The incense sticks should then be lighted and placed on all sides.

The movement of the smoke should be observed. The drawing in of the smoke towards the black surface should be noted and the reasons explained.

Students should also be asked to notice that the smoke spirals upwards over the black area from where the air is rising.

Students should also be made to see that the column of smoke becomes wider as it goes up.

Note: Care should be taken that there is no draft of air.

Variation / extension

Observe smoke from chimneys during the heat of the day.

Near the seashore, observe the winds blowing during the heat of the day and during the cool of the early morning. Explain the causes of land and sea breezes.

Observe clouds forming on a still, hot day and watch vultures and kites spiraling up under the clouds. Discuss why they glide in spirals.

Observe whirlwinds (sudigali) as many times as you get the opportunity. Note that they always turn in the sane direction.

21. SOLAR WATER PURIFIER

Objectives

To show how pure water can be obtained from impure water by using solar energy.

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Activity

Put some water in a glass or metal dish and place it in the sunlight. Add a few drops of black ink to the water. Cover the dish with a transparent glass or polythene sheet. Leave it in the sunlight for 15-20 minutes. You will see droplets of water condensing on the inner surface of the glass or sheet. Ask the students to note the colour of the condensed water drops. They may taste these water drops. Repeat the experiment using salt water. Does the condensed water taste salty?

Variation / extension

Ask students how they will obtain drinking water from sea water.

How do evaporation and condensation take place in this activity?

Is the formation of droplets of water on the glass sheet related to formation of clouds?

22. WEB OF BIOSPHERE

Objectives

To demonstrate the interconnectedness of various elements in the environment.

Activity

Based on the list provided alongside, make a set of cards with the names of the animal or bird or plant or resource, etc. The children can illustrate these cards. There should be as many cards as there are children. Cards can be made of chart paper cut into rectangular pieces of about 5 x 8 cm. A safety pin can be put through the top of each card.

Make the students sit in a circle. Make sure to include and distribute cards depicting the four main elements of nature, 'Sun', 'Soil', 'Air' and 'Water'. Take a ball of string about 250 m long and give it to the Sun. It is appropriate to begin with the Sun because all life is made possible by it. Let the Sun, wind one end of the string around her finger and throw the ball to any aspect of nature she feels is related to her. For example, the 'Sun' may pass it on to 'Tree' because the 'Sun' gives energy to plants or trees. Let the student state the reason why she feels related to, this element. The 'Tree' then winds the string once or twice around his finger after ensuring that it is not loose between the 'Sun' and him. He then passes it to another aspect he feels related to, e.g., 'Fruit'. So the line of relationships continues as the string unwinds and begins to form a pattern which the students hold together. The ball of string is thus completely used.

Ask the students to see the web-like effect of the string. Then ask them to raise the web chest high. Let them hold it tightly so that if the web is pressed down it does not sag and touch the ground.

Ask the students to note this.

Ask the students what would happen if some of these elements were destroyed. Let the student representing these elements drop the string. Notice the visual effect. More elements may be dropped to dramatize the effect. Now press the web down. It would probably touch

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the ground because it is loose.

Ask the students what would happen if the Sun or the other three major elements of nature were disturbed. Conclude the game by explaining to the students how inter-relationships exist and why they are important.

Sun	Air	Water	Soil	Tree
Rat	Mongoose	Butterfly	Kingfisher	Ant
Parrot	Student	Woodcutter	Fruit	Grass
Buffalo	Washerman	Dead leaf	Honey	Algae
Earthworm	Honeybee	Fish	Root	Squirrel
Leaf	Snake	Eagle	Shrub	Moss
Turtle	Seed	Grasshopper	Insect	Fungus
Plastic bag	Frog	Dragonfly	Dead wood	Mosquito
Monkey	Paper	Lizard	Spider	Crocodile

23. BARK AUTOGRAPHS

Objectives

- To learn that different trees have distinctive bark characteristics.
- To use the senses of smell, touch, as well as observation, to study trees.

Activity

Take the students to a place where a variety of trees is growing. Let each student select a different tree.

Ask the students to feel the barks of different trees with their hands and note the differences. Barks of certain trees have characteristic smells and these may also help to differentiate between them. Ask the students to describe the smell of each bark, if any. It is not necessary to know the names of the trees in the beginning.

Now tell the students to place a sheet of blank paper on the bark, hold it with one hand and rub a soft pencil or a crayon on it with the other. The pattern of the bark will emerge clearly on the paper.

Ask the students to compare two or more prints prepared by them and note the differences. Let them find out the names of the trees.

Let them observe prints made by their friends to find out if they can name the trees.

24. SEED BANK

Objectives

To familiarize students with the large variety of seeds.

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Activity

Ask the students to collect different types of seeds (fruits, flowers, vegetables as well as cereals, pulses, etc.). These could be collected from home gardens, nurseries or plantations. Ask the students to observe, study and classify the seeds according to shape, size, colour and the location from where the seeds were collected.Initiate a discussion on the ways in which the classification can be done.Students could create a "display corner" of the seeds after they properly classify and catalogue them.You could ask the students to exchange seeds or give them to people who want to raise plants/trees from them.

Vriation/ Extension

Ask the students to collect few seeds of each variety and divide them into two parts. Drop one part into a container with clean, cool water. This should be kept undisturbed for four hours. The soaked seeds should be compared with the dry seeds. Observe that the seeds will be bigger and the seed coat may be wrinkled or broken. Discuss the reasons.Ask the students to sow some of the seeds in small suitable containers with soil in the classroom itself. Observe the seed germination. Compare how different seeds germinate (e.g. time taken by different varieties of seeds to germinate), how the leaves and the roots develop, etc.

25. USE OF LAND

Objectives

To enable students to identify how land is used in their surroundings.

Activity

Discuss with the students different purposes for which land is used: for agriculture, for building houses, for building factories, offices, etc; for building roads, for forests, as a habitat for animals, etc.Take the students for a walk in the neighbourhood areas around the school. Ask them to carefully observe how the land is used in that particular area. Ask them to record their observations.

After the observations, ask the students to classify their observations in terms of rough percentage in different categories, e.g.:

- Land utilized for human habitation
- Land utilized for agriculture
- Land used for transportation
- Land utilized for commercial purposes (shops, offices, etc.)
- Land not utilized for any purpose by humans.

Ask the students to visit the area again and interview some elders living in the area. You may help them to put together a list of questions to be asked. For example:

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How long has a particular piece of land been under this use? Do they know why the use changed?

Do they feel the change is for better or worse?

Groups of five students can perform the task of interviewing one elder and recording the answers.

Evaluation

You could generate a discussion on changing land use patterns based on the interviews.

26. HOME FOR EVERY BIRD

Objectives

- To encourage students to attract birds to nest where they can be observed.
- To observe how birds make their nests and how they rear their young Subject Science, Craft

Activity

Let the students experiment with different types of nest-boxes to try and attract sparrows to nest in them. A pot could be used by covering the mouth so that large birds or cats cannot enter, and making a small hole on one side. The hole could be 5 - 6 cm in diameter. If a box is being used, only one small opening should be kept. The potor the box should be hung in one corner of a room near an open window or a door. Once the sparrow is attracted to the pot or box, and begins building the nest, students should observe carefully and make notes. They should note the following:

- Does the male or the female make the nest?
- What materials does the bird use to make the nest?
- Where does it bring these materials from?
- How many times in an hour does the bird come to the nest?
- How much time does the bird take to complete its nest?
- Can each one guess on which day the bird laid its eggs?
- How many days after the completion of the nest was the chirping of the baby birds heard?
- What is the difference between the baby bird's chirp and the parent bird's call?
- Who takes more care of the babies-the mother or the father?
- What do the parents feed the babies with?
- How many times in an hour do they feed the babies?
- Where do they get this food from?
- After how many days do the babies start flying?
- How do they learn to fly?

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- Once they leave the nest, do the parents and the babies come back to the nest?
- How long does it take, from the time the bird started building the nest till the babies fly out of it?

27. THE POET IN US

Objectives

To enable students to identify themselves with a natural object and to express themselves in writing.

Activity

Ask each student to choose an element in nature (such as sun, soil, air, cloud, tree, grass, butterfly, sparrow, tiger, water, river, fish, etc.) which she feels close to, because it reflects her own personality or qualities.

Students may then be asked to speak on how the chosen object reflects their personality. Let the students then take up their papers and pencils and:

- in the first line, write the name of the chosen element (subject / noun)
- in the second line, write two words describing its qualities (adjectives)
- in the third line, write three words of action about the element i.e. what that object does (verbs)
- in the fourth line, write four words describing how they feel about the element (phrase, sentence, expression)
- in the fifth and last line, write a word to replace the first noun (synonym).

Now let each student read out what she has written like a poem or song. Here is an example.

Butterfly
Delicate, graceful
Flutters, finds, sips
Seems weak but isn't
Beauty

This exercise can be done in any language.

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