APPENDIX I a

KNOWLEDGE TEST ON SUSTAINABLE DEVELOPMENT (KTSD)

Class: VII
Time: 45 minutes

Below are given few items to measure the awareness on sustainable development. Choose any one from the given options which you think is right.

1. Due to increase in the number of vehicles worldwide, which among the following is a major threat to environment?
   a) Rise in global temperature
   b) Increase desertification
   c) Floods
   d) More accidents

2. Which among the following is the main reason for the changes in weather patterns in the world that has led to unsustainable development?
   a) Industrialization
   b) Population explosion
   c) Poverty
   d) Illiteracy

3. Which of the following category does Tsunami, earthquakes and floods come under?
   a) Natural disaster
   b) Manmade disaster
   c) Creeping disaster
   d) None of the above

4. The effective way to bring awareness in illiterate people to reduce pollution is through………………
   a) Writing in books or journals
   b) Teaching Environmental Education through text books
   c) Through newspapers
   d) Providing awareness through community participation programmes.

5. Which among the following is the main reason for the melting of polar ice caps today?
   a) Global warming
   b) Ozone depletion
   c) Water pollution
   d) Acid rain

6. Which of the following areas is best for harvesting Wind energy?
   a) Forest
   b) Area with residential buildings
   c) Mountain tops
   d) Desert area

7. Which agency provides timely warnings regarding a natural calamity
   a) Meteorological and hydrological department
   b) Department of science and technology
   c) Agriculture department
   d) Space research department

8. There is an increase in the world population every year. Hence, it is essential to satisfy the food requirements of all the individuals. Among the following methods for increasing food production, which one do you feel is a possible option?
   a) Clearing forest
   b) Increasing yield on farmland already in production by using chemical fertilizers
   c) Developing high yielding varieties
   d) Aquaculture (culturing of water living organisms)

9. We know that China has the highest population. Which among the following is the second highly populated country?
   a) India
   b) Russia
   c) USA
   d) Japan
10. Which among the following is true for Fossil fuels?
   a) Everlasting in nature   c) They are renewable resources
   b) They are firewood   d) They are in limited stock

11. Which among the following is a major source of energy for other organisms in food chain?
   a) Autotrophs   c) Saprotrophs
   b) Parasites   d) Heterotrophs

12. We need to plant more trees. Why?
   a) Plants take in oxygen during respiration
   b) Plants give out carbon dioxide during respiration which is important
   c) Plants serve as an important source of energy in the form of fuels
   d) Plants give out oxygen during photosynthesis which is essential for maintaining life on earth.

13. Which among the following is important for maintaining a good health
   a) Rich diet
   b) Adequate exercise and rest
   c) Balanced diet with proper exercise and rest
   d) Drinking lots of water

14. Which among the following is true
   a) Humans/ People are destroying nature for satisfying his needs
   b) Humans/ People are conserving environment in all its form
   c) Humans beings and environment are considered to be equal
   d) Humans/ People are killing all living organisms on earth

15. Plants give out---------- gas which is used by most of the organisms for breathing. Hence, we should grow more trees.
   a) Oxygen   b) Carbon monoxide   c) Carbon dioxide   d) Methane

16. Which of these increase the fertility of agricultural land?
   a) Crop rotation   c) Deforestation
   b) Burning debris   d) Irrigation

17. Which among the following is a natural resource that supports the growth of plants and hence needs to be conserved?
   a) Coal   c. Soil
   b) Fossil fuels   d. Atmosphere

18. Which of the following helps in preventing soil erosion
   a) Planting more trees   c. Building dams
   b) Constructing more buildings   d. Building bunds

19. Weathering of rock results in the formation of soil. This soil contains many minerals which is essential for the life to exist in this earth. Which among the following does not cause the depletion of these minerals in the soil?
   a) Soil erosion   c. Mining
   b) Deforestation   d. construction of buildings

20. Which is a natural fertilizer?
   a) Earthworm   c. Sand
   b) Humus   d. Super phosphate
21. You might have heard about oxygen parlours in various metropolitan cities which serve the purpose of satisfying the oxygen needs of people. How can you maintain oxygen balance in the atmosphere?
   a) By increasing the number of oxygen parlours
   b) By planting more trees
   c) By using more number of air conditioners
   d) By increasing the use of fans and coolers

22. How is soil formed?
   a. By weathering of plants   c. By the action of chemicals
   b. By weathering of rocks   d. By the activity of microorganisms

23. Read the following information answer all of the questions below as best as you can.
    Sustainable: If a resource is sustainable it can keep going and will not run out. An example of this is a forest. When some trees die, others will be growing so that the forest will stay alive.
    Over-consumption: This is when a resource is consumed faster than it can be replaced. An example of this is when trees in a forest are cut at a faster rate than they can grow back. Eventually the forest will disappear.
    Optimum-consumption: This is when a resource is consumed at the same speed as it is being produced. An example of this is when trees in a forest are cut at the same rate as they are growing. The forest will stay the same size and is sustainable.
    Under-consumption: This is when a resource is consumed at a slower rate than it is being produced. An example of this is when trees in a forest are cut at a slower rate than they are growing. The forest will grow in size and is sustainable.

23.1. A wood contains 100 oak trees. Every year 5 new trees grow and 5 trees are chopped down for fire wood. Which type of consumption is this?

23.2. An area of the North Sea contains a fish stock of 100,000 Cod. Every year 5,000 Cod hatch. Every year people who fish catch 10,000 Cod. Which type of consumption is this and is it sustainable? Why?

23.3. Where there is over-population, there is always over-consumption. Do you agree with this statement? Why?

23.4. Why do some people think that it is important to manage resources in a sustainable way?

24. The movement of lithospheric plates in the oceans causes………………
   a) Earthquake   c) Tsunami
   b) Volcano   d) Cyclone

25. In which of the following part a river may be mostly polluted?
   a) In a forest   c) In residential areas
   b) In unpopulated areas   d) In a waterfall

26. Which among the following is a threat to the environment?
   a) Growing plant   c) Growing crops
   b) Growing animals   d) Growing population

27. When did a major Tsunami occur?
   a) December 26, 2004   c) December 26, 2006
   b) June 26, 2006   d) June 26, 2004
28. Which of the following gas when increased in the atmosphere causes melting of glaciers and sinking of coastal areas?
   a) Nitrogen      c) Carbon dioxide
   b) Oxygen      d) Hydrogen

29. Which of the following activities causes Desertification?
   a) Industries      c) Felling of trees
   b) Agriculture      d) Planting trees

30. Which is the group of people who depend on forests for their food, shelter, water and medicine?
   a) Rural people      c) Tribal people
   b) Urban people      d) People from foreign countries

31. We should plant more trees because the roots of trees help in preventing …………………
   a) Transpiration      c) Soil erosion
   b) Guttation      d) Water logging

32. Following is a graph which shows what happened to the forest that once covered the earth. Observe it and answer the following

   ![Graph showing the reduction of forests worldwide]

   Which continent experienced the more number of forest trees being cleared?
   a. Russia and Europe   c. North and Central America
   b. Asia      d. Africa

33. The natural environment is being depleting year by year. There are several reasons for depletion of natural environment. What is the main reason for the depletion of natural resources?
   a. Man’s exploitation of environment for satisfying his needs
   b. Natural phenomenon
   c. Various natural calamities
   d. Human settlements

34. Concretizing the ground causes ………………
   a) Decrease in percolation of water      c) Does not affect water percolation
   b) Increase in percolation of water      d) None of the above
35. Which is an alternative source of energy that is renewable and is produced by the movement of waves?
   a) Solar energy   c) Wind energy
   b) Hydel energy   d) Tidal energy

36. There have been many riots and violence between the states in our country on the issue of water. How can you solve such problems in the future?
   a. Through wars
   b. By constructing dams
   c. By discussing with authorities and practice Rain water harvesting
   d. By making boundaries

37. How can you create awareness in illiterate people about water conservation?
   a. Through discussion   c. Through newspapers
   b. Through community participation programmes   d. Through law

38. Following is a graph showing the population of various species of edible fishes such as Grouper, Snapper, Lobster and Rays that existed from 1980 to 2000.

   Use the above graph to help you answer the following questions. Assume that all of the species of the fishes are being consumed by humans.

   38.1. Name one population that has experienced:
      a) Optimum-consumption
      b) Over-consumption
      c) Under-consumption

   38.2. Which of the populations are being managed in a sustainable way?
      a) Grouper   b) Rays   c) Lobster   d) None of the above

39. Which of the following days is celebrated as the ‘World water Day’?
   a) June 5   c) December 1
   b) August 1   d) March 22

40. Which among the following is the best way to conserve water, so that we can overcome severe water problem in the future?
   a) Constructing dams   c) Rain water harvesting
   b) Digging bore wells   d) Making ponds
41. Which among the following made an improvement in agricultural crops to increase the food production
   a) White revolution    c) Blue revolution
   b) Green revolution    d) None of the above

42. Which of the following components of the environment is usually polluted by the use of DDT?
   a) Air        c) Soil
   b) Water      d) All the above

43. Which of the following is not a Green house gas?
   a) Carbon dioxide    c) Methane
   b) Chloro fluoro carbon    d) Oxygen

44. For which of the following is Medha Patkar famous for?
   a) Chipko movement    c) Green Revolution
   b) Narmada Bachao Andolan    d) Silent Valley Project

45. Which of the following helps in Rainwater harvesting?
   a) Recharge pits    c) Abandoned wells
   b) Recharge trenches    d) All the above

46. Why is rainwater harvesting done in some places?
   a. Due to heavy rains in that place    c. In order to grow more plants
   b. Due to lots of waste land    d. In order to use water for their present needs

47. How can you make local people aware about the importance of safe drinking water?
   a. Through medias and awareness programmes    c. Through textbooks
   b. Through discussion with friends    d. Through enforcement

48. Which among the following is the correct way of disposal of wastes?
   a. Disposing wastes into water bodies
   b. Disposing wastes after proper treatment and converting into less toxic forms
   c. Disposing wastes in some waste lands
   d. Burning wastes and converting it into ash

49. Which of the following gases protects us from harmful ultra violet rays?
   a. Carbon dioxide    c) Ozone
   b. Carbon monoxide    d) Nitrogen

50. Planting of more trees can decrease the excessive accumulation of ------- gas
   a. Oxygen    c) Nitrogen
   b. Hydrogen    d) Carbon dioxide

51. Ozone is present in ------- layer.
   a. Lithosphere    c) Stratosphere
   b. Mesosphere    d) Troposphere

52. Which is one of the main things that one should keep in mind while planting trees?
   a. Plant those trees that provide food or other eatables
   b. Plant those trees that provide wood
   c. Plant those trees that will suit the geography and environment of that area
   d. Plant any trees that one likes
53. Which of the following area experiences high pollution?
   a. Urban area     c) Tribal area
   b. Forests       d) Rural area

54. Oil leakage from ships causes damage to ..............
   a. Marine life     c) Terrestrial life
   b. Life of those living in air   d) None of the above

55. Which is the major environmental problem in Ganga-Brahmaputra Basin that usually creates problems for people living near the basin?
   a. Flood     c) Rain
   b. High temperature     d) Drought

56. Which is the vehicle that does not pollute the environment?
   a. Aeroplane     c) Buses
   b. Train       d) Cycles
### APPENDIX Ib
Scoring key for KTSD

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# APPENDIX I c

## KTSD Answer Sheet

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</tbody>
</table>
APPENDIX II a

CRITICAL THINKING TEST ON SUSTAINABLE DEVELOPMENT (CTTSD)

Class VII
Time: 1 hour 30 minutes

Following are given few items to measure the critical thinking abilities in sustainable development. Each item is followed by four alternative solutions. Choose the one which you prefer as the most appropriate option.

1. In a class, teacher gives the students a list of things like petrol, water, kerosene, wind, fossil fuels, solar energy, tidal energy and forest. The students were asked to categorize them. Below are given four different ways of classifying them. Which among the following do you feel is the correct classification?

   a) 
<table>
<thead>
<tr>
<th>Renewable resources</th>
<th>Non renewable resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fossil fuels</td>
<td>Water</td>
</tr>
<tr>
<td>Solar energy</td>
<td>Wind</td>
</tr>
<tr>
<td>Petrol</td>
<td>Tidal energy</td>
</tr>
<tr>
<td>Forest</td>
<td>kerosene</td>
</tr>
</tbody>
</table>

   b) 
<table>
<thead>
<tr>
<th>Renewable resources</th>
<th>Non renewable resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrol</td>
<td>Water</td>
</tr>
<tr>
<td>Solar energy</td>
<td>Fossil fuels</td>
</tr>
<tr>
<td>Tidal energy</td>
<td>kerosene</td>
</tr>
<tr>
<td>wind</td>
<td>Forest</td>
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</table>

   c) 
<table>
<thead>
<tr>
<th>Renewable resources</th>
<th>Non renewable resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Solar energy</td>
</tr>
<tr>
<td>Fossil fuels</td>
<td>Petrol</td>
</tr>
<tr>
<td>wind</td>
<td>Tidal energy</td>
</tr>
<tr>
<td>kerosene</td>
<td>Forest</td>
</tr>
</tbody>
</table>

   d) 
<table>
<thead>
<tr>
<th>Renewable resources</th>
<th>Non renewable resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Petrol</td>
</tr>
<tr>
<td>Solar energy</td>
<td>Fossil fuels</td>
</tr>
<tr>
<td>Tidal energy</td>
<td>Kerosene</td>
</tr>
<tr>
<td>wind</td>
<td>Forest</td>
</tr>
</tbody>
</table>

2. The students were given a list of things like CO₂, O₂, plants, N₂, Soil, animals, bacteria, dust particles, fungus, water, rocks, ferns, algae and birds. They were asked to make into categories based on their characteristics. Which one do you think the student should select.

   a) 
<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants</td>
<td>Birds</td>
</tr>
<tr>
<td>Algae</td>
<td>Fungus</td>
</tr>
<tr>
<td>CO₂</td>
<td>Water</td>
</tr>
<tr>
<td>O₂</td>
<td>Rocks</td>
</tr>
<tr>
<td>Dust particles</td>
<td>N₂</td>
</tr>
<tr>
<td>Bacteria</td>
<td>Ferns</td>
</tr>
<tr>
<td>Animals</td>
<td>Soil</td>
</tr>
</tbody>
</table>
b)

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Rocks</td>
</tr>
<tr>
<td>N₂</td>
<td>Soil</td>
</tr>
<tr>
<td>CO₂</td>
<td>O₂</td>
</tr>
<tr>
<td>Dust particles</td>
<td>Plants</td>
</tr>
<tr>
<td>Fungus</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Animals</td>
<td>Ferns</td>
</tr>
<tr>
<td>Algae</td>
<td>Birds</td>
</tr>
</tbody>
</table>

c)

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants</td>
<td>Fungus</td>
</tr>
<tr>
<td>Rocks</td>
<td>Bacteria</td>
</tr>
<tr>
<td>soil</td>
<td>Animals</td>
</tr>
<tr>
<td>O₂</td>
<td>Algae</td>
</tr>
<tr>
<td>Dust particles</td>
<td>Birds</td>
</tr>
<tr>
<td>Water</td>
<td>CO₂</td>
</tr>
<tr>
<td>Ferns</td>
<td>N₂</td>
</tr>
</tbody>
</table>

d)

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants</td>
<td>Water</td>
</tr>
<tr>
<td>Fungus</td>
<td>Rocks</td>
</tr>
<tr>
<td>Bacteria</td>
<td>Dust particles</td>
</tr>
<tr>
<td>Animals</td>
<td>Soil</td>
</tr>
<tr>
<td>Ferns</td>
<td>N₂</td>
</tr>
<tr>
<td>Algae</td>
<td>O₂</td>
</tr>
<tr>
<td>Birds</td>
<td>CO₂</td>
</tr>
</tbody>
</table>

3. Following is a list of some materials classified into natural and man-made things. Which of the following is the right classification?

a)

<table>
<thead>
<tr>
<th>Natural things</th>
<th>Man- made things</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Park</td>
</tr>
<tr>
<td>Rain</td>
<td>Dam</td>
</tr>
<tr>
<td>Soil</td>
<td>Zoo</td>
</tr>
<tr>
<td>River</td>
<td>Nuclear power plant</td>
</tr>
<tr>
<td>Trees</td>
<td>Rayon</td>
</tr>
<tr>
<td>Silk</td>
<td>Buildings</td>
</tr>
</tbody>
</table>

b)

<table>
<thead>
<tr>
<th>Natural things</th>
<th>Man- made things</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park</td>
<td>Water</td>
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<tr>
<td>Rain</td>
<td>River</td>
</tr>
<tr>
<td>Soil</td>
<td>Trees</td>
</tr>
<tr>
<td>Rayon</td>
<td>Dam</td>
</tr>
<tr>
<td>Buildings</td>
<td>Zoo</td>
</tr>
<tr>
<td>Silk</td>
<td>Nuclear power plants</td>
</tr>
</tbody>
</table>
4. Here is news that appeared in Deccan Herald, March 10, 2009, which is titled as ‘A silent revolution in Channapatna’. Go through the news item carefully.

“Though the forest region in and around Channapatna is fast depleting, a government official from Channapatna taluk has taken it upon himself to bring some greenery in the region. Mukund Rao who works in the Income tax department has found a committee for the protection of the environment…He chose a small hill, five kilometers away from the town, spread across 4,500 acres with the help of school students and NSS cadets, he started the process of planting varieties of flora on the hill. Today, the seedlings have sprouted in the barren hills of Channapatna.”

What do you think is the significance of such an effort?

a) Growing plants increases the green cover, increase rainfall and gives out enough Oxygen
b) Growing plants is useful for domestic purpose
c) It is a good model for others to follow it up.
d) It is easier to get the schools involved in such environment related works.

5. Ram lives in a village called Srirangapattanam, which has a beautiful river. The people mostly used the river to wash clothes, and cattle. Some also bathe in the river and some also performs pujas near the riverbank. In the panchayath meeting of the village it was decided by the members to implement a rule in the village that prohibits throwing wastes and garbage into the river and not to wash or bathe in the river. What do you think may be the reason for taking such decision?

a) It is a way of rain water harvesting
b) To keep the river water clean so that it does not cause the outbreak of any diseases
c) The water can be kept clean so that the nearby industries can get sufficient water for their work
d) The water should be kept clean for some holy ceremonies.

6. The students of VII standard planned for a field trip to a national park. The students came across a board stating ‘Plastic free zone’. Which among the following statements does not convey the meaning of the statement?

a) The area is free from plastics
b) The tourists are not supposed to throw plastics in that area
c) Should not throw plastics in the forest because it will not degrade
d) The plastics are sold free of cost in that area

7. “We have to redesign our cities in response to the climate changes and this means investment in green roofs (growing plants). Investments in grey infrastructure (buildings) runs into billions, but investment in green infrastructure remains tiny” Deccan Herald, March 31, 2009.
What does the above statement convey?
   a) Should make houses of green roofs
   b) Should plant more trees, make more parks etc
   c) Should build only concrete buildings around
   d) None of the above

8. Read the passage carefully
   “Mangrove forests are found abundantly on the banks of rivers. In the name of industry and
development people destroy mangrove forests. Mangrove forests provide conditions suitable for the
breeding of certain species of fish”.
   Put a tick mark against the statement that clears the meaning of the above passage.
   a. Mangrove forest also gives shade for human beings  (   )
   b. Mangrove forests have to be protected  (   )
   c. Industrial development should be given importance  (   )
   d. Mangrove forests are different from ordinary forests  (   )

9. Read the newspaper cutting carefully
   “Poverty is the main reason for more children running away from home…as scheduled caste and
tribes, they face discrimination and this also leads to their running away” (August 20,2008, Times of
India)
   Which statement clears the meaning of the above passage? Put a tick mark in the space given.
   a. Children are the wealth of our country  (   )
   b. Scheduled caste and scheduled tribes are not treated properly  (   )
   c. Lack of love and affection in families also leads to running away behaviour of children  (   )
   d. Due to many children in a house, the children usually run away from house  (   )

10. “Researchers generally agree that many species are now vanishing at least 100 and possibly as
much as 10,000 times faster than new ones are being born. Many experts believe that by the present
rate of environmental change, half the world’s surviving species could be gone by the end of the
century”. What do you think the threatening statement conveys? (Ref: National Geographic, January
2000)
    a) Man’s exploitation of the environment
    b) Over population of human beings
    c) Increase in the number of other species
    d) By the end of the century there will be no species left on earth.

11. “A survey was conducted in 4000 houses in nine slums in Bombay. The results showed that nearly
40% have two to four persons packed into one rooms; another 35% of houses have 5 to 9 persons
crammed into one living room and one percent have 10 or more persons living in a room. No house
has a private toilet. A quarter of the houses does not even have access to community toilets and use
the open space around the slum for defecation. Over a third has uncovered drains. This lack of
amenities makes the slum environment extremely dirty and prone to sickness”. What does the above
paragraph mean to you?
    a) The drastic and terrible life condition in the slum
    b) India has majority of people living in slums
    c) The people in the slum are responsible for making environmental pollution
    d) The slum dwellers should take care of themselves and should live in slums
throughout their life.
12. In an evergreen forest, which is densely populated, there is a river that flows through it. The government of that state decides to construct a dam across the river in the forest. What do you as a citizen of that state suggest the government.
   a) Let the government construct the dam in the forest, as it is not my business to interfere.
   b) I will suggest that instead of building dam in the forest, they can construct it outside the forest or in place where it is not densely populated.
   c) Dam is important for availability of water and electricity, so I will support the government to go ahead with the project.
   d) I will gather people and protest against the construction of dams.

13. There are two groups in your residential area in which group 1 wants to cut few tree for some construction purpose. Another group 2 does not want to cut the trees as it will disturb the biodiversity and the water body nearby and also it is a living place for many animals and birds. Which of the above arguments will you support?
   a) Group 1 which wants to cut the tree
   b) Group 2 which want to protect the tree
   c) I will not support any group
   d) I will support both Group 1 and group 2.

14. A nuclear energy plant is located in a place, which is highly populated. The government has decided to construct the plant there, because it has easy access to transportation facilities like airways, railways, waterways and roadways. There was a group, which was protesting, and another group, which was in favour. Their arguments are as follows. Which of the following do you support?
   a. The Government can construct the power plant in some other place, which may be a barren land
   b. All the local people should be shifted to some other places.
   c. The government can construct the power plant wherever it intends to be constructed.
   d. The government can leave the idea of constructing the nuclear plant

15. There is an industry on the banks of a river. It is usually seen that the wastes produced in the industry is released into the river. The manager of the industry was questioned by the local people as they were not able to use the water and also frequented by various diseases. They also felt that the organisms living in the water will be more affected. The manager was arguing by telling that industry is necessary for the economic development of the country. Whom do you support?
   a) The manager is rightly saying that industry is for the progress of the country, but is not taking an alternative for releasing the wastes
   b) The people are right in saying that the organisms in the water will die.
   c) The people are not right because the disease is caused by other reasons
   d) Neither the manager nor the local people were right.

16. A meeting was being held at the panchayath. The panchayath members have decided to construct a road which cuts through the properties of local people which also has several trees. One of the local person suggested that they can construct the road by taking a deviation, so that it will pass through a barren land and will not cause much harm to the trees and local people. There is a conflict occurring between the panchayath and the local people. Who do you think is of the right view?
   a. The panchayath has the right view because the roads are necessary for the progress of the country, and hence can construct the roads as they wish
   b. The local person is right it saying because it looks into the progress of the country as well as the protection of nature
   c. The local person is not right, because they can plant more trees if some of them are cut off
   d. Neither the local people nor the panchayath were right.
17. It was observed in the Human Development Report of 1998, that the amount spent on Education was $6 billion, whereas for alcohol in Europe is $105 billion, for Narcotic drugs is $400 billion, pet food is $17 billion. What should be the most suitable solution for a country to progress?
   a) A country should spend more on alcohol and drugs
   b) A country should increase the amount spent on education for a betterment of the nation
   c) A country can spend whatever amount it wishes for education, alcohol, drugs and pet foods
   d) A country should always spend lesser amount on education.

18. You might have seen mountains being denuded for several developmental purposes. There are several places that have witnessed the impact of such destruction to nature. Which among the following will be the most common natural disaster that is intended to occur in such situation?
   a) Global warming
   b) Soil erosion
   c) Cyclone
   d) Coastal areas being submerged.

19. You have seen the ‘Ganesha festival’ being celebrated in your locality. There was an argument between your parents regarding the Ganesha idol that they are going to purchase. Your father says that he is going to buy a Ganesha idol which is painted colourfully. But your mother wants to buy a Ganesha idol which is not painted by chemicals as she feels that the water should not be polluted by chemicals when they immerse ganesha. What will you suggest to resolve the argument?
   a. I will support my mother because Lead cause neurological damage and arsenic is a carcinogen whereas clay made Ganesha idol are eco friendly.
   b. I will support my father as it is easy to purchase a Ganesha idol made of chemicals
   c. I will not raise my opinion and be silent without bothering their argument
   d. I will support the father’s argument as it was the tradition which we usually follow in our house.

20. You have to go to your aunt’s house which is 10km. away from your house. Your mother insists that you can use the car for going to aunt’s house. But father opposes saying that it is better to go by bus which is a public means of transport. Finally the decision was left to you. Which among the following is your preference?
   a. I will go by car as we love going by car
   b. I will go by bus as I know that going by car leads to wastage of resources
   c. I don’t mind whether I go in a car or a bus
   d. I prefer to go by car because I can take my own time and way to reach my aunt’s house.

21. Read the passage and identify the strong arguments in it.
   (S- Strong.). Put a tick mark in the given space in the table

<table>
<thead>
<tr>
<th>Arguments</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>A We should not prefer to start new industry if it affects the environment negatively</td>
<td></td>
</tr>
<tr>
<td>B We can prefer it, because we want more developments</td>
<td></td>
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<tr>
<td>C We should not prefer it because it is against simple living</td>
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<tr>
<td>D It is preferable to shift the whole population to some other places</td>
<td></td>
</tr>
</tbody>
</table>
Following are few items for which you have to write about what you will do in those situations. Write them in the response column. One example is given.

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Statements</th>
<th>Responses</th>
</tr>
</thead>
</table>
| 22          | It was told that the drinking water you are taking contains some impurities in it. What strategies will you adopt to find out the cause of it? | 1. Check out the recent developments in the surrounding.  
2.  
3.  
4. |
| 23          | It is found in the recent times that some of the metropolitan cities are using Compressed natural gas as fuels in vehicles. What do you think would be the reasons for using it? | 1.  
2.  
3.  
4. |
| 24          | You know that chloro-fluro carbons are causing harm to the ozone layer. List out the different human activities you will suggest to save ozone layer from depleting? | 1.  
2.  
3.  
4. |

25. “All sorts of human activities lead to problems of water quality. It causes acid rain which is one of the biggest threats; ozone depletion; agricultural run-off which carry inorganic salts that make the water in rivers salty; power plants which release radioactive waste into the water etc.” Which among the following is the best way for water conservation and preventing water pollution?
   a) We need to dispose the wastes more wisely and see to it that it does not mix with water or air of our environment.
   b) All wastes should be disposed in water bodies.
   c) All wastes can be burnt off.
   d) If we mix wastes in the water, it will not reduce the oxygen level in the water.

26. Read the passage and write the answer for the following questions.

There were lots of leaf wastes in front of the school due to number of trees in front of the school. These wastes affect school cleanliness. The school authorities planned to burn the wastes. But some members of the school object to it saying that it will pollute the air. They said that waste could be dumped outside the school compound. Some others said that a pit may be dug and the wastes could be dumped into it and a compost pit may be made which can be used as manure to the plants.

   a) Identify the problem

   b) Determine the impact

   c) Identify the solutions

<table>
<thead>
<tr>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<tr>
<td>3</td>
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</tbody>
</table>

d) Choose the most effective solution with reason

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27. There are several sacred groves in India. The floral diversity in sacred groves is very rich. It not only yields non-timber forest products, but also harbors multiple use livelihood goods. Resources that are traditionally obtained from trees and plants located in sacred groves include fodder, fruits, dry fallen wood, seeds and medicine. Sacred groves are important source of water also. They are being preserved based on some religious beliefs and fear of God. Which among the following is your conclusion about the sacred groves?
   a) Sacred groves are places of religious importance and hence it should be destroyed
   b) Sacred groves is an example for a sustained natural ecosystem
   c) One can get fodder, fruits, medicines etc. from sacred groves
   d) Sacred groves are places where one can plan for some developmental work.

28. Read the news carefully and what do you conclude from this news. Put a tick against the correct answer in the given space.
   “Agriculture, which was earlier considered as a provider of food for the hungry, has got transformed into agro-business… but agriculture system should be close to nature as far as possible” (Oct 2, 2008, The Hindu)
   a. Agriculture is for food purpose    ( )
   b. Agriculture has become business, but should be close to nature   ( )
   c. Agriculture is so close to nature now.   ( )
   d. Agro business is better than industrial business   ( )

29. There is a glacier by name Siachen in the Himalayas. Recently news happened to appear in a daily which is as follows
   “Siachen glaciers' shrunk by half...”
   "The mighty siachen glacier has shrunk to half of its original length. The Siachen glacier was once 150km long and was covered with 600mt of ice. The glacier length today stands at only 74km. Deccan Herald, March 31, 2009.

   What will be the consequence or result if this reduction in length and height of glaciers continues?
   a) There will be more drinking water available
   b) The low lying areas and coastal areas will start to submerge
   c) There will be increase in the number of polar animals like penguin, polar bear etc.
   d) There will be more aquatic organisms.

30. Following are few activities seen in the modern world. Read them carefully.
   • 944mm of rainfall in 24 hours in Mumbai on July 2005
   • More than 20,000 people dying during heat waves of 2005 summer in Europe.
   • More and more people being affected by malaria and dengue
   The above listed activities are the result of which of the following
   a. It is due to climate changes occurring globally
   b. It is only due to heavy rainfall in some areas
   c. It is only due to drought in some areas
   d. None of the above.

31. Read the passage carefully
   Joel listed various ways of generating electricity, as a part of his project; from steam, wind, tides, biogas solar power and nuclear power etc. which can produce electricity. Teacher was happy with the project of Joel. He is a good student in the class and also the class leader.
   Various statements based on the above passage are given below. Among these statements identify the statements that show the result of his project
   a. Joel listed various ways of generating electricity    ( )
   b. From steam, wind, tides, biogas we can produce electricity    ( )
   c. He also listed solar power and nuclear power sources of generating electricity    ( )
   d. He is a good student and leader of the class    ( )
32. There is a chemical industry in your locality and also a river, which is flowing near by the industry. Earlier, the wastes from the industries were mixed with the river water, but later the authorities decided to practice wastewater treatment, so that chemical and toxics can be removed from the wastes liberated from the factory. What do you think is the correct way?
   a) Waste water can be released as such
   b) Water has natural purifying mechanism, hence it will purify by itself
   c) The wastewater should be properly treated and converted to less toxic forms before releasing it out.
   d) The wastes if released in water bodies do not have any harmful effect as wastes are also a part of our environment.

33. Read the passage carefully.
   Government authorities decided to build a huge shopping complex in the city. For this purpose they have to cut number of trees. Many people protested against it and put forward their opinions that it affects environment, it can take away the property of local people etc. many were in favour of the decision of the government and were of the opinion that it will lead to the progress of city, availability of goods etc. At last government decided to change the location of the shopping complex.
   a) Identify the problem from the given passage.
   b) List the option of the issue
   1.
   2.
   c) What are the positive and negative elements of the options?

<table>
<thead>
<tr>
<th>Option 1</th>
<th>Option 2</th>
</tr>
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<tbody>
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   d) What was the decision at last?

34. Read the passage carefully
   There was a hot discussion in the P.T.A meeting regarding the admission of two students who had AIDS. Some parents expressed not to admit them because there is a chance for other students also to infect and it affects the status of the school. There were others who were in favour of admitting them in school because they are also children like others and if we are not giving admission to them, it affects their life. Also they were of the opinion that AIDS will not spread through mere being together or playing. At last, the P.T.A decided to admit the two students in the school.
   a) Identify the problem from the given passage
   b) List the options of the issue
   1.
   2.
3. What are the positive and negative elements of the options?

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<th>Option 1</th>
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4. What was the decision at last?

35. Today there are several service stations to check the pollution from vehicles. But, earlier there was no much pollution checking centres. What is the main cause or reason for the increase in the number of such centres in the world?
   a) Due to the increase in the number of vehicles around  
   b) Due to the increased population  
   c) Due to the increased unemployment in the world  
   d) Due to the developments in science and technology.

36. There is a village by name ‘Alore’. The people of the village lived a very beautiful life, which was in accordance with the nature. Few years back some industries started to settle in Alore. They started mining industry, chemical factories, IT companies and number of educational institutions. But now the people of Alore, started getting many diseases mainly breathing problems. What do you think would be the reason for these diseases?
   a) It has nothing to do with the industries, mines or factories  
   b) The industries may be giving out some poisonous chemicals which causes breathing problems  
   c) The diseases might have been transmitted from their fore fathers  
   d) It is the fate that has caused the disease.

37. Which among the following do you always check after using tap water in your house?
   a. Will check whether the tap is closed properly because I know that water should not be wasted and it is meant for the future also.  
   b. I do not bother about closing it always because I know that someone will come and close it.  
   c. Will somehow close the tap not taking care that it is not closed properly.  
   d. Will not always close the tap after using it.

38. As a student you have read many articles regarding environmental protection. Whenever you are doing any work, which among the following is always considered by you?
   a. I will somehow finish the work without caring for the environment  
   b. I will just do what the others are also doing  
   c. I will think it whether the work is helping in maintaining a clean environment.  
   d. I am lazy to do any work, so I’ll sit idle.

39. Suppose you have a habit of putting dried grasses on fire just for fun and enjoying with friends. You have recently read in a book that these grasses are also a habitat or a living place for many animals and birds. What will you do the next time when you see dried grasses growing in your locality?
   a. I will continue as what I was doing earlier as putting fire on dried grasses  
   b. I will not put fire on dried grasses  
   c. I will not bother about what is read in the book.  
   d. I will not always put fire on dried grasses, but will do it sometimes when I am in the company of friends.
40. There is a beautiful lake in Ooty which was once so beautiful with its rich biodiversity and the fresh water around which was also a tourist spot. But now, people have destroyed the lake by throwing the garbage and wastes including plastics into the lake, such that the lake has lost its freshness and beauty. You have planned to visit the lake with your parents. Which among the following do you follow?

   a) I will not throw garbage or wastes into water bodies as I know that it causes water pollution which is harmful for all organisms.
   b) I will throw wastes in water bodies without looking into its consequences.
   c) I will just do things what the others are doing.
   d) I will not bother about others and will do as I wish.

41. For several months your class room was found to be very dirty with full of dust, wastes and cob web with all the table and chairs placed in disorder. It was found that nobody was ready to clean the room. What will you do as a student?

   a) I will not do anything and will go to the class as usual
   b) I will take initiative and call some friends and clean the class room and arrange chairs and desks properly
   c) I will ask the sweeper to clean it
   d) I will write to the head of the institution about the situation
## APPENDIX II b

CTTSD Answer key

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<td>22.1</td>
<td>Check recent developments</td>
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<td>Complaining the authority</td>
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<td>Testing the water in a lab</td>
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<td>Check the presence of any chemical industry</td>
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<td>Easy to produce</td>
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<td>No pollution/ alternative source of energy etc.</td>
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<td>Reduce the use of refrigerators</td>
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<td>24.2</td>
<td>Reduce the use of ACs</td>
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<td>24.3</td>
<td>Giving awareness to people</td>
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<td>24.4</td>
<td>Reduce the use of cosmetics</td>
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<tr>
<td>26 (a)</td>
<td>Leaf waste is accumulated in front of the school</td>
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<td>26(b)</td>
<td>School premises become dirty</td>
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<td>26(c)</td>
<td>Burn leaf waste, make compost etc.</td>
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<td>32</td>
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<td>33(a)</td>
<td>Constructing huge shopping complex by cutting trees</td>
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<td>33(b).1</td>
<td>Stop building shopping complex to protect the environment</td>
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<td>33(b).2</td>
<td>Construct shopping complex by cutting trees</td>
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<td>33(c)</td>
<td>Option 1 positive-Saving the environment/ sufficient space for parking</td>
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<td>Option 1 Negative-Progress of the city neglected/lack of availability of goods</td>
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<td>Option 2 Positive-Progress of the city/Various types of goods will be available</td>
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<td>Option 2 Negative-Environment is polluted/lack of parking area for the vehicles</td>
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<td>33(d)</td>
<td>Location of shopping complex was shifted to another place</td>
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<td>Admitting the 2 students with AIDS in the school</td>
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<td>Do not admit the students having AIDS in the school</td>
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<td>Option 1 Positive-Disease will not affect the other students</td>
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<td>Option 2 Positive-School can save the children having AIDS</td>
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<td>Option 2 Negative-It may affect the status of the school</td>
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APPENDIX II c
CTTSD Answer Sheet

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Option 1 | Option 2
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Positive | Negative | Positive | Negative
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APPENDIX III a
PROBLEM SOLVING TEST ON SUSTAINABLE DEVELOPMENT (PSTSD)
Class VII
Time: 30 minutes

Following are given few items to measure the Problem solving abilities in sustainable development. Each item is followed by four alternative solutions. Choose the one which you prefer as the most appropriate option.

1. There is a chemical industry on the banks of a river. It is usually seen that the wastes produced in the industry is transported into the river. The manager of the industry was questioned by the local people as they were getting frequent sickness and the water was not able to be used by the local people. What do you feel the most suitable solution for the problem?
   a. Allow the industry to dispose the wastes into the river
   b. Let the industry people and local people quarrel over the problem
   c. The industrial people can be asked to convert the wastes from the industry by recycling and transforming into less toxic substances.
   d. The local people can gather together and go for a strike against the industry.

2. It was planned by the panchayath that a road will be constructed in their village. The location selected was that there are number of trees in the site for road construction. The road can be constructed only if these trees are uprooted. The people living nearby are not ready to give off their lands as it may cause damage to the trees that are present in their property. There is a conflict occurring between the panchayath and the local people. What suggestion will you give in order to solve the problem?
   a. I will not interfere in the matter, as it is not my duty to solve the problem
   b. I will suggest that the road can be constructed through places where there are no much trees.
   c. I will support the panchayath and support them in constructing the roads.
   d. I will support the local people and will not support in constructing the roads.

3. The shops in Bangalore city are using only plastic bags. The shopkeepers are only concerned about its easy availability. Few people has come forward asking the shops to ban the use of plastic bags and shift to the use of eco-friendly bags like paper bags can be easily degraded unlike plastic bags. The shopkeepers and the local people meet and put their arguments. What do you think is the most appropriate solution for the argument?
   a. The shops can use plastic bags
   b. All the shops should shift from using plastic bags to eco friendly paper bags.
   c. Shopkeepers need not think of the after effects of using plastics.
   d. Let the agitation and arguments continue without coming to a solution.

4. Originating in Mexico, Swine flu (caused by Orthomyxoviruses endemic to pig populations) has caused more than 100 deaths there and moved to the U.S, where more than a dozen children in New York found to have caught it after a visit to Mexico. Cases have been reported in Spain and U.K.

   The Times of India, April 28, 2009, pp 1

   i) What is the problem that has been sensitized?
   a. The swine flu is spreading very fast which originated in Mexico.
   b. Only children are affected by swine flu
   c. Swine flu need not be considered as a serious problem.
   d. None of the above.
ii) What will you do to know more about it?
a. Collect more information from the newspaper and other resources.
b. I am not interested in collecting any information
c. I will just ask about it to elders.
d. I will ask my friends about it.

iii) What is the solution for the problem?
a. Killing all the pigs
b. Avoid visiting places that are affected by Swine flu
c. Taking pork in the diet
d. None of the above.

5. A city, which was highly populated, was using only plastic bags for their domestic purposes. The city was so much polluted with plastics, that the authorities were unable to dispose the plastics
   i. What is the alternative that you will suggest to the people?
a. Plastics can be buried in the soil
b. Try to use eco friendly bags like paper bags, cotton bags etc.
c. Can continue using plastic bags itself
d. Can use plastic bags, cloth bags and paper bags.

   ii) What will be the results if plastics are unable to dispose
a. They will get buried in the soil, which is not degradable and affect the life of all organisms living there.
b. Plastics will be decomposed in the soil
c. There is no problem if plastics are disposed anywhere.
d. It will not be a source of pollution.

   iii) What do you conclude from the above statement?
a. Plastics do not cause pollution
b. Can dispose plastics where ever possible
c. Do not dispose non degradable plastics into the nature
d. The authorities should take proper steps to dispose plastics

6. Forest clearing to provide farms for landless peasants or large cattle ranches often leave land and soil barren causing biodiversity loss and erosion are the major environmental concerns of tropical rain forests.
   i. What is the major environmental problem that will be faced in the future if this process continues?
a. It will not have any effect on the ecosystem
b. It can affect the global carbon cycle, global warming and loss of biodiversity
c. It will be helpful for poor people who can use it as fuels
d. More plants can be grown

   ii. What is the problem that is sensed in Tropical rain forests
a. Loss of biodiversity and soil erosion
b. Soil erosion
c. Extinction of species
d. Causing global warming

   iii) What is the alternative for preserving the lost biodiversity?
a. Afforestation
b. Constructing buildings
c. Deforestation
d. Converting forest lands to buildings
7. Farmers are using chemical fertilizers for their agriculture, which contain synthetically produced Ammonium and Nitrate compounds. These fertilizers are used very intensively by the farmers.
   i) What is the major problem that has been sensitized?
      a. The use of chemical fertilizers are reducing the fertility of the soil
      b. These chemical fertilizers can increase the productivity of crops by maintaining the fertility of the soil
      c. Synthetic Ammonium and Nitrate are similar to the natural ones
      d. There will be a decline of productivity in agrarian crops
   
   ii) What is the solution you would suggest for the problem?
      a. Can use more chemical fertilizers
      b. Practice using natural fertilizers or crop rotation
      c. Chemical fertilizers will not affect soil fertility
      d. Chemical fertilizers cannot harm the soil or plants, as it can be recycled
   
   iii) What will be the effect of using chemical fertilizers in large quantity?
      a. It can increase the soil fertility for several years
      b. It can enter the food chain and get deposited in humans and other animals
      c. Chemical fertilizers do not have any impact on any living beings
      d. It can yield good and highly nutritive food products from agricultural crops.

8. “The hardships and deprivation of poverty fall most heavily on women and children...nearly every sizable developing world city has thousands of stray children, on the order of 20 million in all by some estimates and their numbers are growing. Forced child labor, child prostitution and selling children for adoption are additional problems that exist in no small measures”
   i. What is the problem that is being sensitized?
      a. The problems faced by children due to poverty
      b. The problems faced by children
      c. Poverty is more in developing countries
      d. Lack of food and other amenities
   
   ii. How can you reduce the problems faced by children?
      a. By adopting the children to some people who doesn’t have children
      b. By arresting these children and taking them to juvenile court
      c. By putting forward new policies for protection of rights of children
      d. By providing them money
   
   iii. How can these children be rehabilitated?
      a. By providing housing and food for them
      b. By not providing them with food and shelter
      c. By taking them to juvenile jails
      d. By collecting money for them and constructing houses

9. It was observed in a village that the newborn ones were having severe genetic problems and genetic disorders occurring, which were due to the spraying of a pesticide named Endosulfan in their agriculture.
   i. What will be the alternative solution that you will suggest here?
      a. Can use natural pesticides instead of chemical pesticides.
      b. Can continue using endosulfan
      c. Genetic disorders are not due to the use of endosulfan
      d. Genetic disorders are due to the genetic problems of their ancestors
ii. How can you prove that the disorders happened due to the use of endosulfan?
   a. By consulting the companies or factories that produce endosulfan
   b. By testing it in laboratory and collecting data about whether such diseases occurred in their earlier generations
   c. By consulting a doctor
   d. By testing the chemicals on the coming generations

iii. What will be the consequence of using Endosulfan for several years
   a. Do not have any effect on human race.
   b. Can cause extinction of Human species as it produce genetically disordered ones
   c. Can result in evolution of new plants
   d. Plants will increase its productivity in the coming years

10. There is severe ‘Power cuts’ during the night times in some states of India. The Government and other authorities are of the opinion that the dams are not having enough water for producing the electricity needed for the domestic purpose of the whole nation.
   i. What is the major problem that is being sensitized here?
      a. The power cuts are due to the carelessness of the authorities
      b. There is more water in the dams
      c. There is a major water problem which causes lack of electricity being produced
      d. The states should not share water from other states
   
   ii. What is the alternative for solving the water problem?
      a. Can produce electricity from other sources of energy like wind energy, Tidal energy etc.
      b. Can use water from other states for producing electricity
      c. Can use generators in every houses
      d. Each house can purchase an Invertors

   iii. What will be the consequence of the use of water for producing electricity?
      a. There will be no water problem on the earth
      b. People will have a better living in the future
      c. People can share water from different states and countries
      d. There will be severe water problem and drought in the future.
APPENDIX III a
Scoring key of PSTSD

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**TOTAL** 24
APPENDIX III c
PSTSD Answer Sheet

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APPENDIX IV a

VALUE PREFERENCE SCALE ON SUSTAINABLE DEVELOPMENT (VPSSD)
Class VII
Time: 30 minutes

Instructions
Below are given some pairs of statements (a and b). Each statement is important, but you have to compare to judge which statement is important out of each pair. You have to make a cross (X) in the square given against the statement which you think more important. There are no right or wrong answers. Your answers will be kept confidential and will be used for my Ph.D work only.

I. You would like to maintain equality and concern towards sustaining environment and resources
   1. a. By protecting the trees in our compound
      b. By protecting the trees that are around us including those in parks and other public places
   2. a. By not discriminating urban and rural on the basis of medical facilities
      b. By not discriminating urban and rural on the basis of food availability
   3. a. By resolving issues regarding water problems that exist between nations
      b. By resolving issues regarding water problems that exist between states
   4. a. By treating all organisms as one among human beings
      b. By treating pet animals as one among us
   5. a. By providing food for the poor and needy
      b. By providing money for the poor and needy
   6. a. By considering that the water, trees, soil etc. belongs to all the creatures on the earth
      b. By considering that the water, trees, soil etc. belongs to only human beings

II. You would maintain solidarity towards environment for sustainable development
   7. a. By providing help such as food, clothes, house etc. to the victims of Tsunami
      b. By appreciating those people who provide help for the victims of tsunami
   8. a. By gathering my friends to stop the practice of cutting trees
      b. By gathering my friends to plant more trees
   9. a. By gathering people for providing relief in a cyclone hit area
      b. By gathering your friends and relatives for providing relief in a cyclone hit area
   10. a. By gathering people for planting mangrove saplings along riverside
       b. By gathering friends and relatives for planting mangrove saplings along riverside
   11. a. By appreciating those programmes that provide awareness about HIV/ AIDS to local people
       b. By participating in programmes for providing awareness about HIV/ AIDS to local people
   12. a. By confirming that the electricity in your room is switched off when not in use.
       b. By confirming that the electricity in your house/ school is switched off when not in use
   13. a. By asking my parents to put off the engine of their vehicle in traffic.
       b. By asking the people around you, to put off the engine of their vehicle in traffic

III. You would observe tolerance in order to attain sustainable development if
   14. a. One does not quarrel with their neighbours, if they are disposing wastes into their compound.
      b. One does not dump wastes into their neighbour’s compound if they are doing the same towards others.
   15. a. One uses electric fans during summers
      b. One uses air conditioner during summers.
16. a. One takes ice creams during hot summers  
   b. One takes in fruits during hot summers.

17. a. One takes proper diet in order to maintain a healthy mental and physical life  
   b. One takes proper diet and proper exercise in order to maintain a healthy mental and physical life.

18. a. One take effort to reduce water pollution  
   b. One takes effort to reduce environmental pollution.

19. a. By making sure that the individual does not add to green house gas by his activities  
   b. By making sure that one’s family does not add to green house gas by their activities

IV. **We can develop respect and care for environment and community of life**

20. a. By discouraging others in cutting trees  
   b. By encouraging others in planting more saplings

21. a. By protecting animals  
   b. By being kind to animals

22. a. By participating in awareness programmes about population explosion  
   b. By encouraging people who participates in programmes related to population explosion.

23. a. By minimising pollution  
   b. By avoiding the use of substances which cause pollution

24. a. By keeping birds as pet and protecting them in cage  
   b. By giving food to birds that are freely flying about

25. a. By planting some plants in the garden  
   b. By taking care of garden by watering plants

V. **We can maintain a shared responsibility for sustaining our environment if**

26. a. One considers that it is the responsibility of each individual to keep himself clean  
   b. One considers that it is the responsibility of each individual to keep his surroundings clean

27. a. One participates in keeping public properties clean and tidy  
   b. One works in group in keeping public properties clean and tidy

28. a. One raises his voice against different practices like cutting down of trees  
   b. One raise his voice in group against different practices like cutting down of trees

29. a. One individually organise programmes that can reduce smoking and use of alcohol  
   b. One organise programmes in groups that can reduce smoking and use of alcohol

30. a. One participates in groups that are involved in making a vermicompost/ rainwater harvesting in school  
   b. One works individually in making a vermicompost/ rainwater harvesting in school

31. a. One cooperates with class representatives to do any work regarding the protection of environment  
   b. One takes initiative by themselves to do any work regarding the protection of environment

32. a. One works individually in making a vegetable/ medicinal garden  
   b. One works in group in making a vegetable/ medicinal garden
VI.  We can attain socio-economic justice for a sustainable society
33. a. By participating in programmes for eradicating poverty from rural areas
b. By participating in programmes for eradicating poverty from the whole world
34. a. By supporting the authorities in providing more opportunities for males
b. By supporting the authorities in providing opportunities for all irrespective of gender
35. a. By supporting the authorities for providing the accessibility of education to all
b. By supporting the authorities for providing the accessibility of education only to urban areas
36. a. By giving more priority to men
b. By giving equal priority to men and women
37. a. By providing food and other medical amenities to your country
b. By providing food and other medical amenities to all countries
38. a. By supporting the educational facilities given by state to the urban areas
b. By supporting the educational facilities given by state to all

VII. We can develop ecological integrity for attaining sustainable development
39. a. By protecting the biodiversity of your locality
b. By protecting the biodiversity of the world
40. a. By exchanging the ecological knowledge acquired with the world
b. By exchanging the ecological knowledge acquired with ones nation
41. a. By preaching the human rights to be followed
b. By practicing the human rights that are to be followed
42. a. By participating in programmes related to community well being
b. By appreciating those who participates in programmes related to community well being
43. a. By preventing any harm to the environment
b. By teaching the students about the impacts of harming the environment

VIII. We can attain non violence and peace for a sustainable society
44. a. By not having war between nations
b. By not having war between states
45. a. By not indulging in activities like crimes, violence
b. By telling ones friends not to indulge in activities like crimes, violence
46. a. By not telecasting the scenes from war and violence through news
b. By not telecasting the scenes from war and violence through films
47. a. By investing more amount in military
b. By investing more amount in Education
48. a. By being friendly with your classmates
b. By being friendly with your close friends
49. a. By supporting the beliefs of your religion with logical reasoning
b. By blindly supporting your religion
50. a. By practicing values such as love, tolerance, non violence, ahimsa etc
b. By preaching values such as love, tolerance, non violence, ahimsa etc
## APPENDIX IV b
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### OBSERVATION SCHEDULE FOR PARTICIPATORY AND PERFORMANCE SKILL (OSPPS)

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<td>Pupil is taking initiative in solving environmental related problems</td>
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<td>Pupils are cooperating with their friends when working in groups when assigned some works related to SD</td>
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<td>Pupil is interested in working on solving environmental related problems</td>
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<td>Pupil takes keen interest in cleaning their environment without giving any instructions</td>
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<td>Pupil has leadership quality when taking up some projects and group works related to SD.</td>
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<td>7</td>
<td>Pupil is coming forward with innovative ideas to solve problems related to the environment</td>
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<td>8</td>
<td>Pupil is making models, which are innovative for protection of environment and society.</td>
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<td>Participates and performs well in poster competition on environmental protection.</td>
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<td>Participates and performs well in the exhibition for showing environmental protection.</td>
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<td>Is interested and listens to different programmes in the different Medias which are related to ESD and share them in class.</td>
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<td>Takes initiatives to conserve natural resources</td>
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<td>Show love and concern for animals and plants</td>
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<td>Participates with interest in programmes which are related to creating awareness about AIDS or HIV, TB, Polio etc.</td>
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<td>Take initiative and participates in preserving and conserving biodiversity</td>
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<td>Does not pollute the environment with wastes like sweet wrappers, waste papers etc.</td>
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<td>Does not waste food and other eatables</td>
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<td>Uses water judiciously</td>
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<td>Bring recent news regarding environmental protection from different Medias</td>
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<td>Take initiative for taking up small projects which can help in bringing about sustainable development.</td>
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APPENDIX XII A
WORKSHEET

1. What is the type of human settlement given above?

2. What are the advantages/disadvantages of such a settlement?

3. Identify the type of settlement

4. What are the developments that should be introduced to the rural areas?

5. Differentiate between the following
   - Temporary and permanent settlement
   - Urban and rural settlements
• Compact and scattered settlements
APPENDIX XII B

WORKSHEET

1. Have you ever changed your place of living (towards urban), what are the reasons for it?

2. In Indian society, women earn through producing goods in their homes (making bamboo baskets, broom sticks, agarbathi, beedi), picking and recycling rubbish to support their family income. But their hard work is paid in meagre amount which does not allow them to improve their standard of life. The gender discrimination in terms of payment is also in practice. As a responsible citizen, what is your role in improving the situation?

3. Gradually in cities and towns’ transportation becoming unmanageable due to increasing number of cars and private vehicles. Do you think, using public transport system may solve the problem? Discuss in groups and make your suggestions.

4. The life conditions of unorganised labours (construction, waste collection etc) in urban and metropolitan area are very miserable. They are deprived of permanent and quality accommodation due to geographical instability and they are unable to receive general government facilities like goods on subsidized cost and remain out-of-coverage of basic health, education and development services. Discuss this problem in your group, and work out some strategy to address it?

5. The extreme pollution by direct flow of industrial and domestic sewage through cannels and drains, dumping of non-biodegradable waste into river and rapid development works related to construction of roads and bridges by human activities causes threat to other animals and birds habitation as well as their extinction. The following data is of Okhla Bird Sanctuary
located in Yamuna river basin at Delhi. The following table gives the details of bird census of this year (2010) with respect to 2009.

<table>
<thead>
<tr>
<th>Name of the Bird</th>
<th>Number of migratory birds observed in 2010</th>
<th>Number of migratory birds observed in 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar-headed geese</td>
<td>112</td>
<td>212</td>
</tr>
<tr>
<td>Gadwal</td>
<td>72</td>
<td>302</td>
</tr>
<tr>
<td>Northern Shoveler</td>
<td>484</td>
<td>854</td>
</tr>
<tr>
<td>Northern pintail</td>
<td>172</td>
<td>272</td>
</tr>
<tr>
<td>Common coot</td>
<td>231</td>
<td>355</td>
</tr>
<tr>
<td>Mixed flock of brown-headed and black-headed gull</td>
<td>345</td>
<td>877</td>
</tr>
<tr>
<td>Eurasian widegeon</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Grey leg geese</td>
<td>411</td>
<td>416</td>
</tr>
<tr>
<td>Eurasian spoonbills</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Common teal</td>
<td>78</td>
<td>184</td>
</tr>
<tr>
<td>Common pochard</td>
<td>28</td>
<td>320</td>
</tr>
<tr>
<td>Tufted pochard</td>
<td>4</td>
<td>236</td>
</tr>
<tr>
<td>Greater flamingos (local bird)</td>
<td>20 (tracked later)</td>
<td>Large numbers</td>
</tr>
</tbody>
</table>

Discuss in your class how to regulate human activities, so that sustainable environment can be achieved.

6. There is a belief in our religious practice where, polluting rivers (putting things in river, taking bath, immersing ganesh statue in river) had been done for a long. In recent times rivers becoming major source of drinking water for urban and rural areas this practice become more dangerous. How to overcome this problem without hurting religious sentiments.

7. “Where hunger rules, peace cannot prevail”. “In India, agriculture neither intellectually satisfying, nor economically rewarding”. comment
Answer the following

1) What are the factors responsible for unhealthy nature of human health (List any 4)?

2) How do water logged areas near your house affect the health of people around you?

3) What are the precautions that you take during monsoon season to prevent yourself from getting diseases like fever?
4) List any two community activities that one can do to create a healthy environment around you?
APPENDIX VI a

Name of Units

Unit 1: Climate and climatic changes

  1. Heat
  2. Weather, Climate and adaptations of animals to climate
  3. Wind, Storms and cyclones

Unit 2: Nutrition

  1. Nutrition in plants

Unit 3: Soil

  1. Soil

Unit 4: Respiration

  1. Respiration in organisms

Unit 5: Our Earth

  1. Inside our earth
  2. Our changing earth
  3. Forests- our lifeline
  4. Natural vegetation and wildlife
  5. Environment

Unit 6: Fibre to fabric

  1. Fibre to fabric

Unit 7: Water management

  1. Water
  2. Water- A precious resource
  3. Waste water story

Unit 8: Air

  1. Air

Unit 9: Human environment- Interaction, settlement, transportation and communication

  1. Human environment- Settlements, Transport and communication
  2. Human environment- Interaction, the tropical and sub tropical region
  3. Life in the temperate grasslands
4. Life in the desert
APPENDIX VI b

Syllabus

Unit I: Climate and climatic changes

1. Heat
   1.1 Introduction
   1.2 Hot and cold
      1.2.1 What is temperature and how is it measured
      1.2.2 Heat and climatic change
      1.2.3 Heat and human health
   1.3 Measuring temperature
      1.3.1 What is a clinical thermometer and its importance
      1.3.2 Heat illness
      1.3.3 Heat cramps and heat stroke
   1.4 Laboratory thermometer
      1.4.1 What is laboratory thermometer and its importance
   1.5 Transfer of heat
      1.5.1 What is conduction and conductors
      1.5.2 What are insulators
      1.5.3 What is convection
      1.5.4 What is sea breeze and land breeze
      1.5.5 Radiation from the sun
      1.5.6 Use of Cu in wires
      1.5.7 Non conventional power plants
      1.5.8 Changes in sea breeze and land breeze
      1.5.9 Solar energy for domestic purposes
   1.6 Kinds of clothes we wear in summer and winter
      1.6.1 Global temperature increasing
      1.6.2 Health

2. Weather, Climate and adaptations of animals to climate
   2.1 Weather
      2.1.1 What is weather
      2.1.2 What are the elements in weather
      2.1.3 Maximum and minimum temperature and how is it recorded
      2.1.4 Length of days in summer and winter
      2.1.5 Changing weather patterns
      2.1.6 Adverse weather conditions
      2.1.7 Green house effect and its impact
   2.2 Climate
      2.2.1 What is climate
      2.2.2 What is Hot climate
      2.2.3 What is hot and wet climate
   2.3 Climate and adaptation
      2.3.1 What is adaptation
      2.3.2 Polar regions
         2.3.2.1 Characteristics of polar region
         2.3.2.2 Animals found in polar region and their characteristics
2.3.2.3 Climatic changes and melting of ice caps
2.3.2.4 Impacts of melting of polar ice caps

2.3.3 Tropical rain forests
2.3.3.1 Characteristics of tropical rain forests
2.3.3.2 Animals found in tropical rain forests and their characteristics
2.3.3.3 Deforestation
2.3.3.4 Endangered species- its causes, effects and preventive measures
2.3.3.5 Climatic change and its influence on life forms

3. Wind, Storms and cyclones
3.1 Introduction
3.1.1 Meaning of wind
3.1.2 Movement of air
3.1.3 Wind currents
3.1.4 Wind energy as an alternative source of energy
3.1.5 How to harvest wind energy

3.2 Air exerts pressure
3.3 High speed winds are accompanied by reduced air pressure
3.4 Air expands on heating
3.5 Wind currents are generated due to uneven heating on the earth
3.5.1 Uneven heating between equator and poles.
   3.5.1.1 Which region gets the maximum temperature
   3.5.1.2 Movement of wind during summer
   3.5.1.3 Movement of wind during winter
   3.5.1.4 Monsoon winds
   3.5.1.5 Heating of earth due to pollutants
   3.5.1.6 Green house effect
   3.5.1.7 Impact of heat on polar regions
   3.5.1.8 Difference in climate due to changes in wind patterns
3.5.2 Uneven heating of land and water
3.6 Thunder storms and cyclones
3.6.1 What is a thunderstorm
3.6.2 How a thunderstorm becomes a cyclone
3.6.3 Hurricanes like typhoon, tornado, flood and drought
3.6.4 Timely warnings
3.7 Destruction caused by cyclones or heavy rainfall
3.7.1 Outbreak of epidemics
3.7.2 Type of houses to be constructed in cyclone prone areas
3.8 Effective safety measures
3.8.1 Cyclone forecast and warning services
3.8.2 Cyclone shelters in cyclone prone areas
3.8.3 Importance of technology in forecasting and warning services
3.8.4 Action on the part of the people
   3.8.4.1 Precautionary measures to be taken
3.9 Advance technology has helped
3.9.1 Satellites and radars help in providing cyclone alert
3.9.2 Science and technology for a sustainable society

Unit II: Nutrition

1. Nutrition in plants
1.1 Nutrients
   1.1.1 Major nutrients
   1.1.2 Importance of nutrients in maintaining proper health
   1.1.3 Percentage of food production versus population
   1.1.4 Malnutrition and poverty
   1.1.5 Use of chemicals in agriculture
   1.1.6 Food production, management and food preservation

1.2 Plants make their own food but animals cannot
   1.2.1 Man destroying nature for satisfying his needs
   1.2.2 Loss of soil fertility

1.3 Mode of nutrition in plants
   1.3.1 How plants prepare food
   1.3.2 What is nutrition
   1.3.3 What are autotrophs and heterotrophs
   1.3.4 How do plants transport the nutrients
   1.3.5 Mineral degradation in the soil
   1.3.6 Food scarcity
   1.3.7 Nutrient deficiency
   1.3.8 Hybrid varieties and its impact
   1.3.9 Impact of excessive usage of pesticides and weedicides
   1.3.10 Chemical fertilizers and soil quality

1.4 Photosynthesis- food making process in plants
   1.4.1 Factors needed for photosynthesis
   1.4.2 Importance of photosynthesis
   1.4.3 Replenishing the soil nutrients
   1.4.4 Usable water getting reduced
   1.4.5 Solar energy as an alternative source of energy
   1.4.6 Amount of various gases in the atmosphere and impact
   1.4.7 Climatic change
   1.4.8 Importance of protecting plants
   1.4.9 Reforestation and human settlement
   1.4.10 Crop rotation
   1.4.11 Plant proteins

1.5 Other modes of nutrition in plants
   1.5.1 Heteromorphic mode of nutrition
   1.5.2 Insectivorous plants
   1.5.3 Biodiversity- importance of preserving it

1.6 Saprotrophs
   1.6.1 What is saprotrophs
   1.6.2 Lichens
   1.6.3 Its use in various industries

1.7 How nutrients are replenished in the soil
   1.7.1 Farmers using manures and fertilizers
   1.7.2 Nutrients get replenished
   1.7.3 Importance of rhizobium
   1.7.4 Use of natural manures
   1.7.5 Crop rotation
   1.7.6 Environmentally friendly activities
   1.7.7 Nitrogen fixing symbiotic and free living micro organisms
   1.7.8 Amount of food produced for the population
1.7.9 Agricultural land converting into buildings and industries
1.7.10 Conversion of agrarian culture into consumerism
1.7.11 Rural habitation shifting to urban
1.7.12 Self employment of farmers are disturbed

Unit III: Soil

1. Soil

1.1 Introduction
  1.1.1 Important natural resource
  1.1.2 Supports growth of plants and many organisms
  1.1.3 Soil depletion
  1.1.4 Soil erosion- causes effects and preventive measures

1.2 Soil treasuring with life
  1.2.1 Treasure of living organisms

1.3 Soil profile
  1.3.1 Layers of soil
  1.3.2 What is humus
  1.3.3 Weathering of soil
  1.3.4 What is soil profile
  1.3.5 Characteristics of A- horizon, B- horizon and C- horizon
  1.3.6 Bed rock
  1.3.7 How loss of humus soil occurs
  1.3.8 Mining and its effect on soil profile

1.4 Soil types
  1.4.1 Products of weathering
  1.4.2 Parent rock
  1.4.3 What is soil
  1.4.4 Sandy soil, clayey soil, loamy soil- characteristics
  1.4.5 Water and weathering
  1.4.6 Soil erosion and transport
  1.4.7 Lichens and weathering
  1.4.8 Chemical weathering and mechanical weathering
  1.4.9 Need to preserve soil

1.5 Properties of soil
  1.5.1 Percolation rate of water
  1.5.2 Percolation of water vs. various chemicals in the soil
  1.5.3 Soil water content and infiltration rates

1.6 Moisture in soil
  1.6.1 Nature of water vapour above the soil in summer
  1.6.2 Drainage on run off and flood
  1.6.3 Soil moisture and agriculture

1.7 Absorption of water by soil
  1.7.1 What is soil moisture?

1.8 Soil and crops
  1.8.1 Types of soil in different parts of India
  1.8.2 Factors affecting soil
  1.8.3 Climatic factors and vegetation
  1.8.4 Types of soil for various crops like, wheat, gram, paddy, lentils, pulses, cotton etc.
  1.8.5 Weather and climate
1.8.6 Run off potential
1.8.7 Soil erosion and slope failure
1.8.8 Reservoir management
1.8.9 Geotechnical engineering
1.8.10 Water quality
1.8.11 Soil management and crop management
1.8.12 Soil fertility and crop nutrition
1.8.13 Soil-borne diseases
1.8.14 Soil salinity, pH, and Nutrient requirement
1.8.15 Organic fertilizers and soil fertility

Unit V: Our Earth

1. Inside our earth
   1.1 Introduction
      1.1.1 Earth- a dynamic planet
   1.2 Interior of the earth
      1.2.1 Nature of crust, core and mantle
      1.2.2 Impact of mining on different layers of earth
   1.3 Rocks and minerals
      1.3.1 Types of rocks
      1.3.2 What is rock
      1.3.3 Types of rocks-igneous rocks (intrusive and extrusive rocks), sedimentary rocks and metamorphic rocks
      1.3.4 Rocks and ground water conservation
      1.3.5 Phosphate rocks for sustainable agriculture
      1.3.6 Quarrying and environmental impact
      1.3.7 Depleting of igneous, sedimentary and metamorphic rocks due to over usage by human beings.
      1.3.8 Sustainable development of mineral resources
      1.3.9 Rock cycle
      1.3.10 Over exploitation of minerals- how it influences the nature and life forms on earth.

2. Our changing earth
   2.1 Introduction
      2.1.1 Lithospheric plates
      2.1.2 Movement of lithospheric plates
      2.1.3 Endogenic forces
      2.1.4 Exogenic forces
      2.1.5 What is volcano and earthquake
      2.1.6 What is focus and epicentre
      2.1.7 Man’s activity affecting the earth
      2.1.8 Tsunami- a natural calamity
      2.1.9 Emission of gases in a volcanic eruption and how it harms our environment
      2.1.10 Improved technology as a helping agent in predicting natural calamities
   2.2 Major land forms
      2.2.1 Weathering and erosion
      2.2.2 Soil erosion- its causes and effects
   2.3 Work of a river
2.3.1 What is water fall
2.3.2 What are Meanders, ox bow lake, delta, levees, flood plain and distributaries
2.3.3 Human activities and water pollution
2.3.4 Flood: its importance and its impact on life forms
2.4 Work of sea waves
2.4.1 What are sea caves, arches, stacks and sea cliff
2.4.2 Tsunami waves: Its causes, effects and how to prevent such natural calamities
2.5 Work of Ice
2.5.1 Glaciers and glacial moraines
2.5.2 Green house effect and its effect on glaciers and coastal areas
2.6 Work of wind
2.6.1 Wind as an active agent for erosion
2.6.2 What are mushroom rocks, sand dunes and loess

3. Forests- our lifeline
3.1 Introduction
3.1.1 Forests as green lungs
3.1.2 Forests as an important renewable natural resource
3.2 Visit to a forest
3.2.1 Top canopy
3.2.2 Shrubs and herbs
3.2.3 Various food chains
3.2.4 Creepers and climbers
3.2.5 Various animals, insects, spiders, squirrels found
3.2.6 Decomposers
3.2.7 Transpiration
3.2.8 Green lungs
3.2.9 Tribes and forest
3.2.10 Seed dispersal by animals
3.2.11 Forest as a natural absorber of rain water
3.2.12 Role of forests in controlling floods
3.2.13 Role of forests in controlling soil erosion
3.2.14 Role of forests in bringing rainfall
3.2.15 Role of forests in reducing noise pollution
3.2.16 Forests and wildlife for maintaining ecological balance
3.2.17 Chief forest products
3.2.18 Tropical and sub tropical forests getting disturbed
3.2.19 Reasons for destruction of forests
3.2.20 Forests and ecological balance
3.2.21 Desertification
3.2.22 Deforestation
3.2.23 Afforestation
3.2.24 Plants and soil fertility
3.2.25 Impact of increase in CO₂ in the atmosphere
3.2.26 Forest and economy
3.2.27 Aesthetic value of forest
3.2.28 Eco tourism

4. Natural vegetation and wildlife
4.1 Introduction

4.1.1 Classification of natural vegetation into forests, grasslands and shrubs

4.1.2 What is biodiversity

4.1.3 Rio Declaration (1992)

4.1.4 Richer biodiversity in the tropics

4.1.5 Distribution of species in the polar regions

4.2 Forests: Tropical evergreen forests

4.2.1 Also called as tropical rain forests

4.2.2 Place is hot and receive heavy rainfall

4.2.3 Hardwood trees are found here

4.2.4 Flora and fauna vary depending on climate, altitude, soil

4.2.5 Hotspots of biodiversity

4.2.6 Changing biological diversity

4.2.7 Climate and trees found

4.3 Tropical Deciduous forest

4.3.1 Monsoon forests

4.3.2 Trees shed their leaves in the dry season

4.3.3 Climate and trees found

4.3.4 The hardwood trees found

4.3.5 Biology of rare and declining species

4.3.6 Restoration of ecology through ex-situ conservation

4.3.7 Determining patterns and indicators of ecological response to stress

4.4 Temperate evergreen forests

4.4.1 located in the mid-latitudinal coastal region

4.4.2 Climate and trees found

4.5 Temperate Deciduous forests

4.5.1 found towards higher latitudes

4.5.2 The common trees found

4.5.3 Ecosystems that are heavily affected by human beings

4.5.4 Restoration of the degraded ecosystem in an environmentally friendly manner

4.5.5 Climate and trees found

4.6 Mediterranean vegetation

4.6.1 Found in the west and south west margins of the continents

4.6.2 Climate and trees found here

4.6.3 United nations conservation of biological diversity

4.6.4 Monitoring the impact of deforestation and various forms of pollution

4.7 Coniferous forests

4.7.1 Found in the higher latitudes (50° – 70°) of Northern hemisphere

4.7.2 Climate and trees found

4.7.3 Conservation and wise use of world’s biodiversity for sustainable development

4.7.4 Endemic species and its conservation

4.8 Grasslands: Tropical grasslands

4.8.1 These grow on either side of the equator and extend till the tropics

4.8.2 Climate and trees found

4.8.3 Animals found

4.8.4 Conserving species which are vulnerable, endangered, rare, threatened and lower risk

4.8.5 Various causes of loss of biological diversity
4.8.6  Environmental pollution disturbs the food chain and food web, which lead to destruction of flora and fauna

4.9 Temperate grasslands
   4.9.1  These are found in the mid-latitudinal zones and in the interior part of the continents
   4.9.2  Plants and animals found
   4.9.3  Reasons for loss of biodiversity

4.10  Thorny bushes
   4.10.1  These are found in the dry desert like regions
   4.10.2  Climate found
   4.10.3  Plants and animals found
   4.10.4  Measures taken in India for conservation of biodiversity including the legal framework
   4.10.5  Promoting ex-situ conservation and in-situ conservation
   4.10.6  Human activities responsible for loss of plant diversity
   4.10.7  Policy measures for conservation and suitable utilization of forest biodiversity

5.  Environment
   5.1  What is environment
      5.1.1  What is environment
      5.1.2  What is natural environment
      5.1.3  What is man-made environment
      5.1.4  Human environment
      5.1.5  Human influence on natural environment
      5.1.6  Influence of human activities on land, climate, vegetation and wildlife
   5.2  Natural environment
      5.2.1  Components of natural environment
      5.2.2  Nature of lithosphere, hydrosphere, atmosphere and biosphere
      5.2.3  Depletion of the natural environment by various natural and human influences
      5.2.4  How the topsoil of the lithosphere get washed away
      5.2.5  Major landforms of earth
      5.2.6  Inter relationship of the realms (Lithosphere, Hydrosphere, Atmosphere and Biosphere) of the earth
      5.2.7  How climate changes influences the earth’s atmosphere and its life forms
      5.2.8  Need for conserving natural vegetation and wild life
   5.3  What is Ecosystem?
      5.3.1  Meaning of ecosystem
      5.3.2  Develop sensitivity towards environment
      5.3.3  How an ecosystem gets vanished, polluted and destroyed
   5.4  Human environment
      5.4.1  Transition of man from ancient to modern
      5.4.2  Human settlement, transport and communication- how it causes hindrance to natural environment
      5.4.3  Changes in the environment; like global warming, green house effect, ozone depletion etc
      5.4.4  Changing world due to globalization, commercialization, urbanization etc. and how it can influence the life forms
      5.4.5  Measures to control industrialization, urbanization etc
5.4.6 Need to sustain the natural environment for the well being of all life forms on earth

Unit VI: Fibre to fabric

1. Fibre to fabric
   1.1 Introduction
   1.1.1 Animals that produce wool and silk
   1.1.2 Importance of wool
   1.2 Animal fibres- wool and silk
   1.2.1 The wool yielding animals
   1.2.2 two types of fibres-1) the coarse beard hair 2) the fine soft under hair
   1.2.3 Selective breeding is done for producing offspring of special characteristics
   1.2.4 Growth of farm animals –its importance in eradicating poverty and attaining growth of economy
   1.2.5 Selective breeding for producing disease resistant varieties, high yielding varieties
   1.3 Animals that yield wool
   1.4 From fibre to wool
   1.4.1 Rearing and breeding of sheep
   1.4.2 Some of the breeds of sheep reared
   1.5 Processing fibre into wool
   1.5.1 Steps in wool processing
   1.5.2 Satisfy the needs (of fibre) of human beings without destroying or harming the population of sheep
   1.6 Silk
   1.6.1 What is sericulture
   1.6.2 Sericulture industry and its potential in India
   1.7 Life history of silk moth
   1.7.1 Life cycle
   1.7.2 Silkworm rearing and its importance in economy
   1.7.3 Silk industry
   1.7.4 Silk export
   1.7.5 New technology in sericulture
   1.8 From cocoon to silk
   1.9 Rearing silkworms
   1.9.1 Process of silk worm rearing
   1.9.2 Rearing of silkworm resulting in killing of pupa
   1.9.3 Conservation of silkworm genetic resources
   1.9.4 Development of appropriate technology for silkworm rearing
   1.9.5 For sustainable development of sericulture and progressive increase in productivity
   1.10 Processing silk

Unit VII: Water management

1. Water
   1.1 Introduction
   1.1.1 water cycle
1.1.2  One of the five elements- earth, fire, air, space and water
1.1.3  Modern development and mismanagement of water
1.1.4  Shortage of water leads to epidemics, hunger, despair and death

1.2  Distribution of water bodies
    1.2.1  Watershed projects
    1.2.2  Rainwater harvesting
    1.2.3  Activities to prevent runoff water
    1.2.4  Avoiding concretizing the land

1.3  Ocean circulation
    1.3.1  Waves, tides and currents

1.4  Waves
    1.4.1  What are waves
    1.4.2  What is Tsunami
    1.4.3  Construction of dams, buildings, destruction of forests and natural land etc. as the cause of earthquake and volcanic eruptions
    1.4.4  Reasons for occurrence of Tsunami

1.5  Tides
    1.5.1  What is tide
    1.5.2  High tide and low tide
    1.5.3  Spring tide and neap tides

1.6  Ocean currents
    1.6.1  What are ocean currents?

2.  Water- A precious resource
    2.1  Introduction
        2.1.1  World water day
        2.1.2  Amount water recommended per person per day
        2.1.3  Water scarcity- its causes, effects and preventive measures
        2.1.4  Need for a more oriented and integrated approach to water management and development
        2.1.5  Different ways of managing water
        2.1.6  Managing water at individual level, within cities and between states and countries

    2.2  How much water is available
        2.2.1  71% of earth’s surface is covered with water
        2.2.2  Most of this water is not fit for human consumption
        2.2.3  Fresh water
        2.2.4  Decreasing the amount of usable water on earth
        2.2.5  Impact of water depletion
        2.2.6  How water gets polluted
        2.2.7  Eutrophication
        2.2.8  No. Of rivers in the state
        2.2.9  Nationalizing rivers
        2.2.10  Water becoming a political issue
        2.2.11  Bloodshed occurred on water issues
        2.2.12  Greed for water and equal distribution of water

    2.3  Forms of water
        2.3.1  Water cycle
        2.3.2  Solid, liquid and gaseous forms of water on earth
        2.3.3  Various projects to protect water
2.3.4 How human settlements pollute water
2.3.5 Industrialisation and water pollution
2.3.6 Water quality management issues
2.3.7 Reutilisation and recycling of waste water
2.3.8 Water pollution control through law
2.3.9 Assessment of water quality
2.3.10 Use of solar power for cleaning polluted water

2.4 Groundwater as an important source of water
2.4.1 Water table
2.4.2 Infiltration
2.4.3 Aquifer
2.4.4 Future of groundwater resources at risk
2.4.5 Acid rain
2.4.6 Rain water harvesting
2.4.7 Constructing pits for conserving and percolation of water
2.4.8 Water management in kitchen
2.4.9 Water management in garden
2.4.10 Active participation at individual level

2.5 Depletion of water table
2.5.1 Depletion of water table
2.5.2 Increasing population and ground water
2.5.3 Population pressure on agriculture forces increasing use of ground water
2.5.4 Changing climatic patterns
2.5.5 Concrete buildings, mining and flooring reduce the percolation of water into the soil
2.5.6 A sustainable agriculture is needed to sustain the needs of the increasing population

2.6 Distribution of water
2.6.1 Excessive rainfall causes floods, whereas the absence of rain results in drought
2.6.2 The water available for use varies widely

2.7 Water management
2.7.1 How wastage of water occurs
2.7.2 use water economically
2.7.3 Ways of water harvesting or rain water harvesting
2.7.4 What is Bawri and drip irrigation
2.7.5 sustainable water use
2.7.6 Sustainable criteria for water

2.8 What role can you play? Effect of water scarcity on plants
2.8.1 Plants wilt and ultimately dry up if they are not watered
2.8.2 create awareness among the community
2.8.3 Ones role at home and school

3. Waste water story
3.1 Introduction
3.1.1 What is waste water
3.1.2 Stagnant wastewater causes different contagious diseases
3.1.3 replication of mosquitoes in stagnant water
3.2 Water, Our lifeline
3.2.1 accessibility to safe drinking water
3.2.2 increasing scarcity of fresh water is due to population growth, pollution, industrial development, mismanagement and other factors
3.2.3 the period 2005-2015 as the International Decade for Action on ‘Water for life’
3.2.4 sewage treatment
3.2.5 Chemical and microbial contamination of water
3.2.6 awareness among public about the steps to be taken for maintaining safe drinking water
3.2.7 Over exploitation and pollution of water
3.3 What is sewage
3.3.1 Meaning of sewage
3.3.2 Organic and inorganic impurities in the sewage
3.3.3 Proper disposal of wastes
3.3.4 Improper disposal of wastes from hospitals, industries etc. into water bodies and its impact on environment
3.3.5 mixing of degradable and non-degradable wastes
3.3.6 proper recycling of wastes
3.3.7 Sewage disposal in highly polluted places
3.3.8 Avoiding sewage disposal in areas of human settlements
3.4 Water freshens up- an eventful journey
3.4.1 Treatment plant
3.4.2 Regular checking of sewage pits to prevent the outbreak of contagious diseases
3.5 Wastewater treatment plant (WWTP)
3.5.1 Treatment of wastewater involving physical, chemical and biological processes
3.5.2 Role of technology in wastewater treatment
3.5.3 Convert sewage into usable forms like Biogas
3.5.4 Avoid direct discharge of wastes into water bodies
3.6 Become an active citizen
3.6.1 Participatory behavior of public
3.7 Better housekeeping practices
3.8 Sanitation and disease
3.8.1 Poor sanitation and contaminated drinking water is the cause of a large number of diseases
3.8.2 Untreated human excreta are a health hazard, cause water pollution and soil pollution
3.8.3 diseases like cholera, typhoid, Polio, Meningitis, Hepatitis and Dysentery
3.8.4 Outbreak of various diseases like Malaria, Chikunguniya etc due to unhygienic waste disposal and due to stagnant water
3.9 Alternative arrangements for sewage disposal
3.9.1 low cost onsite sewage disposal systems
3.10 Sanitation at public places
3.10.1 Railway stations, bus depots, airports, hospitals are places where large amount of waste is generated
3.10.2 The government has laid down certain standards of sanitation
3.11 Conclusion
3.11.1 Adopting good sanitation practices
3.11.2 individual initiative
3.11.3 collective action
Unit VIII: Air

1. Air
   1.1 Introduction
      1.1.1 What is atmosphere
      1.1.2 Importance of atmosphere
      1.1.3 one of the important element in the five elements- earth, fire, air, space and water

1.2 Composition of the atmosphere
   1.2.1 The composition of gases in the atmosphere needs to be maintained in a balance
   1.2.2 Atmosphere gets polluted due to different poisonous gases
   1.2.3 Need to plant more trees which is suitable for each place
   1.2.4 Planting of more suitable trees to prevent the excessive accumulation of carbon dioxide in the atmosphere
   1.2.5 Increase in carbon dioxide level leading to green house effect and global warming and its impact on the environment

1.3 Structure of the atmosphere
   1.3.1 Troposphere, Stratosphere, Mesosphere, Thermosphere and Exosphere
   1.3.2 How troposphere, stratosphere, mesosphere, thermosphere and exosphere get affected by human activities

1.4 Weather and climate
   1.4.1 What is climate
   1.4.2 Monitor the impact of climate change, deforestation and various forms of pollution

1.5 Temperature
   1.5.1 What is temperature
   1.5.2 What is insolation
   1.5.3 Changes in climatic patterns
   1.5.4 Trapping of solar energy for domestic purposes
   1.5.5 Temperature fluctuations causing global warming and its impact
   1.5.6 Industrialization, modernization, globalization and its relation to increase in temperature

1.6 Air pressure
   1.6.1 What is air pressure
   1.6.2 Cyclones and its impact

1.7 Wind
   1.7.1 What is wind
   1.7.2 Permanent wind, seasonal wind and local winds
   1.7.3 What is loo
   1.7.4 Changes occurring in various seasons like heavy rains during monsoon, rains during summer, lack of rain, rain in desert etc

1.8 Moisture
   1.8.1 Water vapour
   1.8.2 How is rain formed
   1.8.3 Rains that are not seasonal and its impact on environment
Unit IX: Human environment- Interaction, settlement, transportation and communication

1. Human environment- Settlements, Transport and communication
   1.1 Introduction
      1.1.1 What are settlements
      1.1.2 Early life
      1.1.3 Permanent and temporary settlements
      1.1.4 Rural settlement, compact settlement and scattered settlements
      1.1.5 The early man and how they lived a life in accordance with nature
      1.1.6 How exploiting of nature by man started
      1.1.7 Need for a sustainable development to satisfy the needs of man and without exploiting other organisms
      1.1.8 Compact settlements in big cities- how it creates pollution of various types
      1.1.9 Rural life- need of developments in these areas
      1.1.10 Urban life- has many differences- culturally, environmentally, morally
   1.2 Transport
      1.2.1 What is transportation
      1.2.2 Early transportation
      1.2.3 Modern transportation
      1.2.4 Modern transport causing various types of pollution
      1.2.5 Exploiting natural resources
   1.3 Roadways
      1.3.1 What are roadways
      1.3.2 Metalled and unmetalled roads
      1.3.3 Subways or under paths
   1.4 Railways
      1.4.1 The invention of the steam engine and the Industrial Revolution
      1.4.2 Diesel and electric engines have largely replaced the steam engines
      1.4.3 super fast trains
      1.4.4 Advanced technological skills
      1.4.5 It is the largest in Asia
   1.5 Waterways
      1.5.1 inland waterways and sea routes
      1.5.2 important ports of the world
      1.5.3 Oil leakage into water bodies from vessels moving in the sea
      1.5.4 Big ships causes harm to water- living organisms
   1.6 Airways
      1.6.1 Importance of airways
      1.6.2 Air traffic is adversely affected by bad weather
      1.6.3 important airports
   1.7 Communication
      1.7.1 information revolution in the world
      1.7.2 newspapers, radio and television- Mass communication
      1.7.3 Importance of satellites
      1.7.4 electronic mails or e-mails

2. Human environment- Interaction, the tropical and sub tropical region
   2.1 Life in the Amazon
      2.1.1 Climate
2.1.1.1 hot and wet climate

2.1.2 Rainforests
   2.1.2.1 thick forests grow that create dense roof and does not allow the sunlight to reach the ground
   2.1.2.2 plants and animals found
   2.1.2.3 Deforestation of these rain forests
   2.1.2.4 Conversion of these forests to agricultural lands
   2.1.2.5 Remote sensing technology helping in conservation of Amazon

2.1.3 People of the rain forest
   2.1.3.1 crops that are cultivated
   2.1.3.2 The indigenous population
   2.1.3.3 large area of the rainforest has been disappearing annually in the Amazon basin due to developmental activities
   2.1.3.4 Culture and life styles of the people are well adapted to the environment
   2.1.3.5 Threat to the Amazon basin is deforestation and cattle ranching

2.2 Life in the Ganga Brahmaputra basin
   2.2.1 monsoon climate
   2.2.2 Crops that are cultivated
   2.2.3 vegetation varies according to the landforms
   2.2.4 Mangrove forests
   2.2.5 variety of wildlife
   2.2.6 Animals found
   2.2.7 Tourism
   2.2.8 Water resource management approach
   2.2.9 Surplus water and flooding
   2.2.10 International conflicts and co-operation
   2.2.11 Environmental factors affecting quality and quantity of water
   2.2.12 Flood control programmes in India
   2.2.13 the environmental value and the geomorphic importance of floods
## APPENDIX VII

### CLASS VII- SCIENCE

### CHAPTER 1

**NUTRITION IN PLANTS**

<table>
<thead>
<tr>
<th>NAME OF CHAPTER</th>
<th>CONCEPTS IN THE TEXTBOOK</th>
<th>SUB CONCEPTS IN THE TEXTBOOK</th>
<th>ESD INTEGRATED</th>
</tr>
</thead>
</table>
| Nutrition in Plants | Nutrients | Proteins  
Fats  
Vitamins  
Minerals | What is the importance of nutrients in maintaining proper health  
Malnutrition and poverty  
Percentage of food production versus population  
Today no fruits and vegetables are there without chemicals  
Causes bio-magnification  
Food production, Food management and Food preservation |
| Plants make their own food but animals cannot. | | | How man destroys nature for satisfying his needs  
Loss of soil fertility |
| Mode of nutrition in plants | Plants prepare food by themselves using water. Carbon dioxide and minerals  
Nutrients help in building their bodies, to grow, repair damaged parts and providing energy.  
Nutrition is the mode of taking food by an organism and its utilization by body.  
The mode of nutrition in which organisms make food themselves is called Autotrophic organisms. Eg. Plants  
Heterotrophs are organisms | Importance of water not only to plants, but also for other organisms  
Degradation of minerals in soil  
Food prepared by plants are being used by human and food scarcity  
Nutrient deficiency leading to various diseases  
The plants upon which we depend on the food we eat, for the oxygen we breathe depends in turn upon the soil (which supplies with the mineral elements they use).  
Proper nutrients to be needed in appropriate quantity |
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where are food factories of plants located?</td>
<td>Introducing of hybrid varieties and its impact</td>
</tr>
<tr>
<td>How plants obtain raw materials?</td>
<td>Excessive use of pesticides and weedicides and its impact like causing of more diseases</td>
</tr>
<tr>
<td>How do they transport them?</td>
<td>Continuous use of fertilizers and pesticides reduces the quality of soil</td>
</tr>
<tr>
<td>Photosynthesis - food making process in plants</td>
<td>Leaves are food factories Water and mineral in soil are absorbed by roots</td>
</tr>
<tr>
<td></td>
<td>Carbon dioxide is taken from air through stomata.</td>
</tr>
<tr>
<td></td>
<td>Chlorophyll helps leaves to capture energy of sunlight.</td>
</tr>
<tr>
<td></td>
<td>Sun is the ultimate source of energy for all living organisms.</td>
</tr>
<tr>
<td></td>
<td>Photosynthesis (photo= light and synthesis= to combine) is a process in which the chlorophyll containing leaves in the presence of sunlight use carbon dioxide and water to synthesize carbohydrates (food- starch)</td>
</tr>
<tr>
<td></td>
<td>![Chemical Reaction](Sunlight CO2+H2O→chlorophyll Carbohydrates+ O2)</td>
</tr>
<tr>
<td></td>
<td>Oxygen, which is essential for survival of all living organisms, is produced during photosynthesis.</td>
</tr>
<tr>
<td></td>
<td>Leaves other than green also perform photosynthesis</td>
</tr>
<tr>
<td></td>
<td>Synthesis of plant food other than carbohydrates (proteins and fats) is by using nitrogen from the soil.</td>
</tr>
<tr>
<td></td>
<td>Replenishing the soil nutrients by various ways.</td>
</tr>
<tr>
<td></td>
<td>Usable water getting reduced.</td>
</tr>
<tr>
<td></td>
<td>Amount of various gases in atmosphere and its impact on earth.</td>
</tr>
<tr>
<td></td>
<td>Use of solar energy as a major source of energy (solar cooker, solar heater etc.)</td>
</tr>
<tr>
<td>Other modes of nutrition in plants</td>
<td>Some plants have heterotrophic mode of nutrition.</td>
</tr>
<tr>
<td></td>
<td>Plants like Cuscuta are parasitic over other plants</td>
</tr>
<tr>
<td></td>
<td>Biodiversity- Importance of preserving it.</td>
</tr>
</tbody>
</table>
Insect eating plants are called **Insectivorous plants**

**Saprotrophs**

The mode of nutrition in which organisms take in nutrients in solution form from dead and decaying matter is called saprotrophic nutrition and such plants are called saprotrophs. Eg. Fungi.

Some organisms live together and share shelter and nutrients, which is called symbiotic relationship.

In Lichens, a chlorophyll containing partner, which is an algae, and a fungus live together.

In industries like paper industry, beverages etc…its uses and harm to nature.

**How nutrients are replenished in the soil**

Farmers spread manure or fertilizers in the field.

Since plants absorb mineral nutrients from soil, it gets replenished.

Fertilizers contain Nitrogen, potassium, phosphorus etc.

A bacterium called Rhizobium can convert atmospheric nitrogen to its soluble form, which can be used by plants.

Rhizobium lives in the roots of leguminous plants in the form of symbiotic association with plants.

This is helpful for farmers since they need not add nitrogen fertilizers in the soil.

How can Rhizobium improve the yield of agricultural crops?

- Use of Natural manures in agriculture.
- Crop rotation as a means of improving soil fertility.
- Environment friendly
- Avoiding soil depletion in a natural way.
- Microorganisms that can fix atmospheric nitrogen can be classified into two main groups as symbiotic microorganisms and free-living microorganisms (eg. Cyanobacteria)

**How much agricultural land is available**

Amount of food produced per population

Agricultural land getting converted into buildings and industries

Conversion of agrarian culture into consumerism

Who should take care of agriculture

Selling of agricultural land and migrating to towns
### CHAPTER 3
#### FIBRE TO FABRIC

<table>
<thead>
<tr>
<th>Fibre to fabric</th>
<th>Introduction</th>
<th>Wool is obtained from the fleece (hair) of sheep or Yak.</th>
<th>Use of wool in colder parts of the world.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Silk fibres come from cocoons of the silk moth.</td>
<td></td>
</tr>
<tr>
<td>Animal fibres-wool and silk</td>
<td>Wool- It comes from sheep, goat, yak and some other animals.</td>
<td>The wool yielding animals bear hair on their body, which trap a lot of air. Air is a poor conductor of heat. So hair keeps these animals warm.</td>
<td>Growth of farm animals – its importance in eradicating poverty and attaining growth of economy.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The hairy skin of the sheep has two types of fibres-1) the coarse beard hair 2) the fine soft under hair.</td>
<td>Livestock production</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Selective breeding is done for producing offspring of special characteristics</td>
<td>Selective breeding for producing disease resistant varieties, high yielding varieties etc.</td>
</tr>
<tr>
<td>Animals that yield wool</td>
<td>Angora wool is obtained from angora goats found in hilly regions as Jammu and Kashmir.</td>
<td>Wool is obtained from goat hair.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Wool is obtained from goat hair.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Fur (hair0 on the body of camels is also used as wool.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Llama and Alpaca found in South America also yield wool.</td>
<td></td>
</tr>
<tr>
<td>From fibre to wool</td>
<td>Rearing and breeding of sheep</td>
<td>Sheep are herbivores and prefer grass and leaves.</td>
<td></td>
</tr>
</tbody>
</table>
Some of the breeds of sheep reared in our country are Lohi, Rampur bushair Nali, Bakharawal, Marwari, and Patanwadi.

<table>
<thead>
<tr>
<th>Processing fibre into wool</th>
<th>Step 1- The fleece of the sheep along with a thin layer of skin is removed from its body (shearing).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Step 2- The sheared skin with hair is thoroughly washed in tanks to remove grease, dust and dirt (scouring).</td>
</tr>
<tr>
<td></td>
<td>Step 3- The hairy skin is sent to a factory where hair of different textures are separated or sorted (sorting).</td>
</tr>
<tr>
<td></td>
<td>Step 4- Small fluffy fibres called burrs are picked out from the hair. The fibres are scoured again and dried.</td>
</tr>
<tr>
<td></td>
<td>Step 5- The fibres can be dyed in various colour, as the natural fleece of sheep and goat is black, brown or white.</td>
</tr>
<tr>
<td></td>
<td>Step 6- The fibre are straightened, combed and rolled into yarn.</td>
</tr>
<tr>
<td></td>
<td>Satisfy the needs (of fibre) of human beings without destroying or harming the population of sheep.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Silk</th>
<th>Silkworms spin the silk fibres.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The rearing of silkworms for obtaining silk is called ‘Sericulture’</td>
</tr>
<tr>
<td></td>
<td>Sericulture industry and its potential in India</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Life history of silk moth</th>
<th>The female silk moth lays eggs, from which hatch larva which are called caterpillar or silkworms.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Caterpillar moves to the next pupa stage where it first weaves a net to hold itself.</td>
</tr>
<tr>
<td></td>
<td>It swings its head from side to side in the form of a figure ‘8’. During the movements of the head the caterpillar secretes fibres made of a protein, which hardens on exposure to air and becomes silk fibre.</td>
</tr>
<tr>
<td></td>
<td>The caterpillar completely covers itself by silk fibres called cocoon.</td>
</tr>
<tr>
<td></td>
<td>Silk fibres are used for weaving</td>
</tr>
<tr>
<td></td>
<td>Silkworm rearing and its importance in economy of a country.</td>
</tr>
<tr>
<td></td>
<td>Silk industry Providing employment.</td>
</tr>
<tr>
<td></td>
<td>Silk export New technology in sericulture.</td>
</tr>
<tr>
<td>From cocoon to silk</td>
<td>For obtaining silk, moths are reared and their cocoons are collected to get silk threads.</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Rearing silkworms</td>
<td>A female silkworm lays hundreds of eggs at a time.</td>
</tr>
<tr>
<td></td>
<td>Eggs are stored carefully on strips of cloth or paper and sold to farmers.</td>
</tr>
<tr>
<td></td>
<td>Keep eggs under hygienic conditions and suitable conditions of temperature and humidity.</td>
</tr>
<tr>
<td></td>
<td>Eggs are warmed to suitable temperature for the larvae to hatch from eggs.</td>
</tr>
<tr>
<td></td>
<td>The worms are kept in clean bamboo trays along with fleshy chopped mulberry leaves.</td>
</tr>
<tr>
<td></td>
<td>After 25-30 days caterpillar stop eating and move to tiny chambers of bamboo in the tray to spin cocoon.</td>
</tr>
<tr>
<td></td>
<td>Small racks or twigs may be provided on which cocoon get attached.</td>
</tr>
<tr>
<td></td>
<td>Caterpillar or silk moth spins the cocoon inside which develops silk moth.</td>
</tr>
<tr>
<td>Processing silk</td>
<td>A pile of cocoon is used for obtaining silk fibres.</td>
</tr>
<tr>
<td></td>
<td>Cocoons are kept under sun or boiled or exposed to steam. The silk fibres separate out.</td>
</tr>
<tr>
<td></td>
<td>The process of taking out threads from the cocoon for use as silk is called reeling the silk (done by</td>
</tr>
</tbody>
</table>
CHAPTER 4
HEAT

<table>
<thead>
<tr>
<th>Heat Introduction</th>
<th>Woolen clothes keep us warm and we wear light coloured clothes when it is hot.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heat</strong></td>
<td><strong>Introduction</strong></td>
</tr>
<tr>
<td>Hot and cold</td>
<td>How do we decide which object is hotter than the other?</td>
</tr>
<tr>
<td></td>
<td>A reliable measure of the hotness of an object is its temperature.</td>
</tr>
<tr>
<td></td>
<td>Temperature is measured by a device called Thermometer</td>
</tr>
<tr>
<td></td>
<td>Climate change turning up the heat.</td>
</tr>
<tr>
<td></td>
<td>Heat beyond a limit can kill human beings</td>
</tr>
<tr>
<td></td>
<td>In extreme heat and humidity evaporation is slowed down and the body must work extra hard to maintain normal temperature.</td>
</tr>
<tr>
<td></td>
<td>Older adults, young children and those who are sick or overweight are more likely to succumb to extreme heat.</td>
</tr>
<tr>
<td>Healthy persons.</td>
<td>Asphalt and concrete store heat longer and gradually release heat at night which can produce higher night time temperature known as ‘urban heat island effect’</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>The clinical thermometer is designed to measure the temperature of human body only.</td>
<td>Heat stroke or sun stroke and its impact</td>
</tr>
<tr>
<td>The temperature of human body does not go below 35°C or above 42°C.</td>
<td>How to prepare oneself from extreme heat</td>
</tr>
<tr>
<td></td>
<td>Usually in high temperature, high humidity or rigorous exercise in hot weather, the natural cooling system (sweating) begin to fall which may result in heat illness, which can come in the form of heat cramps, heat exhaustion or heat stroke</td>
</tr>
<tr>
<td>Laboratory Thermometer</td>
<td>Laboratory Thermometer is generally from –10°C to 110°C.</td>
</tr>
<tr>
<td></td>
<td>The temperature must be read while the thermometer is in water in a laboratory thermometer.</td>
</tr>
<tr>
<td></td>
<td>In clinical thermometer there is a kink that prevents mercury level from falling on its own.</td>
</tr>
<tr>
<td>Transfer of Heat</td>
<td>Heat flows from a hotter object to a colder object.</td>
</tr>
<tr>
<td></td>
<td>The process by which heat is transferred from the hotter end to the colder end of an object is known as conduction.</td>
</tr>
<tr>
<td></td>
<td>The materials that allow heat to pass through them easily are conductors of heat. Eg. Al,Fe,Cu.</td>
</tr>
<tr>
<td></td>
<td>The materials that do not allow heat to pass through them easily are poor conductors of heat, which are called as</td>
</tr>
</tbody>
</table>

| Non-conventional power plants. |
| Development of environmentally friendly cables. |
| How geothermal heat pumps could power the future. |
insulators. Eg. Plastic, wood, water, air.

When water is heated the water near the flame gets hot. Hot water rises up, cold water from the sides moves towards the source of heat. This water also gets hot and rises and water from the sides moves down. This mode of heat transfer is called convection.

In coastal areas during day, the land gets heated faster than water. The air over the land becomes hotter and rises up, cooler air from sea rushes towards the land. Warm air from land move towards sea. The air from the sea is called sea breeze.

At night it is reverse. The water cools down more slowly than land. So the cool air from the land moves towards the sea. This is called land breeze.

From the sun the heat comes to us by a process called radiation.

The transfer of heat by radiation does not require any medium.

When heat falls on some object, a part of it is reflected, a part is absorbed and a part may be transmitted.

<p>| Kinds of clothes we wear in summer and winter | Dark surfaces more heat and hence one feel comfortable with dark coloured clothes in winter. Light coloured clothes reflect most of the heat that falls on them and hence feel more comfortable wearing them in summer. Wool is a poor conductor of heat. There is air trapped in between the wool fibres, which prevents the flow of heat from our body to the cold surrounding. Hence we feel warm in winter. | Seasonal land- sea temperature, in conjunction with certain weather patterns, can significantly affect wind speed. Often such changes causes changes in air mass stability or sea or land breeze development. Trapping of solar energy for domestic purposes like in solar heater, solar cooker etc. Global temperature increase due to increase in carbon dioxide. Importance of maintaining proper health. |</p>
<table>
<thead>
<tr>
<th>WEATHER, CLIMATE AND ADAPTATIONS OF ANIMALS TO CLIMATE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weather, climate and adaptations of animals to climate</strong></td>
</tr>
</tbody>
</table>
| **Weather** | The day-to-day condition of the atmosphere at a place with respect to the temperature, humidity, rainfall, wind speed etc. is called the weather at that place.  
The temperature, humidity and other factors are called the elements of the weather.  
Weather is a complex phenomenon that it can vary over very short periods of time.  
The maximum and minimum temperature can be recorded everyday using a maximum and minimum thermometer.  
The maximum temperature of the day occurs in afternoon while the minimum temperature occurs in early morning.  
Days are shorter in winter than summer. |
| **Climate** | The average weather pattern taken over a long time, say 25 years is called the climate of the place.  
If temperature at a place is high most of the time, then we say that the climate of that place is hot.  
If there is rainfall on most of the days in the same place, then we can say that the climate is hot and wet.  
Eg. In India, Kerala- very hot and wet  
J&K- moderately hot & wet  
Rajasthan (typical desert)-Hot &dry  
NE India- Wet |
| **Climate and adaptation** | Animals are adapted to survive in the conditions in which they live.  
Animals living in very hot and cold climate must possess special features to protect themselves against extreme cold or heat.  
Features and habits that help animals to adapt to their surroundings are a result of the process of evolution.  
Eg. Animals of polar regions and tropical rain forests. |
| **Changing weather patterns in different parts of the world.** |
| **Adverse weather conditions like drought, flood etc. in some places.** |
| **Green house effect and its impact.** |
| **Polar regions** | Eg. Canada, Greenland, Iceland, Norway, Sweden, Finland, Alaska in USA and Siberian region of Russia.  
Polar regions present an extreme climate, which is covered with snow.  
For 6 months the sun does not rise and for 6 months does not set.  
In winter the temperature can be low as −37°C.  
Polar bear found here have white fur which protects them from predators.  
To protect from extreme cold, they have thick layers of fur.  
They also have a layer of fat under their skin, which insulates the body from cold and keeps it warm.  
It has long curved and sharp claws, which help to walk in ice.  
It has a strong sense of smell, which helps to locate and catch its prey.  
Penguin is also white which has thick skin and lot of fat to protect from cold.  
Penguins are also good swimmers.]  
Other animals living in the polar regions are many types of fishes, foxes, oxen, reindeers etc.  
They migrate to warmer regions when winter sets in.  
Eg. Siberian Crane comes to India.  
| **Climate change and the melting of polar ice caps, its impacts.**  
If polar ice caps melts how it affects the life in polar regions. |
| **Tropical rain forest** | Eg. Malaysia, Indonesia, Brazil, Republic of Congo, Kenya, Uganda and Nigeria.  
Tropical region has a hot climate because of its location around equator.  
The coldest month has temperature less than 15°C and in summer it may cross 40°C.  
Days and nights are almost equal in length.  
They receive plenty of rainfall and has  
| **Deforestation.**  
Destruction of species leading to endangered species |
tropical rain forests.
It is found in Western ghats and Assam in India, South east Asia, central America and central Africa.

Major type of animals living here are monkeys, apes, gorillas, lions, tigers, elephants, leopards, lizard, snakes, birds and insects.

The climatic conditions are highly suitable for supporting an enormous number and variety of animals.
Eg. Toucan (bird) and its characteristics.

Many tropical animals have sensitive hearing, sharp eyesight, thick skin and a skin colour, which helps them to camouflage by blending with the surroundings.
Eg. Big cats. Lion, tigers etc.

Lion tailed macaque and its characteristics.
Elephant and its characteristics.

How these species can be affected as a result of deforestation.

How change in climatic conditions influence the life forms in tropical rain forest.

What are endangered species and its causes, effects and preventive measures.

---

### CHAPTER 8
**WIND, STORMS AND CYCLONES**

| Wind, storms and cyclones | Wind currents are | Introduction, Air exerts pressure, High-speed winds are accompanied by reduced air pressure, Air expands on heating | The moving air is called wind. Air exerts pressure. High-speed winds are accompanied by reduced air pressure. Air moves from the region where the air pressure is high to the region where pressure is low. Air expands on heating. Warm air is lighter than the cold air. Wind currents are generated due to uneven heating on the earth. | Use of wind energy as an alternative source of energy. Wind turbines for harvesting wind energy. | Regions near the equator get maximum heat from the sun. Heating of earth, due to the pollutants |
generated due to uneven heating on the earth.
Uneven heating between equator and poles.

Air in these regions gets warm which rises up and the cooler air from the regions in the 0-30 degrees latitude belt on either side of the equator moves in.
These winds blow from the north and south towards the equator.
At the poles the air is colder than that at latitudes about 60 degrees. The warm air at these latitudes rises up and the cold wind from the polar regions rushes in, to take its place.

Green house effect and global warming.
Impact of heat on the polar regions, which ultimately affect the low-lying areas and coastal areas.
Changes in wind patterns causing difference in climate.

Uneven heating of land and water

In summer, near the equator the land warms up faster and most of the time the temperature of the land is higher than that of water in the oceans.
The air over the land gets heated and rises. This causes the winds to flow from the oceans towards the land.
In winter, the direction of the wind gets reversed.
The monsoon wind carries water and it rains.

Hurricanes like Typhoon, Tornado, flood and drought leading to human sufferings, loss of lives, economic damage.
Timely warnings are essential for mitigating the disastrous impact on population and economy.
Information provided by National Meteorological and hydrological services is crucial for sustainable development in all countries.

Thunderstorms and cyclones

Thunderstorm develops in hot, humid tropical areas like India.
The rising temperature produce strong upward rising winds, which carry water droplets, upwards, when they freeze and fall down again.
The swift movement of the falling water droplets along with the rising air creates lightening and sound. This is called Thunderstorm.

How a thunderstorm becomes a cyclone

Before cloud formation, water takes up heat from atmosphere to change into vapour.
When water vapour changes back to liquid (raindrops) heat is
released to the atmosphere, which warms the air around.

The air tends to rise and cause a drop in pressure. More air rushes to the center of the storm.

This chain of events ends with the formation of a very low-pressure system with very high speed winds revolving around it. It is called a cyclone.

Wind speed, wind direction, temperature and humidity contribute to the development of cyclones.

Strong winds push water towards the shore even if the storm is hundreds of kilometers away.

Low pressure in the eye lifts water surface in the center where water may rise as high as 3-12 meters, which appear like a water wall moving towards the shore.

As a result seawater enters the low-lying coastal areas causing severe loss of life and property, which can also reduce fertility of soil.

Continuous heavy rainfall may worsen the situation.

It can damage houses, telephones, other communication systems, trees etc.

Tornadoes: Tornadoes is a dark funnel shaped cloud that reaches from the sky to the ground.

A violent tornado can travel at a speed of about 300km/ hour. It may form within cyclones.

The whole coastline of India is vulnerable to cyclones, particularly the east coast.

Weather, climate and water resources have a drastic impact on socio-economic development and well being of human kind.

Cause drowning of human beings and livestock, erode beaches and embankments, destroy vegetation and reduce soil fertility.

Floods and coastal inundation pollute drinking water and cause outbreak of epidemics.

Measures to be taken during a cyclone hit.

The type of houses to be constructed in places which are prone to cyclones.

**Effective safety**

**Cyclone forecast and warning service.**

**Importance of technology in forecast and warning**
<table>
<thead>
<tr>
<th>Action on the part of the people</th>
<th>Measures</th>
<th>Services.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Should not ignore the warnings issued by meteorological department.</td>
<td>Rapid communication of warnings to the government agencies, port, fisherman, ships and public.</td>
<td></td>
</tr>
<tr>
<td>Make necessary arrangements to shift essential goods.</td>
<td>Construction of cyclone shelters in cyclone prone areas.</td>
<td></td>
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<tr>
<td>Avoid driving vehicles through standing water.</td>
<td></td>
<td></td>
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<tr>
<td>Keep ready phone number for emergency services.</td>
<td></td>
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<tr>
<td>Precautions to be taken if one is staying in a cyclone hit area.</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Advance technology has helped</th>
<th>Science and technology for a sustainable society.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due to satellites and radars, a cyclone alert or cyclone watch is issued 48 hours in advance of any expected storm and a cyclone warning is issued 24 hours in advance.</td>
<td></td>
</tr>
</tbody>
</table>

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**CHAPTER 9**

**SOIL**

<table>
<thead>
<tr>
<th>Soil Introduction</th>
<th>Soil profile</th>
<th>Depleting of soil, which is rich in nutrients.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil is one of the most important natural resources.</td>
<td>Soil is composed of distinct layers.</td>
<td>Soil erosion: its causes, effects and preventive measures.</td>
</tr>
<tr>
<td>It supports growth of plants.</td>
<td>The rotting dead matter in the soil is called humus.</td>
<td></td>
</tr>
<tr>
<td>It is home for many organisms.</td>
<td>Soil is formed by the breaking down of rocks by the action of wind, water and by a process called weathering.</td>
<td>Loss of humus soil due to various natural disasters like flood. Soil erosion etc.</td>
</tr>
<tr>
<td>It is essential for agriculture, which provides food, clothing and shelter for all.</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Soil trembling with life</th>
<th>Soil is a treasure of living organisms like microbes, plants, animals etc.</th>
<th></th>
</tr>
</thead>
</table>
A vertical section through different layers of the soil is called soil profile.

Each layer (horizon) differs in texture, colour, depth and chemical composition.

The uppermost horizon is dark in colour and rich in humus and minerals, which makes the soil fertile and provides nutrients to growing plants.

This layer is soft, porous and retains more water which is called topsoil or A-horizon, which provides shelter for many living organisms such as worms, rodents, moles, beetles.

The next layer has a lesser amount of humus, but more of minerals.

This layer is harder and more compact and is called B-Horizon or middle layer. The third layer is the C-horizon, which is made up of small lumps of rocks with cracks and crevices.

Below this layer is the bedrock, which is hard and difficult to dig.

<table>
<thead>
<tr>
<th>Soil types</th>
<th>Weathering of rocks produces small particles of various materials like sand and clay. The relative amount of sand and clay depends upon the rock from which the particles were formed ie. The parent rock. The mixture of rock particles and humus is called the soil. If soil contains greater proportion of big particles it is called sandy soil. If the proportion of fine particles is relatively higher, then it is called clayey soil. If the amount of large and fine particles is about the same, then the soil is called loamy. Sandy soil tends to be light, well aerated and dry.</th>
<th>Importance of water in weathering Soil erosion and transport (Sediments on move). Importance of lichens in weathering of rocks. - Chemical weathering - Mechanical weathering Aggregate water stability of sandy and clayey loam soils. Plants growing in loamy and clayey soils. Need to preserve the soil.</th>
</tr>
</thead>
<tbody>
<tr>
<td>How mining affects the soil profile?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Properties of soil</td>
<td>Clay particles are much smaller, can pack tightly leaving little space for air. Water can be held in tiny gaps. The best topsoil for growing plants is loam. Loamy soil is a mixture of sand, clay and silt. It has humus in it, which has the right water holding capacity for growth of plants.</td>
<td>Water percolation being affected by various chemicals in the soil. The soil water content influences infiltration and percolation rates.</td>
</tr>
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</tr>
<tr>
<td>Moisture in soil</td>
<td>On a hot summer day, the vapour coming out of the soil reflects the sunlight and the air above the soil seems to shimmer.</td>
<td>Influence of drainage on run off and flooding. Soil moisture and its impact on agriculture</td>
</tr>
<tr>
<td>Absorption of water by soil</td>
<td>Soil holds water in it, which is called soil moisture.</td>
<td></td>
</tr>
<tr>
<td>Soil and crops</td>
<td>Different types of soil are found in different parts of India. Soil is affected by wind, rainfall, temperature, light and humidity. The climatic factors and components of soil determine the various types of vegetation and crops grown. Clayey and loamy soils are both suitable for growing cereals like Wheat and Gram. For paddy, soils rich in clay and organic matter and having good capacity to retain water are ideal. For lentils and other pulses, loamy soils, which drain water easily, are required. For cotton, sandy loam or loam which drain water easily and can hold plenty of air are more suitable. Crops such as wheat are grown in the fine clayey soils because they are rich in humus and are very feeble.</td>
<td>Weather and climate. Run off potential and flood control. Soil erosion and slope failure. Reservoir management. Geotechnical engineering. Water quality. Soil management and crop management. Soil fertility and crop nutrition. Soil borne diseases. Soil salinity, pH, and Nutrient requirement. Organic fertilizers and soil fertility.</td>
</tr>
</tbody>
</table>
CHAPTER 10
RESPIRATION IN ORGANISMS

<table>
<thead>
<tr>
<th>Respiration in organisms</th>
<th>Why do we respire</th>
<th>Carbohydrates (glucose), proteins (amino acids) and fats (fatty acids) are broken down during respiration.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Each cell of an organism performs certain functions such as nutrition, transport, excretion and reproduction for which they need energy.</td>
<td>Fat need more oxygen for its complete breakdown.</td>
</tr>
<tr>
<td></td>
<td>The food has stored energy, which is released during respiration.</td>
<td>High deposit of fats in human body increases ones weight and is difficult to oxidize.</td>
</tr>
<tr>
<td></td>
<td>All living organisms respire to get energy from food.</td>
<td>Need of proper exercise to maintain a proper amount of carbohydrates, protein and fats in the body.</td>
</tr>
<tr>
<td></td>
<td>The air we breathe in contain oxygen and that we breathe out is rich in carbon dioxide.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The air we breathe in is transported to all parts of the body and ultimately to each cell.</td>
<td></td>
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<tr>
<td></td>
<td>In the cells, oxygen in the air helps in the breakdown of food with the release of energy by a process called cellular respiration.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cellular respiration takes place in the cells of all organisms.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the cell, the food (glucose) is broken down into carbon dioxide and water using oxygen.</td>
<td></td>
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<tr>
<td></td>
<td>When breakdown of glucose occurs with the help of oxygen, it is called aerobic respiration.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Food can also be broken down, without using oxygen, which is known as anaerobic respiration.</td>
<td></td>
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<tr>
<td></td>
<td>Breakdown of food releases energy.</td>
<td>Industrial metabolism—recycling of materials.</td>
</tr>
<tr>
<td></td>
<td>Glucose $\rightarrow$ $\text{CO}_2 + \text{H}_2\text{O} + \text{Energy}$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organisms like yeast survive in the</td>
<td></td>
</tr>
</tbody>
</table>

18
absence of air, which are called as anaerobes. Here in the absence of 
$O_2$, glucose breaks down into 
alcohol and carbon dioxide.
Glucose without the use of oxygen
Alcohol +$CO_2$ + Energy

Anaerobic respiration takes place 
in muscle cells.
Glucose in the absence of oxygen

Lactic acid+ Energy

The accumulation of lactic acid 
causes muscle cramps.

Hot water bathos massage 
improves circulation of blood, 
which results in increase in the 
supply of oxygen to the muscle 
cells.

The increase in the supply of 
oxgen results in the complete 
breakdown of lactic acid into 
carbon dioxide and water.

Use of anaerobes in 
fermentation in various 
industries like paper 
industry, textile industry 
etc.

Active exercise to reduce 
muscle fatigue.

| Breathing | Breathing means taking in air rich 
in oxygen and giving out air rich in 
carbon dioxide with the help of 
respiratory organs. 

The taxing in of air rich in oxygen 
into the body is called inhalation. 

Giving out of air rich in carbon 
dioxide is known as exhalation. 

The number of times a person 
breathes in a minute is termed as 
the breathing rate. 

A breath means one inhalation plus 
one exhalation. 

Whenever a person needs extra 
energy, he or she breathes faster, 
so that more oxygen is supplied to 
our cells. |
|---|
| Increase in $CO_2$ content in 
the atmosphere. 

Resulting in building 
oxxygen parlours in big 
cities and towns. 

Breathing problems due to 
changing life styles. |

| How do we breathe | We take in air through our nostrils. 

When we inhale air, it passes 
through our nostrils into the nasal 
cavity. 

From the nasal cavity, the air 
reaches our lungs through the |
|---|
| Various diseases of 
respiratory system due to 
changes in environment. |
Lungs are present in the chest cavity, which is surrounded by ribs on the sides.

A large muscular sheet called diaphragm forms the floor of the chest cavity.

Breathing involves the movement of the diaphragm and the rib cage.

During inhalation, ribs move up and outwards and diaphragm moves down, which increases space in the chest cavity and air rushes into the lungs.

During exhalation, ribs move down and inwards, while diaphragm moves up to its former position, which reduces the size of chest cavity and air is pushed out of the lungs.

Animals such as elephant, lions, cows, goats, frogs, lizards, snakes, birds have lungs in their chest cavities like the human beings.

Cockroach:
A cockroach has small openings on the sides of its body, which are called spiracles.

Insects have a network of air tubes called tracheae for gas exchange.

Oxygen rich air rushes through spiracles into the tracheal tube diffuses into the body tissue and reaches every cell of the body.

Similarly carbon dioxide from the cells goes into the tracheal tubes and moves out through spiracles.

Earthworm:
Skin of an earthworm feels moist and slimy on touching. Gases can pass through them.

Frogs have pairs of lungs, they can also breathe through their skin which is moist and slippery.

Breathing Gills in fish help them to use
under water | oxygen dissolved in water. Gills are projections of the skin. Gills are well supplied with blood vessels for exchange of gases. |  
---|---|---
Do plants also respire | Plants take in oxygen from the air and give out carbon dioxide. In the cells, oxygen is used to breakdown glucose into carbon dioxide and water as in other organisms. The leaves of the plants have tiny pores called stomata for exchange of oxygen and carbon dioxide. Roots take up air (oxygen) from air spaces present between the soil particles. | Global climate change and its effect on coastal areas, changes in current vegetation. |

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**CHAPTER 16**  
**WATER: A PRECIOUS RESOURCE**

<table>
<thead>
<tr>
<th>Water: a precious resource</th>
<th>Introduction</th>
<th>March 22 is celebrated as the world water day. 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. In some places there is an acute shortage of water especially during summer. It is estimated that in a few years from now more than one-third of the people in the world could face water scarcity.</th>
<th>Water supports ecosystems, economic development, community well-being and cultural values. Water scarcity- its causes, effects and preventive measures. Need for a more oriented and integrated approach to water management and development. Different ways of managing water Managing water at individual level, within cities and between states and countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much water is</td>
<td>71% of earth’s surface is covered with water.</td>
<td>Decreasing the amount of usable water on</td>
<td></td>
</tr>
</tbody>
</table>
Almost all the water on the earth is contained in the seas and oceans, rivers, lakes, ice caps, as ground water and in the atmosphere.

Most of this water is not fit for human consumption.

The water that is fit for use is fresh water.

<table>
<thead>
<tr>
<th>available</th>
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<tbody>
<tr>
<td>earth.</td>
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<tr>
<td>Protect fresh water sources.</td>
</tr>
<tr>
<td>What would be the impact of water depletion?</td>
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<tr>
<td>How water gets polluted?</td>
</tr>
<tr>
<td>Eutrophication: its causes and effects</td>
</tr>
<tr>
<td>Number of rivers in the state</td>
</tr>
<tr>
<td>Nationalizing rivers</td>
</tr>
<tr>
<td>Water becoming a political issue</td>
</tr>
<tr>
<td>Bloodshed occurred on water issues (Kaveri issue)</td>
</tr>
<tr>
<td>Scarcity of water and it is not any ones property</td>
</tr>
<tr>
<td>No greed for water and equal distribution of water.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Forms of water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water on the earth has been maintained for millions of years by various processes, which make the water cycle.</td>
</tr>
<tr>
<td>When water circulates through the water cycle, it can be found in all the three forms- solid, liquid and gas at any given time somewhere on the earth.</td>
</tr>
<tr>
<td>Solid form, snow and ice is present as icecaps at the poles of the earth, snow covered mountains and glaciers.</td>
</tr>
<tr>
<td>Liquid water is present in oceans, lakes, rivers and underground.</td>
</tr>
<tr>
<td>Gaseous form is the water vapour present in the air around us.</td>
</tr>
<tr>
<td>Various projects to protect water sources like Ganga action plan, Yamuna action plan etc.</td>
</tr>
<tr>
<td>How human settlements pollute water.</td>
</tr>
<tr>
<td>Industrialisation and water pollution.</td>
</tr>
<tr>
<td>Water quality management issues.</td>
</tr>
<tr>
<td>Reutilisation and recycling of waste water.</td>
</tr>
<tr>
<td>Water pollution control through law.</td>
</tr>
<tr>
<td>Depletion of water table</td>
</tr>
<tr>
<td>Groundwater as an important source of water</td>
</tr>
<tr>
<td>The continuous cycling of water among its three forms keeps the total amount of water on the earth constant.</td>
</tr>
<tr>
<td><strong>Distribution of water</strong></td>
</tr>
<tr>
<td>--------------------------</td>
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<tr>
<td><strong>Water management</strong></td>
</tr>
</tbody>
</table>
Data on water resources availability, use and quality will be collected and made accessible to all parties.

Institutional mechanisms will be set up to prevent and resolve conflicts over water.

Water planning and decision making will be democratic, ensuring representation of all affected parties and fostering direct participation of affected interests.

What role can you play? Effect of water scarcity on plants

Plants wilt and ultimately dry up if they are not watered for a few days.

How to create awareness among the community

One's role at home and school

CHAPTER 17
FORESTS: OUR LIFELINE

<table>
<thead>
<tr>
<th>Forests: Our lifeline</th>
<th>Introduction</th>
<th>Forests are important renewable natural resource.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit to a forest</td>
<td>Forest is a system comprising various plants, animals and microorganisms. The different treetops form green covers over the land, which is not uniformly green. In forest, the trees form the</td>
<td>Forests and wildlife are essential for ecological balance of an area. The chief products that forests supply are wood, minor forest products etc. The major reduction in</td>
</tr>
</tbody>
</table>
uppermost layer, followed by shrubs. Herbs form the lowest layer of vegetation.

The trees are covered with different types of creepers and climbers.

The branchy part of a tree above the stem is known as the crown of the tree (canopy).

Trees have crowns of different types and sizes. These have created understoreys in the forest.

Giant trees constituted the top layer, followed by shrubs and tall grasses and herbs formed the lowest layer.

Various animals, insects, spiders, squirrels, various other small animals are found in the forest.

All animals whether herbivores or carnivores depend on plants for food.

Organisms which feed on plants often get eaten by other organisms.

Many food chains can be found in a forest.

All food chains are linked. If any one food chain is disturbed, it affects other food chains.

Mushrooms, tiny insects, millipedes, ants, beetles and microorganisms in the soil feed upon the dead plant and animal tissues and convert them into dark coloured substances called humus.

The microorganisms, which convert the dead plants and animals to humus, are known as Decomposers.

The presence of humus ensures the forest is in tropical and sub- tropical regions (40.2%).

Problems such as over grazing, indiscriminate felling of trees, over exploitation of land resources leads to destruction of forest which ultimately lead to desertification.

When forests die, the ecological balance maintained by nature breaks away; and flood or drought are the terrible consequences.

Plants reduce evaporation; thus allowing water to remain in soil for a long time.

India is losing about 1.5 million hectares of forest cover each year.

Forests are destroyed for agriculture, river valley projects, industrial uses, road construction and miscellaneous uses.

Desertification causes a steady rise in the atmospheric temperature.

Afforestation – a strategy to restore the forests.

Role of plants in maintaining soil fertility.

Impact of increasing carbon dioxide in the atmosphere- green house effect and global warming- its causes and effects on the environment.

How the seedlings grow in a forest in natural way.
that the nutrients of the dead plants and animals are released into the soil.

From these the nutrients are again absorbed by roots of the living plants.

Plants release oxygen through the process of photosynthesis, which are used by animals for respiration.

Plants maintain the balance of oxygen and carbon dioxide in the atmosphere. Hence forests are called “Green lungs”.

Trees take in water through their roots and release water vapour into the air through evaporation.

The people living in the forest (tribes) depend on forests for their food, shelter, water and medicines.

The animals disperse the seeds of certain plants and help the forest to grow and regenerate. The decaying animal dung also provides nutrients to the seedlings to grow.

With greater variety of plants, the forest provides greater opportunities for food and habitat for herbivores.

Larger number of herbivores means increased availability of food for carnivores.

Wide variety of animals helps the forest to regenerate and grow.

Decomposers help in maintaining the supply of nutrients, to the growing plants.

Hence forest is a living entity.

Forest acts as a natural absorber of rainwater and allows it to seep and helps to maintain water table

Destruction of any one species in the ecosystem disturbs the total balance of ecosystem.

Forest is an important component of our environment and economy, it checks air pollution and soil erosion, save hill slopes from land slides and in deserts trees reduce soil erosion by checking wind velocity, water holding capacity of soil, maintain soil fertility, regulate earth’s temperature regimes and water cycle, shifting of sand and silting and reduce flood havoc.

It also has aesthetic and tourist values and serve as gene reserve of important species- Eco tourism
throughout the year.

Forests help in controlling floods and maintain the flow of water in the streams so that we get a steady supply of water.

Roots of trees bind the soil together, which prevent soil erosion.

Forests help in bringing good rainfall in neighbouring areas.

Noise pollution can be less due to forests.

If we do things wisely, we can preserve forests and environment as well as have development.

---

### CHAPTER 18

**WASTE WATER STORY**

<table>
<thead>
<tr>
<th>Waste water story</th>
<th>Introduction</th>
<th>Water which is rich in lather, mixed with oil, black brown water that goes down the drains from sinks, showers, toilets, laundries which are dirty is called waste water.</th>
<th>Stagnant wastewater causes different contagious diseases. Cause the replication of mosquitoes in stagnant water.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water, Our lifeline</td>
<td>Clean water is not available to all. It has been reported that one billion of our fellow human beings have no access to safe drinking water, which cause water related diseases and deaths. The increasing scarcity of fresh water is due to population growth, pollution, industrial development, mismanagement and other factors.</td>
<td>Chemical and microbial contamination of water. Create awareness among public about the steps to be taken for maintaining safe drinking water. Over exploitation and pollution of water should be controlled.</td>
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<td></td>
<td>On March 22, 2005, the General Assembly of the UN proclaimed the period 2005-2015 as the International Decade for Action on ‘Water for life’. The decade aims to reduce by half the number of people who do not</td>
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<tr>
<td><strong>What is sewage</strong></td>
<td>Sewage is wastewater released by homes, industries, hospitals, offices and other users. It also includes rainwater that has run down the street during a storm or heavy rain. Sewage is a liquid waste, which has majority of water with dissolved, and suspended impurities called contaminants. Sewage is a complex mixture containing suspended solids, organic and inorganic impurities, nutrients, saprotrophic and disease causing bacteria and other microbes. Organic impurities are human faeces, animal waste, oil, urea (urine), pesticides, herbicides, fruit and vegetable waste etc. Inorganic impurities are nitrates, phosphates, and metals. Nutrients are Phosphorus and Nitrogen. Bacteria are such as which causes Cholera and Typhoid. Other microbes are such as which cause dysentery.</td>
<td>Proper disposal of wastes for maintaining proper hygiene. Improper disposal of wastes from hospitals, industries etc. into water bodies and its impact on environment. Sewages also mix with rainwater and is carried to other water bodies like river and oceans. Avoid mixing of degradable and non-degradable wastes. Maintain separate bins for degradable and non-degradable wastes. Separate each impurities based on their degrading ability and its proper recycling should be recommended. Protect ones locality from stagnant water. Sewage disposal in highly polluted places. Avoid sewage disposal in areas of human settlements.</td>
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<tr>
<td><strong>Water freshens up—an eventful journey</strong></td>
<td>In home or a public building generally one set of pipes brings clean water and another set of pipes takes away wastewater. A network of big and small pipes called sewers, forming the sewerage is present. It carries sewage from the point of being produced to the point of disposal ie. Treatment plant.</td>
<td>Regular checking of sewage pits to prevent the outbreak of contagious diseases.</td>
<td></td>
</tr>
</tbody>
</table>
Manholes are located at every 50m to 60m in the sewage, at the junction of two or more sewers and at points where there is a change in direction.

Wastewater treatment plant (WWTP)

Treatment of wastewater involves physical, chemical and biological processes, which remove physical, chemical and biological matter that contaminates the wastewater.

1. Wastewater is passed through bar screens. Large objects like rags, sticks, cans, plastic packets, napkins are removed.
2. Water then goes to a grit and sand removal tank. The speed of the incoming wastewater is decreased to allow sand, grit and pebbles to settle down.
3. Water is then allowed to settle in a large tank which is sloped towards the middle.
   - Solids like faeces settle at the bottom and are removed with a scraper which is called sludge.
   - A skimmer removes the floatable solids like oil and grease.
   - Water so cleared is called clarified water.
   - The sludge is transferred to a separate tank where it is decomposed by anaerobic bacteria, which produce biogas.
4. Air is pumped into the clarified water to help aerobic bacteria to grow and it can consume human waste, food waste, soaps and other unwanted matter remaining in clarified water.

Dried sludge is used as manure, returning organic matter and nutrients to the soil.

Role of technology in wastewater treatment.

Convert sewage into usable forms like Biogas.
| The treated water has a very low level of organic material and suspended matter.  
- It is discharged into a sea, a river or into the ground.  
- Nature cleans it up  
- It may be necessary to disinfect water with chemicals like chlorine and ozone before releasing it into the distribution system | Avoid direct discharge of wastes into water bodies. |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Become an active citizen</strong></td>
<td><strong>Participatory behavior of public to be promoted for cleaning drains, proper plastic disposal etc.</strong></td>
</tr>
</tbody>
</table>
| To be an enlightened citizen, one can approach the municipality or the gram panchayat and insist them to cover the open drains etc. | Avoid or minimize using plastics. Substitute polythene bags with paper bags, which are eco-friendly.  
Oils and grease if thrown directly in water bodies can affect the organisms living in water, which will not get enough oxygen. |
| **Better housekeeping practices** | **Avoid direct discharge of wastes into water bodies.** |
| One of the ways to minimize or eliminate waste is to see what one is releasing down the drain.  
Cooking oil and fats should not be thrown down the drain as it can harden and block the pipes.  
Chemicals like paints, solvents, insecticides, motor oils, medicines should not be thrown down the drain as it may kill microbes that help purify water.  
Used tealeaves, solid food remains, soft toys, cotton, sanitary towels etc. should be thrown in the dustbin. | Avoid or minimize using plastics. Substitute polythene bags with paper bags, which are eco-friendly.  
Oils and grease if thrown directly in water bodies can affect the organisms living in water, which will not get enough oxygen. |
| **Sanitation and disease** | **Outbreak of various diseases like Malaria, Chikunguniya etc due to unhygienic waste disposal and due to stagnant water.** |
| Poor sanitation and contaminated drinking water is the cause of a large number of diseases.  
A very large fraction of our people defecates in the open, on dry riverbeds, on railway tracks, near fields or directly in water.  
Untreated human excreta are a health hazard, cause water pollution and soil pollution.  
It becomes the most common route for water borne diseases like cholera, typhoid, Polio, Meningitis, Hepatitis and Dysentery. | Outbreak of various diseases like Malaria, Chikunguniya etc due to unhygienic waste disposal and due to stagnant water. |
| **Alternative arrangements** | **Some technology have developed an alternative to dispose human** |
| To improve sanitation, low cost onsite sewage disposal systems are |
| Sanitation at public places | Railway stations, bus depots, airports, hospitals are places where large amount of waste is generated. It must be disposed properly otherwise epidemics may break out. The government has laid down certain standards of sanitation, but unfortunately, they are not strictly enforced. We should not scatter litter anywhere. If there is no dustbin in sight, we should carry the litter home and throw it in the dustbin. |

| wastes on railway tracks like; | - The latrine automatically closes ones the train comes to a halt. - Avoiding using toilets in the railway stations when train is halted. |

| Conclusion | We all have role in keeping our environment clean and healthy. One must realize ones responsibility in maintaining water sources in a healthy state. Adopting good sanitation practices should be our way of life. As an agent of change, ones individual initiative will make a great difference. A lot can be done if people work together which has a great power in collective action |

- Use Reflective journals on everyday effort shown by students, which can foster Education for sustainable development
APPENDIX VIII
CLASS VII
SOCIAL SCIENCE- OUR ENVIRONMENT

CHAPTER 1
ENVIRONMENT

<table>
<thead>
<tr>
<th>Name of the chapter</th>
<th>Concepts</th>
<th>Sub concepts</th>
<th>ESD to be integrated</th>
<th>Methodology/ strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>What is environment</td>
<td>The place, people, things and nature that surround any living organism is called Environment.</td>
<td>Environment as the totality of surrounding conditions.</td>
<td>Environment is a combination of natural and man-made phenomena.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environment is a combination of natural and man-made phenomena.</td>
<td>It is the surrounding conditions, influences or forces, by which living forms are influenced and modified in their growth and development.</td>
<td>The natural environment refers to both biotic and abiotic conditions existing on the earth.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The natural environment refers to both biotic and abiotic conditions existing on the earth.</td>
<td>How human influences cause danger to natural environment.</td>
<td>Human environment reveals the activities, creations and interactions among human beings.</td>
</tr>
<tr>
<td>Natural environment</td>
<td>Land, water, air, plants and animals comprise the natural environment.</td>
<td>Depletion of the natural environment by various natural and human influences.</td>
<td>Depletion of the natural environment by various natural and human influences.</td>
<td>Lithosphere is the solid crust or the hard top layer of the earth, which is made up of rocks and minerals and covered by a thin layer of soil.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lithosphere is the solid crust or the hard top layer of the earth, which is made up of rocks and minerals and covered by a thin layer of soil.</td>
<td>Sustainable development for future prosperity.</td>
<td>It is the domain that provides us forests, grasslands for grazing, land for agriculture and human settlements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>It is the domain that provides us forests, grasslands for grazing, land for agriculture and human settlements.</td>
<td>How the topsoil of the lithosphere get washed away.</td>
<td>The domain of water is referred to as hydrosphere, which comprises of different types of water bodies like rivers, lakes, seas, oceans etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The domain of water is referred to as hydrosphere, which comprises of different types of water bodies like rivers, lakes, seas, oceans etc.</td>
<td>Major landforms of earth.</td>
<td>The atmosphere is the thin layer of air that surrounds the earth, which is held due to gravitational force.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The atmosphere is the thin layer of air that surrounds the earth, which is held due to gravitational force.</td>
<td>Inter relationship of the realms (Lithosphere, Hydrosphere, Atmosphere and Biosphere) of the earth.</td>
<td>It protects from the harmful</td>
</tr>
<tr>
<td>Rays and scorching heat of the sun, which consists of a number of gases, dust and water vapour.</td>
<td>How climate changes influences the earth’s atmosphere and its life forms.</td>
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<tr>
<td>The changes in the atmosphere produce changes in the weather and climate.</td>
<td>Need for conserving natural vegetation and wild life.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Biosphere is a narrow zone of the earth where land, water and air interact with each other to support life and consists of plants and animal kingdom.</td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What is Ecosystem?</th>
<th>All plants, animals and human beings depend on their immediate surroundings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The relation between the living organism, as well as the relation between the organisms and their surroundings form an ecosystem. Eg. Rain forest, grassland, desert, mountains, lake, river, ocean, small ponds etc.</td>
<td>Develop sensitivity towards environment.</td>
</tr>
<tr>
<td>How climate changes influences the earth’s atmosphere and its life forms.</td>
<td>How an ecosystem gets vanished, polluted and destroyed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Human environment</th>
<th>Human beings interact with the environment and modify it according to their need.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early humans adapted themselves to the natural surroundings by leading a simple life and fulfilling their requirements from the nature.</td>
<td>Human settlement, transport and communication- how it causes hindrance to natural environment.</td>
</tr>
<tr>
<td>When time and need grew, humans learn new ways to use and change environment.</td>
<td></td>
</tr>
<tr>
<td>They learn to grow crops, domesticate animals and lead a settled life, wheel was invented, surplus food was produced, barter system emerged, trade and commerce developed.</td>
<td>Changes in the environment; like global warming, green house effect, ozone depletion etc.</td>
</tr>
<tr>
<td>Industrial revolution enabled large-scale production; transportation became faster, information revolution made communication easier and speedy.</td>
<td>Changing world due to globalization, commercialization, urbanization etc. and how it can influence the life forms.</td>
</tr>
<tr>
<td>A perfect balance is necessary</td>
<td>Measures to control</td>
</tr>
</tbody>
</table>
between the natural and human environment.
Humans must learn to live and use their environment in a harmonious way.

industrialization, urbanization etc.
Need to sustain the natural environment for the well being of all life forms on earth.

| CHAPTER 2 |
| INSIDE OUR EARTH |

<table>
<thead>
<tr>
<th>Inside our earth</th>
<th>Introduction</th>
<th>Interior of the earth</th>
<th>Rocks and minerals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The earth, our homeland is a dynamic planet. It is constantly undergoing changes inside and outside.</td>
<td>Earth is made up of several concentric layers with one inside another. The uppermost layer over the earth’s surface is called the crust. It is the thinnest of all the layers. It is about 35 km. on the continental masses and only 5 km. on the ocean floors. The main mineral constituents of the continental mass are silica and alumina. It is thus called sial. The oceanic crust mainly consists of silica and magnesium; it is therefore called sima. Just beneath the crust is the mantle, which extends up to a depth of 2900 km. below the crust. The innermost layer is the core with a radius of about 3500 km. It is mainly made up of nickel and iron and is called nife which has very high temperature and pressure. Mining of silica and alumina- how it influences the lithosphere. Mining can cause severe damage to the earth’s crust. Mining damages the land and pollute the top soil and contaminate the area with toxic metals and chemicals.</td>
<td>The earth’s crust is made up of various types of rocks. Any natural mass of mineral matter that makes up the earth’s crust is called a rock, Role of rocks in conserving ground water. Sustainable ground water development.</td>
</tr>
</tbody>
</table>
which can be of different colour, size and texture.

There are three major types of rocks: igneous rocks, sedimentary rocks and metamorphic rocks.

When the molten magma cools, it becomes solid, which are called as igneous rocks (primary rocks); they are of two types- intrusive rocks and extrusive rocks.

When the molten lava comes on the earth’s surface, it rapidly cools down and becomes solid on the crust, which are known as extrusive igneous rocks, which have a very fine-grained structure. For example, basalt.

The molten magma cools down deep inside the earth’s crust. Solid rocks so formed are called intrusive igneous rocks. Since they cool down slowly they form large grains. Granite

Rocks roll down, crack, and hit each other and are broken down into small fragments called sediments which are transported and deposited by wind, water, etc

These loose sediments are compressed and hardened to form layers of rocks, which are known as sedimentary rocks. For example, sandstone is made from grains of sand.

Igneous and sedimentary rocks can change into metamorphic rocks under great heat and pressure. For example, clay changes into slate and limestone into marble.

Rocks are useful to us for making roads, houses and

Use of phosphate rocks for a sustainable agriculture.
Phosphate rocks used in industries.
Quarrying and its environmental impacts.
Depleting of igneous, sedimentary and metamorphic rocks due to over usage by human beings for building purposes.

Steps to be taken for a sustainable development of mineral resources.

Igneous and sedimentary rocks being exploited by human beings for constructing buildings.

Need for sustainable development of these resources.
buildings.

The process of transformation of the rock from one type to another under certain conditions in a cyclic manner is known as the rock cycle.

The igneous rocks are broken down into small particles that are transported and deposited to form sedimentary rocks. When the igneous and sedimentary rocks are subjected to heat and pressure they change into metamorphic rocks which are still under great heat and pressure melt down to form molten magma, which can again cool down and solidify into igneous rocks.

Minerals are important to mankind. Some are used as fuels (coal, natural gas and petroleum), in industries (iron, aluminium, gold, uranium, etc), in medicine, in fertilizers etc.

Rock cycle, which helps in maintaining an ecological balance.

Over exploitation of minerals- how it influences the nature and life forms on earth.

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**CHAPTER 3**

**OUR CHANGING EARTH**

<table>
<thead>
<tr>
<th>Our changing earth</th>
<th>Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The lithosphere is broken into a number of plates known as the lithospheric plates.</td>
</tr>
<tr>
<td></td>
<td>Due to the movement of the molten magma inside the earth, the lithospheric plates move around very slowly.</td>
</tr>
<tr>
<td></td>
<td>The movement of these plates causes changes on the surface of the earth.</td>
</tr>
<tr>
<td></td>
<td>The earth movements are divided on the basis of the forces, which cause them.</td>
</tr>
<tr>
<td></td>
<td>The forces that act in the interior of the earth are called as</td>
</tr>
<tr>
<td></td>
<td>Other than natural forces, man also exhibits forces</td>
</tr>
</tbody>
</table>
Endogenic forces and that work on the surface of the earth are called as exogenic forces.

Endogenic forces sometimes produce sudden movements (Earthquakes and volcanoes) and at the other times produce slow movements (building mountains).

A volcano is a vent (opening) in the earth’s crust through which molten materials erupts suddenly.

When the lithospheric plates move, the surface of the earth vibrates. The vibrations can travel all round the earth, which are called earthquakes.

The place in the crust where the movement starts is called the focus.

The place on the surface above the focus is called the epicenter.

Vibrations travel outwards from the epicenter as waves, where greatest damage is usually closest to the epicenter and the strength of earthquake decreases away from the center.

Although earthquakes cannot be predicted, the impact can be minimised if one is prepared beforehand.

Some common earthquake prediction methods adopted locally by people include studying animal behaviour; fish in the ponds get agitated, snakes come to the surface.

---

<table>
<thead>
<tr>
<th>Major land forms</th>
<th>The landscape is being continuously worn away by two processes – weathering and erosion.</th>
<th>Soil erosion- its causes and effects.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weathering is the breaking up of the rocks on the earth’s surface.</td>
<td>Apart from Natural erosion, soil erosion occurs due to human activities.</td>
</tr>
</tbody>
</table>
Erosion is the wearing away of the landscape by different agents like water, wind and ice.

The process of erosion and deposition create different landforms on the surface of the earth.

<table>
<thead>
<tr>
<th>Work of a river</th>
<th>The running water in the river erodes the landscape.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>When the river tumbles at steep angle over very hard rocks or down a steep valley side it forms a waterfall</td>
</tr>
<tr>
<td></td>
<td>As the river enters the plain it twists and turns forming large bends known as meanders.</td>
</tr>
<tr>
<td></td>
<td>Due to continuous erosion and deposition along the sides of the meander, the ends of the meander loop come closer and closer. In due course of time the meander loop cuts off from the river and forms a cut-off lake, also called an ox-bow lake.</td>
</tr>
<tr>
<td></td>
<td>As the river overflows its banks, it leads to the flooding of the neighbouring areas, which deposits layers of fine soil and other material called sediments along its banks. This leads to the formation of a flat fertile floodplain.</td>
</tr>
<tr>
<td></td>
<td>The raised banks are called levees.</td>
</tr>
<tr>
<td></td>
<td>As the river approaches the sea, the speed of the flowing water decreases and the river begins to break up into a number of streams called distributaries.</td>
</tr>
<tr>
<td></td>
<td>Each distributary forms its own mouth.</td>
</tr>
<tr>
<td></td>
<td>The collection of sediments from all the mouths forms a delta.</td>
</tr>
</tbody>
</table>

How river gets polluted due to various human activities.

River getting polluted as it enters places where human beings are inhabited.

Flood: its importance and its impact on life forms.
| Work of sea waves | The erosion and deposition of the sea waves gives rise to coastal landforms.  

Sea waves continuously strike at the rocks, which develop cracks, which become larger and wider to form hollow like caves called sea caves.  

As these cavities become bigger and bigger only the roof of the caves remain, thus forming sea arches.  

Further, erosion breaks the roof and only walls are left which are called stacks.  

The steep rocky coast rising almost vertically above seawater is called sea cliff. | Tsunami waves: Its causes, effects and how to prevent such natural calamities. |
| Work of Ice | Glaciers are “rivers” of ice which too erode the landscape by bulldozing soil and stones to expose the solid rock below.  

As the ice melts they get filled up with water and become beautiful lakes in the mountains.  

The material carried by the glacier such as rocks big and small, sand and silt gets deposited which are called glacial moraines. | How Carbon dioxide increase causes Greenhouse effect and its impact on melting of Glaciers and sinking of coastal land. |
| Work of wind | An active agent of erosion and deposition in the deserts is wind.  

In deserts you can see rocks in the shape of a mushroom, commonly called mushroom rocks.  

Winds erode the lower section of the rock more than the upper part, hence such rocks have narrower base and wider top.  

When the wind blows, it lifts and transports sand from one place to another and when it stops blowing the sand falls and | |
gets deposited in low hill-like structures called sand dunes.

When the grains of sand are very fine and light, the wind can carry it over very long distances. When such sand is deposited in large areas, it is called loess

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### CHAPTER 4

#### AIR

<table>
<thead>
<tr>
<th>Air Introduction</th>
<th>Composition of the atmosphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our earth is surrounded by a huge blanket of air called atmosphere on which all living beings on the earth depends. It provides us the air we breathe and protects us from the harmful effects of the sun’s rays.</td>
<td>Nitrogen and oxygen are two gases, which make up the bulk of the atmosphere. Carbon dioxide, helium, ozone, argon and hydrogen are found in lesser quantities. Gases, tiny dust particles are also present in the air. When we inhale, we take some amount of nitrogen into our lungs and exhale it. Plants need nitrogen for their survival, which cannot be taken directly from the air. Bacteria that live in the soil and roots of some plants take nitrogen from the air and change its form so that plants can use it. Humans and animals take in oxygen during breathing and green plants produce oxygen during photosynthesis. Oxygen content in the air remains</td>
</tr>
<tr>
<td>Considered as one of the important element in the five elements- earth, fire, air, space and water- it was revered and worshipped and treated by all with respect.</td>
<td>The composition of gases in the atmosphere needs to be maintained in a balance for supporting various life forms and ecosystem. Atmosphere gets polluted due to different poisonous gases. Oxygen amount in the atmosphere decreases due to human activities. Need to plant more trees which is suitable for each place. Planting of more suitable trees</td>
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</tbody>
</table>

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- Air
- Introduction
- Our earth is surrounded by a huge blanket of air called atmosphere on which all living beings on the earth depends. It provides us the air we breathe and protects us from the harmful effects of the sun’s rays.

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- Nitrogen and oxygen are two gases, which make up the bulk of the atmosphere. Carbon dioxide, helium, ozone, argon and hydrogen are found in lesser quantities. Gases, tiny dust particles are also present in the air. When we inhale, we take some amount of nitrogen into our lungs and exhale it. Plants need nitrogen for their survival, which cannot be taken directly from the air. Bacteria that live in the soil and roots of some plants take nitrogen from the air and change its form so that plants can use it. Humans and animals take in oxygen during breathing and green plants produce oxygen during photosynthesis. Oxygen content in the air remains

- The composition of gases in the atmosphere needs to be maintained in a balance for supporting various life forms and ecosystem. Atmosphere gets polluted due to different poisonous gases. Oxygen amount in the atmosphere decreases due to human activities. Need to plant more trees which is suitable for each place. Planting of more suitable trees
constant. If we cut trees then this balance gets disturbed.

Green plants use carbon dioxide to make their food and release oxygen.

Humans or animals release carbon dioxide.

The amount of carbon dioxide released by humans or animals seems to be equal to the amount used by the plants, which make a perfect balance.

The balance is upset by burning of fuels, such as coal and oil which add billions of tons of carbon dioxide into the atmosphere each year resulting in the increased volume of carbon dioxide which affects the earth’s weather and climate.

<table>
<thead>
<tr>
<th>Structure of the atmosphere</th>
<th>Our atmosphere is divided into five layers starting from the earth’s surface, which are Troposphere, Stratosphere, Mesosphere, Thermosphere and Exosphere.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Troposphere is the most important layer of the atmosphere. Its average height is 13 km. Almost all the weather phenomena like rainfall, fog and hailstorm occur in this layer.</td>
</tr>
<tr>
<td></td>
<td>Stratosphere lies above the troposphere, which extends up to a height of 50 km, which is almost free from clouds and associated weather phenomenon. It contains a layer of ozone gas.</td>
</tr>
<tr>
<td></td>
<td>Mesosphere is the third layer above the stratosphere, which extends up to the height of 80 km. Meteorites burn up in this layer on entering from the space.</td>
</tr>
<tr>
<td></td>
<td>In Thermosphere, temperature rises very rapidly with increasing height. Ionosphere is a part of this layer. It extends between 80-400 km. This layer helps in radio transmission.</td>
</tr>
<tr>
<td></td>
<td>Exosphere is the upper most layer of the atmosphere, which has very thin air, light gases like helium and</td>
</tr>
<tr>
<td></td>
<td>to prevent the excessive accumulation of carbon dioxide in the atmosphere. Increase in carbon dioxide level leading to green house effect and global warming and its impact on the environment.</td>
</tr>
</tbody>
</table>

How troposphere, stratosphere, mesosphere, thermosphere and exosphere get affected by human activities.
Weather and climate

Weather can change dramatically from day to day.

The average weather condition of a place for a longer period of time represents the climate of a place.

Monitor the impact of climate change, deforestation and various forms of pollution and explore means of mitigating damages.

Temperature

The degree of hotness and coldness of the air is known as temperature.

The temperature of the atmosphere changes not only between day and night but also from season to season.

*Insolation* is the incoming solar energy intercepted by the earth.

The amount of insolation decreases from the equator towards the poles.

If the earth’s temperature rises too high, it would become too warm for some crops to grow.

Temperature in cities is much higher than that of villages.

The concrete and metals in buildings and the asaphalt of roads get heated up during the day.

Change in the climatic patterns in the earth.

Trapping of solar energy and using it as an alternative source of energy for domestic purposes.

Temperature fluctuations causing global warming and its impact.

Industrialization, modernization, globalization and its relation to increase in temperature.

Air pressure

Air pressure is defined as the pressure exerted by the weight of air on the earth’s surface.

As we go up the layers of atmosphere, the pressure falls rapidly. The air pressure is highest at sea level and decreases with height.

In areas where temperature is high, the air gets heated and rises which creates a low-pressure area, which is associated with cloudy skies and wet weather.

In areas having lower temperature, the air is cold. It is therefore heavy. Heavy air sinks and creates a high-pressure area. High pressure is associated with clear and sunny skies.

The air always moves from high-pressure areas to low-pressure areas.

Cyclones and its impact
### Wind

The movement of air from high-pressure area to low pressure areas is called wind.

Winds can be broadly divided into three types.

Permanent winds are those, which blow constantly throughout the year in a particular direction. Eg. Trade winds, Westerlies and easterlies.

Seasonal winds are those, which change their direction in different seasons. For example monsoons in India.

Local winds are those, which blow only during a particular period of the day or year in a small area. For example, land and sea breeze.

The hot and dry local wind of northern planes of India is called *loo*.

### Moisture

When water evaporates from land and different water bodies, it becomes water vapour.

Moisture in the air at any time is known as humidity.

When the water vapour rises, it starts cooling. The water vapour condenses causing formation of droplets of water.

Clouds are just masses of such water droplets.

When these droplets of water become too heavy to float in air, then they come down as precipitation.

Precipitation that comes down to the earth in liquid form is called rain. Most of the ground water comes from rainwater.

When trees on hill sides are cut, rainwater flows down the bare mountains and can cause flooding of low lying areas.

On the basis of mechanism, there are changes occurring in various seasons like heavy rains during monsoon, rains during summer, lack of rain, rain in desert etc.
three types of rainfall: the convectional rainfall, the orographic rainfall and the cyclonic rainfall

## CHAPTER 5

**WATER**

| Water Introduction | The process by which water continually changes its form and circulates between oceans, atmosphere and land is known as the water cycle.  
Earth is like a Terrarium, where the same water that existed centuries ago still exists today.  
The major sources of fresh water are the rivers, ponds, springs and glaciers.  
The ocean and the seas contain salty water which contains large amounts of dissolved salts mostly salts of is sodium chloride or the common table salt.

| One of the five elements-earth, fire, air, space and water.  
Modern development and mismanagement of water resulted in huge shortage of water.  
Shortage of water leads to epidemics, hunger, despair and death.

| Distribution of water bodies | Three-fourth of the earth surface is covered by water.  
Distribution of water is Oceans (97.3%) (Saline), Ice-caps (02.0%), Ground water (0.68%), Fresh water lakes and Inland seas (0.009%), salt lakes (0.009%), Atmosphere (0.0019%), Rivers (0.0001%) (Fresh water).

| Watershed projects for conserving ground water.  
Rainwater harvesting and its importance.  
Activities to prevent run off water.  
Avoiding concretizing the land to help in easy penetration of water.

| Ocean circulation | Ocean water keeps moving continuously and is never still.  
The movements that occur in oceans can be broadly categorized as: waves, tides and currents.

| Construction of dams, buildings, destruction of forests and natural land etc. as the cause of earthquake and volcanic eruptions.

| Waves | When the water on the surface of the ocean rises and falls alternately, they are called waves.  
During a storm, the winds blowing at very high speed form huge waves, which cause tremendous destruction.  
An earthquake, a volcanic eruption or underwater landslides can shift large amounts of ocean water, which... |
result in huge tidal wave called tsunami that may be as high as 15m. The largest tsunami ever measured was 150m high. These waves travel at a speed of more than 700 km per hour.

The tsunami of 2004 caused wide spread damage in the coastal areas of India. The Indira point in the Andaman and Nicobar islands got submerged after the tsunami.

Reasons for occurrence of Tsunami. Mans influence on environment and the natural response to these.

<table>
<thead>
<tr>
<th>Tides</th>
<th>The rhythmic rise and fall of ocean water twice in a day is called a tide. It is high tide when water covers much of the shore by rising to its highest level. It is low tide when water falls to its lowest level and recedes from the shore. The strong gravitational pull exerted by the sun and the moon on the earth’s surface causes the tides. The water of the earth closer to the moon gets pulled under the influence of the moon’s gravitational force and causes high tide. During the full moon and new moon days, the sun, the moon and the earth are in the same line and the tides are highest. These tides are called spring tides. When the moon is in its first and last quarter, the ocean waters get drawn in diagonally opposite directions by the gravitational pull of sun and earth resulting in low tides. These tides are called neap tides. The rise and fall of water due to tides is being used to generate electricity in some places.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean currents</td>
<td>Ocean currents are streams of water flowing constantly on the ocean surface in definite directions, which may be warm or cold. The warm ocean currents originate near the equator and move towards the poles. The cold currents carry</td>
</tr>
</tbody>
</table>
water from polar or higher latitudes to tropical or lower latitudes. The Labrador Ocean current is cold current while the Gulf Stream is a warm current.

The ocean current influences the temperature conditions of the area. Warm currents bring about warm temperature over land surface. The areas where the warm and cold currents meet provide the best fishing grounds.

### CHAPTER 6
#### NATURAL VEGETATION AND WILD LIFE

| Natural vegetation and wild life | Introduction | With the change in height, the climate changes and that changes natural vegetation.

The growth of vegetation depends on temperature and moisture. It also depends on factors like slope and thickness of soil.

Natural vegetation is generally classified into three

Forests are those, which grow where temperature and rainfall are plentiful to support a tree cover.

Grasslands are which grow in the region of moderate rain.

*Shrubs:* Thorny shrubs and scrubs grow in the dry region.

Biodiversity is ‘the variability among living organisms from all sources, including, inter alia, terrestrial, marine and other ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystem’ - Rio Declaration (1992)

Biodiversity is not distributed evenly on earth.

It is richer in the tropics.

As one approaches the polar regions one finds larger and larger populations of fewer and fewer species.

| Forests: Tropical Evergreen forests | These forests are also called tropical rainforests

These forests occur in the regions near the equator and close to the tropics, which are hot and receive heavy rainfall throughout the year. The trees do not shed their leaves altogether.

The thick canopies of the closely

Flora and fauna vary depending on climate, altitude, soil and the presence of other species.

Hotspots of biodiversity

Most hotspots are located in the tropics and most of them are forests. |
<table>
<thead>
<tr>
<th>Forest Type</th>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tropical deciduous forest</td>
<td>Spaced trees do not allow the sunlight to penetrate inside the forest even in the daytime. Eg. Hardwood trees like rosewood, ebony, mahogany</td>
<td>Changing biological diversity and how the change will affect community structure and ecosystem processes.</td>
</tr>
<tr>
<td>Tropical deciduous</td>
<td>Changing biological diversity and how the change will affect community structure and ecosystem processes.</td>
<td>Biology of rare and declining species and develop scientific information needed to sustain populations and determine value and viabilities of these species.</td>
</tr>
<tr>
<td>Temperate evergreen forests</td>
<td>The temperate evergreen forests are located in the mid-latitudinal coastal region.</td>
<td>Restoration of ecology through ex-situ conservation.</td>
</tr>
<tr>
<td>Temperate deciduous forest</td>
<td>The temperate deciduous forests are found towards higher latitudes whereby they shed their leaves in the dry season.</td>
<td>Determining patterns and indicators of ecological response to stress so that technologies needed to assess the status of ecological system, to forecast and assess stress and to monitor the recovery of damaged ecological system.</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>The west and south west margins</td>
<td>Ecosystems that are heavily affected by human beings.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restoration of the degraded ecosystem in an environmentally friendly manner.</td>
</tr>
<tr>
<td>Vegetation of the Continents</td>
<td>Mediterranean vegetation, which are found in the areas around the Mediterranean sea in Europe, Africa and Asia, and also in California in the USA, south west Africa, south western South America and South west Australia. These regions are marked for hot dry summers and mild rainy winters. Citrus fruits such as oranges, figs, olives and grapes are commonly cultivated here because people have removed the natural vegetation in order to cultivate what they want to.</td>
<td>deforestation, various forms of pollution and explore means of mitigating damages. United nations conservation of biological diversity.</td>
</tr>
<tr>
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</tr>
<tr>
<td>Coniferous forests</td>
<td>In the higher latitudes (50° – 70°) of Northern hemisphere the spectacular Coniferous forests are found. They have tall, softwood evergreen trees like Chir, pine, cedar. Silver fox, mink, polar bear are the common animals found here.</td>
<td>Conservation and wise use of world’s biodiversity for sustainable development. Endemic species and its conservation.</td>
</tr>
<tr>
<td>Grasslands</td>
<td>These grow on either side of the equator and extend till the tropics. This vegetation grows in the areas of moderate to low amount of rainfall. They can grow very tall, about 3 to 4 meters in height. Eg. Savannah grasslands of Africa. Elephants, zebras, giraffes, deer, leopards are the common animals.</td>
<td>Conserving species which are vulnerable, endangered, rare, threatened and lower risk in order to prevent it from becoming extinct. Various causes of loss of biological diversity. Environmental pollution disturbs the food chain and food web, which lead to destruction of flora, due to changed climatic conditions.</td>
</tr>
<tr>
<td>Tropical grasslands</td>
<td>Temperate grasslands</td>
<td>Other causes of loss of biodiversity are due to human need, increasing human population, faulty government policies, selfish attitudes of social control authorities, inadequate distribution of lands, lack of public awareness and nature.</td>
</tr>
<tr>
<td>Thorny bushes</td>
<td>These are found in the dry desert like regions. Tropical deserts are located in the western margins of the continents. The vegetation cover is scarce, because of scanty rain and scorching heat. Polar region is extremely cold. Growth of natural vegetation is very limited here. Only mosses, lichens and very small shrubs are found here. It grows during the very short summer, which is called as Tundra type of vegetation. This vegetation is found in the polar areas of Europe, Asia and North America. The animals have thick fur and thick skin to protect from the cold climatic conditions. Seal, walruses, musk-oxen, Arctic owl, Polar bear and snow foxes are some of the animals found here</td>
<td>Measures taken in India for conservation of biodiversity including the legal framework. Promoting ex-situ conservation and in-situ conservation whenever needed. Human activities responsible for loss of plant diversity are dam construction and reservoir formation, extension of towns, construction of roads, clearance of vegetation, logging and exploitation of forests, grassland reclamation programmes, overgrazing, overexploitation of plant species, forest fire, land slides etc. Policy measures for conservation and suitable utilization of forest biodiversity.</td>
</tr>
</tbody>
</table>

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**CHAPTER 7**

**HUMAN ENVIRONMENT- SETTLEMENTS, TRANSPORT AND COMMUNICATION**

| Human environment-settlements, transport and communication | Early human beings depended entirely on nature for food, clothing and shelter; but with time they learnt new skills to grow food, build homes and develop better means of transport and communication. Settlements are places where people build their homes. Early human beings lived on trees and in caves. When they started to grow crops it became necessary to have a permanent home. The settlements grew near the river valleys as water was available. The early man and how they lived a life in accordance with nature. Less resource exploitation was seen in earlier days. How exploiting of nature by man started. Developments creating burden to the nature. Need for a sustainable development to satisfy the needs of man and without exploiting other organisms. |
available and land was fertile.

With the development of trade, commerce and manufacturing, human settlements became larger. Settlement flourished and civilizations developed near river valleys.

Settlements can be permanent or temporary.

Settlements, which are occupied for a short time, are called temporary settlements. Eg. People living in deep forests, hot and cold deserts, mountains etc. who practice hunting, gathering, shifting cultivation and transhumance.

Settlements, where people build homes to live in are called permanent settlements.

The villages are rural settlement where people are engaged in activities like agriculture, fishing, forestry, crafts work and trading etc.

Rural settlements can be compact or scattered.

A compact settlement is a closely built area of dwellings, wherever flat land is available.

In a scattered settlement dwellings are spaced over an extensive area. Eg. In hilly tracts, thick forests, and regions of extreme climate.

In rural areas, people build houses to suit their environment. In regions of heavy rainfall, they have slanting roofs. Places where water accumulates in the rainy season the houses are constructed on a raised platform or stilts.

Thick mud walled houses with thatched roofs are very

| Compact settlements in big cities- how it creates pollution of various types and the increased use of natural resources in these areas. |
| Rural life- need of developments in these areas which need to have sustainability. |
| Urban life- has many differences- culturally, environmentally, morally etc. |
Transport is the means by which people and goods move. In the early days, people had to walk long distances and used animals to carry their goods. Invention of the wheel made transport easier. Early traders used either the sea route or the land route, which takes long time. Airplanes have made travel faster. Modern means of transport thus saves time and energy. The four major means of transport are roadways, railways, waterways and airways. Modern transport causing various types of pollution. Exploiting natural resources and construction of roads, destroying the natural vegetation; but need to have roads only when necessary.

<table>
<thead>
<tr>
<th>Transport</th>
<th>Roadways</th>
<th>Railways</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport</td>
<td>Roadways</td>
<td>Railways</td>
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</tbody>
</table>

**Transport**

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- In the early days, people had to walk long distances and used animals to carry their goods.
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- Airplanes have made travel faster.
- Modern means of transport thus saves time and energy.
- The four major means of transport are roadways, railways, waterways and airways.
- Modern transport causing various types of pollution.
- Exploiting natural resources and construction of roads, destroying the natural vegetation; but need to have roads only when necessary.

**Roadways**

- This is the means of transport especially for short distances.
- Roads can be metalled (*pucca*) or unmetalled (*kutcha*), which are build in terrains like deserts, forests, high mountains etc.
- Manali-Leh highway in the Himalayan Mountains is one of the highest roadways in the world.
- Roads built underground are called subways/under paths. Flyovers are built over raised structures.

**Railways**

- The railways carry heavy goods and people over long distances quickly and cheaply.
The invention of the steam engine and the Industrial Revolution helped in speedy development of rail transport. Diesel and electric engines have largely replaced the steam engines. In places super fast trains have been introduced to make the journey faster. Advanced technological skills have enabled laying of railway lines in difficult mountain terrains. Indian railway network is well developed. It is the largest in Asia.

<table>
<thead>
<tr>
<th>Waterways</th>
<th>Waterways are the cheapest for carrying heavy and bulky goods over long distances. There are mainly of two types of waterways – inland waterways and sea routes. Navigable rivers and lakes are used as inland waterways. Eg. The Ganga-Brahmaputra river system, the Great Lakes in North America and the river Nile in Africa. Sea routes and oceanic routes are mostly used for transporting merchandise and goods from one country to another. These routes are connected with the ports. Some of the important ports of the world are Singapore and Mumbai in Asia, New York, Los Angeles in North America, Rio de Janerio in South America, Durban and Cape Town in Africa, Sydney in Australia, London and Rotterdam in Europe</th>
<th>Oil leakage into water bodies from vessels moving in the sea or water bodies. Big ships causes harm to water- living organisms.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airways</td>
<td>It is the fastest way of transport developed in the early</td>
<td>Too much resource is wasted by various</td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td>twentieth century, which is the most expensive one due to high cost of fuels. Air traffic is adversely affected by bad weather like fog and storms. It is the only mode of transport to reach the most remote and distant areas especially where there are no roads and railways. Helicopters are extremely useful in most inaccessible areas and in time of calamities for rescuing people and distributing food, water, clothes and medicines. Some of the important airports are Delhi, Mumbai, New York, London, Paris, Frankfurt and Cairo.</td>
<td>airways.</td>
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<td>It is the process of conveying messages to others. With the development of technology humans have devised new and fast modes of communication. The advancement in the field of communication has brought about an information revolution in the world. Through newspapers, radio and television we can communicate with a large number of people hence called as called mass media. Satellites have helped in oil exploration, survey of forest, underground water, mineral wealth, weather forecast and disaster warning. Now one can send electronic mails or e-mails through Internet. Wireless telephonic communications through</td>
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</table>
cellular phones have become very popular today.

Internet not only provides us with worldwide information and interaction but has also made our lives more comfortable.

**CHAPTER 8**

**Human Environment Interaction, the tropical and the sub tropical region**

<table>
<thead>
<tr>
<th>Human Environment Interaction, the tropical and the sub tropical region</th>
<th>Life in the Amazon</th>
<th>Climate</th>
<th>Rainforests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tropical region lies very close to the equator; between 10°N and 10°S is referred to as the equatorial region.</td>
<td>The river Amazon flows through this region.</td>
<td>Amazon Basin is characterized by hot and wet climate throughout the year.</td>
<td>As it rains heavily in this region, thick forests grow that create dense roof and does not allow the sunlight to reach the ground.</td>
</tr>
<tr>
<td>The place where a river flows into another body of water is called the river’s mouth.</td>
<td>Both day and nights are equally hot and humid. It rains almost everyday, that too without much warning.</td>
<td></td>
<td>Only shade tolerant vegetation may grow here. Orchids, bromeliads grow as plant parasites.</td>
</tr>
<tr>
<td>Numerous tributaries join the Amazon River to form the Amazon basin. The river basin drains portions of Brazil, parts of Peru, Bolivia, Ecuador, Columbia and a small part of Venezuela.</td>
<td>The day temperatures are high with very high humidity. At night the temperature goes down but the humidity remains high.</td>
<td>Deforestation of these rain forests.</td>
<td>Deforestation of these rain forests.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conversion of these forests to agricultural lands.</td>
<td>Conversion of these forests to agricultural lands.</td>
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<td>Remote sensing</td>
<td>Remote sensing</td>
</tr>
<tr>
<td><strong>People of the rainforest</strong></td>
<td><strong>Culture and life styles of the people are well adapted to the environment.</strong></td>
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<tr>
<td>It is rich in fauna. Birds such as toucans are found here.</td>
<td>Threat to the Amazon basin is deforestation and cattle ranching by larger multinational and corporations.</td>
<td></td>
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</tr>
<tr>
<td>Animals like monkeys, sloth and ant-eating tapirs are found here.</td>
<td>Amazon deforestation jumps to 69% in 2008.</td>
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<tr>
<td>Various species of reptiles and snakes also thrive in these jungles.</td>
<td>Forest cover in Southern Amazon may fall to 20% by 2016.</td>
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<tr>
<td>Several species of fishes including the flesh eating Piranha fish is also found in the river.</td>
<td>20% of Brazilian Amazon tree species is going to be extinct (Proceedings of the National Academy of Sciences).</td>
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</tr>
<tr>
<td>People grow most of their food in small areas after clearing some trees in the forest. While men hunt and fish along the rivers, women take care of the crops.</td>
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<tr>
<td>They mainly grow tapioca, pineapple and sweet potato</td>
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<tr>
<td>They practice “slash and burn agriculture”.</td>
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<tr>
<td>The staple food is manioc, also known as cassava that grows under the ground like the potato.</td>
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<tr>
<td>They also eat queen ants and egg sacs. Cash crops like coffee, maize and cocoa are also grown.</td>
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<tr>
<td>The rainforests provide a lot of wood for the houses. Some families live in thatched houses shaped like beehives. There are other large apartment-like houses called “Maloca” with a steeply slanting roof.</td>
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<tr>
<td>In the older days the heart of the forest, could be reached only by navigating the river.</td>
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<tr>
<td>In 1970 the Trans Amazon highway made all parts of the rainforest accessible.</td>
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<tr>
<td>Aircrafts and helicopters are also used for reaching various places.</td>
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<tr>
<td>The indigenous population was pushed out from the area and forced to settle in new areas</td>
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</tr>
</tbody>
</table>
It is estimated that a large area of the rainforest has been disappearing annually in the Amazon basin due to developmental activities. The topsoil is washed away as the rains fall and the lush forest turns into a barren landscape.

| Life in the Ganga Brahmaputra basin | The tributaries of rivers Ganga and Brahmaputra together form the Ganga-Brahmaputra basin in the Indian subcontinent, which lies in the sub-tropical region, situated between 10°N to 30°N latitudes. The tributaries of the River Ganga like the Ghaghra, the Son, the Chambal, the Gandak, the Kosi and the tributaries of Brahmaputra drain it. The plains of the Ganga and the Brahmaputra, the mountains and the foothills of the Himalayas and the Sundarbans delta are the main features of this basin. The area is dominated by monsoon climate. The monsoon brings rains from mid-June to mid-September. The basin area has varied topography. Wherever there are mountain areas with steep slopes, less number of people lives. The plain area provides the most suitable land for human habitation, where soil is fertile, population is high and Paddy is the main crop. Wheat, maize, sorghum, gram, millets, sugarcane, banana are the other crops that are grown. In West Bengal and Assam tea is Grown. Silk is produced in Bihar and Assam. The vegetation varies according to the landforms. Tropical deciduous trees grow here along with teak, sal and peepal. | Water resource management approach is required to balance environmental, social and economic considerations. Surplus water and flooding are the perennial problem in this region. Eroded materials from uplifted areas are deposited in the down faulted depressions leading to aggradations and shifting of rivers. Increasing demands for water from various sectors and decreasing water availability due to over use, pollution and inefficient water management leads to conflicts world wide (over allocation or over environmental issues.). International conflicts and co-operation. Environmental factors affecting quality and quantity of water. National water policy and inter state issues. Flood control programmes in India and need to have a river-friendly flood control measures that recognize the environmental value and the geomorphic importance of floods. |
The delta area is covered with Mangrove forests.

In parts of Uttarakhand, Sikkim and Arunachal Pradesh, coniferous trees like pine, deodar and fir can be seen.

There is a variety of wildlife.

Elephants, tigers, deer and monkeys, one-horned rhinoceros, Bengal tiger, crocodiles and alligator are found here.

It has several big towns and cities.

The cities of Allahabad, Kanpur, Varanasi, Lucknow, Patna and Kolkata all with the population of more than ten lakhs are located along the River Ganga.

The wastewater from these towns and industries is discharged into the rivers, which leads to the pollution of the rivers.

All the four ways of transport are well developed in this area.

Tourism is another important activity of the basin.

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**CHAPTER 9**

**LIFE IN THE TEMPERATE GRASSLANDS**

| Life in the temperate grasslands | Introduction | Grasslands can be defined as a region where grasses form the dominant type of plant life, which make up almost a quarter of the total land surface.

As climate plays an important role in the formation of grasslands, it is generally used as a basis to divide the world’s grasslands into two broad categories: those that occur in the temperate region and those that occur in the tropical regions. |

| The Prairies | The temperate grasslands of North America are known as the Prairies |

|  | Over grazing causes the depletion of grasslands. |

|  | How fire can destroy the grasslands and how it influences the growth of different flora and fauna. |

|  | Fire caused by periodic burning cause loss of biodiversity. |
It is a region of flat, gently sloping or hilly land. For the most part, prairies are treeless but, near the low-lying plains, flanking river valleys, woodlands can be found. Tall grass, up to two metres high, dominates the landscape.

The prairies are bound by the Rocky Mountains in the West and the Great Lakes in the East.

Prairies cover parts of USA (the area is drained by the tributaries of Mississippi) and parts of Canada (drained by the tributaries of Saskatchewan Rivers).

### Climate

The climate is of continental type with extreme temperature.

The summers are warm with temperature around 20 °C, while in winter may be -20°C.

Annual rainfall is moderate and ideal for growth of grass. Due to the absence of north-south barrier, a local wind 'chinook' blows here.

### Flora and fauna

Prairies are practically tree less.

Places that receive rainfall of over 50cm. are suitable for farming as soil is fertile and the major crops are maize, potatoes, soyabean, cotton and alfa alfa.

Areas where rainfall is very little or unreliable, grasses are short and sparse which are suitable for cattle rearing. Large cattle farms called ranches are looked after by cowboys.

Bison / American buffalo is the important animal which is nearly extinct due to indiscriminate hunting. Other animals are rabbits, coyotes, gophers and prairie dog.

Changes in climatic patterns causing the changes in the vegetation.

Reasons for the extinction of these species and to protect them.

Mexican prairie dog (an endangered species) was poisoned because they were believed to compete with grazing cattle.

Eskimo curlew were...
| People | The people of this region are hard working and have harnessed technology to utilize their rich natural resources.  
Two of the most developed countries in the world- the USA and Canada are located in this region.  
The prairies are also known as ‘Granaries of the world’ due to the huge surplus of wheat production.  
Dairy farming is another major industry. Dairy farming and extensive agriculture promote setting up of food processing industries.  
Large mineral deposits especially coal and iron and a good network of roads, railways and canals in this region have made it most industrialized region in the world. | Mining of resources like coal and iron should not exceed the limit which will hinder the future to meet their needs. |
| The Velds | The temperate grasslands of South Africa are called the velds.  
Velds are rolling plateaus with varying heights ranging from 600m to 1100m, which is ound by the Drakensburg mountains on the east and Kalahari desert in the west.  
On the North east part, ‘high velds’ are located that attain a height of more than 1600 m in some places.  
The velds receive rainfall mainly in the summer months from November to February. |  |
| Flora and Fauna | The vegetation cover is sparse. Grasses dominates the landscape.  
Plants like red grass, acacia and Maroola and animals like lions, leopards, cheetah and kudu are seen here. |  |
| People | Velds are known for cattle rearing and mining.  
The main crops are maize, wheat, barley, oats and potato. Cash crops like Tobacco, sugarcane and cotton are also grown. | Mining- should be controlled so that it does not hinder the needs of the future. |
Sheep rearing is the important occupation of the people. Sheep is bred mainly for wool and has given rise to wool industry.

Merino sheep is a popular species and their wool is very warm.

Dairy farming is the next important occupation where dairy products like butter, cheese are produced for both domestic supply and also for export.

Velds have rich reserve of minerals. Iron and steel industry has developed where coal and iron are present. Gold and diamond mining are major occupations.

Johannesburg is known for being the gold capital of the world and Kimberley is famous for diamond mines.

<table>
<thead>
<tr>
<th>CHAPTER 10 Life in the Desert</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Life in the Desert</strong></td>
</tr>
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<td></td>
</tr>
</tbody>
</table>
| | Desert areas are characterized by low rainfall, scanty vegetation and extreme temperatures. Depending on the temperatures, there can be hot deserts or cold deserts. | ⇒ Sustainability-
| | The people inhabit these lands wherever little water is available to practice agriculture | Developing processes that enable the enjoyment of a quality of life that is in balance with the maintenance and enhancement of local and global life. |
| | | ⇒ Harmony-
<p>| | | Developing processes for the effective engagement of western style and indigenous communities that leads to harmonious and successful economic and social advance for all groups. |</p>
<table>
<thead>
<tr>
<th>The Hot Desert - Sahara</th>
<th>Wealth creation: Developing viable businesses and employment opportunities capable of supporting an internationally competitive lifestyle for the people of the desert.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sahara is the world’s largest desert which has an area around 8.54 million sq. km.</td>
<td>Oil is extracted from here which is of great importance to economy of the entire country.</td>
</tr>
<tr>
<td>It touches eleven countries like Algeria, Chad, Egypt, Libya, Mali, Mauritania, Morocco, Niger, Sudan, Tunisia and Western Sahara.</td>
<td>This mineral exploitation has led to economic growth in Sahara but has lost the indigenous people to lose work.</td>
</tr>
<tr>
<td>Sahara desert is covered with gravel plains and elevated plateaus with bare rocky surface.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Climate</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The climate is scorching hot and parch dry which has a short rainy season. The sky is cloudless and clear. Moisture evaporates faster than it accumulates.</td>
<td></td>
</tr>
<tr>
<td>Days are hot and the temperatures during the day may soar as high as 50°C.</td>
<td></td>
</tr>
<tr>
<td>The nights may be freezing cold with temperatures nearing zero degrees.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flora and fauna</th>
<th>Various environment processes and environmental changes that occurred in Sahara.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetation in the Sahara desert includes cactus, date palms and acacia. In some places there are oasis – green islands with date palms surrounding them.</td>
<td>Plant and animal population is sparse.</td>
</tr>
<tr>
<td>Camels, hyenas, jackals, foxes, scorpions, many varieties of snakes and lizards are the prominent animal species.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Despite of harsh climate, Sahara has been inhabited by various groups of people. Eg. Bedouins and Tuaregs are nomadic tribes rearing livestock such as goats, sheep, camels and horses. They wear heavy robes as protection against dust storms and hot winds.</td>
<td>According to Archeologists, the Sahara was much more densely populated thousands of years ago when the desert’s climate was not as harsh as it is today.</td>
</tr>
<tr>
<td>The extreme temperature causes difficulty in sustaining life in</td>
<td></td>
</tr>
</tbody>
</table>


The oasis in the Sahara and the Nile Valley in Egypt supports settled population. Since water is available, the people grow date palms.

Crops such as rice, wheat, barley and beans are also grown.

Egyptian cotton, famous worldwide is grown in Egypt.

The discovery of oil – a product in great demand throughout the world, in Algeria, Libya and Egypt is constantly transforming the Sahara desert.

Other minerals of importance that are found in the area include iron, phosphorus, manganese and uranium.

The cultural landscape of the Sahara is undergoing change.

| The cold desert - Ladakh | The cold desert - Ladakh is a cold desert lying in the Great Himalayas, on the eastern side of Jammu and Kashmir. The Karakoram Range in the north and the Zanskar mountains in the south enclose it. Several rivers flow through Ladakh, Indus being the most important among them. Several glaciers are found in Ladakh, for example the Gangri glacier. The altitude in Ladakh varies from about 3000m in Kargil to more than 8,000m in the Karakoram. Due to high altitude, the climate is extremely cold and dry. The day temperatures in summer | Sahara. Drip irrigation is a clear and ecologically sustainable way to manage ground water resources. Carefully using water to irrigate desert species can give the suitable added value to families’ economy, needed to develop new profitable use of local resources. Land degeneration caused by salinization has been the main problem constraining the development of oasis. Some of the social problems found here are difference in age classes, low education level and poor livelihood. Desert development leads to gradual decease of basic resources especially water, change in social relations and economical foundation and ultimately to abandoned villages because of out migration. Ladakh witnesses the little change in technological level. Agriculture is confined to river valley basins where irrigation is available. Animal husbandry is main occupation. Ladakh possess virtually no normal forests, though along river banks and valleys some greenery does exist. Melting of the glaciers in Ladakh due to Green house effect and global warming and its impact on the globe. |
are just above zero degree and the night temperatures well below 30°C. It is freezing cold in the winters when the temperatures may remain below 40°C for most of the time.

As it lies in the rain shadow of the Himalayas, there is little rainfall, as low as 10 cm every year.

| Flora and fauna | Due to high aridity, the vegetation is sparse. There are scanty patches of grasses and shrubs for animals to graze. Groves of willows and poplars are seen in the valleys. During the summers, fruit trees such as apples, apricots and walnuts bloom. Several species of birds are sighted in Ladakh. Robins, redstarts, Tibetan snowcock, raven and hoopoe are common. Some of these are migratory birds. The animals of Ladakh are wild goats, wild sheep, yak and special kinds of dogs. Different plant species which are traditional medicinal plants are used against various ailments. The flora and fauna of Ladakh are threatened and protection is vital if ancient ecosystems should survive. |
| People | The people here are either Muslims or Buddhists. Several Buddhists monasteries dot the Ladakhi landscape with their traditional ‘gompas’. Eg. Hemis, Thiksey, Shey and Lamayuru In the summer season the people are busy cultivating barley, potatoes, peas, beans and turnip. The climate in winter months is so harsh that people keep themselves engaged in festivities and ceremonies. The women are very hard working. Leh, the capital of Ladakh is well connected both by road and air. The National Highway 1A connects Leh to Kashmir Valley through the Zoji la Pass. Tourism is a major activity with several tourists streaming in from within India and abroad. Tribal groups of Ladakh. Ethno botanical aspects of Ladakh. Medicines that are been used by various tribal groups for curing different ailments. Traditional medicines of cold desert-Ladakh. Remedies for conservation and development of traditional system of medicines. The valley sustain an agrarian population along the course of the drainage system where ever sources of artificial is available. |
Life of people is undergoing change due to modernization. But the people of Ladakh have over the centuries learned to live in balance and harmony with nature. Due to scarcity of resources like water and fuel, they are used with reverence and care. Nothing is discarded or wasted.

### CIVICS

#### UNIT 1

#### ON EQUALITY

<table>
<thead>
<tr>
<th>On equality</th>
<th>Equality and inequality</th>
<th>How inequality hinders the progress of a nation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Equality is a key feature of democracy</td>
<td>What if the citizens do not vote</td>
</tr>
<tr>
<td></td>
<td>What is Universal adult franchise</td>
<td>Casteism and development in India</td>
</tr>
<tr>
<td></td>
<td>Casteism</td>
<td>Caste-discrimination that they observe in their locality and its impact</td>
</tr>
<tr>
<td></td>
<td>Students being treated unequally based on caste</td>
<td>Religious disparity as a hindrance in development.</td>
</tr>
<tr>
<td></td>
<td>Inequality based on religion</td>
<td>Gender disparity, educational disparity, economic disparity as hindrance in development of a nation</td>
</tr>
<tr>
<td></td>
<td>Indian constitution recognizes every person as equal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>According to Indian constitution, every individual in the country including male and female persons from all castes, religions, tribes, educational and economic backgrounds are recognized as equal.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Every person is equal before the law</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No person can be discriminated against on</td>
<td></td>
</tr>
</tbody>
</table>
the basis of their religion, race, caste, place of birth or whether they are male or female.

Every person has access to all public places

Untouchability has been abolished.

<table>
<thead>
<tr>
<th>How the government has tried to implement equality</th>
<th>Through laws and government programmes or schemes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid day meal scheme</td>
<td>Article 15 of Indian constitution.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Issues of equality in other democracies</th>
<th>In many democratic countries around the world, the issue of equality continues to be the key issue around which communities struggle</th>
</tr>
</thead>
<tbody>
<tr>
<td>African Americans treated unequally in USA.</td>
<td></td>
</tr>
<tr>
<td>Civil rights movement</td>
<td></td>
</tr>
</tbody>
</table>

UNIT 2

ROLE OF THE GOVERNMENT IN HEALTH

<table>
<thead>
<tr>
<th>Role of the government in health</th>
<th>What is health</th>
<th>Health is the ability to remain free of illness and injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Clean water and a pollution free environment is essential for being healthy.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Without any mental strain</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How food was considered in olden days and also among tribal community.</th>
<th>Reasons for the improper health in the modern world</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Water logging and its impact on human health</td>
</tr>
<tr>
<td></td>
<td>Precautions to be taken during monsoon season to prevent one-self from getting diseases.</td>
</tr>
<tr>
<td></td>
<td>Community programmes for</td>
</tr>
<tr>
<td><strong>Health care in India</strong></td>
<td><strong>India has the largest number of doctors in the world</strong></td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Most doctors settle in rural areas</strong></td>
<td><strong>Healthy being and development of a country.</strong></td>
</tr>
<tr>
<td><strong>Health facilities have grown substantially over the years</strong></td>
<td><strong>Reducing the use of allopathic medicines and using a natural way of treatment</strong></td>
</tr>
<tr>
<td><strong>India has a large number of medical tourists from many countries</strong></td>
<td><strong>Avoid wastage of food</strong></td>
</tr>
<tr>
<td><strong>India is the fourth largest producer of medicines &amp; the large exporter</strong></td>
<td></td>
</tr>
<tr>
<td>Private health services</td>
<td>It is run by doctors who run them on their own</td>
</tr>
<tr>
<td>-------------------------</td>
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</tr>
<tr>
<td></td>
<td>There are hospitals and nursing homes that are privately owned.</td>
</tr>
<tr>
<td></td>
<td>There are many laboratories and medical shops that are run privately.</td>
</tr>
<tr>
<td></td>
<td>Private health facilities are not owned or controlled by the government</td>
</tr>
<tr>
<td></td>
<td>In private facilities, patients have to pay a lot of money for every service that they use.</td>
</tr>
<tr>
<td>Health care and equality</td>
<td>In India we can find that the private services are increasing, but public services are not.</td>
</tr>
<tr>
<td></td>
<td>Private services are mostly concentrated in urban areas</td>
</tr>
<tr>
<td></td>
<td>At times, cheaper methods, though available are not used.</td>
</tr>
<tr>
<td></td>
<td>Only 20% of the population can afford all the medicines that they require during an illness.</td>
</tr>
<tr>
<td></td>
<td>40% of people who are admitted to a hospital for some illness or injury have to borrow money</td>
</tr>
</tbody>
</table>

Impact of discrimination on health care leading to hindrance to sustainable development.
or sell some of their possessions to pay for the expenses.

Poor people are not provided basic necessities like drinking water, adequate housing, clean surroundings etc. that make them likely to fall ill.

Women’s health concerns are considered to be less important than the health of men in the family.

What can be done

It is the responsibility of the government to provide quality health care services to all its citizens, especially the poor and the disadvantaged.

The Kerala experience where 40% of the entire state budget was given to panchayats which made possible for the village to make sure that proper planning was done for water, food, women’s development and education.

Anganwadis, heath centres were all improved.

The Costa Rican approach is where the Costa Rican Government (in S. Africa) took a decision and decided to spend the money that the army would have used, on health, education and other basic needs of the people.

Few examples of some case studies is taken as example where it is exposed to better health facilities.
CHAPTER 2
FIBRE TO FABRIC

Fibres

Obtained from
Plants

Sheep, goat, yak

Consists of
Wool

Obtained by
Rearing and breeding of sheep

Steps in processing fibres into wool
1. Shearing
2. Scouring
3. Sorting
4. Burrs picked out and fibres scoured again
5. Dying
6. Fibres straightened, combed and rolled into yarn

Animals

Silkworm

Silk

Life history

Eggs
Larva/ Silkworm/ Caterpillar
Pupa/ Larva/ Cocoons
Silkmoth

Rearing of silkworm

Sericulture

Steps in processing silk
1. Sun boiled cocoon
2. Reeling the silk
3. Silk fibres spun into silk threads
CHAPTER 3
WEATHER, CLIMATE AND ADAPTATIONS OF ANIMALS TO CLIMATE

Geography of a place

Weather
- Meteorological dept.
  - Elements
    - Temperature
    - Humidity
    - Rainfall
    - Windspeed
    - Rainguage
  - Weather reports
    - Weather pattern taken over a long time (25 years)
      - Hot
      - Hot & Wet
      - Hot & dry
      - Wet

Climate

Adaptations
- Special features processed by animals living in extreme cold or heat to protect themselves
  - Polar regions
    - Polar bear
      - White fur
      - Layer of fat under skin
      - Long curved and sharp claws
      - Two thick layers of fur
      - Strong sense of smell
  - Tropical rainforests
    - Fishes, musk, oxen, reindeer, fox, birds, seal,
      - White colour
      - Thick skin
      - Lot of fat to protect from cold
      - Good swimmers (streamlined body and webbed feet)
Tropical rainforests

Found in

Western ghats, Assam, SE Asia, Central America, Central Africa

Animals found are

Red Eyed frog
- Sticky pads on its feet to climb

Monkey
- Long tailed for grasping branches

Toucan
- Long, large beak

Lion tailed macaque
- Silver white mane and a good climber

Elephant
- Trunk, large eyes, tusks are modified teeth

Apes, Gorillas, Lion, Tiger, Leopard, Lizard, Snakes, Birds, Insects
APPENDIX X

THEME 1: Population and sustainability

Questions to be addressed

1. How is the population growth related to poverty? List out the strategies for eliminating poverty in India.
2. How is population growth related to the global community? How does the growth in population affect the global community?
3. What is the status of population growth in developing, developed and underdeveloped countries of the world? How does it influence the earth?
4. How is population growth related to the quality of life? How can you ensure a sustainable population growth along with a better quality of life?
5. Does population education help in attaining sustainability? If yes, how?
6. Why is it important to control the population growth? What are the consequences that one will face if the population growth continues at a faster rate?
7. How are population, environment, resources and development related? What are the ways by which we can have a sustainable development?
8. What are the roles of women in a society for attaining a sustainable society?
9. What are the different strategies that one can adopt to alleviate poverty and how far each individual have attempted to eradicate poverty
10. Find out the different policies in India that are related to population. What could be the reason for giving importance on policies related to population
11. What are the reasons for imbalanced distribution of population and what are the main reasons for international migrations. How can you make use of the native people in bringing about development in their country in a sustainable manner?
12. What are the different ways by which we can balance the population dynamics, socio economic development, natural resources and environmental quality?
13. What are the different environmental problems that are faced by the world due to the rapid population growth?
14. What are the consequences that people has to face living in marginal and vulnerable areas? How can you provide rehabilitation for such people?
15. What are the main reasons for people moving towards metropolitan cities? How can you assure developments in rural areas also so that the metropolitan crowd can be reduced?
16. How is population and food production related? What are the measures that one can take to have a balance between food production and population growth.
17. How is population and family planning related? Should family planning be considered in bringing out a sustainable society?
18. What are the main reasons for the raise in mortality rates in the modern world?
19. How are population and HIV/AIDS related? What are the steps that one has to follow for leading a healthy life and why is it important?
20. Which are the ecosystems that are highly affected by human activities and what are the main causes for such destruction

Content outline

- Relationship between population growth and poverty
- Population and global community
Population in developing, developed and under developed countries
Relationship between population growth and environment
Population growth and quality of life
Importance of population education
Controlling the population growth
Relationship between population, resources, environment and development
Role of women and gender equality
Alleviation of poverty
Policies on population
Imbalanced population distribution and international migration as the major problems
Balancing population dynamics, socio-economic development, the use of natural resources and environmental quality
Environmental problems due to population growth
  - Land degradation
  - Deforestation
  - Air and water pollution
  - Threats to bio-diversity
  - Habitat destruction
  - Rising sea level due to green-house effect
Human settlements in marginal and vulnerable areas
People concentrating on large metropolitan cities
Population versus food production
Importance of education, health and human resource development for quality life
Women empowerment
Family planning and population
Population and mortality rates
Population and HIV/AIDS
Eco systems that are heavily affected by human beings

THEME 2: Agriculture, nutrition and sustainability

Questions to be addressed

1. How is population and food production related? What are the measures that one can take to have a balance between food production and population growth.
2. How is malnutrition and poverty related? What are the strategies that can be adopted for providing proper nutrition for all the people?

What are the impacts of using chemical fertilizers in the agricultural field? How can we
3.

Content outline

- Percentage of food production versus population
- Malnutrition and poverty
- Use of chemicals in agriculture
Food production, management and food preservation
Loss of soil fertility
Mineral degradation in the soil
Food scarcity
Nutrient deficiency
Use of hybrid varieties in agriculture and its impact
Impact of excessive usage of pesticides and weedicides
Chemical fertilizers and soil quality
Replenishing the soil nutrients
Crop rotation
Plant proteins
Rhizobium as a natural fertilizer
Use of natural manures
Nitrogen fixing symbiotic and free living micro organisms
Amount of food produced for the population
Agricultural land getting converted into buildings and industries
Conversion of agrarian culture into consumerism
Self employment of farmers are being disturbed
Soil depletion
Soil erosion
How loss of humus soil occurs
Soil management and crop management
Soil fertility, crop rotation and crop production
Soil borne diseases
Soil salinity, pH and nutrient requirements
Organic fertilizers and soil fertility
Sericulture industry and its potential
Sustainable agriculture
Agrarian population
Prospects for food security
Soil moisture and agriculture
Phosphate rocks for sustainable agriculture
Conversion of forests to agricultural lands
Animal husbandry

**THEME 3: Sustainability and urbanisation**

**Questions to be addressed**

**Content outline**

- Reservoir management
- Movement of people from rural to urban areas
- Importance on anaerobes in various industries like paper, textiles etc.
Changing world due to globalisation, commercialisation, urbanisation etc. and how it can influence the life forms
Measures to control industrialisation, urbanisation etc.
Sericulture industry and its potential in India
Silk industry, silk export and new technologies in sericulture
Silkworm rearing and its importance to economy
Industrialisation and water pollution
Industrialisation, modernisation, globalisation and its relation to increase in temperature
Urban life having difference in culture, environmentally and morally.

THEME 4: Rural Development

Questions to be addressed

1. Why are developments occurring very rarely in rural areas? What solutions can you suggest for bringing about developments in rural areas?

2. What are the reasons for the rural people shifting to urban areas? How can we bring about development both to urban and rural areas in a sustainable manner?

3.

Content outline

- Causes for lack of development in rural areas
- Rural habitation shifting to urban
- Self employment of farmers being disturbed
- Growth of farm animals and its importance in eradicating poverty and attaining growth of economy
- Selective breeding for producing disease resistant varieties and high yielding varieties in agriculture
- Rural life- Need for developments in these areas
- Culture and lifestyles of the people are well adapted to the environment
- Life of tribes getting modernised

THEME 5: International understanding and peace

Questions to be addressed

Content outline

- Rio declaration
- Measures taken in India for conservation of biodiversity including the legal framework
- International conflicts in the name of water and need for cooperation
THEME 6: Gender equality and human rights

Questions to be addressed

Content outline

THEME 7: Health promotion

Questions to be addressed

Content outline

➢ Heat and human health
➢ Heat illness
➢ Heat cramps and heat stroke
➢ Increase in global temperature and health problems
➢ Importance of nutrients in maintaining proper health
➢ Malnutrition and poverty
➢ Food production, management and food preservation
➢ Why fats require more oxygen for its breakdown
➢ Fat deposition and body weight
➢ Obesity
➢ Need for proper exercise
➢ Active exercise to reduce muscle fatigue
➢ Breathing problems and changing life styles
➢ Diseases of respiratory system

THEME 8: Environmental conservation and protection

Sub-theme 1: Water management

Questions to be addressed

1. What are the different sources of water and what is its present condition? What is the main cause for the depletion of water bodies and how can you conserve the water sources?
2. Why is it necessary to maintain a balance between oceans and lands? What are the impacts if such balance is disturbed?
3. What is the importance of hydrological cycle and how is it helpful in maintaining a balance on the earth?
4. What are the different water resources in India? How much of ground water and surface water is used per person and why is it important to conserve them?
5. Why is it necessary to maintain a proper management of water resources? What would happen if it is not taken seriously?
6. List out some of the places which experienced conflicts in the name of water. Why are such conflicts occurring and how can we solve such crisis in the future?

7. Is nationalising rivers a boon or a curse? Why?

8. What are the physical and chemical parameters of water and how is it getting disturbed due to modern developments?

9. How do the radiations affect water resources? What are its harmful effects and how can it be reduced?

10. How are the water distributed in the world and why is it been disturbed? What are the causes for such changes?

11. What are the different ways to attain a sustainable development of water resources?

12. How does increase in population affects the water resources? What are the steps to be taken to reduce water depletion?

13. What are the reasons for water scarcity in different parts of the world? What is the condition of water scarcity in India?

14. What are the different ways to provide access to safe drinking water and better sanitation for the population? Why is it essential?

15. Why the national policy on water has been introduced? What are the reasons for giving such priority for water?

16. What is the main purpose for construction of dams? What are the criteria that one should keep in mind while planning to construct dams?

17. How do modern developments cause hindrance to the proper water management? How can one assure a better water management in an area?

18. What is the status that has been given to water in the ancient Indian literatures? How much changes have occurred in the modern world?

19. What are the various impacts on human beings due to scarcity of water? How can you prevent such disasters in the future?

20. Why are various watershed projects being introduced in India? Why are they gaining priority in the modern world?

21. Why rainwater harvesting is gaining priority and how can you practice rainwater harvesting at home?

22. What are the different activities that you can undertake to prevent runoff water?

23. What are the implications on land by concretizing the land? How can you bring awareness in your community regarding its ill effects?

24. What are the impacts on the environment due to construction of dams? How can you assure development by protecting the environment?

25. What are the reasons for water scarcity in various parts of the world? What are the strategies that you can adopt for preventing water scarcity in the future?

26. What are the different ways of water management and why is it important?

27. What are the different strategies that you can adopt for managing water at the individual level, within cities, between states and countries? Why should you look into these impacts globally?

28. How does the amount of usable water on the earth get decreased? What can you do to prevent the ground water depletion?
29. What are the different ways of water being polluted? What are the steps that one can take to prevent water pollution?
30. Why water has become a political issue in many places and why bloodshed had occurred in many parts of the world. How can we reduce the pressure on water resources?
31. How can you prevent water pollution in areas of human settlements? Find out few strategies to prevent water pollution in such areas?
32. How can you maintain water quality in areas of human settlements and how can you assess the quality of water?
33. What are the ways for converting waste water into usable forms? How has technology helped in recycling of waste water?
34. What are the different laws pertaining to prevention of water pollution? Why the Governments are giving more priority for protecting water?
35. How can you have a better waste water management in kitchens and gardens? List out few methods it?
36. What are the causes for acid rains in certain areas? What are its causes and effects? How can you prevent acid rains in the future?
37. What roles can one play at home and school for conserving water? List out few ways that you can adopt at school and homes for water conservation
38. How can you undertake few activities in order to bring awareness in the community regarding water conservation?
39. What are the ill effects of stagnant water in some places? Why is it very essential to keep your surroundings clean?
40. How does the water get polluted from different sources? What are the different agents of pollution? How can you prevent such pollutions and why is it essential?
41. List out few activities that can be undertaken by the community for safeguarding fresh water, ground water etc.
42. How do water help in weathering of rocks? How does water act as a main agent that need to be protected for the formation of soil?
43. What will happen during heavy rains in places having no proper drainage system? How can it affect the life in those areas?
44. How do floods affect the life in an area? What are the precautionary measures that one can take in flood hit areas?
45. What is the different flood control programmes undertaken in India? Why is it been given more importance?
46. How can drip irrigation help in conserving ground water? How can you adopt them in your locality to conserve ground water?

Content outline
- Different sources of water
- Water balance of oceans and lands
- Hydrological cycle and water balance on earth
- Water resources of India (how much ground water and surface water is used per person)
- Utilisation of water
- Water crisis leading to conflicts
- Nationalisation of rivers
- Water quality (both physical and chemical parameters)
- Radiological effects of water
- The world water distribution
- Water and sustainable development
- Population and water stress
- Water scarcity in different countries and specific to India
- Access to safe drinking water and sanitation in developing countries
- National water policy
- Construction of dams
- Impact of modern development on water management system
- Water as one of the five elements in ancient India-Earth, Fire, Air, Space and Water
- Shortage of water leading to epidemics, hunger, despair and death
- Water-shed projects
- Rain water harvesting
- Activities to prevent run of water
- Avoiding concretizing the land
- Construction of dams, destruction of nature as the cause of earthquake and volcanic eruptions
- Water scarcity – its causes, effects and preventive measures
- Need for a more oriented and integrated approach to water management and development
- Different ways of managing water
- Managing water at individual level
- Water management within cities, between states and countries
- Decreasing the amount of usable water on earth
- Impact of water depletion
- How water gets polluted
- Eutrophication
- Water as a political issue
- Bloodshed occurred on water issues
- How human settlements pollute water
- Water quality management issues
- Re-utilization and recycling of water
- Water pollution control through law
- Assessment of water quality
- Use of solar energy for cleaning polluted water
- Acid rain
- Constructing pits for conserving and percolation of water
Water management in kitchen and garden
Sustainable water use
Ones role at home and school for conserving water
Creating awareness among the community on water conservation
Stagnant water and its impact on human health
Chemical and microbial contamination of water
Role of technology in waste water treatment
Participatory behaviour of public
Diseases that are spread due to stagnant water
Usable water getting reduced
Water and weathering of rocks
Percolation of water versus various chemicals in the soil
Drainage on run of and flood
Surplus water and flooding
Environmental factors affecting quality and quantity of water
Flood control programs in India
Environmental value and geomorphic importance of floods
Drip irrigation to manage ground water

Sub- theme 2: Biodiversity/ Forest

Questions to be addressed

Content outline
  ➢ Importance of protecting and preserving biodiversity
  ➢ Forests as an important renewable resource
  ➢ Forests and wildlife for maintaining ecological balance
  ➢ Chief forest products
  ➢ Tropical and sub tropical forests getting disturbed
  ➢ Reasons for destruction of forests
  ➢ Forests and ecological balance
  ➢ Desertification
  ➢ Deforestation and Afforestation
  ➢ Forest and economy
  ➢ Aesthetic value of forests
  ➢ Eco tourism
  ➢ Richer biodiversity in the tropics
  ➢ Distribution of plant and animal species in the polar regions
  ➢ Flora and fauna vary according to climate, altitude and soil
  ➢ Hotspots of biodiversity
  ➢ Changing biological diversity
  ➢ Biology of rare and declining species
  ➢ Restoration of ecology through ex-situ conservation
Restoration of the degraded ecosystem in an environmentally friendly manner
Importance of conserving trees
Deforestation
Endangered species its causes, effects and preventive measures
Man destroying nature for satisfying his needs
Importance of reforestation
Some of the environmentally friendly activities
Determining patterns and indicators of ecological response to stress
Conservation and wise use of world’s biodiversity for sustainable development
Endemic species and its conservation
Conserving species which are vulnerable, endangered, rare, threatened and lower risk
Various causes of loss of biological diversity
Promoting ex-situ conservation and in-situ conservation
Policy measures for conservation and suitable utilization of forest biodiversity
Influence of human activities on land, climate, vegetation and wildlife
Need to plant more trees which is suitable for each place
Remote sensing technology helping in conservation of forests like Amazon
Threats to Amazon, temperate grasslands, deserts etc.
Over grazing causes the depletion of grasslands
How fire can destroy the grasslands
Changing climatic patterns leading to changes in the vegetation
Endangered species- Reasons for extinction
Maintenance of biodiversity
Areas that need to give focus for its conservation and protection
Various environment processes and environmental changes that occurred in Sahara
Traditional medicines- Ethnobotany
Remedies for conservation and development of traditional system of medicines

Sub theme 3: Renewable energy

Questions to be addressed

Content outline
- Importance of non conventional power plants
- Solar energy for domestic purposes
- Harvesting of wind energy and tidal energy
- How to harvest wind energy and tidal energy

Sub theme 4: Land management

Questions to be addressed

Content outline
Mineral degradation in the soil
Soil depletion Soil erosion
Mining and its effect on soil profile
Soil water content and infiltration rates
Soil erosion and slope failure
Impact of mining on different layers of earth
Quarrying and environmental impact
Causes for soil erosion and soil depletion
Soil erosion and transporting to water bodies
Lichens and weathering of rocks
Impact of mining on different layers of earth
Quarrying and its impact on environment
Causes for soil depletion and soil erosion
Soil erosion and transporting to water bodies
Lichens and weathering of rocks
Impact of mining on different layers of earth
Quarrying and environmental impact
Major landforms of earth
How the topsoil of the lithosphere get washed away
Compact settlements in big cities- how it creates pollution of various types
Land degeneration caused by salinization
desert development

Sub theme 5: Climatic change

Questions to be addressed

Content outline
Heat and climatic change
Global temperature increasing
Changing weather patterns
Adverse weather conditions
Green house effect and its impact
Climatic changes and melting of ice caps
Impacts of melting of polar ice caps
Deforestation
Endangered species- its causes, effects and preventive measures
Climatic change and its influence on life forms
Heating of earth due to pollutants
Difference in climate due to changes in wind patterns
Hurricanes like typhoon, tornado, flood and drought
Importance of technology in forecasting and warning services
Deforestation and climatic change
- Industrialisation and climatic change
- Tsunami - a natural calamity
- Impact of increase in CO₂ in the atmosphere
- Green house effect and its impact
- Causes for global warming
- Why global warming is given more priority now a days
- Impact of global warming on life, polar regions and coastal areas
- Amount of various gases in the atmosphere and its impact
- Improved technology as a helping agent in predicting natural calamities
- Impact of increase in CO₂ in the atmosphere
- Cyclones and its impact
- Changes occurring in various seasons like heavy rains during monsoon, rains during summers, lack of rain, rain in deserts etc.
- Rains that are seasonal and its impact on the environment

Sub theme 6: Waste management, toxic chemicals

Questions to be addressed

Content outline
- Importance of science and technology in proper waste disposal
- Recycling of wastes for minimizing the physical deterioration of the environment
- Industrial metabolism
- Proper disposal and recycling of wastes
- Impact of mixing degradable and non degradable wastes
- Sewage disposal in highly polluted places
- Avoiding sewage disposal in areas of human settlements
- Regular checking of sewage pits to prevent the outbreak of contagious diseases
- Role of technology in waste water treatment
- Convert sewage into usable forms like biogas
- Avoiding direct discharge of wastes to water bodies
- Participatory behaviour of public in waste management
- Conversion of sewage to useful forms
- Diseases spread through unhygienic waste disposal

Sub theme 7: Sustainable use of natural resources

Questions to be addressed

Content outline
- Natural resources are limited
- Oxygen parlours as a result of lesser no. of trees
- Sustainable development of mineral resources
- Depleting of igneous, sedimentary and metamorphic rocks due to over usage by human beings
- Over exploitation of minerals- how it influences the nature and life forms on earth
- Forests as an important renewable natural resource
- Restoration of the degraded ecosystem in an environmentally friendly manner
- Human influence on natural environment
- Depletion of natural environment by various natural and human influence
- Develop sensitivity towards environment
- How an ecosystem gets vanished, polluted and destroyed
- The early man and how they lived a life in accordance with nature
- How exploiting of nature by man started
- Extraction of oil from different deserts
- Mineral exploitation though lead to economic growth, it can lose the work of indigenous people

Sub theme 8: Air pollution

Questions to be addressed

Content outline
- Emission of gases in a volcanic eruption and how it harms our environment
- Monitoring the impact of deforestation and various forms of pollution
- Green house effect, ozone depletion, acid rain- its causes and effects
- Air as one of the main elements among the five elements in the ancient time- earth, fire, air, space and water
- Need for maintaining a balance in composition of gases in the atmosphere
- Different gases that pollutes the environment
- Planting of more suitable trees to prevent the excessive accumulation of CO₂ in the atmosphere
- Increase in CO₂ leading to Green house effect and global warming
- How the troposphere, stratosphere, mesosphere, thermosphere and exosphere get affected by human activities
- Monitor the impact of various forms of pollution

Sub theme 9: Transport

Questions to be addressed

Content outline
- Modern transportation
- How modern transportation causes various types of pollution
- How natural resources are exploited due to transportation
- Oil leakage from different vessels in the water bodies
  - Big ships causing harm to organisms living in the water
APPENDIX XI
CLASS VII
SCIENCE AND SOCIAL SCIENCE
UNIT 1
NUTRITION IN PLANTS

Scope:

The unit deals with the various modes of nutrition in plants like, autotrophs, heterotrophs, saprotrophs and symbiotic relationships. It also describes about the food making process in autotrophic plants i.e., Photosynthesis that helps in the synthesis of carbohydrates. They also synthesize other components of food such as proteins and fats.

Focus points

1. Malnutrition and health
2. Organic nutrients in the soil getting depleted
3. Reasons for the soil nutrient depletion
4. Concentration of CO₂ in the atmosphere and how it gets disturbed
5. Reasons for usable water getting reduced
6. What is crop rotation? What is the role of farmers in food production?
7. Ways of utilising solar energy for domestic work
8. Need for protecting plants and trees
9. What happens if chemical fertilizers are used in excess in the soil
10. Food production vs. Population. How food distribution is managed in India?
11. How can we improve the fertility of soil eco-friendly

Issues to be raised:

1. What are the causes of malnutrition?
2. What is the importance of nutrients in maintaining proper health?
3. What will happen to plants if nutrients are less in the soil?
4. How do soil nutrients deplete?
5. What are the various gases in the atmosphere and how it influences the environment?
6. How do usable water in the soil get reduced?
7. How can you use solar energy in our domestic work?
8. What are the importance of protecting plants and trees?
9. Why is it important to preserve biodiversity?
10. What are the disadvantages of using fertilizers in the soil?
11. What is Rhizobium and what is its importance?
12. How can you reduce the use of chemical fertilizers?
13. What are the ways of improving the fertility of soil?
14. What are the advantages of using organic manure?

**Learning objectives:**

**The pupil**

- Infer the causes of malnutrition
- Identifies the reasons for degradation of minerals in the soil.
- List out the various reasons for depletion of usable water in the soil
- Analyze the uses of solar energy in various domestic purposes.
- Discuss the importance of protecting plants and biodiversity
- Analyze the importance of saprotrophs in different industries
- Interpret the disadvantages of using fertilizers in the soil to increase fertility
- Mention ways to reduce the use of chemical fertilizers
- List out ways of improving soil fertility in an eco-friendly manner

**Resources:**

Pictures of various deficiency diseases (both plants and animals), potted plants, iodine solution, newspaper cuttings on water conservation, fungus, root nodules of leguminous plants, visit to a paddy field, bread slice, microscope, magnifying glass.

**Activity:**

Pupil will be asked to list out the various nutrients needed by organisms for living. They are asked to collect about the different functions of these nutrients. They are also asked to collect pictures of diseases caused due to the deficiency of these nutrients (both in plants and animals). Pupils are asked to explore into the causes for malnutrition in the country and to come out with solutions to tackle the problem. Pupil will be asked to get recent news from newspaper regarding the food shortage and malnutrition in different places of the country and present in the classroom and maintain a record of the collected material.

**Learning outcome:**

Develop awareness about the functions of different nutrients, the reasons for malnutrition and various deficiency diseases caused due to nutrient deficiency.
**Activity:**

Pupil will be asked to compare the nutritional behaviour in animals and plants. They are asked to observe the plants and find out how they prepare food. They will be asked to discuss on the following questions.

- Where do plants get the various nutrients?
- How do plants transport the raw materials?
- How is water important for plants?
- Where are food factories of plants located?
- How does the mineral in the soil degrade?

They are asked to reflect upon why plants are called as Autotrophs? They will be asked to observe the surroundings and find out the varied colour plants and are asked to find out how they too prepare food?

*Learning outcome:*

Develops understanding about the nutrition in plants and the different ways by which they get the raw materials for photosynthesis

**Activity**

Pupil is asked to collect information about plants that are used as medicines for common diseases (grandma’s medicine) from earlier days onwards. They are asked to collect few plants which are to be pasted in the science diary. It can be followed by maintaining a herbal garden in the school.
**Learning outcome:**
Develop awareness about the various medicinal plants and skill of plant collection and pasting them in books.

**Activity**
A graph is shown about how many students below 5 years of age die of malnutrition in India. Students are asked to observe the graphical data and critically analyse the issue.

**Learning outcome:**
Develop awareness about the importance of food and the habit of not wasting food.

**Activity**
A drama is enacted on the impact of chemicals. Eg. Endosulfan. It is followed by a poster presentation about the impact of using such chemicals.
Learning outcome:
Develop awareness on the impact of using chemicals as fertilizers

Activity
A debate is conducted on the topic- Genetically engineered crops- a boon or a bane

Learning outcome:
Develop awareness about the advantages and disadvantages of genetically engineered crops

Activity
Teacher initiates a discussion on how organic farming is better than chemical farming.

Learning outcome:
Develop an understanding about the advantages of organic farming than chemical farming

Activity
A collage is developed on the topic malnutrition and excess and wastage of food

Learning outcome:
Develop awareness about the various causes of malnutrition and wastage of food.

Activity:
Pupil is asked to act upon the nutritional mode in human beings. They will enact as from where we get food, who produces it, how it is prepared etc. From this activity the concept of Heterotrophs is brought in. They are asked about the nutrition in other animals too. They are asked about the following questions:

- What do lion eat as food?
- What is the food of Hen?
- What is taken as food by cow?

From these questions they come to the conclusion that Animals depend on others for food and these are called as Heterotrophs.

**Learning outcome:**

Develop understanding about heterotrophs and give some examples

**Activity:**

Pupils are asked to perform an experiment to demonstrate Photosynthesis in plants that is as follows. “Take two potted plants of the same kind. Keep one in dark (or in a dark box) for 72 hours and other in sunlight. Perform iodine test with the leaves of both the plants and record the results. Leave the pot which was earlier kept in dark in the sunlight for 3-4 days and perform the iodine test again on its leaves and record the observations.

**Learning outcome:**

Infers that light is essential for plants for photosynthesis

**Activity:**

Pupil is asked to discuss on water scarcity in different places. They also discuss on the various causes for water scarcity and how it affects life forms especially plants. They are also asked to reflect upon different ways of preserving or conserving ground water. They are asked to visit some people in their village (locality) and collect data regarding water depletion occurred in their locality. They are also asked to collect newspaper cuttings regarding the various methods to conserve rain water and rain water harvesting. They are asked to reflect upon the following questions.

- Is water a renewable or non-renewable resource?
- What are the reasons for water depletion in the country?
- What are the various ways to conserve rain water?

**Learning outcome:**
Analyse the different ways of water conservation and the ways/ reasons by which water is getting depleted in their locality

**Activity:**
Pupil is asked to find out the various gases present in our atmosphere. They are asked to present a chart showing the graphical representation of concentration of various gases in the atmosphere (eg. of year 1997 and 2007). They are asked to compare the amount of various gases and they are asked to discuss on the changes in the concentration of various gases. Pupil collects information about the impact of increase in CO₂, CO etc. in the atmosphere with special reference to the environment.

*Learning outcome:*
Develop awareness about the impact of increasing various gases in the atmosphere especially CO₂.

**Activity:**
Pupil is asked to explore into the different uses of solar energy. They are also asked about different household items that work by using sunlight as a source of energy and how it is important in saving energy. They are asked to have a discussion on the importance using different sources of energy in order to prevent the unplanned utilization of non-renewable resources. The concept of sustainable development is brought in this aspect.

*Learning outcome:*
Develop awareness about the importance of solar energy as an alternative source of energy

**Activity:**
Pupil is asked to enumerate the importance of O₂ to living things. They are also asked about how O₂ is produced and how can its decreasing amount affect the life and climate of a place. It is linked to the importance of plants and the impacts of deforestation.

*Learning outcome:*
Develop awareness about the relationship between growing plants and O₂ production by plants.

**Activity:**
Pupil is asked about the organisms they have seen in dead and decaying matter. They are asked to list few organisms seen on dead and decaying matter. They are shown some
examples of fungus that are saprotrophs. They are asked to find out how microbes are useful in various industries like paper industries, beverages etc.

**Learning outcome:**
Develop understanding about saprotrophs and its importance

**Activity:**
Pupil is asked to enact a role play on symbiotic relationship seen in few organisms like Lichens. They are asked on how it is mutually benefited, how it is able to survive etc. They are asked to quote few examples from their surroundings showing symbiotic relationship. The Rhizobium bacteria in the root nodules are observed by the students. They are asked about the type of relationship they exhibit and how are they benefited from each other. The importance of it in farming is also brought in.

**Learning outcome:**
Develop awareness about symbiotic relationship and its importance in agriculture.

**Activity:**
The pupil is asked to visit a nearby paddy field and find out the type of vegetation they follow in a year. They also visit few farmers and enquire about;

- What are the fertilizers they use?
- What are its use and harm of using these fertilizers?
- What is the eco-friendly way of agriculture?
- What are the natural manures that can be used?
- What is the importance of crop rotation? etc.

Pupil is also asked to explore other Nitrogen fixing bacteria which are Free-living and which are living symbiotically. The pupil is asked to find out solutions for avoiding the depletion of soil nutrients in a natural way and protection of soil.

**Learning outcome:**
Explore the ways of agricultural practices in their locality.

**Activity:**
Take a piece of bread and moisten it with water. Leave it in a moist warm place for 2-3 days or until fluffy patches appear in them. Observe the patches under a microscope or a magnifying glass. Write down their observations in their book.
Learning outcome:
Identifies the fungus in the spoiled piece of bread

Project:
Take a potted plant with broad leaves. Take two strips of black paper and cut out a small square in the centers. Cover a part of two leaves with these papers and secure them with paper clips. Keep the plant in the sunlight for 2-5 days. Observe the difference in the colour of the covered and the uncovered portions on the one leaf. Perform iodine test on this leaf. Now take another leaf, remove the strip and expose the covered part to the sunlight for 2-3 days and do the iodine test again. Describe the observation.

Learning outcome:
Observes that starch is produced in plants in the presence of sunlight

UNIT 2
FIBRE TO FABRIC

Scope:
The unit deals with the various fibres obtained from different animals like sheep, goat and silkworm. The chapter focuses on the different ways of rearing these animals and the processing of fibres and also the importance and ways of sustaining them without harming its population.

Focus points:
- Why do we prefer selective breeding in domestic animals? How is it helpful?
- Role of rearing animals in eradicating poverty and also helping in growth of the economy
- Sericulture and its prospects in India
- Sericulture and sustainable development

Issue to be raised:
1. Where is wool obtained from?
2. Which part of the world mostly uses woolen clothes?
3. Which are the animals other than sheep that produce wool?
4. Why do sheep have hairy skin?
5. What are the two types of fibers present in the hairy skin of sheep?
6. What is selective breeding? How is it important?
7. How does rearing of sheep help in eradicating poverty and growth of economy?
8. List out few varieties of sheep?
9. Name some of the breed of sheep that are reared in our country?
10. Explain the different steps in processing of wool?
11. Where is silk obtained from? What is rearing of silkworm called as?
12. Explain the life history of silkworm?
13. What is the importance of Sericulture industry in India?
14. What are the new technologies in sericulture?
15. What are the steps involved in rearing of silkworm?
16. Reflect upon the killing of pupa inside the cocoon of silkworm.
17. How can sericulture play its role in Sustainable development?
18. How do we process silk?
19. What is heeling of silk?
20. What are the uses of silk?

**Learning objectives:**

The pupil

1. Recalls that wool is obtained from hair (fleece) of sheep or yak.
2. Recalls that silk fibres come from cocoon of silk moth.
3. Recognizes that both wool and silk are animal fibres.
4. Identifies that wool comes from sheep, goat, yak and some other animals.
5. Hypothizes that the wool yielding animals bear hair on their body and hair traps a lot of air. Since air is a poor conductor of heat, it keeps them warmer.
6. Understands that hairy skin of sheep has two types of fibres ie. Coarse beard hair and fine soft under hair.
7. Infer that selective breeding is done for producing offsprings of special characteristics.
8. Identifies the place from where Angor wool is obtained.
9. Identifies where Llama and Alpaca species are found.
10. Recalls that fur of camel is also used as wool.
11. Communicates the uses of wool in colder parts of the world.
12. Infer the importance of growing farm animals and its importance in eradicating poverty and growth of economy.
13. List out the names of some breeds of sheep reared in our country, which are selectively bred.
14. Observes the various steps involved in processing the fibres into wool.
15. Recalls that sericulture is the rearing of silkworm for obtaining silk.
16. Discusses the different stages in the life cycle/life history of silkmoth.
17. List few examples of different varieties of silkworm.
18. Enumerate the importance of producing silk on commercial scale.
19. Discusses the importance of sericulture industry and its potential in India.
20. Discusses the importance of sericulture industry in the economy of a country.
21. Predict the importance and disadvantages of new technologies in sericulture.
22. Recognizes the most common silkmoth.
23. Identifies the different steps and processes in rearing of silkworm.
24. Reflect on the rearing of silkworm resulting in killing of pupa inside the cocoon.
25. Predict the importance of conserving the genetic resources of silkworm.
26. Discusses on the importance of Sustainable development in sericulture and progressive increase of its productivity.
27. Explain the processing of silk.
28. Define what is reeling of silk.
29. List out the importance of silk.
Resources:
Pictures of sheep, goat, camel, yak, silkworm, woolen thread, silk, Multimedia presentation of the different steps involved in the processing of wool, Multimedia presentation on processing of silk, visit to a sericulture department, cocoon, outline map of India, pure silk piece, artificial silk.

Activity:
Pupil is shown pictures of sheep, goat, camel, yak, silkworm and asked how are they important to human beings and why do we rear these animals. They are asked to reflect upon the season in which we use woolen clothes and which part of the country uses woolen clothes more and how do woolen clothes keep us warm. They are also asked about places where sheep are found and how does the hairy skin of these animals help in keeping them warm.

Learning outcome:
Develop awareness about the importance of wool

Activity:
Pupil is asked to find out the characters that are inherited from their parents and also those characteristics that are not inherited from parents. The same way they are asked to observe their pets to identify the characteristics which are similar to its parents and which are dissimilar. They then compare it with selective breeding in sheep to inherit the desired characters like disease resistant varieties, high yielding varieties etc. Pupil make five groups and discusses on the importance of rearing farm animals and its importance in eradicating poverty and how it help in the growth of the economy of a country.

Learning outcome:
Develop knowledge about the inheritance of desired characteristics in breeding of sheep and also develop awareness about the importance of rearing farm animals and its importance in eradicating poverty and growth of the economy.

Activity:
Students are asked to feel the hair on their body and arms and those on their head. They are asked whether they find any difference. Which one seems to be coarse and which one is soft? They are then asked to compare the hairy skin of the sheep with these two types, which form the fleece of sheep-(i) the coarse beard hair, and (ii) the fine soft under-hair close to the skin.

Learning outcome:
Develop awareness about the two types of fleece in sheep

Activity:
Students are shown a multimedia presentation of the different steps involved in the processing of wool. The different steps involved like shearing, scouring, sorting etc. are shown to pupil in a series. They are also asked to bring their observations regarding
- The cruelty shown to animals
- Is rearing of sheep for wool a cruelty against animals? If so how?
- Will the population of sheep be affected by rearing of sheep?

Learning outcome:
Develop understanding about the different steps in processing of wool.

**Activity:**
The students are shown a multimedia on a sericulture department and asked to find out the processes involved in rearing of silkworm. They are also asked to reflect on the life cycle of a silkworm moth and compare it with the life cycle of a butterfly.
Pupil also identifies a cocoon and its nature, colour etc. The processing of silk from cocoon is shown through a multimedia presentation. They also reflect on the cruelty shown to the pupa inside the cocoon and compare it with the rearing of sheep for wool. They are asked to collect more information regarding the recent technologies involved in the rearing of silkworm and processing of silk and also asked to reflect on their idea of bringing out an appropriate technology (which they feel) in silkworm rearing and egg production. A discussion is also initiated on the sustainable development of sericulture and steps to be adopted for a progressive increase in its production.

*Learning outcome*
Develop awareness about the rearing of silkworm and its life cycle.

**Activity**
To find out when the cocoon stage is reached in the life history of the silk moth, the following activity is carried out. Cut out pictures of the stages of the life history of the silk moth, and paste them on pieces of cardboard or chart paper. Jumble them. Now students are asked to try and arrange the stages in the correct sequence. Whoever does it fastest wins the game. They are insisted to describe the life history in their own words and write it down in their scrapbook.

*Learning outcome*
Are able to arrange the pictures of life cycle of the silkworm in the order

**Activity**
Students are asked to collect pictures of animals whose hair is used as wool and stick them in their scrapbook. If you are unable to get pictures, try and draw them from the ones given in the book. Find out words for sheep, goat, camel and yak in your local language and also in other languages of our country.
Yak                        Alpaca                    Angora goat                 Goat
Camel

*Learning outcome*
Paste/ draws the picture of animals that produce wool

**Activity:**
Procure an outline map of India and the world. Find out and mark the places on the map where we find animals that provide wool. Use different colours to denote the location for different wool yielding animals

*Learning outcome*
Able to locate on the map where the wool yielding animals are reared

**Activity**
Debate amongst your classmates whether it is fair on the part of humans to rear sheep and then chop off their hair for getting wool.

*Learning outcome*
Develop awareness about the pros and cons of rearing sheep and then chopping off their hair for getting wool.

**Activity**
Pupil is asked to discuss on the various importance of silk, how is it used and why is it more costly. They are also asked to visit a nearby textile shop and collect information regarding the names of different silks and also find out the price of each type. They are also asked to gather information regarding the quality of the material and what are the indications to identify pure silk. They also collect information regarding the mixing of different types of other materials in the silk.

*Learning outcome*
Explore into the importance, types and quality of different silks available.

**Activity**
Students are asked to collect pieces of silk cloth of various types and samples of woolen cloth pieces from their homes or neighborhood or tailor shops and paste them in their scrapbook. They may be insisted to visit a tailor’s shop where they can find a heap of waste cut pieces. They can take help of others like aunt or teacher and identify the types of silk such as mulberry silk, tassar silk, eri silk, mooga silk, etc. Compare the texture of these silks with that of the artificial silk pieces, which contain synthetic fibres.

*Learning outcome*
Paste the different types of silk in their science diary

**Activity**
Students are asked to take an artificial (synthetic) silk thread and a pure silk thread and asked to burn these threads carefully. Ask them to notice any difference in the smell while burning? This is
followed by burning a woolen fibre carefully and students are asked to find out whether it smell like burning of artificial silk or that of pure silk? They are asked to explain the reason.

Learning outcome
Develop the ability to differentiate synthetic silk from that of natural silk

Extended activity:
Look for eggs of any moth or butterfly in your garden or park or any other place full of plants. They look like tiny specks (dots) laid in a cluster on the leaves. Pull out the leaves containing eggs and place them in a cardboard box. Take some leaves of the same plant or another plant of the same variety, chop them and put them in the box. Eggs will hatch into caterpillars, which are busy eating day and night. Add leaves everyday for them to feed upon. Sometimes you may be able to collect the caterpillars. But be careful careful. Use a paper napkin or a paper to hold a caterpillar. Observe every day. Note the (i) number of days taken for eggs to hatch, (ii) number of days taken to reach the cocoon stage, and (iii) number of days to complete life cycle. Record your observations in your notebook.

Learning outcome
Develop awareness about the number of days taken for eggs to hatch, to reach the cocoon stage, and to complete life cycle.

Unit 3
HEAT

Scope:
The unit deals with the hot and cold nature of objects and the dresses one wears during summer and winter. It also deals with the devices, unit etc. for measuring temperature and also how transfer of heat occurs.

Focus points:
• Impact of heat on climatic change
• Impact of heat on human health
• Why the usage of non conventional power plants should be increased
• How solar energy can be used for domestic purpose
• Why global temperature is increasing.

Issues to be raised:
1. What clothes do one prefer to wear during summer and winter?
2. What is the reliable measure of hotness?
3. Name the device used to measure hotness?
4. What is a clinical thermometer and name its parts?
5. What is the scale we use in clinical thermometer?
6. What is the normal temperature of human body?
7. What do you mean by normal temperature of a human body?
8. What is a laboratory thermometer and what precautions should be taken while using a laboratory thermometer?
9. What is conduction?
10. What are conductors and insulators?
11. What is convection?
12. Differentiate between sea breeze and land breeze?
13. What is radiation?
14. Why do we feel comfortable in wearing dark coloured clothes during winter and light coloured clothes in summer?
15. How do woolen clothes keep us warm during winter?
16. How does climatic change cause change in temperature?
17. What are the changes that you have observed in your body temperature when you are not well or having fever?
18. What are non-conventional power plants?
19. How can we make use of solar energy in various domestic purposes?

**Learning objectives:**
The pupil
- Interprets the importance of wearing different types of dresses during different seasons.
- Observes the device used for measuring temperature and its scale.
- Observes and differentiates between a clinical thermometer and a laboratory thermometer.
- Conduct experiments to find out the normal temperature of a human body.
- Identifies and differentiates between conductors and insulators.
- Understands the concept of convection.
- Interprets what is sea breeze and land breeze.
- Describes what is radiation.
- Analyze which type of dress keeps one comfortable during summer and winter.
- Interpret how and why woolen clothes keep us warm during winter.
- Infer the climatic changes due to change in temperature.
- Recalls the temperature changes they experienced when they had fever.
- Reflect on the importance of non-conventional power plants.
- Infer the use of solar energy as an alternative source of energy for various domestic purposes.

**Resources:**
Newspaper cuttings on changes in climatic patterns followed by poster presentation, Mug, hot and cold water, Clinical thermometer, laboratory thermometer, plastic scale, iron rod, steel spoon, pencil, knife, beaker, tripod, flask, pictures of some articles that work with the help of solar energy, wool, cotton, tin can.

**Activity:**
Students are asked to discuss about the clothes they prefer to wear during summer and during winter. They are also asked to discuss on what colour makes them comfortable during summer and winter. They can also collect information from their parents, relatives’ etc. regarding the same.
Learning outcome
Develop awareness about the type and colour of dress one prefer to wear during different seasons.

Activity:
Students are made to groups and asked to collect few newspaper cuttings regarding changes in the temperature and how it can cause changes in climatic patterns. They are also asked to discuss on the impact of such rise in temperature on the various life forms on earth. The discussion can be followed by a poster presentation, which can be exhibited.

Learning outcome
Develop awareness about the impact of increasing temperature on changes in climatic patterns and their impact on life.

Activity:
Students are given a list of items and are asked to classify them into hot, cold and neither hot nor cold. It can be marked as a tick mark (✓) in the following table.

<table>
<thead>
<tr>
<th>Object</th>
<th>Cold/Cool</th>
<th>Warm/ hot</th>
<th>Neither hot nor cold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ice cream</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spoon in a teacup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit juice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handle of a frying pan</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Learning outcome
Able to categorize objects as warm, cold and neither hot nor cold

Activity:
Students are asked whether they got fever any time and how do doctors measure their temperature and the device needed for measuring the human temperature. They are asked to bring a thermometer and observe it carefully to find out the scale used for measuring temperature, how to measure and how to take the readings, precautions to be taken while taking measurement etc. A discussion is initiated on the importance of having a thermometer at home and how can it be helpful in having a health consciousness.

Learning outcome
Develop awareness about the instrument used to measure temperature and its scale and the importance of having a thermometer at home.

Activity
Students are asked to demonstrate how to measure the temperature of a human body. One of the students takes a thermometer and washes it with an antiseptic solution and firmly gives few jerks to bring the mercury level down below 35°C. The student is asked to place the bulb of the thermometer under their tongue. After a minute, take the thermometer out and note the readings. Find out your body temperature in the same way.

Learning outcome
Develop the skill of measuring temperature their body using a thermometer

Activity:
Measure the body temperature of some of your friends (at least 10) with a clinical thermometer. Record the observations and find out the normal body temperature of a human body.

Learning outcome
Able to find out the normal body temperature of a human body

Activity:
Take a laboratory thermometer and observe it closely to find out its highest and lowest temperature it can measure, how much smaller divisions are there, how to measure using a laboratory thermometer, how to take the readings etc. They are also given a clinical thermometer and asked to compare it finding out the differences and similarities in both.

Learning outcome
Able to observe the measurements in laboratory and clinical thermometers and their differences

Activity
Students are asked to perform an experiment to demonstrate that transfer of heat occurs from hotter to colder part. An Iron rod is taken and fix few small wax pieces on the rod. These pieces should be at nearly equal distance. Now heat the rod on one end and observe the changes. The students are also asked to find out answers for the following questions.

• Wax on which part of the iron rod melts first and which melts late?
• Why all the wax is not melting at the same time?

Learning outcome
Develop an understanding that transfer of heat occurs from hotter to colder part.

**Activity**

Heat water in a small pan or a beaker. Collect some articles such as a steel spoon, plastic scale, pencil and divider. Dip one end of each of these articles in hot water. Wait for a few minutes. Touch the other end. Enter your observation in Table

<table>
<thead>
<tr>
<th>Articles</th>
<th>Materials with which the article is made of</th>
<th>Does the other end get hot</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel spoon</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pencil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knife</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glass</td>
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</tr>
</tbody>
</table>

**Learning outcome**

Categorize objects into those that can conduct heat and that do not conduct heat

**Activity**

One of the students is asked to demonstrate the following experiment. Take a round bottom flask (if flask is not available, a beaker can be used). Fill it two-thirds with water. Place it on a tripod, or make some arrangement to place the flask in such a way that you can heat it by placing a candle below it. Wait till the water in the flask is still. Place a crystal of potassium permanganate at the bottom of the flask gently using a straw. Now, heat the water by placing the candle just below the crystal. The students are asked to write their observations in the notebook and also draw a picture of what they observed. The students are also asked to observe what happens to the water when it is heated, what happens to the water near the flame, which water rises up, which water moves down towards the source of heat etc.

**Learning outcome**

Develop an understanding about the concept convection

**Activity**

Take some tap water in a beaker A and hot water in beaker B. Dip the laboratory thermometer in water so that the bulb is immersed in water but does not touch the bottom or sides of the container. Hold the thermometer vertically and observe the movement of mercury in the thermometer. Wait till the mercury thread becomes steady. Note the readings. Compare the temperature of water recorded by each student in the class. Are there any variations? Discuss the possible reasons. Also take the temperature of water in beaker B and observe the thermometer after taking it out of the beaker. They are also asked to compare how to take the readings using a clinical thermometer and a laboratory thermometer.

**Learning outcome**

Able to compare the different ways of measuring temperature using a clinical thermometer and a laboratory thermometer

**Activity**

Students are asked to collect a list of metals that can conduct heat (conductors), and also a list of metals that do not conduct heat (insulators). They are asked to observe a copper wire and find out which part conducts electricity and which part does not. They are also asked to reflect on the impact of using the non-renewable sources of energy and how these can be overcome by using various non-
conventional power plants that are helpful in order to save energy. They are also asked to reflect upon
the impact of using cables through underground and how one can develop environmentally friendly
cables.

Learning outcome
Develop awareness about the depletion non-renewable energy and ways to overcome its demand and
reflect upon the impact of using cables through underground.

Activity
Few students who stays nearby sea is asked to narrate about the climatic changes they have
noticed during daytime and nighttime. They are also asked about the direction in which the wind
blows during day and that which blows during night. They are also asked to discuss on the
differences they have experienced during a sea breeze and land breeze.

Learning outcome
Able to differentiate between land breeze and sea breeze

Activity
Students are asked to narrate on their experiences they had on a hot sunny day while moving
out. They are also asked about why one should use an umbrella during hot sunny day and what are
the impacts in moving out in the hot sun and they are asked about how can radiation have an
influence on human body.

Learning outcome
Understand the impact of radiation to human body

Activity
Students are shown pictures of some equipment that are run with the help of solar energy. Eg.
solar heater, solar cooker etc. They are also asked about the importance of using these types of things
for house hold purposes. A discussion is also followed which focuses on the importance of using
solar energy in place of utilizing other resources as a source of energy. They are also asked to reflect
on how they can increase the use of renewable energy for various purposes so that we can limit the
consumption of non-renewable energy resources.

Learning outcome
Develop awareness about the use of solar energy as an alternative source of energy

Activity
Take two identical tin cans. Paint the outer surface of one black and of the other white. Pour
equal amounts of water in each and leave them in the mid-day sun for about an hour. Measure the
temperature of water in both the cans. Students are asked to find out if there is any difference in the
temperatures? In which can is the water warmer etc. They are then asked to compare their findings
with the colour of dress they prefer to wear during summer and also during winter.
Fill the two cans with the same amount of hot water at the same temperature. Leave the cans in a room or in a shade. Note the temperature of water after 10-15 minutes. Students are asked to find out

- Whether the temperature of water in both the cans fall by the same amount?
- What type of dresses do they wear on summer and winters?
- How do woolen clothes keep us warm?

Learning outcome
Develop understanding about the type and colour of dresses one like to wear during different seasons

CHAPTER 4
WEATHER, CLIMATE AND ADAPTATIONS OF ANIMALS TO CLIMATE

Scope:
The unit deals with the meaning and differences between weather and climate. It also emphasize on the different climates and adaptations shown by different organisms, like those living in polar regions and tropical rain forests.

Focus points:
- What are the reasons for the changing weather patterns
- Why the adverse weather conditions occur in some parts of the world
- Why the impact of Green House effect is considered to be very serious
- Impact of climatic change on the polar ice caps
- Impact of melting of polar ice caps on the different life forms
- Impact of deforestation
- Impact of endangered species- its causes, effects and ways of conserving them
- Climatic change and impact on life forms

Issues to be raised:
1. What do you mean by weather of a place?
2. What are the elements of weather?
3. How can you measure the maximum and minimum temperature in a day?
4. What are the causes for changes in weather patterns of the world?
5. Why do adverse weather conditions like drought, flood etc. occur in some places?
6. What is green house effect and what are their impacts?
7. Why days are shorter in winter than summer?
8. What do you mean by climate of a place?
9. What are the climatic changes occurring in the world? What are its causes and how can one solve it?
10. Differentiate between hot, hot and wet and wet climate and name few places that experience it?
11. What do you mean by adaptations?
12. How can climatic changes bring about changes in polar ice cap?
13. What are the characteristic features of Polar Regions?
14. What are the special features seen in polar animals like polar beer and penguin?
15. How can the melting of polar ice caps affect the life forms in Polar Regions?
16. Why do tropical regions have a hot temperature?
17. Name some places that are located in Polar Regions?
18. Name some places, which have tropical rain forests?
19. What is deforestation and how it can affect the life of various species?
20. How do some species become endangered?
21. What are the characteristic features of tropical rain forest?
22. What are the major types of animals that are seen in tropical rain forests?
23. What are the characteristic features of animals that live in tropical rain forest?
24. How do the various species in tropical rain forest get affected due to deforestation?
25. How can the changes in the climatic conditions influence the life forms in tropical rain forest?

Learning objectives:
The pupil,

- Understands the meaning of weather and the different elements that contribute weather.
- Conducts experiments to find out the maximum and minimum temperature in a day.
- Explore the causes for changes in weather patterns of the world.
- Discusses on the various adverse conditions like drought and flood occurring in some places.
- Explore the causes for green house effect and its impact on the earth.
- Analyses why days are shorter in winter than in summer
- Explore the meaning of climate
- Observes and interprets the climatic changes occurring in the world
- Infers the causes of climatic changes and solutions to solve the same
- Differentiates between hot, hot and wet and wet climate
- Identifies the places that have hot, hot and wet and wet climate
- Observes and explains the meaning of adaptation
- Infer the impact of climatic changes on the changes in polar ice caps
- Observes the characteristic features of polar regions
- Identifies the special features seen in polar animals like polar bear and penguin
- Interpret the impact of melting of polar ice caps on the life forms in polar regions
- Observes and explains the reason for having hot temperature in the tropical region
- Identifies the places located in polar regions
- Observes and list out the names of places that are located in the polar region
- Observes and list out the names of places that have tropical rain forests
- Recalls the meaning of deforestation and interpret how it can affect the life of various species
- Interprets the reasons for some species becoming extinct
- Identifies the characteristic features of tropical rain forests
- Observes and lists out the major type of animals that are seen in tropical rain forests
- Identifies the characteristic features of animals that live in tropical rain forests
- Interprets how the various species in tropical rain forests get affected due to deforestation
- Interprets how the changes in climatic conditions influences the life forms of tropical rain forests
Resources:
Newspaper cuttings on weather forecast, Pictures of floods, tsunami, drought, Thermometer, Multimedia presentation of various lives (in extreme climatic areas, tropical rain forest and polar regions), graph paper.

Activity 1:
Pupil reads a newspaper cutting regarding the weather forecast and find out the maximum and minimum temperature of a place, humidity and rainfall. They also bring the news regarding weather forecast of different days and read it in classroom. The pupil is asked about how they can define weather and to find out the various elements that constitute weather.

Learning outcome
Develop awareness about the weather reports and the meaning of weather

Activity 2:
Pupil are asked about various situations like planning for a family function, a cricket match etc. where one has to look into the weather. They are also asked to reflect upon a recent cricket match which they have observed in Television and analyze on what are the factors of weather that are dealt with in such type of games and whether the weather of that place have a profound effect on the games.

Learning outcome
Develop understanding about the need for looking into the weather forecast for different functions

Activity 3:
Cut out the weather reports of last week from any newspapers. Record the information from the weather reports and fill in the following table.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Date</th>
<th>Max. Temp. (°C)</th>
<th>Min. Temp. (°C)</th>
<th>Min. Humidity (%)</th>
<th>Max. Humidity (%)</th>
<th>Rainfall</th>
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</tbody>
</table>

Pupil is then asked to find out which day they have recorded has the maximum temperature and which one has minimum temperature and also which day has maximum humidity and minimum humidity.

Learning outcome
Able to record and interpret weather report of a week.

Activity 4:
Students are shown various pictures and news cuttings of the changes in weather patterns like drought, flood, cyclones, Tsunami etc. The students are made into groups and asked to discuss on

- The various reasons for such drastic changes in the atmosphere.
- What are the roles of man in causing such disaster?
- How can you prevent such disasters in future?
- What are the impacts of such changes in life?

**Learning outcome**
Develop awareness about the causes and effects of various natural disasters

**Activity 5:**
Students are asked about the time in a day during which there occurs maximum temperature and the time in a day when there is minimum temperature. They are also asked to share their experiences they had during a summer afternoon and early morning in winter. They are then shown a maximum and minimum thermometer and explain its function and how to measure the maximum and minimum temperature.

**Learning outcome**
Recalls when maximum and minimum temperature occurs in a day and the instrument used to measure it.

**Activity 6:**
Pupil is asked to collect about the weather patterns in different parts of the world, say, U.S, U.K, India, Australia, Africa etc. and find out the variations they have observed in the weather. They are also shown a world map of these places showing the climatic patterns in these regions and asked to define what is climate?

**Learning outcome**
Able to define climate

**Activity 7:**
Pupil is asked to conduct an interview with their grandparents and some old people in their village to collect information regarding the changes in climate they experience in their locality today with that of their younger days. They also collect the opinion regarding the reasons for these changes and how to solve the climatic problems.

**Learning outcome**
Able to compare the climatic changes that was prevailing in the past with that of the present.

**Activity 8:**
Students are asked about how they protect themselves during extreme cold and extreme hot. They are also asked to spot some places in the globe where they have these extreme climate. They are also shown a multimedia presentation of various lives in these places. The pupil is asked to list the name of animals they have observed in these areas in the slide. The climatic patterns and changes in these places are observed. They are also shown an animated picture of earth, which rotates and revolves around sun. This is used to come to a conclusion that in Polar Regions the sun does not rise for 6 months and does not set for another 6 months. From the life forms the pupil is asked to find out the following
• Observe the polar bear and identify its habit, adaptations and other characteristics.
• Observe the penguin and identify its habit, adaptations and other characteristics.

**Learning outcome**
Develop awareness about the habit, adaptations and characteristics of polar animals

**Activity 9:**
Pupil is shown an experiment to demonstrate the impact of melting of ice to the low-lying areas using some ice-cubes and a simulated situation. They are also asked about what are the reasons of these melting of ice and how it can influence the life forms in low-lying and coastal areas. They are also asked to reflect on the impact of melting of polar ice caps on the life in Polar Regions also.

![Image of polar bear and penguin](image1.png)

**Learning outcome**
Develop awareness about the cause and impact of melting of polar ice caps

**Activity 10:**
Pupil is shown a globe and asked about which part of the globe has maximum temperature and why. They are also asked to identify the areas in these places where there are forest and asked them to suggest the name for such forests. They are asked about the places where they find tropical rainforests. A multimedia presentation is shown to demonstrate the life in tropical rainforests and the pupil is asked to list down the names of animals they found in tropical rainforests. They are also asked to identify the habit, adaptations and other characteristic features of few animals of tropical rainforests, eg. Lion tailed Macaque, Elephant, Touchan (bird) etc.

**Learning outcome**
Develop understanding about the habit, adaptations and other characteristics of tropical animals

**Activity 11:**
Students are asked whether they have seen trees cut down on either sides of road (eg. In Mysore-Bangalore highway), for widening the roads. They are also asked whether they have seen trees being cut down for constructing dams, buildings, houses etc. and they are asked to reflect on the various life forms that have lost from the earth or animals that are getting reduced in number (eg. Sparrow, frogs etc.) and analyze the reasons for such changes.

**Learning outcome**
Develop awareness on the environmental deterioration caused by developments.

**Activity 12:**
Students are asked to make groups and discuss on ‘the relationship between endangered species and deforestation’. Their findings are being presented.

**Learning outcome**
Develop understanding on the relationship between endangered species and deforestation

**Activity 13:**
A debate is conducted on ‘whether development can be attained without causing harm to earth’.

*Learning outcome*
Able to reflect on the pros and cons of development

**Activity 14:**
The temperature analysis of different years is collected and pupil is asked to discuss on the impact of rise in temperature on the earth and also on life forms.

*Learning outcome*
Develop awareness about the impact of rising temperature on the earth and on various life forms

**Project 1**
Pupil is asked to collect weather reports of seven successive days in the winter months (Preferably December). Collect similar reports of summer months (preferably June). Now prepare a table for sunset and sunrise times in the table and answer the following questions

<table>
<thead>
<tr>
<th>JUNE</th>
<th></th>
<th>DECEMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>Sunrise</td>
<td>Sunset</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

- Is there any difference in the time of sunrise during summer and winter?
- When do you find that the sun rises earlier?
- Do you find any difference in the time of sunset during the month of June and December?
- When are the days longer?
- When are the nights longer?
- Why are the days sometimes longer and sometimes shorter?
- Plot the length of the day against the days chosen in June and December.

*Learning outcome*
Develop awareness about the various timings of sunrise and sunset during different months in a year

**Project 2:**
Pupil is asked to collect a list of endangered species and find out the causes and effects of species getting endangered. The project should be concluded with a discussion on how to prevent the species from becoming extinct and endangered.

*Learning outcome*
Explore into the causes and effects of species getting endangered from the earth surface
UNIT 5
WINDS, STORMS AND CYCLONES

SCOPE:
The unit focuses on the movement of wind and wind currents. It also gives emphasis on thunderstorms and cyclones and how a thunderstorm becomes a cyclone. The chapter also deals with the various destructions caused by cyclones and also what effective safety measures one should take during a cyclone and how far technology is helping in predicting and escaping from such natural disasters.

Focus points:
• How wind energy can be used as an alternative source of energy
• Mention the way by which one can harvest wind energy
• How the earth gets heated up due to the pollutants? What are the different ways by which we can minimize the pollution?
• What is the impact of heat on polar regions
• What are the reasons for the occurrence of hurricanes like typhoon, tornado, flood and drought?
• What are the precautions one should take during these timely warnings
• Epidemics and cyclones- Elaborate
• Types of houses in cyclone prone areas
• Science and technology for a sustainable society- Discuss

ISSUES TO BE RAISED:
1. What is wind?
2. What is the relationship between the direction of wind and air pressure?
3. How are wind currents being generated?
4. How can you utilize wind energy for domestic purposes?
5. What changes in temperature one can experience near equator and near poles?
6. Explain the movement of wind in relation to polar and equatorial regions?
7. Which part of the earth (land or water) near the equator warms up faster in summer and why?
8. How can different pollutants raise the temperature of earth?
9. What is green house effect and global warming and what are its impact?
10. What is the impact of heat on Polar Regions and on low lying and coastal areas?
11. How can changes in wind patterns causes difference in climate?
12. What are the directions of wind in summer and in winter?
13. Which is the wind that carries water and brings rain?
14. What is thunderstorm and how does it develop?
15. What are the ill effects brought about by hurricanes like typhoon, tornado, flood, drought etc?
16. How can one make use of timely warnings given by meteorological agencies during such hurricanes?
17. How does a thunderstorm become a cyclone?
18. What are the factors that contribute towards the development of cyclones?
19. What are the various destructions caused by cyclones?
20. What is a tornado?
21. What is the relationship between weather, climate and water resources towards the economic development and well being of humans?
22. What are the impact of cyclones and tornadoes on earth and life forms?
23. What are the measures to be taken in a cyclone- hit area?
24. What types of houses are suitable in places, which are prone to cyclonic attack?
25. How far technology has helped in giving warning during a natural calamity?
26. What are the steps (measures) to be taken when one receives a warning from meteorological department about a hurricane like cyclone, tornado etc.
27. What is the role of science and technology in providing warnings about any natural hurricanes like cyclone and tornado?

**LEARNING OBJECTIVES:**
The pupil
- understands the meaning of wind
- Explains the relationship between the direction of wind and air pressure.
- Infers how the wind currents are being generated.
- Hypothesize on how wind energy can be utilized for various domestic purposes.
- Infer the changes in temperature one can experience near the equator and at poles.
- Explains the direction of movement of wind in relation to polar and equatorial regions.
- Hypothesize and justify which part of earth (land or water) near the equator warms up faster in summer.
- Reasons out how can different pollutants raise the temperature of earth.
- Discuss what is green house effect and global warming and its impact.
- Predict the impact of heat on Polar Regions and on low lying and coastal areas.
- Interpret how changes in wind patterns cause difference in climate?
- Analyze the direction of wind in summer and winter.
- List out the name of the wind that carry water and brings rain.
- Explain how a thunderstorm develops.
- Discuss and predict the ill effects brought about by hurricanes like typhoon, tornado, flood, drought etc.
- Extrapolate on how one can make use of timely warnings given by meteorological agencies during hurricanes.
- Explain how a thunderstorm becomes a cyclone.
- Analyze the different factors that contribute towards the development of cyclones.
- Discusses the various destructions caused by cyclones.
- Explain the meaning of a tornado.
- Compare what is weather and climate.
- Analyzes the relationship between weather, climate and water resources towards the economic development and well being of humans.
• Interpret the impact of cyclones and tornadoes on earth and life forms.
• Reasons out the measures to be taken in a cyclone-hit area.
• Hypothesize on the type of houses that are suitable to places that are prone to cyclonic attack.
• Justify the role of technology in giving warnings during a natural calamity.
• Discusses the steps (measures) to be taken when one receives warning from meteorological department about hurricanes like cyclone, tornado etc.
• Analyzes the role of science and technology in providing warning about any natural hurricanes like cyclone or tornado.

LEARNING RESOURCES:
A tin can, candle, plastic bottle, balloon, paper strips, water, cold water, hot water

ACTIVITIES

Activity 1:
Take a tin can with a lid. Fill it approximately half with water. Heat the can on a candle flame till the water boils. Let the water boil for a few minutes. Blow out the candle. Pour out the water and immediately put the lid tightly on the can. Be careful in handling the hot can. Put the can carefully in a shallow metallic vessel or a washbasin. Pour fresh water over the can. What happens to the shape of the can? Can you guess why the shape of the can gets distorted? If you cannot get a tin can, take a soft plastic bottle. Fill it with hot water. Empty the bottle and immediately cap it tightly. Place the bottle under running water.

Learning outcome
Experiences that air exerts pressure

Activity 2
Crumpel a small piece of paper into a ball of size smaller than the mouth of an empty bottle. Hold the empty bottle on its side and place the paper ball just inside its mouth. Now try to blow on the ball to force it into the bottle. Try the activity with bottles of different sizes.

Learning outcome
Experience that High-speed winds are accompanied by reduced air pressure and Air moves from the region where the air pressure is high to the region where pressure is low

Activity 3
Take two balloons of approximately equal size. Put a little water into the balloons. Blow up both the balloons and tie each one to a string. Hang the balloons 8–10 cm apart on a cycle spoke or a stick. Blow in the space between the balloons. What did you expect? What happens? Try different ways of blowing on the balloons to see what happens.

Learning outcome
Experiences that High-speed winds are accompanied by reduced air pressure

Activity 4
Hold a strip of paper, 20 cm long and 3 cm wide, between your thumb and forefinger. Now blow over the paper. What do you think will happen to the paper?

Learning outcome
Experiences that High-speed winds are accompanied by reduced air pressure

**Activity 5**
Take a boiling tube. Stretch a balloon tightly over the neck of the tube. You can use a tape to make it tight. Pour some hot water in a beaker. Insert the boiling tube with the balloon in the hot water. Observe for 2–3 minutes for any change in shape of the balloon. Take the tube out, let it cool down to the room temperature. Take some ice-cold water in another beaker and place the tube with the balloon in cold water for 2–3 minutes. Observe the change in the shape of the balloon.

*Learning outcome*
Experience that air expands on heating

**Activity 6**
Take two paper bags or empty paper cups of the same size. Hang the two bags in the inverted position on the two ends of a metal or wooden stick. Tie a piece of thread in the middle of the stick. Hold the stick by the thread as in a balance. Put a burning candle below one of the bags. Observe what happens. Why is the balance of the bags disturbed?

*Learning outcome*
Experience that warm air is lighter than cold air

**Activity 7**
Visit places, factories and houses to see the uses of different kinds of energy and make a list of their utilities

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<thead>
<tr>
<th>Sl No</th>
<th>Energy</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Electricity</td>
<td>Heating, light</td>
</tr>
<tr>
<td>2</td>
<td>Coal</td>
<td></td>
</tr>
</tbody>
</table>

Note down the cost of each fuel being used. Also find the relative cost of energy obtained from different sources such as electricity, coal, kerosene, petroleum gas and firewood. If this identical job (say boiling 2 litres of water) would be done using different fields, the cost should be estimated. Thus the relative cost of using different fuels could be calculated.

Energy used to boil 2 litres of water

<table>
<thead>
<tr>
<th>Energy/ Fuel</th>
<th>Amount</th>
<th>Cost (Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewood</td>
<td>(kg)</td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td>(Units)</td>
<td></td>
</tr>
</tbody>
</table>

Survey at least 25 families in different localities and note down the total amount of different kinds of energy used by them in a week/month. From this calculate the average amount of fuel used by one person per day. Estimate the total amount of different fuels consumed over during a month by the village/city.

*Learning outcome*
Develop awareness about the amount of fuels consumed and its impact in the future
**Activity 8:**
Collect the data about the consumption of coal, electricity and petroleum products in India over the last couple of decades and extrapolate its demand for the future.

*Learning outcome*
Develop awareness about the amount of fuels consumed in India and its impact in the future

**Activity 9:**
Arrange a visit for the students to an area nearby the school. Let them look for an area of bare soil or trails of sand or earth after a storm and also look for dust accumulated on broad leaves of nearby plants. This helps in understanding the concept that soil erosion occurs by air.

*Learning outcome*
Able to understand that soil erosion occurs by air

**Activity 10**
The pupil is shown a working model of a windmill where it is used in generating electricity and also for grinding flour. The working of the windmill is demonstrated and the production of a cheaper source of energy is also explained. A discussion is also followed to discuss on the importance of conserving non-renewable resources and how one can make use of renewable sources of energy in various household activities.

*Learning outcome*
Develop awareness about the using renewable source of energy and how wind energy can be utilized for various domestic purposes

**Activity 11:**
A multimedia presentation is shown about the polar and equatorial regions and asks the pupil to identify the characteristic features of these two areas. They are also shown a global representation of the movement of wind in these areas. Pupil explains the direction of movement of wind in relation to polar and equatorial regions.

*Learning outcome*
Understand how the wind currents are being generated and the direction of movement of wind in relation to polar and equatorial regions.

**Activity 12:**
Pupil is shown a globe and asked to find out the location of India on the globe. They are asked to find out whether it is near the equator or not. They are asked about which part of the earth (land or water) near the equator warms up faster in summer and why.

*Learning outcome*
Able to understand which part of earth (land or water) near the equator warms up faster in summer
Activity 13:
Pupil is asked to list the common sources of air pollution. From their past experiences and from
surveying the locality note down the major sources that pollute air. Also conduct an interview with an
elderly person in your locality on the temperature changes they have experienced from their
childhood and how different pollutants have contributed for the increase in temperature of their
locality.

Pupil is asked to collect leaves of plants from different localities (near the road, near a forest,
away from the road, near a bazaar etc.) and examine the dust particles settled on them. Discuss its
source and its ill-effects. The pupil is asked to come to a conclusion for the following questions
- Which places have more polluted air (bazaar, near a road, near a forest etc.)?
- What are the sources of suspended particles in the air?
- At what time of the day, the air is more polluted?

Learning outcome
Develop awareness about how various pollutants and how they influence the temperature

Activity 14:
Refer various literatures to find out which are the common air-polluting gases. Make a list of such
gases, their sources and their effect on human beings and the environment. Ask pupils to collect
newspaper cuttings regarding news on specific gases that cause pollution and its effect on human
beings and environment. They are also asked to collect information from various literatures regarding
green house effect and global warming. They are also taken to a nearby nursery (where plants are
cultivated) where there is a green house for the germination of different plants. They are also asked to
discuss on the impact of global warming on the low-lying or coastal areas and Polar Regions.

Learning outcome
Develop awareness about green house effect and global warming, and its impact on Polar Regions
and on low lying and coastal areas.

Activity 15:
Pupil is asked to find out the direction of wind during summer and winter seasons, which can be done
by conducting an interview with their neighbours or family members. They are also asked to collect
the names of different wind that carry water and bring rain.

Learning outcome
Develop understanding about the direction of wind in summer and winter and the names of the wind
that carry water and bring rain.

Activity 16:
A multimedia presentation of the formation of thunderstorm is shown to the students. They are also
shown about how a thunderstorm becomes a cyclone. They are asked to discuss and predict on the ill-
effects brought about by hurricanes like typhoon, tornado, flood, drought etc.

Learning outcome
Develop awareness about how a thunderstorm develops, destructions caused by hurricanes, how a
thunderstorm becomes a cyclone and the measures to be taken.

Activity 17
The pupils observe the latest paper cuttings and photos about a recent natural calamity like cyclone, flood, drought etc. and read out the various destruction happened to life and property. They also discuss the various safety measures taken during such natural calamities and the agencies that provide timely warnings about such disasters. The discussion will also focus on the importance of science and technology during different natural calamities.

Learning outcome
Develop awareness on the role of science and technology in providing warnings during a natural calamity and the type of houses that are suitable to places that are prone to cyclonic attack.

UNIT 6
SOIL

SCOPE:
The unit focuses on the soil properties, types, soil profile and how it is important to different life forms. The unit also gives importance to how the soil gets depleted due to various human activities and how can one protect the soil from deterioration. There is also focus on water percolation into the soil and how to increase the percolation of water by rainwater harvesting and also the relationship between soil management and water management.

Focus points:
- Why soil depletion is considered to be more severe problem nowadays
- What are the causes, effects and preventive measures of soil erosion
- What are the human activities that lead to loss of humus soil
- How do mining affect the soil profile
- What is the relationship between water and weathering
- How do soil erosion affect the transport of minerals
- Why do we need to preserve soil
- How percolation of water is related to various chemicals in the soil
- How is soil water content related to infiltration rates
- How drainage gets affected by runoff and flood
- How is soil moisture and agriculture related
- What are the main reasons for maintaining a better reservoir
- Why is it necessary to maintain a better water quality
- How is soil management related to crop management
- How is soil fertility related to crop nutrition/ crop productivity
- What are soil borne diseases and how can we reduce it by eco friendly means
- What are the advantages and disadvantages of using chemical fertilizers in the soil
• Why is it important to use natural (organic) fertilizers and what are its advantages

**Issues to be raised:**
1. What is soil?
2. What are the importance of soil?
3. What is soil erosion?
4. How is soil formed?
5. What is soil profile?
6. What are the different soil layers?
7. How does the humus get depleted?
8. How does mining affect the soil profile?
9. What are the different types of soil?
10. How do lichens help in weathering of soil?
11. What is chemical weathering and mechanical weathering?
12. How can you preserve the soil and why?
13. What is percolation rate of water?
14. What are the agents that affect the percolation rate of water?
15. What is soil moisture?
16. How does soil moisture influence the agriculture?
17. What are the agents that affect the soil?
18. Which are the different types of soil present in different parts of India?
19. Which are the types of soil suitable for different agricultural crops?
20. How does the weather and climate of a place influence the soil?
21. What is run off potential?
22. What is the relationship between soil management and crop management?
23. What is the relationship between soil fertility and crop nutrition?
24. What are soil borne diseases?
25. What is salinity, soil pH and the nutrient requirements?
26. What are organic fertilizers and what are their importances?

**Learning objectives:**
The pupil;
• Defines what is soil
• Discusses the importance of soil
• Interpret the impacts of soil erosion
• Discusses the process of soil formation
• Explains what is soil profile
• Identifies the different layers of soil
• Interpret the different ways of depleting the humus in the soil
• Extrapolate the impact of mining on the soil profile
• Identifies the different types of soil
• Understands the importance of lichens in weathering of rocks
• Differentiates between chemical weathering and mechanical weathering
• Analyze the different ways of preserving soil and its need
• Defines what is percolation of water
• Identifies the different agents that affect the percolation of water
• Defines what is soil moisture
• Explains the relationship between soil moisture and the type of agriculture
• Identify the various agents that affect the soil
• Lists out the different types of soil found in different parts of India
• Describes the types of soil suitable for different agricultural crops
• Interpret how the weather and climate of a place influence the soil
• Defines what is run off potential
• Identifies the relationship between soil management and crop management
• Identifies the relationship between soil fertility and crop nutrition
• Defines soil borne diseases
• Differentiates salinity, soil pH and the nutrient requirements
• Explains what are organic fertilizers and its importance

Learning resources:
Soil samples from different places, slide shows showing the impact of soil erosion, glass tumbler, pictures on mining, slide shows on weathering of rocks, samples of clayey, loamy and sandy soils, hollow cylinder or a pipe, boiling tube, visits a water body, funnel, filer paper, paper cuttings regarding heavy floods, measuring cylinder, dropper, pictures of Dams, water from different sources.

Activities
Activity 1:
Collect some soil samples from different places and ask the students to observe it carefully. From their observations of the soil sample and also their previous experience, let them complete the following table

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Soil source</th>
<th>Plants found</th>
<th>Animals found</th>
<th>Any other observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Soil near a pond</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Soil from road side</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Learning outcome
Able to understand the importance of soil for supporting life

Activity 2:
Pupil is asked to collect information from their parents and grandparents about the various soil deterioration that has occurred in their locality. They are also asked to find out how those landscapes looked like in their younger age and what changes has happened to them.

Learning outcome
Interpret the impacts of soil erosion and compare it with the olden days
Activity 3:
Pupil is shown some slide shows showing the impact of soil erosion. They are also asked to reflect on the various causes for soil erosion and how does it affect the plants, animals and other living organisms of the area? The pupil is made into groups and asked to discuss on the preventive measures that can be taken to prevent this soil erosion.

Learning outcome
Develop awareness about the impact of soil erosion on various life forms

Activity 4:
Take a little soil. Break the clumps with your hand to powder it. Now take a glass tumbler, three quarters filled with water, and then add a handful of soil to it. Stir it well with a stick to dissolve the soil. Now let it stand undisturbed for some time. Afterwards, observe it and answer the following questions:

- Do you see layers of particles of different sizes in the glass tumbler?
- Draw a diagram showing these layers.
- Are there some dead rotting leaves or animal remains floating on water?

Learning outcome
Develop awareness about the different layers of soil and soil profile

Activity 5:
Pupil is shown soil sample from a fertile land and asked them what makes the soil fertile. They are introduced the concept of humus. They are shown some paper cuttings on different ways of soil being deteriorated. They are asked to discuss in groups about the various ways by which the humus in the soil gets depleted. They also suggest ways of preventing such depletion.

Learning outcome
Develop understanding about the different ways of depleting the humus in the soil

Activity 6:
Pupil is shown some pictures on mining being occurring in different places. The pictures showing some quarries are also shown. The pupil is asked to reflect on what would be the place look like if it was not used in mining. They are asked to reflect on its impact on soil profile, and what is the alternative to prevent such massive destruction.

Learning outcome
Able to interpret the impact of mining on the soil profile

Activity 7:
Pupil discusses about the various agents that are responsible for causing weathering of soil. They are asked to reflect on the relationship between water and weathering and also between lichens and weathering. To justify the findings they are shown slide shows on weathering of rocks with the help of water and lichens.

Learning outcome
Develop awareness about the relation between lichens and weathering of rocks and also water and weathering
Activity 8:
Collect samples of clayey, loamy and sandy soils. Take a fistful of soil from one of the samples. Remove any pebbles, rocks or grass blades from it. Now add water drop by drop and knead the soil. Add just enough water so that a ball can be made from it, but at the same time it should not be sticky. Try to make a ball from this soil. On a flat surface, roll this ball into a cylinder. Try to make a ring from this cylinder. Repeat this activity with other samples also. Does the extent to which a soil can be shaped indicate its type? Can you suggest which type of soil would be the best for making pots, toys and statues?

Learning outcome
Develop understanding about the water holding capacity of different types of soil

Activity 9:
For this activity divide yourself into three teams. Name the teams A, B and C. You will be finding out how fast the water passes down the soil. You will need a hollow cylinder or a pipe. Ensure that each team uses pipes of the same diameter. Some suggestions for obtaining such a pipe are given below:
1. If possible, get a small tin can and cut off its bottom.
2. If PVC pipe (approx. diameter 5 cm) is available, cut it into 20 cm long pieces and use them.
At the place where you collect the soil, place the pipe about 2 cm deep in the ground. Pour 200 mL water in the pipe slowly. For measuring 200 mL water you can use any empty 200 mL bottle. Note the time when you start pouring water. When all the water has percolated leaving the pipe empty, note the time again. Be careful not to let the water spill over or run down on the outside of the pipe while pouring. Calculate the rate of percolation by using the following formula:
Percolation rate = \frac{\text{amount of water (mL)}}{\text{Percolation time (min)}}
Calculate the rate of percolation in your soil sample. Compare your findings with others and arrange the soil samples in the increasing order of the rate of percolation.

Learning outcome
Develop understanding about percolation of water if different soils

Activity 10:
Take a boiling tube. Put two spoonfuls of a soil sample in it. Heat it on a flame and observe it. Let us find out what happens upon heating. Do you see water drops any where? If yes, where did you find them?

Learning outcome
Develops understanding about soil moisture

Activity 11:
Pupil visits a water body nearby and collects some water. They are asked to find out the impurities present in it. They are asked the reason why it is not safe to drink such water. They are also asked to find out the soil content in it. They are asked to reflect on how did the soil reach the water bodies and how soil erosion leads to transportation of such impurities to water bodies.

Learning outcome
Develop awareness about how soil erosion leads to transportation of impurities to water bodies
Activity 12:
Pupil is shown a power point presentation illustrating the relationship between percolation of water and the amount of various chemicals in the soil. It also demonstrates the relation between soil water content and infiltration rates.

Learning outcome

Activity 13
Take a plastic funnel. Take a filter paper (or a piece of newspaper sheet), fold and place it as shown in the figure. Weigh 50g of dry, powdered soil and pour it into the funnel. Measure a certain amount of water in a measuring cylinder and pour it drop by drop on the soil. You can use a dropper for this purpose. Do not let all the water fall at one spot. Pour water all over the soil. Keep pouring water till it starts dripping. Subtract the amount of water left in the measuring cylinder from the amount you started with. This is the amount of water retained by the soil. Record your results in your notebook.

Learning outcome

Activity 14:
Pupil is shown some paper cuttings regarding heavy floods that occurred in the recent times in a city. They were asked about the outbreak of various diseases in that locality and they were asked to focus on the drainages there and how can it affect the areas that are flooded. They are also asked to discuss on the impact of such drainage and floods on the life, and the steps to be taken to prevent such disasters.

Learning outcome

Activity 15:
Take 100g soil. (Take help from any shopkeepers to weigh the soil.) Place it on a newspaper in the sun and allow it to dry for two hours. This activity is best done in the afternoon. Take care that the soil does not spill outside the newspaper. After drying it, weigh the soil again. The difference in the weight of the soil before and after drying gives you the amount of moisture contained in 100 g of soil. This is called the percentage moisture content.

Learning outcome

Activity 16:
Pupil is asked to collect information regarding the different types of soil along with their moisture content, and find out the type of vegetation that is being seen in such areas. They are asked to reflect on how the moisture content of soil determines the vegetation of the place.

Activity 17:
Pupil is asked about the temperature of the day, whether it was hot, cold or average. They are also asked about the seasons that they experience in a year. They are also asked about what is climate and how to differentiate between weather and climate. They also explain the relationship between weather and climate and how they are mutually dependent.

**Learning outcome**

**Activity 18:**
Crops such as wheat are grown in the fine clayey soils, because they are rich in humus and are very fertile. Find from your teachers, parents and farmers the type of soils and crops grown in your area. Enter the data in the following table.

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Soil type</th>
<th>Crops grown</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clayey soil</td>
<td>Wheat…</td>
</tr>
</tbody>
</table>

**Learning outcome**

**Activity 19:**
Pupil is shown some pictures of Dams that are about to collapse due to several reasons. A discussion is initiated on the various reasons for dams being in such a dangerous condition. The conclusions are listed on the black board. The pupil is asked to reflect upon these and find out some suggestions for the safety and security of dams.

**Learning outcome**

**Activity 20**
The pupil is asked to bring water from different sources. They are asked to categorize into two groups as the water which one can take in and the one which we cannot take in. They are asked about the reason for not using certain water and how can one detect the quality of drinking water.

**Learning outcome**

**Activity 21**
The pupil is taken to a nearby field where crops are grown. They are asked to find out how the crops have been grown and how the soil management is been done in those areas. They are also asked to find out the relationship between soil management and crop management.

**Learning outcome**

**Activity 22**
Pupil is asked to visit some farmers in their nearby areas and collect information regarding some of the soil borne diseases that usually attack their crops in the field. The pupil asks their parents, friends, grandparents and so on for collecting the relevant information. Each student makes a presentation on their collected material.

They are also asked to collect information regarding the relationship between soil fertility and crop productivity.

**Learning outcome**
**Activity 23**
The pupil is asked to collect information regarding organic fertilizers that are being produced. The different ways of producing organic fertilizers are also being explored. They are asked to list out how these fertilizers are produced at home and its usage. They also find out the different materials from which organic fertilizers can be produced.

*Learning outcome*

**Project**
- Pupil makes a compost pit in the school so that they can dispose all the degradable wastes into it and can be used as a manure or if possible as a biogas plant
- Pupil also prepares a vermicompost in their school campus, so that natural fertilizers can be obtained from it.

*Learning outcome*

**UNIT 7**
**FORESTS- OUR LIFELINE**

**SCOPE**
The unit focuses on forest as a natural resource and its importance. The unit also emphasizes the role of forest as an important component in the life cycle and food chain.

*Focus points:*
- Why fossils are considered as an important natural resource? Why should we give more importance in protecting it
- How the ecological balance disturbed when the forests and wildlife are disturbed?
- What are the chief forest products and why is it important to conserve them?
- What are the main reasons for the tropical and sub tropical forests getting disturbed?
- What are the main causes for the destruction of forests and how can it influence the life on earth?
- How is desertification, deforestation and Afforestation related
- How is soil fertility related to growth of plants?
- How is forest helpful in improving the economy of a country?
- How does an increase in CO2 in the atmosphere affect the globe?
- What are the advantages of eco tourism to the environment and economy of a nation

*Issues to be raised*
1. Why are forests called as green lungs?
2. Why do you say that forests are an important renewable resource?
3. What is top canopy of a forest?
4. What are creepers and climbers?
5. Name some animals that depend on forest for living?
6. What are decomposers?
7. What is transpiration?
8. What is the relationship between tribes and forests?
9. Name some animals that help in seed dispersal
10. Why do you say that forest is a natural absorber of rainwater
11. What is the role of forests in controlling floods, soil erosion, noise pollution and bringing rainfall?
12. How can you substantiate that forests and wildlife help in maintaining ecological balance?
13. Which are the chief forest products?
14. What are the main reason for the tropical and sub tropical forests being disturbed?
15. What are the reasons for destruction of forests?
16. What is the role of forests in maintaining the ecological balance?
17. What is Desertification, Deforestation and Afforestation?
18. What are the impacts of increase in CO₂ in the atmosphere?
19. What is the relationship between forest and economy?
20. What is ecotourism?
21. Comment on the aesthetic value of forest.

Learning objectives:
The pupil
- Give reasons for forests been called as green lungs
- Explains the reasons why forests are called as renewable resources
- Describes what is top canopy of a forest
- Differentiates between creepers and climbers
- List out the names of some animals that depend on forests for their life
- Defines what are decomposers
- Explains transpiration
- Explores the relationship between tribes and forests
- List out the names of animals that helps in seed dispersal
- Predict the reason why forest is a natural absorber of rainwater
- Justify how forests help in controlling floods, noise pollution and soil erosion.
- Predicts how forests can help in bringing rainfall
- Reasons out how forests and wildlife help in bringing ecological balance
- List out the chief forest products
- Explore into the reasons for the tropical and sub tropical forests being disturbed
- Predicts the reason for destruction of forests
- Explains the role of forests in maintaining the ecological balance
- Compare Desertification, Deforestation and Afforestation
- Predicts the impacts of increase in CO₂ in the atmosphere
- Analyze relationship between forest and economy
- Defines ecotourism
- Reflects on the aesthetic value of forest

Activities
Activity 1
Observe the various things in your home and make a list of those which are made from material which may have been obtained from the forest.

**Activity 2**
Visit a forest or a park in your neighbourhood. Observe the trees and try to identify them. You can take the help of some elders or books on trees. List the characteristics of the trees that you observe, such as the height, shape of leaves, crown, flowers, and fruits. Also draw the crowns of some trees.

This can be followed by the asking few questions like:
- What is the colour of the forest?
- What are its uses?
- Why are plants called as green lungs?
- Why forests are called as renewable resources?
- What do you mean by top canopy in a forest?

**Activity 3**
Few creepers and climbers are brought to the classroom. The pupil is asked to differentiate between the two, based on their habit, nature etc. They are also asked to discuss on their role in a forest.

**Activity 4**
Pupil is asked to list out the names of animals that are found in a forest. They are also asked about what is the role of decomposers in a food chain and also which are the animals that helps in seed dispersal and also what makes it possible.

**Activity 5**
Take a potted plant. Select any leaf and cover it using a polythene cover. Cover it properly to see that no air space is left out. Keep in this manner for one day and observe the plant leaf on the next day. The observation is noted down, and the pupil explains how transpiration occurs in plants.

**Activity 6**
Pupil is shown some pictures of people who depend on forests for their living (Tribes). They are also asked about the different modes of dependence of these people on the forest. They are asked to discuss on what would be the impact on these people if the forest gets destroyed.

**Activity 7**
Dig a small pit. Put vegetable waste and leaves in it. Cover them with soil. Add some water. After three days, remove the upper layer of the soil. Does the pit feel warm inside?

Few dried leaves are spread on the soil and pour some water on it. Leave it as such for few days. The leaves are removed after few days and observe the moisture inside. From this the importance of forests in conserving rainwater is brought into. This finally leading to water conservation is also dealt here. They are also shown a water cycle so that they reflect on how rainwater is formed and also the role of forests in bringing about rainfall.

**Activity 8**
Pupil is taken to a garden nearby where there are lot of trees. One of the students is asked to call his friends name from behind a tree. Repeat it without the cover of a tree. The pupil is asked to recognise which made more noise and which had less noise. The conclusion will help in inferring that trees help in controlling noise pollution.

**Activity 9**
Pupil is made into groups and different groups are given different forest products and they are asked to discuss on its origin and economic use. They are also asked to find out other forest products and list out their origin and economic value of them and list them on the black board.

**Activity 10**
Pupil is asked about the nearby places that are facing destruction of forests. They are asked about the impacts of destruction of forest on different life forms.

**Activity 11**
A film regarding the impact of increase in CO$_2$ on the earth and life forms are screened.

**Activity 12:**
Pupil is shown a picture of a plant with roots. They are asked to discuss on the importance of roots and how it helps in soil conservation. They also discuss how a large number of trees in a forest can help in preventing soil erosion.

**Activity 13**
The whole class is engaged in playing the following game. Different crowns are made out of paper on which are written names of different animals (Lion, frog, deer, cow...), plants, birds and other living organisms found in the forest. Each student is asked to select a crown and they wear it. A long thread is taken and it is linked to one student to another according to their dependence on food which finally forms a food web.
One of the students (say Frog) completely leaves the thread and the pupil identifies the imbalance happening in that ecosystem. In this way they reach the conclusion of how forests and wildlife help in maintaining an ecological balance.

**Activity 14**
In Fig. the artist has forgotten to put the labels and directions on the arrows. Mark the directions on the arrows and label the diagram using the following labels:
UNIT 8
WASTE WATER STORY

Scope
The unit focuses on the harmful effects of waste water from different sources and waste water treatment. It also gives importance for the need of safe drinking water. The unit also focuses on the meaning of sewage and proper sewage disposal, sanitation and outbreak of various diseases and also the importance of being an active citizen.

Focus points
• How does stagnant water result in spreading of contagious diseases?
• What are the ill effects of stagnant water?
• What are the reasons for contamination of water?
• What are the steps to be taken for bringing about awareness among public about the importance of maintaining safe drinking water?
• How do over exploitation lead to water pollution?
• What are the different ways for the proper disposal of wastes (from hospitals, industries etc.)
• What will happen if we mix degradable and non degradable wastes and what are its consequences?
• What is the safe way for disposing sewage in highly polluted and populated places?
• How can you maintain a sewage pit properly?
• What are the different ways by which we make useful products from sewage?
• How can you make use of technology in waste water treatment?
• How can citizens help in maintaining a sewage free environment?
• How is sanitation of a place and spread of diseases related? What are the diseases spread through water?
• What are the different eco friendly ways of sewage disposal?
• What practices can one adopt for maintaining sanitation in public places?
• What are some of the individual and collective actions that can be undertaken for better sanitation practices?

Issues to be raised
• What is waste water?
• What are the impact of stagnant water to life forms
• What are the reasons for increasing scarcity of fresh water
• When is the International Decade for action on “Water for life”
• What is sewage treatment?
• What are chemical and microbial contamination of water
• What are the steps to be taken for maintaining safe drinking water
• What are the reasons for water pollution
• What do you mean by sewage and what are the organic and inorganic impurities in the sewage
• Which are the sources from which wastes are added to different water sources
• How can you dispose degradable and non degradable wastes
• How will you dispose sewage in highly polluted places and also at places of human settlements
• What are sewage pits and how can you maintain it properly
• What is waste water treatment plant
• How can you make useful products from sewage
• What is the role of technology in waste water treatment
• What are the roles of citizens in maintaining a sewage free environment
• What is the relation between sanitation and diseases
• What are the diseases that can be affected due to unhygienic waste disposal and stagnant water
• What are the alternative arrangements for sewage disposal
• How can you assure sanitation at public places
• What are the individual and collective actions that can be undertaken for better sanitation practices?

Learning objectives
• Explain the meaning of waste water
• Explains the impact of stagnant water to life forms
• Give reasons for increasing scarcity of fresh water
• Identifies the International Decade for action on “Water for life”
• Defines what is sewage treatment
• Identifies which are the chemical and microbial contaminants of water
• Identifies the steps to be taken for maintaining safe drinking water
• Predicts the reasons of water pollution
• Explains what sewage is and identifies the organic and inorganic impurities in it.
• Identifies the sources from which wastes are added to different water sources
• Explain the ways of disposing degradable and non degradable wastes
• Explain the different ways of sewage disposal in highly polluted places and also at places of human settlements
• Explains what are sewage pits and how can you maintain it properly
• Explain what is waste water treatment plant
• Mention different ways of making useful products from sewage
• Explore the role of technology in waste water treatment
• Discusses the roles of citizens in maintaining a sewage free environment
• Analyze the relation between sanitation and diseases
• List out the diseases that can be affected due to unhygienic waste disposal and stagnant water
• Discusses on the alternative arrangements for sewage disposal
• Explore the different ways to assure sanitation at public places
• Analyze the individual and collective actions that can be undertaken for better sanitation practices

Learning resources

Activities

Activity 1:
Pupil is asked about the water they drink. They are asked about what type of water they take for drinking and what makes the water suitable for drinking?
They are asked about the waste water from kitchen, bathroom etc. They are shown paper cuttings of several diseases that are spreading in the recent years and its ill effects. It is followed by asking the following questions
• What makes water impure?
• What are the ill effects brought about by stagnant waste water?
• How can you keep your surroundings neat and clean?
• How can you reduce the spreading of mosquitoes?
• What are the diseases that have started spreading in the recent years?

Activity 2:
Let us make a mind map of the many uses of clean water. (We have given one example of the use of clean water. You can add many more.)
Activity 3:
Pupil is shown a slide show on scarcity of fresh water in different places. They are asked to discuss on the causes for water scarcity. A debate is conducted on the topic- United Nations International Decade for action on “Water for life”. They are also asked to reflect on the various steps to be taken for maintaining safe drinking water.

Activity 4:
Pupil is asked to prepare two dustbins outside the classroom. They are asked to dispose all the degradable wastes in one dustbin and non degradable ones in the other. The pupil is asked about the reasons for separating them. They are also asked to reflect on the following
- How will you dispose sewage in highly polluted places
- How will you dispose sewage places of human settlements
- How wastes can be made into some useful products on economical value

Activity 5:
Pupil is shown pictures of waste treatment plant and asked to explain the functioning of it. They are also asked about how we can protect sewage pits from the outbreak of some contagious diseases.

Activity 6:
Pupil is shown a slide show about the role of various technologies in waste water treatment. They are asked about how one can protect water bodies by not making it polluted from any sources

Activity 7:
Locate an open drain near your home, school or on the roadside and inspect water flowing through it. Record colour, odour and any other observation. Discuss with your friends and your teacher and fill up the following Table

<table>
<thead>
<tr>
<th>SI No.</th>
<th>Type of sewage</th>
<th>Point of origin</th>
<th>Substances contaminate</th>
<th>which</th>
<th>Any other remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sullage water</td>
<td>Kitchen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Foul waste</td>
<td>Toilets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Trade waste</td>
<td>Industrial and commercial organisations</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Activity 8:
Pupil is asked to list out the names of few diseases that are usually spread among Human beings. They are asked to categorise into different groups based on their mode of transmit.

<table>
<thead>
<tr>
<th>Diseases spread through air</th>
<th>Diseases spread through water</th>
</tr>
</thead>
</table>

They also list the names of some diseases that are spread by mosquitoes.

Activity 9:
Study the sewage route in your home/school/building. Do the following:
- Make a line diagram of the sewage route.
- Walk down the street or survey the campus to find the number of manholes.
- Follow an open drain and find out where it ends and which living organisms are found in and around it.

In case you do not have a sewerage system in your locality, find out how sewage is being disposed off.

Activity 10:
Divide yourself into groups to perform the activity. Record observations at each stage:
- Fill a large glass jar 3/4 full of water. Add some dirty organic matter such as grass pieces or orange peels, a small amount of detergent, and a few drops of an ink or any colour.
- Cap the jar, shake it well and let the mixture stand in the sun for two days.
- After two days, shake the mixture and pour a small sample into test tube. Label this test tube “Before treatment; Sample 1”. How does it smell?
- Use an aerator from an aquarium to bubble air through the sample in the glass jar. Allow several hours for aeration; leave the aerator attached overnight. If you do not have an aerator, use a mechanical stirrer or a mixer. You may have to stir it several times.
- The next day when aeration is complete, pour another sample into a second test tube. Label it as “After aeration; Sample 2”.
- Fold a piece of filter paper to form a cone. Wet the paper with tap water and then insert the cone in a funnel. Mount the funnel on a support (as you have learnt in Class VI).
- Place layers of sand, fine gravel and finally medium gravel in the funnel (An actual filtration plant does not use filter paper, but the sand filter is several metres deep).
- Pour the remaining aerated liquid through the filter into the beakers. Do not allow the liquid to spill over the filter. If the filtered liquid is not clear, filter it a few times till you get clear water.
- Pour a sample of the filtered water into a third test tube labelled “Filtered; Sample 3”.
- Pour another sample of the filtered water into a fourth test tube. Add a small piece of a chlorine tablet. Mix well until the water is clear. Label the test tube “Chlorinated; Sample 4”. Observe carefully the samples in all the test tubes. Do not taste! Just smell them!

Now answer the following questions:
(a) What changes did you observe in the appearance of the liquid after aeration?
(b) Did aeration change the odour?
(c) What was removed by the sand filter?
(d) Did chlorine remove the colour?
(e) Did chlorine have an odour? Was it worse than that of the wastewater?

Activity 11
Here is a crossword puzzle: Good luck!

Across
3. Liquid waste products
4. Solid waste extracted in sewage treatment
6. A word related to hygiene
8. Waste matter discharged from human body

Down
1. Used water
2. A pipe carrying sewage
5. Micro-organisms which causes cholera
7. A chemical to disinfect water

Activity 12:
Pupil is asked to discuss on what can be done as an active citizen for protecting water bodies and what the better housekeeping practices are. Pupil is also asked to make a table and find out what can one do at individual and collective level for conserving water.

<table>
<thead>
<tr>
<th>Individual level</th>
<th>Collective level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
</tbody>
</table>

Activity 13:
Collect from different books/reviews about the alternative arrangements for sewage disposal with special reference to disposal of wastes in Railway stations, Bus depot, airport etc.

UNIT 9
WATER- A PRECIOUS RESOURCE

SCOPE:
The unit deals with the amount water recommended per person per day, how much water is available, forms of water with special reference to groundwater as an important source of water. The unit also focus on the Depletion of water table, Distribution of water and water management. The unit emphasise on what role can one play in conserving water and also the effect of water scarcity on plants

Focus points
- How much water is been utilised per person per day
- Why does water scarcity occur in the modern world?
- What are the ways by which we can have a better way of managing water
- How can individual play a major role in water management
- Why is the amount of usable water on the earth getting reduced? What are the alternative measures
- How does water depletion has an impact on the environment
- Why do we need to nationalise the rivers?
- What are the reasons for water becoming a political issue? How can such issues be solved?
- Why are different projects being given importance for protecting and conserving water
- What are the various ways by which water get polluted in places of human settlements and how can we minimise such pollution?
- How is industrialisation related to water pollution? What are the steps to be taken in order to prevent water pollution by industries?
- Why is it important to reutilise and recycle waste water? How can you do it?
- Why is rainwater harvesting considered to be a solution to water problems?
- What are the steps that one can adopt for proper water management in kitchen and garden?
- What roles can one play towards conserving water?
- What are the main reasons for the depletion of water table?
- How is population increase and level of ground water related?
- How is agriculture and ground water related?
- How does the percolation of water into the soil get reduced?
- How do changing climatic patterns influence water?
- What human activities are responsible for the occurrence of flood and drought? How can we minimise such activities?
- How can we make use of waste water so that we can reduce the pressure on fresh water?
- What are the different ways of rain water harvesting which we can practice at home?
- How can each individual help in reducing water scarcity?
- What roles can you play at home and school to reduce water scarcity?
ISSUES TO BE RAISED:
1. When is the world water day celebrated?
2. What is the amount of water recommended per person per day?
3. What are the causes and effects of water scarcity in the modern world?
4. What are the different methods of managing water?
5. What are the duties of an individual in managing water?
6. What is the amount of water present on the earth?
7. Which is the water that can be used by human beings?
8. What do you mean by fresh water?
9. What are the reasons for decreasing amount of usable water on earth?
10. What are the impacts of water depletion?
11. How water gets polluted?
12. What is eutrophication?
13. How many rivers are there in your state?
14. What is the importance of nationalising rivers?
15. Why water is becoming a political issue?
16. What is water cycle?
17. What are the different forms of water?
18. What are the various projects to protect water?
19. How do human settlements pollute water?
20. What is the relationship between industrialisation and water pollution?
21. How can you reutilise and recycle water?
22. What are the laws in India to control water pollution?
23. How can you assess the water quality?
24. What are the techniques for cleaning polluted water?
25. What are water table, infiltration and aquifer?
26. What is acid rain?
27. What do you mean by rain water harvesting?
28. How can you have proper water management in kitchen and garden?
29. How can an individual help in conserving water?
30. How do the water table get depleted
31. What is the relationship between increasing population and ground water?
32. What is the relationship between agriculture and ground water?
33. What are the different reasons for reducing the percolation of water into the soil?
34. How do changing climatic patterns influence water?
35. What are the causes of floods and drought?
36. How do wastage of water happens?
37. What are the different ways of rain water harvesting?
38. What is Bawri and drip irrigation?
39. How can you ensure a sustainable water usage?
40. What are the effects of water scarcity on plants?
41. What role can you play in reducing water scarcity?
42. What are your roles at home and school to reduce water scarcity?
LEARNING OBJECTIVES:
- Recalls when is world water day celebrated
- Understands the amount of water recommended per person per day
- Interprets the causes and effects of water scarcity in the modern world
- Analyze the different methods of managing water
- Identifies the duties of an individual in managing water
- Explores the amount of water present on the earth
- Recalls which is the water that can be used by human beings
- Defines what is fresh water
- Explore the reasons for decreasing amount of usable water on earth
- Reflects on the impacts of water depletion
- Explains how water gets polluted
- Defines eutrophication
- List out the names of river in your state
- Analyse the importance of nationalising rivers
- Reasons out why water is becoming a political issue
- Defines water cycle
- Communicates the different forms of water
- Mention the various projects to protect water
- Reflects on how human settlements pollute water
- Analyse the relationship between industrialisation and water pollution
- Hypotheses on reutilising and recycling of water
- What are the laws in India to control water pollution
- Explore the different ways of assessing the water quality
- Analyse the various techniques for cleaning polluted water
- Define what are water table, infiltration and aquifer
- Defines acid rain
- Communicates what is rain water harvesting
- Explains the different ways of water management in kitchen and garden
- Analyse the roles of different individuals in conserving water
- Explains how water table get depleted
- Analyze the relationship between increasing population and ground water
- Analyze the relationship between agriculture and ground water
- Infer the different causes for reducing the percolation of water into the soil
- Reflect on the how the changing climatic patterns influence water
- Analyze the causes of floods and drought
- Explains how the wastage of water occurs
- Mention the different ways of rain water harvesting
- Explains what is Bawri and drip irrigation
- Explain different ways to ensure sustainable water usage
- Explore the effects of water scarcity on plants
- Discuss on different roles you can play in reducing water scarcity
- Discuss on different roles one can play at home and school to reduce water scarcity
ACTIVITIES:
Activity 1:
The pupil is asked to refer few books and find out when is the world water day and why is it celebrated. They are asked to share their findings in the classroom. They are also asked about the amount of water is recommended per person per day. The students are asked to find out whether they are taking in the required amount of water daily and what is the importance of taking enough water each day.

Activity 2:
Pupil is asked to share their experience about summer seasons. They are also asked about the water problem they experienced during summer. They are asked to discuss on the reasons for such water problem being experienced and the possible solutions to solve such water problems in the future.

Activity 3
The pupil is shown a multimedia presentation, chart or newspaper cutting on different ways of managing water and they are asked to discuss on the importance of such water management.

Activity 4
Pupil read certain issues on water between states, countries etc. in the class. They are then asked about why there are water issues between states, countries and nations? Why there is water scarcity? What can one do at the individual level/ community level for conserving water? Why bloodshed has occurred in the name of water?

Activity 5
Students observe the pictures of different lakes and rivers getting dried off. They are asked about the reason for such disaster. The discussion is focussed on the following points
- What are the impacts of water depletion
- How water gets polluted?
- What do you mean by nationalizing rivers? What are its advantages?
- How many rivers are there in your state?

Activity 6
Refer few journals and find out the nature of various projects to protect water

Activity 7
Pupil is asked to divide into 2 groups and each group is asked to have a presentation on
- Group A- Human settlement and water pollution
- Group B- Industrialisation and water pollution

Activity 8
An elocution competition is been conducted in the classroom on the topics:
- Reutilisation and recycling of waste water
- Water pollution control through law

Activity 9
Data on the present Ground water level is shown and pupil is asked to compare it with that of previous years. They are also asked to analyse on the risk of ground water depletion on the life forms and to the environment. The following are the areas are to be discussed
- What are the different ways of increasing the ground water level
- What are the various reasons for reducing the percolation of water
- What is rain water harvesting
- What is the advantages of constructing pits / bunds in water management
• How can one have a proper water management in the kitchen
• How can one have a proper water management in the garden

**Activity 10**
Pupil is asked about the changes in the colour of rainwater, acid rain that occurred in different parts of the country. They are asked about the possible causes for such happenings.

**Activity 11**
A film is screened on the changing climatic patterns.

**Activity 12**
Pupil is given a description of Green revolution and they are asked to discuss on
• Meaning of sustainable agriculture
• Meaning of sustainable water use

**Activity 13**
Pupil is asked to develop some strategies for creating awareness about water conservation at different areas like;
• Plan activities for water conservation at community level
• Plan activities for water conservation at school, home and society

**Activity 14**
Collect clippings from newspapers and magazines on the news items, articles and pictures related to water shortage. Paste them in your scrapbook and share it with your friends. List some problems faced by the people and discuss them in the class.

**Activity 15**
Most of us assume water to be a limitless resource. From this activity can you appreciate the actual amount of water available for human use? Does the finding worry you? Discuss this in your class.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Figure</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take a medium-sized bucket and fill it up with water. It contains about twenty litres of water.</td>
<td><img src="image1.png" alt="Bucket" /></td>
<td>Assume that this water represents all the water present on the earth.</td>
</tr>
<tr>
<td>Take a tea spoon of about 5mL capacity and transfer 100 spoons of water from the bucket to a small container, like a bath mug.</td>
<td><img src="image2.png" alt="Teaspoon" /></td>
<td>This represents total freshwater on the earth.</td>
</tr>
</tbody>
</table>
From the bath mug transfer thirty spoons of water to a glass tumbler. This gives a measure of usable water present as groundwater.

Finally take out a quarter (1/4th) spoonful of water from the mug. It represents all the water present in all the lakes and rivers of the world.

- The water left in the bucket represents the saline water present in the seas, oceans and partly as groundwater. This water is not fit for human use.
- The water left in the bath mug represents the water, which is present in the frozen form in glaciers, ice caps and permanent snow; again not available readily.

**Activity 16**
The following figure shows the processes involved in the water cycle. Mark the following processes given below in the figure.

1. Ground water
2. Evaporation
3. Condensation
4. Clouds
5. Transpiration
6. Infiltration
7. Precipitation

**Activity 17**
Name some industries familiar to you. Make a list of the products obtained from these and used in our daily life. Discuss with your teacher and parents how the growing industrial activity is responsible for the depletion of water table.

**Activity 18**
Given here is the rainfall map of India. It gives the average annual rainfall in different regions of our country.

⇒ Locate on the map the place you live in.
Are you blessed with sufficient rainfall?
Is there sufficient water available in your area throughout the year?

It may be possible that we are living in an area where there is sufficient rainfall yet there is shortage of water. Can we attribute this to mismanagement of water resources?
Rain map of India
2. Based upon Survey of India map with the permission of the Surveyor General of India.
3. The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate baseline.
4. The external boundaries and coastlines of India agree with the Record/Master Copy certified by Survey of India.

Activity 19
You can have the following role play enacted in your classroom.
You are a water detective in your school. You have a team of six members. Survey the campus and make a note of the following:
(a) Total number of taps
(b) Number of taps leaking
(c) Amount of water wasted due to leakage
(d) Reasons of leakage
(e) Corrective measures taken

PROJECT
Form groups of 4 to 5 students in the class and prepare a report on the various traditional ways of water harvesting. If possible, use the following web link: www.rainwaterharvesting.org

UNIT 10
ENVIRONMENT

SCOPE:
The unit deals with the meaning of environment, natural and manmade environment, human influence on natural environment. The unit also deals with the nature of lithosphere, hydrosphere, atmosphere and biosphere along with its inter relationships. The unit focuses on how climatic changes influence the earth’s atmosphere and the life forms on earth. The unit also give emphasis on the meaning and deterioration of ecosystem, human environment and their influence on nature.

Focus points
- What are the human activities that can disturb the natural environment? How can we reduce such human activities or reduce the impact of human activities on the environment?
- What are the human activities that can cause the top soil of lithosphere to be washed away?
- What are the human activities that cause changes in climatic conditions and how does it influence the various life forms on earth?
- What steps can we take for conserving natural vegetation and wildlife? Why is it necessary?
- How can we minimise those activities that lead to the vanishing, pollution and destruction of ecosystem?
- How was the environment considered as in the ancient world and how far it has changed in the modern world and what are its impact?
• How do modern human settlements, transport and communication cause hindrance to natural environment? How can we reduce its impacts?
• What are the human activities that can be a cause for global warming, green house effect, and ozone depletion? How can we reduce such activities for minimizing such climatic changes?
• What are the Changes in the world due to globalization, commercialization, urbanization etc. and how it can influence the life forms
• What are the measures to control industrialization, urbanization etc

ISSUES TO BE RAISED:
1. What is environment
2. What is natural environment
3. What is man- made environment
4. What do you mean by human environment
5. How do the natural environment get disturbed by human influence
6. How do human activities influence the land, climate, vegetation and wildlife
7. What are the components of natural environment
8. What is the nature of lithosphere, hydrosphere, atmosphere and biosphere?
9. How the topsoil of the lithosphere get washed away
10. What are the Major landforms of earth
11. How are lithosphere, hydrosphere, atmosphere and biosphere inter related
12. How climate changes influences the earth’s atmosphere and its life forms
13. What is the Need for conserving natural vegetation and wild life
14. What is ecosystem
15. How an ecosystem gets vanished, polluted and destroyed
16. What are the changes in the human environment of the ancient and modern world
17. How human settlement, transport and communication causes hindrance to natural environment
18. What are the impact of global warming, green house effect, ozone depletion etc on the environment
19. What are the Changes in the world due to globalization, commercialization, urbanization etc. and how it can influence the life forms
20. What are the measures to control industrialization, urbanization etc
21. Why do we need to sustain the natural environment

LEARNING OBJECTIVES:
- Recalls the meaning of environment
- Explains what is natural environment
- Explains what is man- made environment
- Explains the meaning of human environment
- Interprets how the natural environment get disturbed by human influence
- Interprets how do human activities influence the land, climate, vegetation and wildlife
- Analyse the different components of natural environment
- Explains the nature of lithosphere, hydrosphere, atmosphere and biosphere?
- Explains how the topsoil of the lithosphere get washed away
- Describes the Major landforms of earth
- Analyse how the lithosphere, hydrosphere, atmosphere and biosphere inter related
- Interprets how climate changes influences the earth’s atmosphere and its life forms
- Analyse the need for conserving natural vegetation and wild life
- Explains what is ecosystem
- Infer how an ecosystem gets vanished, polluted and destroyed
- Explore the changes in the human environment of the ancient and modern world
- Explains how human settlement, transport and communication causes hindrance to natural environment
- Predict the impact of global warming, green house effect, ozone depletion etc on the environment
- Analyse the Changes in the world due to globalization, commercialization, urbanization etc. and how it can influence the life forms
- Explore the measures to control industrialization, urbanization etc
- Reflect on the need to sustain the natural environment

**ACTIVITIES:**

**Activity 1**
Look at your surroundings. Make a list of uses that the land in your neighbourhood is being put to.

**Activity 2**
Recollect any development that has happened in your area recently. It may be construction of a building, shopping mall, road etc. The pupil is asked to recollect what are the ill effects of such developments? They are asked to discuss on similar situations where human activities influences the land, climate, vegetation and wild life.

**Activity 3**
A role play is enacted to show the inter relationship between the various realms of earth.

**Activity 4**
Pupil is asked to collect the information regarding rainfall from their grandparents and how it was in their childhood days. They are asked to find out the difference in rainfall during olden days and present days. They are asked about the consequences on the top soil if such heavy rains prevail. They are asked about different ways by which the top soil gets washed away.

**Activity 5**
Through a drama students act the importance of natural vegetation and wildlife and also the need for conserving them and also how an ecosystem gets vanished, polluted and destroyed.

**Activity 6**
How some pictures of different developments from ancient to modern world in the areas of transport, human settlement and communication and pupil is asked to discuss on how these developments can cause hindrance to natural environment

**Activity 7**
Pupil is made into groups and each group is asked to collect information regarding the following and they are asked to present in the classroom
- Global warming and its influence on life
- Ozone depletion and its influence on life
- Globalization and its influence on life
- Urbanization and its influence on life
Activity 8
Where does the water you use in your home and school come from? Make a list of different uses of water in our daily life. Have you seen anyone wasting water? How?

Activity 9
Observe the sky while coming to school. Make a note whether the day is cloudy, rainy, sunny, foggy etc.

Activity 10
Sketch or bring photographs of your place

Activity 11
Talk to some elderly person in your neighbourhood and collect information about—
• The trees in his/ her neighbourhood when he/ she were your age.
• The indoor games he/she played.
• His/her favourite fruit at your age.
• How did they make themselves comfortable during hot summers and cold winters? Display your answers on a wall/bulletin board.

Activity 12
Imagine an ideal environment where you would love to live. Draw the picture of your ideal environment.

UNIT 11
INSIDE OUR EARTH

SCOPE:
The unit deals with why our earth is called a dynamic planet, the interior of our earth, nature of crust, core and mantle and its impact on mining. The unit also give emphasis on the different types of rocks and minerals, rocks and ground water conservation, quarrying and impact on environment, depletion of different types of rocks, rock cycle and over exploitation of minerals.

Focus points
• Is there a relationship between rocks and ground water conservation
• How does quarrying has an impact on environment
• What are the ways by which we can assure a sustainable development of mineral resources
• How do the exploitation of minerals influence the nature and life forms

ISSUES TO BE RAISED:
1. Why is earth known as a dynamic planet?
2. Describe the interior of earth
3. What is the nature of crust, core and mantle?
4. What is rock?
5. What are the different types of rocks?
6. What is the relationship between rocks and ground water conservation?
7. What is the relationship between quarrying and its impact on environment?
8. How do the different types of rocks get depleted?
9. What do you mean by sustainable development of mineral resources?
10. What is rock cycle?
11. How do the exploitation of minerals influence the nature and life forms?

LEARNING OBJECTIVES:
• Infer why earth is known as a dynamic planet
• Describe the interior of earth
• Analyse the nature of crust, core and mantle
• Defines what is rock
• Lists the different types of rocks
• Analyse the relationship between rocks and ground water conservation
• Analyse the relationship between quarrying and its impact on environment
• Interprets how the different types of rocks get depleted
• Reflect on sustainable development of mineral resources
• Explains what is rock cycle
• Analyse how the exploitation of minerals influence the nature and life forms

ACTIVITIES:

Activity 1
Pupil is shown a globe and asked about what they know about the planet earth. Their conclusions are written on the black board.

Activity 2
Pupil is shown a transverse section of an onion and a boiled egg to explain the interior structure of earth, which is followed by a discussion on the impact of mining on different layers of earth.

Activity 3
Pupil is shown a piece of rock and they are asked to discuss on what are rocks, and the different types of rocks followed by rock cycle. A chart showing the rock cycle is also exhibited in the classroom.

Activity 4
Pupil is made into 4 groups and each group is given one topic for making a presentation in the class
  ➢ Group 1: Rocks and ground water conservation
  ➢ Group 2: Phosphate rocks for sustainable agriculture
  ➢ Quarrying and its impact on the environment
  ➢ Over exploitation of minerals and its influence on environment and life

Activity 5
Pupil is asked to visit a petrol bunk near their area and asked to list down the amount of petrol and diesel that is been sold in a day. They are asked to find out the market rate of petrol and diesel and analyse on the amount that is spend on these per day. They are asked to find out how much is spend per month and per year on these non renewable resources and discuss on the impact of it if it continues for several years.

Activity 6:
A discussion is been initiated in the classroom to discuss on the various alternative sources that can be utilised to reduce the pressure on non renewable sources.

Activity 7
From the above discussion pupil is asked to come out with some suggestions on sustainable development of mineral resources.

Activity 8
What are the minerals found in your state? Collect some samples to show in your class.

Activity 9
(i) What are the minerals most commonly used in the following objects?
(ii) Identify some more objects made up of different minerals.

Pan/Tava
Hammer
Bell
Karhai
Ornaments
Lamp

**Project:**
Collect pictures of some monuments and find out which are the rocks used to build them. Two pictures have been collected for you.
UNIT 12
OUR CHANGING EARTH

SCOPE:
The unit deals with what are lithospheric plates, its movement, endogenic and exogenic forces, volcano, earthquake, focus and epicentre. The unit also focus on how man’s activity affect the earth, tsunami as a natural calamity, volcanic gases and how technology helps in predicting natural calamities. The unit also emphasise on weathering, soil erosion with its causes and effects, working of a river, sea waves, ice and wind, with focus on how human activities have led to the drastic environmental changes.

Focus points
- How and what are the human activities that affects the earth?
- Tsunami- why it occurs and what are the precautionary measures
- The impact of various gases emitted during a volcanic eruption and how it harms the environment
- How can technology be utilised for predicting natural calamities?
- What are the causes for soil erosion and how can we prevent them?
- What are the human activities that cause water pollution
- What are the impact of flood on life and environment
- What are the present condition of glaciers and glacial moraines
- How do green house effect has an impact on glaciers and coastal areas
- Do wind help in erosion? Is it a climatic change?

ISSUES TO BE RAISED:
1. What are lithospheric plates and their movement?
2. What are endogenic and exogenic forces?
3. What are volcanoes and earthquake?
4. What is focus and epicentre?
5. What are the activities of human beings that affect the earth?
6. What are the causes of Tsunami?
7. What are the gases that are emitted during a volcanic eruption and how it harms our environment?
8. What is the importance of technology on predicting natural calamities?
9. What are weathering and soil erosion and what are its causes and effects?
10. What is a water fall?
11. What are Meanders, ox Bow Lake, delta, levees, flood plain and distributaries?
12. What is the relation between human activities and water pollution?
13. What is flood and what are its importance and impact on life and nature?
14. What are sea caves, arches, stacks and sea cliff?
15. What are tsunami waves and what are its causes, effects and how can one prevent such natural calamities?
16. What are glaciers and glacial moraines?
17. What is green house effect and what are its impact on glaciers and coastal areas?
18. How do wind help in erosion?
19. What are mushroom rocks, sand dunes and loess?

LEARNING OBJECTIVES:
The pupil
- Explains what are lithospheric plates and their movement
- Differentiates between endogenic and exogenic forces
- Describes what are volcanoes and earthquake
- Differentiates between focus and epicentre
- Hypothesise the activities of human beings that affect the earth
- Analyse the causes of Tsunami
- Recognise the gases that are emitted during a volcanic eruption and how it harms our environment
- Analyse the importance of technology on predicting natural calamities
- Explains what are weathering and soil erosion and what are its causes and effects
- Defines what is a water fall
- Explains what are Meanders, ox Bow Lake, delta, levees, flood plain and distributaries
- Analyse the relation between human activities and water pollution
- Discuss what is flood and its importance and impact on life and nature
- Explains sea caves, arches, stacks and sea cliff
- Analyse what are tsunami waves and what are its causes, effects and how can one prevent such natural calamities
- Explains glaciers and glacial moraines
- Defines green house effect and interprets its impact on glaciers and coastal areas
- Justify how do wind help in erosion
- Defines what are mushroom rocks, sand dunes and loess

ACTIVITIES:
Activity 1
Pupil is asked about what are lithospheric plates, explain with an experiment the meaning of endogenic and exogenic forces.

Activity 2
Take a small coloured paper pellet and put it in a beaker half filled with water. Place the beaker on a tripod stand and heat it. As the water warms up, you will observe that the paper pellet is moving
upward along with the warm layers of water and then sinks back along with the cooler layers of water. The molten magma inside the earth moves in a similar manner.

**Activity 3**
A demonstration is done to show the formation of a volcano and earthquake with special reference on focus and epicentre. Newspaper cutting on the recent earthquake is asked to read out in the class and also asked to discuss on how the gases that are emitted during a volcano can harm the environment.

**Activity 4**
Take a container, fill it with water and close it with a lid. Put the water to boil. Now put some peas, spoon and beads on top on the lid. What do you notice? As the water boils the lid begins to shake. The things which you have put on the lid also vibrate. The beads roll down and the spoon vibrates to make a sound. In the same manner, the earth vibrates when an earthquake occurs.

**Activity 5**

![Earthquake – A Case Study](image)

1. Read the ‘Earthquake – A case study’ given in the form of headlines that appeared in the newspapers after the quake. Arrange the events in the right sequence of their happening.
2. Imagine if a quake suddenly shook in the middle of the school day, where would you go for safety?

**Activity 6**
A video is shown about the Tsunami attack that happened in December 26, 2004. Followed by it a presentation is made on the causes for such natural disaster and man’s role in causing danger to earth.

**Activity 7**
Pupil is shown a model of volcanic eruption and also a multimedia presentation on the emission of various gases during a volcanic eruption. They are asked to discuss on how it harms the environment.

**Activity 8**
Pupil is asked about the importance of technology in predicting natural calamities and how it can be harmful

**Activity 9**
Pupil is asked to discuss on weathering and some photographs are shown on soil erosion and different agents that cause soil erosion with special reference on wind as an agent of soil erosion.
Activity 10
Pupils are shown a photograph of any waterfall and ask them to define what a waterfall is.

Activity 11
Teacher explains what are meanders, Ox-bow lake, delta, levees, flood plains and distributaries

Activity 12
Pupil is made into two groups and each group is asked to make a presentation on any one of the following
- Human activities and water pollution
- Flood- its importance and impact on life forms

Activity 13
Pupil is shown pictures of sea caves, arches, stacks, sea cliffs, glaciers, glacial moraines, mushroom rocks, sand dunes and loess and asked to define each.

Activity 14
Can you find out names of some rivers f the world that forms a delta?

UNIT 13
AIR

SCOPE:
The unit deals with the meaning of atmosphere, its importance and air being considered as one of the five elements. The unit also deals with the composition of atmosphere, maintaining its balance, how atmosphere gets polluted, need for planting more trees, impact of increase in the concentration of CO₂. The unit also focus on the structure of atmosphere and how troposphere, stratosphere, mesosphere, thermosphere and exosphere get affected by human activities. The unit highlights the meaning of weather and climate, air pressure, wind (permanent wind, seasonal wind and local winds), moisture, loo, temperature, insolation, trapping of solar energy, monitoring the impact of climatic change, deforestation and various forms of pollution, how industrialisation, modernization, globalization bring changes in temperature. The unit also emphasise on the rains that are not seasonal and its impact on environment.

Focus points
- What is the importance of maintaining a balance of atmospheric gases? What are the impacts if their balances get disturbed?
- What is the need for planting more trees?
- How do the increase in the concentration of CO₂ effect the environment
- How do the different layers of atmosphere get affected by human activities
- Climatic changes, deforestation and pollution affects the life and environment- How
- How can you make use of solar energy for domestic activities by not using any highly expensive devices
- Industrialisation, modernisation and globalisation lead to increase in temperature- analyse
- What could be the cause for occurrence of non seasonal rains in some areas of the world? What are its impact?

ISSUES TO BE RAISED:
1. What is atmosphere and what is its importance?
2. How was water considered as in the ancient days?
3. What is the importance of maintaining a balance of atmospheric gases?
4. Why do you need to plant more trees?
5. What are the impacts on atmosphere due to increase in the concentration of CO₂?
6. What are troposphere, stratosphere, mesosphere, thermosphere and exosphere and how it get affected due to human activities?
7. Differentiate between weather and climate?
8. What are the impacts of climate change, deforestation and pollution on life and environment?
9. What is temperature and insolation?
10. How can you make use of solar energy for domestic purpose?
11. How do industrialisation, modernisation and globalisation lead to increase in temperature?
12. What is air pressure?
13. What are cyclones and its impact?
14. What is wind?
15. Differentiate between permanent wind, seasonal wind and local winds?
16. What is loo?
17. Why do non seasonal rains occur in some areas?
18. What is atmospheric moisture?
19. How is rain formed?

LEARNING OBJECTIVES:
✓ Explains what is atmosphere and its importance
✓ Analyse how was water considered in the ancient days
✓ Discuss the importance of maintaining a balance of atmospheric gases
✓ Predicts the importance of planting more trees
✓ Analyse the impacts on atmosphere due to increase in the concentration of CO₂
✓ Explain what are troposphere, stratosphere, mesosphere, thermosphere and exosphere and how it get affected due to human activities
✓ Differentiates between weather and climate
✓ Reflect on the impacts of climate change, deforestation and pollution on life and environment
✓ Explains what is temperature and insolation
✓ Explores on how can you make use of solar energy for domestic purpose
✓ Analyse on how industrialisation, modernisation and globalisation lead to increase in temperature
✓ Explains the meaning of air pressure
✓ Describes what is cyclone and its impact
✓ Defines wind
✓ Differentiate between permanent wind, seasonal wind and local winds
✓ Explains what is loo
✓ Reflect on the reasons why non seasonal rains occur in some areas
✓ Defines what is atmospheric moisture
✓ Explains how rain is formed

ACTIVITIES:
Activity 1
The teacher narrates a sloka in Sanskrit
“Madhuvata Rstasyate, Madhu ksharanti Sindhavah
Madhvirana Santosodhih
Madhunaktamutososih Madhumat Parthivam rajah
Madhurdourastunah pita Madhuvan me vanaspathi
Madhvinam astusuryah, madhurgabobnabantu nah”

(Rigveda 1-90, 6-8)

The above wish occurring in the Rigveda means the following,

“For us who are governed by the great cosmic order,
May the breeze blow sweet and pleasant,
May the river flow sweet and pleasant,
May the plants be sweet and pleasant,
May the night and dawn be sweet and pleasant.
May the dust of earth be sweet and pleasant.
May the upper regions, our father, be sweet and pleasant
May the tree be sweet and pleasant
May the sun be sweet and pleasant
And may our cattle, wealth and speech be sweet and pleasant.”

It designates the five elements of the universe- earth, fire, air, space and water. Pupil is then asked to explain on the importance given to air in the ancient days. From this pupil is asked to define what is atmosphere.

Activity 2
Pupil is shown a chart showing the composition of various gases in the atmosphere. They are asked to discuss on the impact if some of these gases get increased. They are asked to discuss on the impact of increase in concentration of CO₂ in the atmosphere, followed by the ways to prevent the accumulation of CO₂ in the atmosphere.

Activity 3
Pupil is shown a slide show on the impact of green house effect and global warming on the environment and life.

Activity 4
Pupil is shown a chart on the different structure of atmosphere. A debate is initiated on the

- Effect of human activities on the troposphere, stratosphere, mesosphere, Thermosphere and exosphere.

Activity 5
Pupil is asked to collect about the weather patterns in different parts of the world, say, U.S, U.K, India, Australia, Africa etc. and find out the variations they have observed in the weather. They are also shown a world map of these places showing the climatic patterns in these regions and asked to define what is climate?

Activity 6
Pupil is asked to collect information from their elders on the climatic changes that have occurred in their earlier years and asked to find out the various pollution that have occurred from their younger days to the present day.

**Activity 7**

Read and Ponder: Is global warming a serious issue in today’s world? They are also asked to discuss on temperature and insolation.

**Activity 8**

For ten days note down weather report from a local newspaper and observe the changes occurring in the weather.

**Activity 9**

Pupil is shown pictures of solar panels, solar cooker etc. and they are asked to discuss on how these renewable resources can be made use in order to have a sustainable development and also to reduce the pressure over non-renewable resources.

**Activity 10**

Class is made into three groups and each group is asked to collect information regarding any one of the following and present in the classroom

- Industrialisation and temperature
- Modernisation and temperature
- Globalisation and temperature

The discussion is followed by a poster presentation on its impacts

**Activity 11**

Pupil is asked to discuss on the formation of cyclones and its impact with its relationship on air pressure. They are also asked to discuss on the various non-seasonal changes occurring like heavy
rains during monsoon, rains during summer, lack of rain, rain in desert etc. Pupil is asked to come out with possible reasons and its impact on life and environment.

**Activity 12**
Pupil is shown the paper cuttings about the cyclones and heavy rains in some parts of India. Pupil is asked to discuss on the impact of these non seasonal rains over the environment.

**Activity 13**
Pupil is asked about the various names of wind that have occurred in the recent times. They are asked to discuss about its formation and the various impacts.

**Activity 14**
Pupil is shown a glass containing ice cubes. After some time they are asked to observe the outside of the glass and find out what they observe and how these water droplets are formed on the glass. Students are also asked about how the wet clothes dry after it is kept for drying. From these discussions they come to a conclusion on the meaning of moisture, water vapour and how rain is formed.

**UNIT 14**
**WATER**

**SCOPE:**
The unit deals with the meaning of water cycle, the importance given to water in the ancient days, developments in water management and how the water shortage can lead to epidemics, hunger, despair and death. The unit also focus on the distribution of water bodies with watershed projects, rain water harvesting, activities to prevent runoff water and the importance of avoiding concretizing the floor. The unit give emphasis on ocean circulation, waves, tides and currents, tsunami, human activities leading natural disasters.

**Focus points**
- How is water being considered in ancient days
- How can we reduce the mismanagement of water due to different developmental activities
- What could be the various disasters that can arouse due to shortage of water
- What are the importance of various water shed projects
- What are the importance of rain water harvesting
- What are the different ways of conserving water
- Tsunami- and its varied impacts on life
- Impact of earthquake and volcanic eruptions

**ISSUES TO BE RAISED:**
1. What is water cycle?
2. What is the importance given to water in the ancient days?
3. What are the developments that have led to mismanagement of water?
4. What are the disasters that can be faced due to shortage of water?
5. What do you mean by watershed projects?
6. What is rain water harvesting?
7. How can you conserve water?
8. What are waves, tides and currents?
9. What is Tsunami and its impact on life
10. What are the cause of earthquake and volcanic eruptions?
11. What is high tide, low tide, spring tide and neap tides
12. What are ocean currents?

LEARNING OBJECTIVES:
- Explains what is water cycle
- Analyse the importance given to water in the ancient days
- Describes the developments that have led to mismanagement of water
- Interprets the disasters that can be faced due to shortage of water?
- Analyse the meaning of watershed projects and its importance
- Explains what is rain water harvesting
- Identifies different ways of conserving water
- Compare waves, tides and currents
- Explains what is Tsunami and its impact on life
- Analyse the cause of earthquake and volcanic eruptions
- Defines what is high tide, low tide, spring tide and neap tides
- Explains what are ocean currents

ACTIVITIES:
Activity 1
The teacher narrates a sloka in Sanskrit
“Madhuvata Rtyate, Madhu ksharanti Sindhavah
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Madhunaktamutososih Madhumat Parthivam raja
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(Rigveda 1-90, 6-8)
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May the plants be sweet and pleasant,
May the night and dawn be sweet and pleasant.
May the dust of earth be sweet and pleasant.
May the upper regions, our father, be sweet and pleasant
May the tree be sweet and pleasant
May the sun be sweet and pleasant
And may our cattle, wealth and speech be sweet and pleasant.”

It designates the five elements of the universe- earth, fire, air, space and water. Pupil is then asked to explain on the importance given to water in the ancient days.

Activity 2
Make your own Terrarium
Fill one-fourth of a big jar with soil and press it well. Put a thin layer of humus on top of it. Plant the largest plants first and then arrange the smaller area around them. Spray the arrangement with water and close the jar. The water that evaporates from the leaves and soil condenses and falls back as forms of water drops.

**Activity 3**
Pupil is asked to discuss on the various developments that led to the mismanagement of water and also the impact of water shortage like, epidemics, hunger, despair and death.

**Activity 4**
Take 2 litres of water. Let it represent the total water on the surface of the earth. Measure out 12 spoons of water from this vessel into another bowl. The water that is left behind in the vessel represents the salty water found in oceans and seas. This water is obviously not fit for consuming. It is saline (contains salts). The 12 spoons of water that was taken in a bowl is the total amount of fresh water on earth. See for yourself how much water can actually be used by you.

**Activity 5**
Pupil is demonstrated an experiment. Two glass jars are taken and both are filled with soil. One plant is planted in each pot. One of the jars is concretized on the top of soil. Keep it for drying. Everyday teacher asks the pupil to pour water and observe both jars. They are asked to identify the fate of plant in the concretized jar and they are to compare it with concretizing their floors and its impact on soil and life.

**Activity 6**
Pupil is asked whether their parents or grandparents say about the tides ie. It is high tide, it is low tide etc. From their explanations, pupil is asked to find out the meaning of tide, waves and current. A chart showing high tide and low tide, when it occurs are shown to the students. Another chart to explain spring tide and neap tide is also shown in the class.

**Activity 7**
Pupil is shown a video on tsunami waves that happened in 2004, December 26. Pupil is asked to recall the consequences of it and also on the reasons/ causes for the occurrence of tsunami.

**Activity 8**
Pupil is asked about waves and how the energy from waves can be utilized for producing energy which are renewable sources of energy.

**Activity**
A paper cutting on the news and photo of mining of oil from the sea beds eg. In Mumbai is shown to the classroom. Pupil is asked to reflect on the consequence of it. Their conclusions are presented in the classroom.

**Activity 9**
Take a mug of water and add some oil in it. Ask the pupil to observe the changes. They are asked to discuss on what are the reasons for oil spills entering the sea and how does this affect the life forms in the oceans and seas.
Activity 10
A debate is conducted on the topic ‘Oceans are the main waste disposal area of the world’.

Activity 11

- Why water is important for us?
- Suggest some ways in which water can be conserved in your home and in your school

Activity 12
Fill three-fourths of a bucket with tap water. Heat the water by putting an immersion road on one side of the bucket. On the other side introduce an ice tray just removed from the freezer. Add a drop of red ink to observe the path of current by the process of convection.
Activity 13
A collage is made on the pathetic condition of the various beaches in India, and pupil is asked to discuss on the various measures that can be taken to keep our beaches neat and clean.

Activity 14
Following is an international law relating to the high seas. Read them carefully and the pupil is asked to discuss on the pros and cons of such law with special reference to the present disastrous condition of some seas

Desiring to codify the rules of international law relating to the high seas, recognizing that the United Nations Conference on the Law of the Sea, held at Geneva from 24 February to 27 April 1958, adopted the following provisions as generally declaratory of established principles of international law,

Article 2

The high seas being open to all nations, no State may validly purport to subject any part of them to its sovereignty. Freedom of the high seas is exercised under the conditions laid down by these articles and by the other rules of international law. It comprises, inter alia, both for coastal and non-coastal States:

(1) Freedom of navigation;
(2) Freedom of fishing;
(3) Freedom to lay submarine cables and pipelines;
(4) Freedom to fly over the high seas.

These freedoms, and others which are recognized by the general principles of international law, shall be exercised by all States with reasonable regard to the interests of other States in their exercise of the freedom of the high seas.

Activity 15
Following is a passage regarding cruelty that man sometimes shows towards animals. Pupil is asked to read them and observe the following photographs. They are asked to discuss on the topic and asked to come out with some suggestions by which one can prevent such cruelty to animals.

Denmark is a big shame.
The sea in the following photographs is seen to be stained in red and it’s not because of the climate effects of nature. It’s because of the cruelty that the human beings (civilised human) do to animals by killing hundreds of the famous and intelligent Calderon dolphins. This happens every year in Feroe Island in Denmark. In this slaughter the main participants are young teens. It is to show that they are adults and mature.... In this big celebration, nothing
is missing for the fun. Everyone is participating in one way or the other, killing or looking at the cruelty “supporting like a spectator” Is it necessary to mention that the dolphin Calderon, like all the other species of dolphins, get near men to play and interact, in a way of pure friendship. They don’t die instantly; they are cut 1, 2 or 3 times with thick hocks. And at that time the dolphins produce a grim extremely compatible with the cry of a new born child.

But he suffers and there’s no compassion till this sweet being slowly dies in its own blood.
Activity 16

The pupil is shown some of the photos and paper cuttings about the oil spills that are given out by the vessels that move about in the oceans and seas. The pupil is asked to discuss on the consequence of such oil spills and how can it have an impact on various life forms. The pupil is asked to come out with some solutions for preventing such oil spills.

Project
Pupil is asked to make rainwater harvesting pits in their school with the help of staff and teachers of the school

UNIT 15
NATURAL VEGETATION AND WILDLIFE

SCOPE:
The unit deals with the meaning of biodiversity, distribution of species. The unit also deals with the vegetation and wildlife seen in tropical evergreen forest, tropical deciduous forest, temperate evergreen forest, temperate deciduous forests, Mediterranean vegetation, coniferous forests, tropical and temperate grasslands, thorny bushes.

Focus points
• What is the importance of protecting biodiversity?
• What are the declarations and legal provisions for protecting biodiversity? Why is it been given more priority?
• What are the species distributed in Polar Regions and how are they being affected by human activities?
• How do the human activities affect the various forest types and how can you restore the biodiversity.

ISSUES TO BE RAISED:
• What are the major types of classification of natural vegetation?
• What is biodiversity and why it should be protected?
• What are the declarations and legal provisions for protecting biodiversity? Why is it been given more priority?
• What are the species distributed in Polar Regions and how are they being affected by human activities?
• What are flora and fauna seen in the following types of forests and how they are getting affected due to human activities and how can you restore the biodiversity.
  ➢ tropical evergreen forest
  ➢ tropical deciduous forest
  ➢ temperate evergreen forest
  ➢ temperate deciduous forests
  ➢ Mediterranean vegetation
  ➢ coniferous forests
  ➢ tropical grasslands
  ➢ temperate grasslands
  ➢ thorny bushes

LEARNING OBJECTIVES:
conut Discuss about the major types of classification of natural vegetation
conut Explains what is biodiversity and why it should be protected
conut Communicates the declarations and legal provisions for protecting biodiversity and why is it been given more priority.
conut Explore species distributed in Polar Regions and how are they being affected by human activities.
conut Analyse the flora and fauna seen in the following types of forests and how they are getting affected due to human activities and how can we restore the biodiversity.
  ➢ tropical evergreen forest
  ➢ tropical deciduous forest
  ➢ temperate evergreen forest
  ➢ temperate deciduous forests
  ➢ Mediterranean vegetation
  ➢ coniferous forests
  ➢ tropical grasslands
  ➢ temperate grasslands
- thorny bushes

**ACTIVITIES:**

**Activity**
Pupil is shown a globe and asked to identify the different regions on the globe. They are also asked to list out the different types of vegetation that are on the earth.

**Activity**
A field visit is conducted to know about the plants and animals found in tropical evergreen forest.

**Activity**
When you go to visit any new place, notice the type of natural vegetation occurring there and try to think of factors responsible for the growth of such vegetation in that habitat.
- Note down if any human interference has taken place in that area in terms of deforestation, grazing, cultivation of cash crops, constructional activities etc.

**Activity**
Pupil is asked about the meaning of biodiversity and what are the hotspot areas.

**Activity**
Where in India do tropical evergreen and tropical deciduous forests occur? Name the states.
- Which type of forest dominates most part of India?

**Activity**
A multimedia presentation is done on the flora and fauna of the following:
- tropical evergreen forest
- tropical deciduous forest
- temperate evergreen forest
- temperate deciduous forests
- Mediterranean vegetation
- coniferous forests
- tropical grasslands
- temperate grasslands
- thorny bushes

It is followed by a discussion on and how these forests are getting affected due to human activities and how can we restore the biodiversity.

**Activity**
Tropical Evergreen Forests

Tropical Deciduous Forests

Temperate Deciduous Forest

Temperate Evergreen Forest

Thorny shrubs

A vineyard in the Mediterranean Region
Activity
Look around in your surroundings and find out the articles made of hard wood and soft wood.
• Find out and learn few names of trees of your locality.
Activity
A talk by an eminent environmentalist/naturalist is arranged to know the importance of protecting biodiversity
Activity
Pupil is given paper cuttings on different measures taken in India for protecting wildlife and natural vegetation and also the various national and international declarations, conferences etc. and followed by a discussion on why natural vegetation and wildlife is been given priority in the modern world.
Activity
(i) Collect pictures and photographs of forests and grasslands of different parts of world. Write one sentence below each picture.
(ii) Make a collage of rainforest, grassland and coniferous forests.

UNIT 16
HUMAN ENVIRONMENT- SETTLEMENT, TRANSPORT AND COMMUNICATION

SCOPE:
The unit deals with the meaning of human settlement, different types of settlement, problems faced by the modern settlements. The unit also gives emphasis on the different modes of transport and how these are causing pollution to the environment and also the different ways of communication.

Focus points
• How do the different types of settlements affect the environment?
• How exploiting of nature by man started? What are its impact?
• Why do rural areas need development and which are the areas that need developments?
• Explain how the changes in urban cities have brought about changes in culture, environment, and morality? What are the various ways to minimise it?
• What are the different modes of transport in the modern world and how does it affect the environment?
• How can we attain a sustainable way of communication

ISSUES TO BE RAISED:
1. What are the different types of human settlement?
2. What are temporary, permanent, rural, compact and scattered settlements and what are its impact on environment?
3. How exploiting of nature by man started?
4. Why do rural areas need development and which are the areas that need developments?
5. Explain how the changes in urban cities have brought about changes in culture, environment, and morality?
6. Explain what are the ancient and modern modes of transport and how does it cause exploitation of natural resources?
7. What are the different modes of transport in the modern world and how does it affect the environment?
8. What are the different ways of communication and how it can be used for a sustainable mode of life?

LEARNING OBJECTIVES:
• Identify the different types of human settlement
• Explain temporary, permanent, rural, compact and scattered settlements and how do they affect environment
• Analyse how the exploiting of nature by man started
• Hypothesise why the rural areas need development and which are the areas that need developments
• Explain how the changes in urban cities have brought about changes in culture, environment, and morality
• Explain what are the ancient and modern modes of transport and how does it cause exploitation of natural resources
• Observes the different modes of transport in the modern world and analyse how they affect the environment
• Identify the different ways of communication and interpret on how it can be used for a sustainable mode of life

ACTIVITIES:
Activity 1
Pupil is asked about what you mean by settlements and the different types of settlements like temporary, permanent, rural, compact and scattered settlements. They are asked to discuss on how early man has lived a life in accordance with nature and how man started to exploit the nature.

They are asked to discuss on how compact and urban settlements are polluting the environment and ‘what are the developments that should be introduced to the rural areas’.
Activity 2
Pupil is asked about the various means of transport and how transportation was done in olden days and how it is different from modern times. They are also asked about how modern transport is causing pollution and exploiting our natural resources

Activity 3
Gradually in cities and towns’ transportation becoming unmanageable due to increasing number of cars and private vehicles. Ask the students do they think, improving public transport system may solve the problem? Allow them to discuss in groups and make their suggestions.

(The Hindu, November 25, 2009)
Activity 4
The increasing population in urban areas lead to greater pressure to transportation, where poor public transport facility leads to chaos. The two picture shows the risk of travelling in public transport. Consider yourself as a expert team who is planning for improvement of public transport system and through discussion, observation and interviews with public, concerned authorities make a plan to suggest the government.

(The Hindu, Feb 24, 2010) & (The Indian Express, November 25, 2009)

Activity 5
List the different modes of transport used by the students of your class while coming to school.

Activity 6
Find out the names of some newspapers and TV news channels in English, Hindi and a regional language.

Activity 7
What if the cities have special roads for cyclists? What are the implications of it in urban transport? What will be the difficulties in implementing it?

Activity 8
Brainstorm on the issue
Population and sustainability- Do we learn from nature?

Activity 9
Provide a situation as given here. A house has 3 rooms and a family of 4 members are comfortably living in the house. Suppose another family of 4 members join them to live in the house, the space need to be shared. The house gets over crowded or congested. Allow the students to
imagine such a situation and let them discuss the advantages and disadvantages of having to live with more people sharing the house and resources.

Lastly pose the question if you are head of the original family living in the house and to take a decision, what decision would you take? Why?
Which solution is acceptable to you to meet this challenge?
   a) Allow the new family to live in.
   b) Refuse to share the house and resources with this new family
   c) Accommodate only 2 members to live in with your family.

Allow the students to vote.

**Activity 10:**
Encourage the students to collect statistical information on the population size, land area and density of population of different states of India as well as the whole country, make a comparison of density of population of different states and infer.

Some states have high density of population- Why?
Pose the questions and allow them to gather more information on the geographical, social, economic and cultural factors which were responsible for the high density of population in those states. Allow the groups to make presentations.

**Activity 11:**
Some multinational companies are allowed to set up industries in Karnataka. Allow students to discuss what would happen to the density of population of the region/state? What associated challenges have to be addressed by the government to meet the requirements of the population? List the major items. Is overcrowding a challenge to sustainability?

**Activity 12**
Let the students in groups critically examine the lifestyle of an affluent family and compare it with the lifestyle of an economically deprived family (or the family living in a multi-storey building and another one living in slums). Write the merits and demerits of their lifestyle giving reasons (If possible by interviewing them). If you think that their lifestyle is not of a good quality, suggest measures for improving the same.

**Activity 13**
Encourage the students to play the role of rural illiterate farmer (man/woman) having many children justifying his/her choice to have many children having at conversation with an urban literate employed person (man/woman) with one or two children justifying the choice for a small family. Allow the students to critically think about the issue and debate.

**Activity 14**
Pupil is made into 4 groups and each group is assigned to collect information on any one of the following topics and asked to make a presentation
   ➢ Roadways and different types of roads
   ➢ Railways- its invention and different types of railways
   ➢ Waterways- Types, oil leakage from ships and how is it harmful
   ➢ Airways
Activity 15
Conduct a survey in your locality and find out how people commute to their respective workplaces using –
(a) More than two modes of transport
(b) More than three modes of transport
(c) Stay within walking distance.

Activity 16
Mention which mode of communication you will prefer most in the following situations –
(a) Your grandfather has suddenly fallen ill. How will you inform the doctor?
(b) Your mother wants to sell the old house. How will she spread this news?
(c) You are going to attend the marriage of your cousin for which you will be absent from the school for the next two days. How will you inform the teacher?
(d) Your friend has moved out with his/her family to New York. How will you keep in touch on a daily basis?
Activity 17
Pupil is asked to exhibit the pictures of different modes of communication on the notice board of their classroom.

Activity 18
Arrange any one of the competitions/ extracurricular activities on population, transport and sustainability.
- Poster with slogan contest
- Quiz
- Essay writing
- Debate
- Short skit.

UNIT 17
HUMAN ENVIRONMENT INTERACTIONS – THE TROPICAL AND THE SUBTROPICAL REGION

SCOPE:
The unit deals with the human environment interaction in the tropical and sub tropical region, with the type of vegetation, climate and the people. The unit also focuses on how we can sustain these forests

Focus points
- Why it is very important to preserve the Amazon basin. What are the disasters that are faced by Amazon basin
- What are the main reasons for deforestation of rainforests
- How technology like remote sensing is helping in conserving Amazon forest
- What is the need for adopting the culture and life style that suits ones environment
• What are the causes for different multinational companies and corporate sectors causing threat to forests and how can we prevent them
• What are the impacts on the environment due to the deforestation in Amazon area
• Water resource management in ganga- Brahmaputra basin- why is it important
• What are the solution for the international conflicts on water
• How can we reduce the environmental factors that affect the quality and quantity of water
• Why is national water policy given more priority
• What are the geomorphic importance of floods

ISSUES TO BE RAISED:
1. What is meant by the mouth of a river
2. Which are the countries through which the river basin of Amazon drains
3. What are the climatic features of Amazon basin
4. What are the characteristic features of Amazon rainforests and what are the flora and fauna found here
5. What are the impacts of deforestation in rainforests
6. How do remote sensing technology help in conservation of Amazon forests
7. What are the main occupation of people in living in Amazon area and what are the crops grown here
8. What are the threats to Amazon basin
9. What are the characteristics of life in ganga- Brahmaputra basin
10. What are the flora and fauna in ganga Brahmaputra basin
11. What are the vegetation seen in ganga Brahmaputra basin
12. Which are the places located in ganga Brahmaputra region
13. How is transportation and tourism linked in these area
14. How is Water resource managed in ganga- Brahmaputra basin- why is it important
15. What are the solution for the international conflicts on water
16. How can we reduce the environmental factors that affect the quality and quantity of water
17. Why is national water policy given more priority in the modern world
18. What are the geomorphic importance of floods

LEARNING OBJECTIVES:
• Recall what is meant by the mouth of a river
• Identifies the countries through which the river basin of Amazon drains
• Discuss the climatic features of Amazon basin
• Explains the characteristic features of Amazon rainforests and what are the flora and fauna found here
• Predicts the impacts of deforestation in rainforests
• How do remote sensing technology help in conservation of Amazon forests
• What are the main occupation of people in living in Amazon area and what are the crops grown here
• What are the threats to Amazon basin
• What are the characteristics of life in ganga- Brahmaputra basin
• What are the flora and fauna in ganga Brahmaputra basin
• What are the vegetation seen in ganga Brahmaputra basin
• Which are the places located in ganga Brahmaputra region
• How is transportation and tourism linked in these area
• How is Water resource managed in ganga- Brahmaputra basin- why is it important
• What are the solution for the international conflicts on water
• How can we reduce the environmental factors that affect the quality and quantity of water
• Why is national water policy given more priority in the modern world
• What are the geomorphic importance of floods

ACTIVITIES:

Activity 1
Pupil is shown a map showing the vegetation in Amazon forest and pupil is asked to discuss on the climate prevailing in these areas along with the plants and animals that are found here.

It is followed by a discussion on how these Amazon forests get destroyed.

Activity 2
Some TV channels broadcast documentaries on the wildlife of the world. Try to watch some of the films and share your experience with the class.

Activity 3
Ashok is the son of a farm labourer from interior rural village which is 5 km away from the main road. He is studying in a school in the nearby village which is 1 km away from his home. Sunil is from a metro city, his parents working in government officers and studies in a public school. Manoj is the son of a rickshaw puller living in a urban slum and he study in municipal school. Neeraj is from a village which is close the town and his father is working as a teacher. All the four are 7th standard students and meet in tourists spot. They share where they come from and their experiences. Ask your students to do a role play on these four characters and express what they aspire for the following dimensions.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Ashok</th>
<th>Sunil</th>
<th>Manoj</th>
<th>Neeraj</th>
</tr>
</thead>
<tbody>
<tr>
<td>What you want to become?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What kind of place do you want to live?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What kind of facilities required in your home?</td>
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<td></td>
</tr>
<tr>
<td>What kind of facilities required for your transportation?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What kind of clothes do you want to wear?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Activity 4
Photographs of people living in Amazon forests are shown to the people and find out their different agricultural practices and discuss on the disasters that are happening to the Amazon forest.

**Activity 5**
Pupil is shown a map on Ganga- Brahmaputra basin and find out the types of climate, vegetation, wildlife and tourism confined to the area.

**Activity 6**
River Brahmaputra is known by different names in difference places. Find the other names of the river.

**Activity 7:**
One of the pupils is asked to read out some articles regarding some of the projects for protecting wild life such as tiger project, elephant project etc. They are asked to reflect on why these animals are being protected and how can we prevent the killing of such animals. What are the laws prevalent that are aiming at protection of wildlife?

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**Project Tiger,** launched in 1972 has been proclaimed as a successful intervention for conserving the tiger population. There were 1827 tigers in 1972 the same has gone up to 3642 in 2001-02 when the tiger census was last conducted.

**Project Elephant,** launched in 1992 helps protect wild elephants from poaching and scientific management of elephant habitats. There are 24 elephant reserves in the country as on 31.03.2004. A programme called 'Monitoring of Illegal Killing of Elephants (MIKE)' launched in 2003-04 for effective prevention of poaching.
Activity 8
Pupil is asked to discuss on the floods that occur in Ganga- Brahmaputra basin, environmental and geomorphic importance of floods, water resource management and International conflicts in the name of water and the need of cooperation in solving such problems.
Activity 9
Collect some handicrafts made from jute, bamboo and silk. Display them in the class. Find out in which area they were made?

Activity 10
Make a collage to show places of attractions in India. You can divide the class in different groups to show attractions based on mountain landscapes, coastal beaches, wildlife sanctuaries and places of historical importance.

Activity 11
The teacher asks the children to discuss on topic Deforestation and its pro’s and con’s with focus on Habitat loss leads species decline and also on the Expected correlation between Human population Growth and species Decline.

- Each year an estimated 27,000 species of animals, plants, fungi, and micro organisms become extinct.
- Human migrations lead to pollution, deplete the atmospheric ozone shield, and leads species extinction, UV radiation which can change the DNA of any organism etc.
- The steady increases in human populations have an adverse effect on forest, which is natural resources; leads to extinction of some species which are widely consumed by mankind.

Activity 12:
A video clipping about Mangrove is shown in the classroom. The pupil is asked to discuss on the impact of loss of mangrove. A video clipping on the Tsunami in 2004 is also shown and the pupils reflect on how can mangroves help in preventing such natural disasters?

Mangroves: Mangroves protect the shoreline from sea erosion, minimizes the destruction caused by cyclones and acts as hatching place for thousands of fish species. Destruction of mangroves can expose the shoreline to the dangers of erosion and also reduce the availability of fishes in the sea.
Activity 13:
The pupil is asked to read the following article in the classroom. They are asked to reflect on which are the countries that are using large amount of papers and also on how the papers are made. They are asked to find out some alternative sources from which the paper can be produced without causing harm to either the forest cover or the biodiversity. They are also asked to give some suggestions to reduce the usage of paper.
Case study 1:
In the state of Madhya Pradesh forests, the tribal’s major economy is based on the Beedi leaf collection (Tendu leaves) (Botanical name- Diospyrus melanoxylon- Ebenaceae). If we do not protect the plant species, it not only cause imbalance to the ecology, but also the economy of the community. (Similarly Teak wood (Tectona grandis- Verbanaceae) for further information refer to Population and Environment- Impacts in the developing world, an information kit containing questions and answers, abstracts of recent scientific papers, charts, official statements and a resource kit).

- Followed by this, the teacher can initiate a discussion on Biological species pressure/ species exploitation.
- What are the ways to restore such plants from getting depleted?
- Suggest some eco friendly ways by which one can improve the economy as well as the environmental diversity.

Case study 2:
In 1973, a scientist (naturalist) discovered that all the trees of a particular kind in Mauritius were over 300 years old. About 13 in number, they were all dying. Though they bore fruits and nuts, none of their nuts were germinating. The scientist then happened to recall that about 300 years ago the last dodo was killed there. The scientist deduced that the nuts would not germinate unless they were first eaten by a dodo and had passed through its gut. Stones in the dodo’s crop (a pouch in its gut) may have helped grind up the nuts, softening the seed-coat, so that the seedling could grow. The dodos were extinct, and no other bird on Mauritius was able to crush the hard nuts of what the scientist called the dodonut tree. The scientist knew that turkey, a kind of bird found in the American continent had a crop (gut) similar to that of the dodo. When turkeys were brought from America, and they were fed the nuts from the dodonut tree, the seeds in the turkeys’ droppings were seen to germinate. Thus, turkeys had to be introduced in Mauritius for the dodonut trees to be saved from extinction.

- What does this story warn you about?
- What adaptive advantage might the tree have in bearing nuts with hard seed-coats? You may do some ‘research’ on the climate, soil, flora and fauna of Mauritius to make up a realistic story about the possible advantages.
- Many Indian trees have hard seeds. The Indian Laburnum amaltas is one such tree. Find out the conditions under which it grows best and the time taken for its seeds to germinate. Do you know of any other tree with a hard seed-coat?
- The dodo and the tree were ‘made for each other’ species; one was a plant and the other an animal. Do you know of any such plants and animals in India? List them and discuss the species in class.
- Turkeys were introduced to Mauritius Island. The island’s flora and fauna had not evolved to deal with these birds. What new problems may the turkeys introduce into Mauritius?

Case study 3:
In 1813, bird expert John James saw a single flock of passenger pigeon that he estimated was 16 kilometer (10 miles) wide and hundreds of kilometer long and contained perhaps a billion birds. The flock took three days to fly past him and was so dense that it darkened the skies. By 1914, the passenger pigeon had disappeared forever. How could a species that was once the most common bird in North America (and probably the world) becomes extinct in only a few decades? The extinction of this species largely resulted from uncontrolled commercial hunting and loss of bird’s habitat and food supply as forests were cleared to make room for farms and cities. Beginning in 1858, passenger pigeon hunting became a big business. In 1878, one professional pigeon trapper made $60,000 by killing 3 million birds at their nesting grounds near Petoskey, Michigan. On early 1880’s few thousand birds remained. At that point, recovery of the species was doomed because the female laid only one egg per nest each year. On March 1900, a young boy in Ohio shot the last known wild passenger pigeon. The last passenger pigeon on earth, a hen named Martha died in Cincinnati zoo in 1914. Her stuffed body is now at the National Museum of natural history in Washington, D.C. (Miller)

Questions

• Why should we care about protecting wild species?
• Which human activities endanger wildlife?
• How can we help prevent premature extinction of species?
• Discuss your reaction to the following statement: ‘Eventually all species become extinct. Thus, it does not really matter that the passenger pigeon is extinct and that the whooping crane and the world’s remaining tigers are endangered mostly because of human activities’.

Case study 4:
A Disturbing message from the birds
Human activities are causing serious declines in the populations of many bird species. Approximately 70% of the world’s 9,800 known bird species are declining in numbers, and roughly one of every six bird species is threatened with extinction, mostly because of habitat loss and fragmentation. Birds are excellent environmental indicators because they live in every climate and biome, respond quickly to environmental changes in their habitats and are easy to track and count. They also play important ecological roles- control of rodents and insects, pollinate variety of flowering plants, spread plants throughout their habitat, scavenge dead animals etc. (Miller)

• What can one do to the environment to prevent pollution thereby protect the endangered species.
• What will you do if you observe that some of the bird species in your locality is getting reduced in number?

Case study 5:
The nonnative Kudzu vine has spread throughout much of the southern United States and is almost impossible to control. In 1930s the Kudzu vine was imported from Japan and planted in the Southeastern United States in an attempt to control soil erosion. It is so prolific and difficult to kill that it engulfs hillsides, gardens, trees, abandoned houses and cars, stream banks, patches of forest and everything else in its path. (Miller)

• Is it right to plant some imported variety of plants in your garden. Why?
UNIT 18
On Equality

SCOPE
The unit deals with the meaning of equality and inequality, universal adult franchise, inequality and nation’s progress, impact of casteism in India, Provisions on equality in Indian constitution and civil rights movement

FOCUS POINT
- Meaning of equality and inequality
- Importance of universal adult franchise
- Inequalities in our country
- Casteism in India
- Constitutional provisions on equality
- Civil rights movement in America

ISSUES TO BE RAISED
- What is equality and inequality?
- How do inequalities hinder the progress of a country?
- Give some examples of inequality from daily life and its impact?
- What is Universal franchise and how does it help in the proper functioning of the country?
- What are the impacts of Casteism in India?
- Why are there certain provisions on equality in the Indian constitution?
- Are there laws and provisions in the constitution that are being benefitted by all equally?
- How civil rights movement emerged in America and what are its consequences?
- What are the agitations in India that were for equality?

LEARNING OBJECTIVES
- Explains what is equality and inequality
- Analyze the relationship between inequality and the progress of a country
- Give some examples of inequality from daily life and its impact
- Understands the importance of Universal adult franchise and how does it help in the proper functioning of the country
- Reflect on the impacts of Casteism in India
- Identifies and reflects on the provisions on equality in the Indian constitution
- Analyze whether the laws and provisions in the constitution that are being benefitted by all equally
  - civil rights movement emerged in America and what are its consequences
- What are the agitations in India that were for equality

ACTIVITIES
Activity 1
Teacher tells a story on the equality of people in casting their votes and inequalities shown in choosing education, hospitals etc. Pupil is asked to give few more examples of inequalities they have seen around.
Activity 2
Pupil is made into groups and each group is asked to discuss on some of the inequalities we find in our society and discuss on how such practices can hinder the progress of the country.

Activity 3
Students are asked to collect some news cuttings or pictures on inequality seen in our society and paste them in the science diary.

Activity 4
One of the students reads out few advertisements of various matrimonial advertisements that appear in newspapers. They are asked to list down the cases where it gave reference to caste. One of the student is asked to read out the two stories (in the textbook)- one of Omprakash Valmiki and another of Mr. and Mrs. Ansari. Pupil is asked to write 4 lines on how would they feel if they were in the place of Omprakash or Mr/ Mrs Ansari. They are also asked to discuss on the impact of Casteism in India and narrate any incidence where they came across caste discrimination.

Activity 4
Pupil is shown some photographs on inequality. They are asked about the various laws that prevent inequality. They are also asked to discuss on the various provisions in the Indian constitution that helps in preventing inequality among caste, religion, race etc. and also the importance of such laws.

Activity 5
Pupil is made into groups and they are asked to discuss on the story of Rosa Parks an African-American woman who was the cause of Civil rights Movement. They are also asked to name few personalities who fought for bringing equality and few agitations in India that were for equality.

Project
Collect the photographs of some personalities who fought for equality and paste in science diary.

UNIT 19
Role of Government on health

SCOPE
The unit deals with meaning of health, how food was considered as in olden days, causes for poor health, condition of health in India, public and private health centres, health programmes being conducted and the Costa Rican approach.

FOCUS POINT
- Meaning of health
- Food as medicine in olden days
- Causes for poor health and precautions to be taken
- Medical status and health care situations in India
- Condition of public hospitals
- Inequalities in providing treatments
- Public and private health care facilities/ hospitals
- Facilities and expenses in a private hospital
- Health programmes in Kerala
- Costa Rican approach

ISSUES TO BE RAISED
- What is meant by health?
• What is the quality of food we had in olden days?
• What are the causes for poor health and what are the precautions to be taken?
• What is the present medical status and health care situations in India?
• What is the condition of public hospitals?
• What are the inequalities we see in providing treatments?
• Differentiate between Public and private health care facilities/ hospitals?
• What are the facilities and expenses in a private hospital
• How the Health programmes in Kerala can set an example for healthy living?
• What is Costa Rican approach?

LEARNING OBJECTIVES
• Recalls the meaning of health
• Analyze the nature of food in olden days
• Analyze the causes for poor health and precautions to be taken
• Analyze and explains the medical status and health care situations in India
• Identify the conditions of public hospitals
• Recall the incidences of inequalities in providing treatments
• Distinguish between public and private health care facilities/ hospitals
• Distinguish the facilities and expenses in a private and public hospital
• Analyze the Health programmes in Kerala
• Infer the advantages of Costa Rican approach

ACTIVITIES
Activity 1
Teacher asks about the food they had taken in the afternoon. They are also asked about the need for taking food and how it helps in maintaining proper health. Pupil is asked to explain the meaning of health.

Activity 2
One of the students is asked to read out news cutting from the newspaper entitled as “Food as medicine” in the olden days and also among tribals. The pupil finds out the importance of food in those days.

Activity 3
Pupil is given a worksheet to analyze the different factors that are responsible for improper health among the modern people. It also has a discussion on the logging of water on health, precautions to be taken during rainy season and community programmes on maintaining a healthy environment.

Activity 4
Pupil is given few statements on the positive developments and negative aspects of health care in India. They are asked to read each statement and they are asked to formulate a title for each one. Each group forms the title for all the statements. The pupil is asked to compare the positive and negative aspects in the healthcare of India and each group is asked to give few suggestions to reduce the negative aspects of healthcare facilities in India.

Activity 5
One of the students is asked to read out the story of Hakim Sheik (from textbook). All the other students are asked to be judge and asked to give out their verdict. Each student gives their verdict.
Activity 6
A role play is enacted in the class about the ‘cost of a cure’ where two students one from a rich family and another from a poor family had to go for treatment for a viral fever (from textbook). The pupil is asked to discuss on the impact of such discrimination and they are asked to discuss on how it lead to an unequal society and how it can affect sustainable development of the society.

Activity 7
Students are asked about the different public and private health centres in their locality. They are made into groups and each group is given a concept map on the public and private health care services. It is followed by some points on which they should discuss. The discussion is initiated on the difference between public and private health facilities, discrimination among people in selecting public and private health centres and suggestions to improve the condition of public health centres.

Activity 8
Students are asked about the private hospitals in their area. They are also asked about their functioning. They are asked to discuss about the various facilities and the expenses in a private hospital. They are also asked to share any of their experience of visiting a private hospital and asked to compare it with a public hospital facilities and expenses.

Activity 9
Students are asked to list any health centres in their locality. They are also asked to list out some health related programmes (like polio drops, distributing iron tablets to pregnant women, distribution of bleaching powder to all houses having wells etc.) and its importance. They are also asked to discuss on how Kerala has set an example on health programmes.

Activity 10
One of the students is asked to read out the story of Costa Rica (in the textbook) and how Costa Rica has become a rich country. The pupil discusses on the impact of war and how does a country progress if they spend money on health and education instead of spending on Army.