Rajeshwarji replied" this humidity in the air is acquired from oceans, rivers, seas, ponds, lakes, trees, plants and animals and other living beings. They all produce vapours. These vapours when they come in contact with the air, produce humidity in the air. Depending upon the amount of heat recieved from the sun, more or less amount of vapours are emitted. This humidity then condenses and takes the form of dew, mist, fog, frost, clouds, rain, hailstorms and so on and so forth.

Abdul asked the teacher, "Sir then surely we must be having an instrument to measure rain too." Yes Abdul, rain can be measured too." Rajeshwarji, explained further, "In a long cylindrical vessel a glass bottle is kept which has a funnel of the size same as of the cylindrical vessel attached to it. This vessel is placed in open when it rains. The drops of rain water pass through the funnel and get collected in the bottle. On taking it out the rainfall is measured in inches, centimetres, or milimetres. Similar to measuring temperature, this rainfall is measured on a daily, monthly or average annual basis.

Jacob asked his teacher, "Sir, which are the factors affecting climate?" Rajeshwarji replied, The climate of any area gets affected by the following:-

1. Distance from the equator
2. Height form the sea level.
3. Distance from the sea.
4. Winds and their direction
5. Mountain ranges
6. Ocean currents
7. Forest cover.
8. Slope of land.
9. Composition and structure of soil.

1. **Distance from the equator—**The sun's rays fall directly in the areas located near the equator. This is the reason why these areas are hotter, also, when the sun's rays fall directly over the sea, water vapour are formed. The water vapour rises above and takes the form of clouds. It now moves along with the wind towards the land. As the vapour loaded clouds move towards the north or south of the equator the rainfall decreases.

Since Delhi is located to the north of the equator it receives rainfall from the two branches of monsoon winds, one from the Bay of Bengal branch while the other from the Arabian sea branch. By the time they apporach Delhi, both the speed and the moisture of the winds decreases resulting in low rainfall. Delhi receives an annual rainfall of about 56 cms.

2. **Winds and direction of the winds—**India comes in the region of winds arising from the subtropical high pressure area. In the absence of monsoon winds the whole of India would have been an aried desert. The cold winds coming from the north cause winters in our country while the hot winds arising from the region of Punjab and Haryana mark the onset of summer season. In the rainy season when south western winds loaded with moisture pass through Delhi they cause rains here, but sometimes because of low vegetation or because of passing through low vegetation areas they recieve latent heat from the land and the clouds proceed ahead leaving the region of Delhi dry. What

ever little rainfall we recieve here is owing to the vegetation cover.

3. **Vegetation—**Dear children, once upon a time Delhi was known as the city of gardens. These gardens were laid around colonies, chowks, and monuments. Today Delhi has turned into a city of concrete. According to the survey conducted in 2005, the total forest cover of Delhi including the area covered by trees is only 18.08% of the total land area of Delhi. Agriculture is done only on a small part of land. The remaining areas are covered by residence, roads and factories. Because of the lack of trees it rains less in summers. For the balanced development of a region at least 33% of the total area should be covered with forests. This attracts monsoon winds and areas with dense forest cover recieve higher rainfall.
4. **Influence of neighbouring states—**Delhi's climate is also influenced by the climate of the neighbouring states. To the north of Delhi the snowfall in the mountaneous regions of Uttarakhand and Himachal Pradesh also influence the climate of Delhi. The hot winds from Punjab and Haryana mainly influence the climate of Delhi.
5. **Human Factors—**Delhi has nearly 54 lakh automobiles which is higher than the total number of vehicles of three metropolitan cities Kolkata, Chennai and Mumbai taken together. It is covered by a large network of roads. Migration of people from other states to Delhi for want of employment and other facilities is a constant feature. This has resulted in mushrooming of residental colonies. In comparison to authorised colonies, there are more of unauthorised colonies, which has resulted in large scale felling of trees. The watershed area of Yamuna has contracted. This is because of construction of long coastal dams and colonies here. Dayalpur, Khurezi, Usmanpur, Shastri Park,

Gandhi Nagar, Shakarpur, Lakshminagar are some of the colonies which had deep trenches filled with water. The example of Jheel can be meaningfully quoted in this regard. In place of Jheel colonies there used to be a Jheel or lake in which the sewage from the cities was dumped and then colonies were constructed over it. Jhilmil, Wazirpur, Okhla, Ananda Parvat, Jakhira, Najafgrah road are colonies where many unauthoried factories were constructed because of which there has been more of water, land and air pollution.

Rahul asked his teacher, "Sir, What is climatic change?" Rajeshwarji replied " The surface of the earth is getting increasingly hot owing to human activities and increasing emission of green house gases." Green house gases bring a vast change in the balance of energy between earth and atmosphere. This change is called climatic change. According to the scientists in the last 20 years the average global temperature has increased by 0.6°C. It is expected that the average temperature of the earth can rise from 1.4°C to 5.8°C by the year 2100. This is called global warming. It is believed that the ill effects of global warming can be seen in the form of rising of water level in oceans, extinction of certain species of animals, decline in food production and adverse affect on the sea life. Apoorva asked, "Sir how would weather and climate be affected by global warming?"

Rajeshwarji explained, "with the rise in the temperature of the atmosphere the tendency of the air to hold moisture or humditiy will also rise. Owing to this will also increase the frequency of aridity, droughts and floods. There will also be a rise in dangerous diseases and water born diseases. Due to the rising temperature the snow in the mountaneous ranges of Himalyas and Antartica shall melt and will fall of in the oceans.

Jacob asked, “Sir, when the snow melts, would there be any change in the sea level”?

Rajeshwarji explained, children, from 1850 to 2004 there has been huge increase in the amount of CO_2 gas in the atmosphere. Since 1970 every year CO_2 has been increasing at an average of 0.4% per year. This increase has been due to human activities. These activities are also termed as carnivore acivities. These are actually responsible for global warming. The average temperature of earth has risen by more than 14°C. Owing to this the glaciers of Himalyas and the Antartica region have melted and this has lead to rise in sea level. The sea level has risen from 9 cms to 88 cms which has posed a great danger to the lower levels of land. These can get submerged. A part of Sunderban has got completely submerged. The average height of our neighbouring country Maldieves is 2.5 metres above the sea level. It may submerge owing to rise in water level. The coastal areas shall almost get submerged, the islands would drown and the birds and fishes in the sea will also get adversely affected. It shall also result in decline in the percentage of land area.

Gurmeet asked his teacher, “Sir, it means global warming can adversely affect the animals and plants too.” Rajeshwarji replied, “Yes, the trees and plants too would get affected by global warming.” Many species of plants have got extinct and soon many species of animals inhabiting the forests would also disappear.

Raghav asked, “Sir will it also affect the food production?”

Rajeshwarji replied, “Yes, with the rising humidity, and temperature the crops will get afflicted by many diseases, because of which crop production would decline”.

Abdul asked , “Sir, how can we save ourselves from these changes in climate kindly elaborate.

The teacher explained “Children, we can protect ourselves from these changes in climate. Human activities are causing increase in the emission of CO_2 gas in the atmosphere. To control the emission of CO_2 gas in the atmosphere we should have effective environment laws. Also, we can employ instruments to purify air. To maintain the water level we should collect the rain water and construct artifical water lakes so that the underground water level rises. We should use the water wisely. We should resort to large scale plantation of trees in the wastelands. We should increase the use of public transportation. We should also encourage the use of non - conventional sources of energy.”

“Dear children, for your knowledge, I would like to tell you that on burning wood 30% of energy is released and on burning coal 40% of energy gets released, rest of the energy remains unused, on burning of petroleum 60% of energy is released, while 40% goes waste. Water electricity releases 98% of energy.”

“Children, you should make people aware of the changes in climatic conditions and the consequences of the same. We should restrict the unnecessary felling of trees. We should begin every auspicious task by planting a tree.”

Children were so absorbed in the conversation that they did not realise when the bell rang as the period was over. The mathematics teacher opened the door. The wind blowing outside had calmed down by now and the weather appeared to be pleasant again.

GEOGRAPHICAL DETERMINERS OF CLIMATE

When Rajeshwarji entered the class, the children who were making a lot of noise suddenly calmed down. They were both surprised and happy, surprised because this period was supposed to be social science period which was taught by Vijay sir and happy because all of them admired the interesting way in which Rajeshwarji taught.

“Sir?” Apoorva could not stop herself from reacting. “Yes, today, Vijay sir is on leave, thus, I will take his period, but not here in the classroom. All of you make a row and proceed to the garden. Today, together, we shall plant some trees. There are many more things to be done in the garden.”

Children who had recently finished off with their first semester exams were happy to hear this. They immediately came to the garden along with Rajeshwarji. “Sir, what do we do now?” asked Abdul.

Rajeshwarji, immediately divided the task amongst all of them. Within no time all of them were busy doing some work or the other. Some were removing the weeds, while others were watering the plants. A few children were sowing the seeds. Sir, I just finished eating this leechi, should I sow its seed?

Will it germinate?” asked Rahul.

No, it will not grow here because Delhi’s climate is not appropriate for growing leechis.

“Sir, what is the climate of Delhi? Rahul asked again. Delhi has an extreme climate. Summers are very hot while winters are very cold. On the basis of its distance from the equator and the amount of rainfall if recieves, the climate of Delhi is also known as subtropical monsoon climate.”

“But, one thing worth noticing here is that though Delhi is located to the north of the Tropic of Cancer, yet, it is very hot in Delhi. Which are the factors responsible for this? All of you must have been told about this by now.”

“Yes sir”, all of them replied together. By now all of them had gathered around their teacher.

Rajeshwarji noticed that all the children were over with their work and he asked all of them to gather beneath a tree.

Sir, Delhi is landlocked. It has no access to the sea. This is the reason why it gets extremely hot in summers here. But Sir, is it enough to know only about the temperature if we are trying to know about the climate of a particular place? asked Abdul.

Rajeshwarji started explaining in detail. Look children, the plants that you have roped here are the ones which can grow well in Delhi’s climate. Plants are the ones which are most influenced by the climate of a place. Had they been affected only by the amount of rainfall we could have met the water defficiency by means of irrigation, but it is not so. There are many other components of climate.

“The first one is temperature” replied Apoorva as she raised her hand.

“Second is rainfall”, this was Marry. “Oh! wonderful! You people know a lot!”

“Sir, we have come to know all this from you”. Apoorva said.

“Ok, but besides these, there are certain other features of climate too”. Rajeshwarji proceeded.

Temperature, rainfall, atmospheric humidity, presence of clouds in the sky, movement of wind and its direction, all are components of climate. The overall impact of all of these determine the climate of a particular place.

“Sir, then, if we talk about change in climate does it mean change in all these components” Gurmeet who was still busy sorting the plants asked.

“Yes, Gurmeet, though “climate” and “change in climate” appear to be little terms but they have a deep meaning. A minor change in any of the components of the climate can affect the entire climatic system. But, first it is important for us to know that how do these determiners of climate affect our environment. First we will talk about temperature.”

“Sun is the major source of heat on earth. The heat that we recieve from sun is called solar heat.” “Does solar heat cause the heating of the atmosphere”? asked Abdul.

“Yes”, Rajeshwarji explained, “Solar heat doesn’t heat the atmosphere directly. The rays of sun first heat the surface of the earth. The surface of the earth then reflects back the insolation recieved. The energy recieved from the rays of sun by the earth is called out going terrestrial radiation and when the earth on getting heated reflects back the same heat it is called terrestrial radiation. Atmosphere gets heated owing to this terrestrial radiation.

“So, in the winters when we recieve less of insolation the atmosphere becomes cold” said Sudeepta.

“You are absolutely right,”said Rajeshwarji. The next question was, “Children, as we proceed upwards the temperature declines why does this happen? Children thought for a while and then one of them replied, “Sir because we are at a high altitude”.

Rajeshwarji laughed, “The key to this also lies in terrestrial radiation. The heat recieved from terrestrial radiation is only able to largely heat the atmosphere near the surface of the earth. As we go up the heat recieved from terrestrial radiation decreases and also the atmosphere becomes less dense?”

“Why does atmosphere become less denser with increase in attitude?” Nandini asked.

This is because of the presence of various gases in the atmosphere out of which some are heavy while others are light. Due to the impact of the gravitational force of the earth heavier gases are found in the lower part of the atmosphere, and so the volume of the atmosphere is more near the surface of the earth. Contrary to this, the lighter gases are found in the upper layers of the atmosphere. Thus, with the increase in altitude, the air in the atmosphere becomes less denser.

Rajeshwarji cleared further “another fact worth remembering about terrestrial radiation is that CO_2 gas is opaque to the outgoing terrestrial radiation but it is transparent to the incoming solar radiation. This helps maintain the balance of heat on the earth.”

“This is amazing”, said Apoorva.

“This entire universe is amazing and to get to know about it is even more interesting” said Rajeshwarji. Sir, why doesn’t the temperature at all the places remain the same? asked Abdul.

“Temperature doesn’t stay uniform at all the places and in all the months because of unequal distribution of solar heat. Insolation recieved by a particular place depends upon the angle of the solar rays. Near the equator the rays of sun almost throughtout the year fall vertically at a right angle. Vertical rays are capable of producing more heat. Proceeding from the equator towards the pole these rays become inclined. The heat from inclined rays gets distributed over a comparatively larger area. Thus we get less of heat per unit area from inclined rays. As we proceed from the equator towards the poles the amount of solar heat recieved starts decreasing.”

“Also, the sun rays continue to change their angle at a particular place. This change in angle is because of the revolution of the earth around the sun. This also causes change of season. Thus it is natural that there is a difference in temperature not only from one place to another but at the same place too temperature differs in different seasons.”

Suddenly it became cloudy. Anticipating that it will rain Rajeshwarji along with the children came to the classroom. As soon as they entered the classroom, Gurmeet said—“Sir, it seems the second determiner of climate has arrived on its own”.

By now it had started drizzling. Closing the windows Rajeshwarji said,—“yes rain is a very important component of climate. Actually, rain is a form of precipitation”.

“Precipitation! what does it mean Sir”, asked Nandini.

The humidity in the atmosphere on condensation reaches earth in various forms. This is called precipitation. Examples are rainfall, snowfall, sleet, hail stones, dew and so on and so forth”, explained Rajeshwarji.

“In Delhi the most visible form of precipitation is rain”. “Yes”, said Marry, “Sometimes, there are hailstones too which are especially very harmful to the crops. Rajeshwarji continued. In Delhi, maximum rainfall is recieved in summers and winters are usually dry, but sometimes a little rain is recieved in winters too. It rains in summers because of the onset of monsoons. This rainfall happens between July and September.

Delhi and Punjab receive rains in winters because of western disturbances.

“Sir, what are western disturbances”? asked Gurmeet. Western disturbances are produced by mixing of hot and cold air masses nearby Mediterraren Sea. The upper air trough in the subtropical westerlies that move eastwards over North India during winter months are known as western disturbances in Indian meteorology. These moving troughs often give rise to closed circulation of winds and are responsible for precipitation in winters.”

“Then how do these Western disturbances reach India?” Lata was the one who put across a question for the first time.

The westerlies and the associated low level cyclonic storms originate in the Mediterranean or the east Atlantic region. In the month of Nov - December low pressure develop over North west India. Thus, these winds arrive in these parts of India causing some amount of rainfall.”

“You will study about these in Geography in higher classes. Rajeshwarji briefed his version and further said—“Delhi recieves an average rainfall of about 5.3 cms from western disturbances. In the mountain ranges of Himalyas this average is 60 cms while Punjab recieves an average rainfall of about 12 cms from western disturbances. It is very beneficial for the wheat crop. Sometimes owing to these disturbances there is snow fall in the Himalyan region”.

And then, it becomes colder in Delhi. Said Apoorva “Yes, you are right.” said Rajeshwarji. By now it had stopped raining. He opened the window and a wave of fresh air filled the room.

“Sir, the sky is still cloudy” said Abdul “and winds are also blowing”said Rohan.

You have yourself stated the other elements of climate. Rajeshwarji said—“the sky is covered with clouds and overcasting too affects the climate. The clouds play an important role in allowing in the solar radiation and preventing the terrestrial tradiation”.

Similarly, the direction of wind too influences climate. What do the winds coming from the hilly areas of the north bring along with them? Rajeshwarji threw a simple question.

“Winters” all of them spoke together.

“Yes, and similarly the dust laiden storms come from Rajasthan in the west and the winds from Arabian sea and Bay of Bengal bring moisture and humidity along with them.”

“Sir, humidity is also a component of climate, you told this in the beginning”, said Nandani.

“Air also has humidity and humidity, infact is a very important component of the atmosphere. Hotter the day, higher the capacity to hold moisture. The amount of humidity in the air prevents the earth from getting too hot or too cold. Humidity maintains the balance of temperature by absorbing some amount of solar raditation and some terestrial radiation.”

“From where does this humidity come from in the air?” asked Gurmeet.

“Air recieves this humidity by means of the process of vaporisation. Water vaporises and rises above from various sources of water and hot air absorbs these vapours.”

“Sir, This is the reason why air is more humid in summers and less humid in winters”, said Neelima.

“Yes, and when air has no more capacity to hold moisture or when the humidity reaches its maximum, the conditions are favourable for raining.” Rajeshwarji explained in brief.

“Sir, I have read that plants too help in increasing humidity in the air by the process of vaporisation” Gurmeet questioned.

“That is right, this is the reason why I made you plant saplings so that Delhi’s weather always remains pleasant.”

Gurmeet asked again, “When we talk about change in climate, do all the components of the climate change?” Rajeshwarji explained, “The term change in climate is used in two contexts. First, in the context that since the time human life attained its present form, climate has undergone changes many times. Second, in this context it refers to the changes in the human lifestyle, crop patterns etc in accordance with the present form of climate. The most important determiner of climate is termperature. This is because the other determiners of climate are dependent upon it.”

“What will happen if there is an extreme rise in temperature?” asked Marry.

Rajeshwarji was serious now, he said, “We humans are constantly contributing towards this increase in temperature especially in the metropolitan cities such as Delhi. On the roads, the fumes emitted from numerous vehicles, the smoke from industrial factories are increasing manifold the quantity of CO_2 gas in the atmosphere. The presence of this increased CO_2 increases the capacity of the atmosphere to absorb the outgoing long wave terrestrial radiation. This leads to rise in atmospheric temperature”.

He paused for a while and then continued. “The blind race for development has led to extinction of many trees which has had its obvious impact on the amount of rainfall”.

“Sir, this is indeed a very serious problem.”Apoorva commented innocently and Rajeshwarji could not stop laughing. “But none of the problems are so serious that they become unsurmountable by our brave children. Look, the plants that you have planted today will make the environment of your school very pleasing in times to come. When you grow up, you have to extend this noble work to whole of your city.”

Activity

Assign a few students of the class roles of various determiners of clilmate such as temperature, air pressure, humidity and rain fall.

According to the role assigned to them each child shall write down their own dialogues which underline their importance. In this manner they can prepare an educative and interesting play.

CHANGING LIFESTYLES AS PER CHANGING WEATHER

Annual examinations were approaching. All the students were whole heartedly preparing for the exams. There used to be a healthy competition amongst Gurmeet, Abdul and Rahul to compete for the top position in the class. Other children too seeked their help.

The teachers also wanted that the children perform their best in the annual examinations. They also wanted that by means of mutual co - operation and support a healthy competitive spirit develops amongst the students.

So when Rahul did not come to the school for two consecutive days, Rajeshwarji was a bit worried. On equiring from the students he came to know that Rahul was not well. This proved right when Rahul's father came to the school to submit his leave application and medical certificate.

During an informal conversation with Rahul's father Rajeshwarji came to know that under the changing weather conditions Rahul was caught by fever.

As soon as he left, there was an outburst of questions from the students. "What does it mean that he has fever because of the changing weather?"

Rajeshwarji calmed the students down and said, "Rahul would get well soon. But right now its very important for all of you to know how to keep healthy and stay away from diseases."

"How, Sir" asked Abdul.

"Ok. tell me Apoorva, which is the present season?" asked Rajeshwarji. Apoorva said without loosing a moment "Winter season."

"No, Winters are gone" said Lata.

"This is worth giving a thought that though winters are coming to an end, summers have not yet approched. The carelessness that we exhibit in our eating and clothing habits invite diseases." Rajeshwarji explained as his attention got drawn towards the sweater held loosely over Nandini's waist. He continued, "Nandini why have you taken off your sweater?"

"Sir, because I was feeling hot."

"You wore the sweater in the morning because you were feeling cold, now you are feeling hot, by the time it is evening, you will again start feeling cold. Our bodies are not able to adjust to these rapidly changing atmospheric conditions. Thus, our immunity weakens and we become vulnerable to the bacterias of the deadly diseases present in the atmosphere. "This is the reason why we fall ill". Rajeshwarji explained.

"Sir, this is really a big problem. In the noon when we feel hot, mom doesn't allow us to switch on the fan" Nandini said sadly.

"She is right, you need to understand this that you have to be really careful during this changing weather when we get prone to infections and diseases. On feeling somewhat hot you should not take off your woollens. The remedy lies in wearing thick cotton or synethic clothes."

You should remember this when you go to bed. In the night temperature comes down while it is high during the day. Thus, we should not leave the quilt immediately, we should instead use thin blankets and woolen sheets. Sir, if this is the case then after every season there must be a transition period in which we would be prone to infection. So do we include this transition period within summer and winter season only?" Gurmeet had been wanting to ask this for long.

"Ours is a vast country. We mainly have three seasons" said Rajeshwarji. "Sir, can I name them?" Nandini asked.

Yes, tell me. Sir, they are :

"1. Winter Season 2. Summer Season 3. Rainy Season" said Nandini

Yes, you are right Nandini. But, the intensity and period of the seasons is not uniform throughout the country. For example in the coastal areas of South India the temperature remains by and large the same in every season. "Then there should be no need of purchasing coolers or woolen clothes" asked Apoorva.

"Almost no" said Rajeshwarji. He knew that even in South India climate of the coastal and internal areas was different, but today he didn't want to introduce them to the complexities of climate and weather. As of now, he wanted the children, to know about the vagaries of changing weather and climatic conditions of their region. He wanted them to be cautious against falling ill. He continued further, "recently Nandini had talked about three seasons but do you know that including Delhi the northern plains of India experience six seasons."

"Six seasons"? Marry was surprised.

"Yes", Rajeshwarji continued further "during all these seasons there is a change in the climatic conditions such as temperature, humidity and so on and so forth. These changes affect our boilogical system also. Thus, we need to be careful about our eating and dressing habits."

"Sir, a few days back we had discussed about the problem of changing climatic condition. Does this influence these six cycle of seasons too?" asked Gurmeet.

Rajeshwarji had not expected such a serious question from the children but he was pleased with this and said "The climatic changes have started affecting the cycle of seasons. You must have noticed that sometimes the onset of winters is delayed. During winters the temperature falls rapidly and then it rises suddenly. Similarly rains are delayed and their duration is also not fixed."

"Ok, tell me, in which season do maximum flowers blossom?"

"In the spring season" - said Abdul.

"Spring i.e in Feburary - March." Apoorva added.

“Absolutely right”. Said Rajeshwarji. But, during Feburary, March if temperature rises rapidly the span of spring season shortens and the flowers die soon. “Then what can we do about this Sir?” Lata was a bit disappointed.

“We cannot change the nature of weather or climate conditions but we can prepare ourselves in a manner that we are protected from the ill effects of these changes”, said Rajeshwarji.

“How can we prepare ourselves Sir?” asked Sudeepta. “We should not only modify our eating and dressing habits in accordance with the climatic conditions, but we should also be careful about certain things so that we can easily face the complexities of weather conditions,” replied Rajeshwariji.

All the children were curious now. They all had their own homes in their imagination. Rajeshwarji started explaining further, “While constructing houses we should be aware about the region where we are constructing them. There is no dearth of space in countryside but in cities especially in the metropolitans there is an accute problem of shortage of space for residential counstruction. Thus, hardpressed for space people construct their houses at sites where construction work is prohibited.” “And which are such sites Sir?” asked Raghav.

“This depends upon geographical condition of different areas “Rajeshwarji explained.” For example in the mountaneous areas houses should be constructed at such places where the base of the rocks is not weak. In the coastal areas too the houses must be built at a safer distance from the sea. Similarly, if we talk about Delhi, then the flood plains of Yamuna are not suitable for construction.

“Why are they not suitable, Sir?” Raghav asked again. “Because every year the river water reaches the flood plain areas and this region comes under flood zone. In addition to this, in these areas, the soil structure is loose and hence such areas are unfit for the construction of buildings.”

“These regions are even more dangerous in the situation of earthquakes”, Rajeshwarji explained. “Sir, now a days architecture is being emphasised upon while constructing houses.”

“Not only these days, this has been a practice since ancient times. Ok, can you tell me what do we mean by architecture?” asked Rajeshwarji” “Sir, architecture means the art of constructing houses”, replied Apoorva.

“Not only the art of constructing houses, but also having a scientific perspective of the position and direction of the doors, windows, rooms and stair-cases. This ancient wisdom helps us in meeting many modern day challenges.”

“But Sir, these days there are so many houses constructed in such little space and in multistoryed flats there are doors in all directions. Then how do we take care of all these aspects?”

Gurmeet expressed his concern.

“You are right but still we should take care that there are good number of windows in the house to let in enough of light and fresh air. High sealings are useful to keep the rooms cool. Even during summers, these windows allow light and cross ventilation.”

“My grandmother says that the mud houses in villages are quiet cool”. Sudeepta said. “Your granny is right. Mud walls are bad conductors of heat, so they stay cool. Now a days we do not construct mud walls but we can make use of other methods such as using ashes of power houses to make bricks. Applying a thin layer of mud and brick tiles on the ceiling keeps the houses cooler in summers. Also, these days people have been making increasing use of glass to beautify their houses. We should refrain from doing this”. Rajeshwarji continued non - stop.

“Then, Sir, should we not use glass in the window?” asked Marry. “It is not so, rather glass used in windows and doors allow the sunlight to come uninhibited in the room.”

“This helps us save electricity during the day. Thus making wise use of glass is really beneficial” said Rajeshwarji.

“Sir, yesterday when I went to my friend’s house, I could feel a foul smell in her house.” “Why was it so? Apoorva think and then let me know”, Rajeshwarji encouraged her.

Apoorva spoke as she recalled, “Sir, their house had little space. It had a small verandah which they had turned into a room. The open space in the small balcony too was covered with a plastic sheet. They also keep their windows shut so that no dust lets in. The house was thus always smelling foul.”

“Another thing that you must have noticed would be that there would have been no provision for ventilation in the kitchen and the bathrooms. In bathrooms and kitchen water is constantly used, so there is presence of humidity. This produces ideal conditions for the growth of bacteria. It is very important for light and air to reach such places.” Rajeshwarji explained by drawing from Apoorva’s experiences.

“Sir, can i say something” Lata raised her hand.

“Yes, why not?” Tell us. “Sir, while constructing our homes we should also keep in mind the earthquake zones. Our Delhi lies in earthquake zones 3 and 4. Thus, when we construct our homes we should be careful to take precautions against earthquakes.”

“Vow! Lata! Well said, I had forgotten to share this information.”

“Sir, I would make a model of an ideal home as directed by you and bring it tomorrow.” Abdul said and then explained a model of a home made of cardboard. “Very good, we shall see your model house tomorrow” said Rajeshwarji. The other subject teacher had arrived to take his period.

The next day, when Rajeshwarji entered the classroom a huge model of a house was placed on the table and the students were eagerly awaiting the reaction of their teacher.

“Vow!, this is so beautiful.” Who made this?” Abdul and Raghav stoop up.

“Sir, while making it we have kept in mind all the suggestions made by you” said Abdul.

“Very good”, Rajeshwarji looked at it carefully as he admired the model. The house was really beautiful and the children had made appropriate provision for unrestricted flow of light and ventilation.

What Rajeshwarji admired the most was that he had not talked about colour coordination and solar energy, yet the students had taken care of these aspects and had installed a solar panel on the terrace of the house.

On enquiring from the students he came to know that they had read about the use of solar energy and the use of hot and cold colours in accordance with the seasons from the books in the library.

Rajeshwarji was overwhelmed with joy. Real education is one which fosters curiosity and inspires the students to explore the unexplored. The model was a testimony that he had been successful in achieving this.

“Sir, what are you going to tell us today?” his attention was diverted when Apoorva spoke. Oh yes, first a big round of applause for Abdul and Raghav.

The next moment, the entire class was filled with cheerful clapping.

Now, Rajeshwarji asked, “What basic things does man require for his livelihood?” “Food, clothing and shelther” replied Gurmeet.

“Yes, absolutely right, yesterday we had discussed about shelter that is house. Today, we shall discuss about food and clothing.”

“Food and clothing appropriate to the weather” Abdul completed the statement.

“Yes, Delhi experiences all the six seasons and the nature of these seasons is also being influenced by changes in weather and climatic conditions.”

“In order to stay healthy and fit we should bring about changes in our food and clothing habits according to the changes in the seasons.”

“Sir, we would have to get a lot of clothes stiched then.” said Sudcepta streching both her hands. “We dont need too many clothes but what we need in abundance is wisdom and knowledge.”

Rajeshwarji started, “yesterday when we came to know about Rahul’s illness, we had discussed that when the winters are about to end, we should not leave wearing our warm clothes immediately. Similarly after the onset of summers we should be careful that we wear such clothes which allow air in and keep our bodies cool.”

“This means we should wear cotton clothes”, said Lata.

“You are absolutely right. In summers we should try to wear loose cotton clothes as much as possible and yes the lighter the colour the better it is.”

“Sir, why only cotton clothes?”asked Abdul.

“Look, when you have to sieve water or any other liquid, which type of cloth would you look for?” “Cotton cloth.” Gurmeet replied without loosing a moment.

“Just as water gets seived easily through cotton cloth similarly air too easily passes through it which keeps our bodies cool. There is less of sweating and whatever little sweating is there it dries up quickly, explained Rajeshwarji.”

“Another thing worth reflecting is that just as we cover our heads with a woolen cap in winters, similarly in summers we should cover our heads with a cotton scarf or handkerchief before we move out in sun.”

“My uncle who stays in a village puts a “gamcha” over his head before he moves out in sun in the noon.” told Apoorva. “That is the right thing to do. This is important to protect ourselves from the scorching sun rays, otherwise we shall be caught by loo.”

“What is loo?” asked Marry.

“The hot - dust laidenwinds prevailing in North India in summers are called loo. They cause an immense rise in temperature. If the temperature rises upto 40°C and above and we are not careful we would become victims of heat stroke.”

“In the cities it gets even hotter owing to pollution” said Lata. “Yes, especially in metropolitan cities such as Delhi, the temperature rises beacuse of pollution. We shall discuss about it later but right now its important to understand how to face these vagaries of weather.”

“What do we do about it Sir?” This was Sudeepta. “All living beings are capable of adapting to the nature. Humans with this wisdom make it even easier for themselves. For example arranging for coolers and airconditioners in summers to beat the heat” explained Rajeshwarji. “Also by having ice-creams and, cold drinks in summers” Apoorva chirupped.

Rajeshwarji couldn’t help laughing and said “Yes, but good eating habits will mean having not only ice-creams and cold drinks. Infact, you should remember to have as much water as possible instead of having cold drinks you should have more of lassi, jaljeera, and nimbu paani.”

“Sir, how should we modify our eating habits in summers?” Abdul asked directly.

“I was just coming to that. In summers we should eat light food and avoid spicy and fried food. Also, we should take care of hygiene and cleanliness because in summers flies, mosquitos and other bacterias grow numerously.” “Fruits are really juicy in summers” said Gurmeet. “Yes, nature understands our needs. Juicy fruits and vegetables such as cucumber, watermelon, muskmelon are boons of nature which help naturally overcome the loss of water from our bodies. Thus, in summer season they should be consumed in plenty.”

“And what about eating habits in winter?” asked Marry.

“During winters our bodies need energy, hence we eat more of dry fruits, nuts, laddoos and mithai made up of til”. said Rajeshwarji.

“My grandmother prepares very delicious gond laddoos in winters.” Apoorva said. and “I love eating sarson ka saag with makka ki roti” Gurmeet said and all the others shouted. “We like it too!”

Rajeshwarji calmed them down and said “Similarly there are many things which are traditionally popular in India. Some of such delicacies are associated with our customs and festivals. For example gujhiya on holi, ghevar mithai on the ocassion of teej, delicious til laddoos on makar sakranti and lohri. All relish them and gift these to their friends and relatives. All these food products help our bodies cope up with the weather.”

“Sir, in summers bathing is really pleasureable. Whenever I get an opportunity, I bathe,” Shaheen spoke for the first time.

“Bathing and keeping ourselves clean is a good thing. But, in summers we should be careful not to drink water immediately after coming home from hot sun. Nor should we bathe immediately after coming from hot sun. Similarly going out in hot sun immediately from an air - conditioned room can be extremely harmful to us. Our bodies do not get adjusted to this change in temperature so soon, Rajeshwarji explained in detail.”

“Sir, how can we remember so many things?” Shaheen was a bit hesitant.

“If we bring these in practice in our day to day life and behaviour, we need not remember them, they shall become a part of our life” explained Rajeshwarji. “Ok, tell me, which is your favourite season? Rajeshwarji asked , “Sir, I like rainy season.” said Shaheen. “Oh! rainy season has its own pleasures. Rajeshwarji continued, “but we can enjoy the rainy season to its utmost if we are careful about certain things.”

“Yes, during rainy season the danger of dengue increases.” said Apoorva. “and sometimes there is a lot of itching” Marry put forth her opinion.

“Both of you are right but if we are a little careful, the rainy season would bring us joy and pleasure and not diseases. Rajeshwarji paused for a while and then continued, “after summer season comes rainy season. Raindrops provide relief from the scorching heat but humidity in the atmosphere increases. This humidity provides ideal conditions for the breeding of flies and mosquitos. Thus we should keep our homes as well as our sorroundings clean.”

“Sir, we should not use coolers also, isn’t it?” Lata shared.

“Yes, coolers produce moist air but during rainy season air becomes naturally moist hence we do not need to switch on the coolers. Since we do not use the cooler often, its water doesn’t finish easily and we forget to change the water. This water breeds the dengue mosquito.” Apoorva completed the statement.

“Very good, Apoorva. It seems you know a lot about dengue.”said Rajeshwarji.

“Sir, last year our uncle in the neighbourhood fell ill. Later, the doctor told us that he had been infected by dengue, it was then that mother told me about dengue.” Apoorva elaborated.

“Its commendable that you remembered these things Apoorva.” All of us should be careful that during rainy season water doesn’t accumulate anywhere unnecessarily. Whether in home or outside we should take care that no such conditions arise which promote breeding of flies or mosquitos. Another very important thing to remember is that you should wear such clothes which cover most of your body so that you don’t get exposed to mosquitos.”

“But Sir, why does itching happen in summers?” Marry did not forget to put forth her query.

“During the rainy season, humidity increases. This atmospheric humidity promotes growth of fungus. When this fungus finds its way into our bodies we get afflicted by itching and many other skin diseaseas. To avoid this, post bathing we should dry ourselves completely with the help of a towel and wear dry cotton clothes. We should clean ourselves with fresh water if we are coming drenched in rain water from outside. By taking some precautions we can completely enjoy the amazing rain showers of this wonderful season”, explained Rajeshwarji.

“We can enjoy the easterly winds of summers and the warm sunlight of winters too.” added Shaheen. “Vow! well said Shaheen”, Rajeshwarji praised her. “By staying clean and hygienic and modifying our eating habits according to the season, we can very well adapt ourselves to the changing weather conditions. We should be careful about another aspect.”

“What is that sir?” asked Gurmeet.

“In all the seasons we should exercise and do Yoga regularly. When we exercise our bodies retain flexibility and fat doesn’t deposit. Thus, we will not feel lethargic.”

“Sir, these days Yoga is being publicised on a large scale.” Asma who was mostly quiet was now trying to participate in the discussion. Rajeshwarji was pleased to see that all the children were now participating in the discussion. “Yoga is a boon for human health. It allows more of oxygen to enter brain which keeps our mind and body fit.”

"Now we too shall, get up early in the morning and practice yoga", some children said together.

"We will share all this information with Rahul when he joins the school. "So that he doesn't fall ill again." spoke Abdul.

"Keep these things in mind, and prepare well for your annual exams" said, Rajeshwarji. He was now confident that the education imparted by him today would pave the way for knowledge tommorrow. The pupil would be able to adjust themselves better to the changing weather and climatic conditions of Delhi as they were now aware of these changes and its impact on their health and well being.

Keeping in mind the forth coming examinations, he asked the students to prepare a small cycle of season and left them to prepare for the next period.

Activity (Do yourself)

Instruction—1. Look at the two circles given below. From a thick cardboard cut out two similar circles.

On the first circle write the names of all the seasons. From the second one, cut out a portion and then impose it on the other circle with the help of a nail in such a manner that it could be rotated to show the change of season.

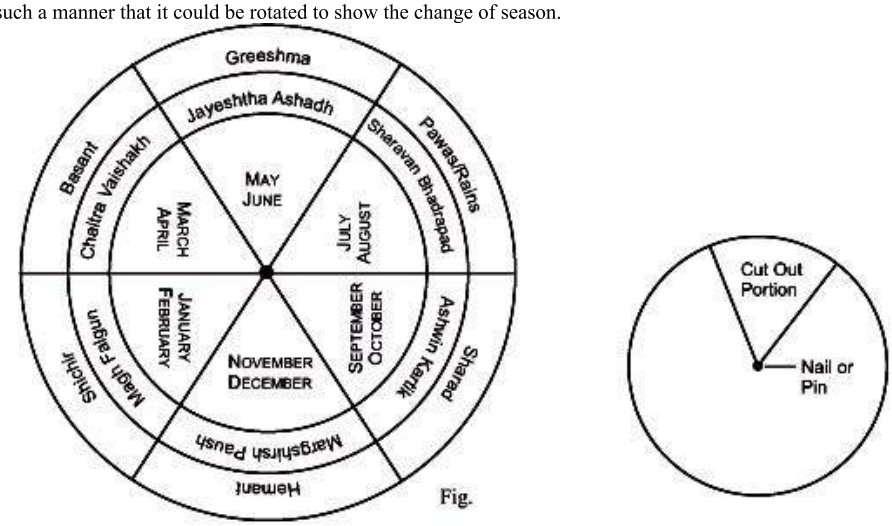

Fig.

2. Examine the changes in plants and trees as the seasons change. You should also examine the changes in the behaviour of birds and animals.

3. Make a list of some common diseases which occur with seasonal changes. How can we prevent them from occuring by being a little careful? Have a group discussion on the above topic in the classroom.

EFFECTS OF POLLUTION AND GREEN BELT DETERIORA— TION ON CLIMATE

Before the summer vacation begun Mridula had never thought that she would have such a wonderful vacation. She enjoyed spending time with these children while teaching them. She found herself unsatiated without their company.

Mridula had no idea when she came to spend a few days with her uncle in summer vacation that the neighbouring childern would mix so well with her. In the evening children of all age groups would gather around their Mridula Didi and time flied un - noticed as they involved themselves in their play and story telling sessions. So when Nandini didnt turn up for two days continuously Mridula enquired about her from Apoorva. Apoorva told her that Nandini was not well, she had problem in breathing and doctor had advised her rest. A few days back my grandmother too was diagnosed with a similar problem by the doctor. It was very painful for her." A deep concern was visible on Apoorva's face as she spoke.

"What is a breathing problem Didi?" Apoorva asked suddenly.

Mridula was lost in deep thoughts. She thought these days diseases have increased manifold in metropolitan cities such as Delhi. Besides adults, even children have got afflicted with diseases such as Asthama, and sour throat. Since past few years she had seen many people around her struggling with serious diseases.

Infrastructure development is taking place rapidly in the cities, economic development is pacing up. Whether schools or hospitals both are opening in large numbers and with them are increasing diseases, tensions and loss of peace of mind, Why is it so?

Mridula's chain of thought got disrupted when amidst the clamour of children echoed Abdul's gentle voice. "Didi why are so many people in Delhi suffering from sour throat?"

Mridula replied "Karim, Marry, Apoorva, Gurmeet all of you come here. Today, we will not listen to any story, nor shall we play any game. Today we will give it a thought that for the well being and good health of the people in our cities is it sufficient to open new hospitals or invent new medicines? or is it important to identify the causal factors of these diseases so as to eradicate them by roots. Rahul, who had brought his loodo game with him to play with, spoke suddenly, "Didi what is to be eradicated by roots"?

"Pollution" said Mridula, "today, in Delhi and other metropolitan cities pollution is responsible to a large extent for the increasing number of diseases."

“What is pollution didi?” This was Marry who was quiet since long.

“When air becomes contaminated its called pollution.” Gurmeet was the eldest amongst them, and liked to display his maturity often.

“You are right to some extent” said Mridula. “Pollution is a condition whereby certain unwanted contaminants enter the various components of the earth such as (air, water and land) and change their original composition in such a manner that they become harmful for the entire ecosystem.”

She explained further “If some chalk powder gets immersed in a glass of water, you throw it away or if we come across a foul smell on our way back home, we cover our nose with a handkerchief why?”

“because water had turned dirty” this was Apoorva. “and air had become polluted”

said Gurmeet.

“Absolutely right!” this way pollution has found its way in air, land and source of water too. But, everytime we cannot throw away water or cover our nose.”

“But didi, what is the relation between pollution and disease?” Rahul who was quiet since long now spoke up.

Mridula had by now turned into a teacher completely. She said, “Look children, you are already aware that pollution is of four types air, water, land and noise pollution. Air pollution is responsible for causing various diseases in human such as aesthama, sour throat, heart problems, breathing problems and inflammation in eyes.”

“Look, when we breathe, we inhale oxygen and we exhale carbon-di-oxide. The percentage of oxygen naturally occuring in the air is 21%. In polluted air the ratio of harmful gases such as carbon - monoxide, nitrogen oxide, sulphur dioxide, chloro fluoro carbons, benzene and dust particles increases.

The percentage of these gases is very low in the atmosphere but increasing usage of fuels such as coal, petroleum and gases increased the level of these harmful gases in the air which adversely affect the health of humans specially in metroplitan cities such as Delhi.”

“In our city Delhi too!!” “Why is this happening didi? Where do these harmful gases come from?” asked Apoorva.

Mridula took a deep breath and said, “increasing number of vehicles and factories are primarily responsible for this. These vehicles run on diesel and on burning diesel and petrol release harmful gases in the atmosphere, and this consequently becomes the cause of many dreadful diseases.”

“O.k, Gurmeet, tell me, according to you how many vehicles are there in Delhi today?” “about, one lakh,” estimated

Gurmeet.

“No, said Mridula, “Gurmeet, you could not even imagine that Delhi has more than 51 lakhs of registered vehicles which is more that the total vehicles of Bombay, Kolkata and Chennai taken together.”

“Really? Oh my God!! Children were astonished at this reveleation.

Mridula further said, “and now, on an average 308 cars and 600 two wheelers are being added each day in Delhi. Do you know what are the consequences of this? Who is getting affected by this?

Marry said, “My mother says this is the reason why Delhi is having such extreme hot summers now a days.”

“and extreme hot prolonged summers means increase in number of diseases.” Abdul completed the sentence.

“Yes, children, slowly this pollution has been adversely affecting our Delhi’s climate. We have been having prolonged and hot summers off lately. The span of winter is continuously declining. Around twenty years back in the month of October-November mild winters would approach and people felt the need of light woolen’s but these days its unthinkable to use them in the months of October-November. Similarly, by the time holi approached mild winters would be there, but, now, by the end of the month of Feburary we say Good bye to winters.”

Rahul thought a bit and said —“didi, sometimes I feel that its not too cold in November but there is a deep fog —is this too attributable to pollution?”

“Good question, Rahul, “said Mridula “Yes, this fog too is a consequence of pollution. Too much of smoke and dust particles cause fog. This is also called “smog” which is a term formed by combining “smoke” and “fog”.

This fog is very harmful for aesthama patients. Mridula said as she got up. “Didi, in the beginning of our discussion you talked about Delhi’s water getting polluted. How does this happen?” Apoorva put her finger on her chin.

“Not today, its getting dark, Now all of you go back home otherwise your mother would get annoyed with me and scold me.”

Hara samandar, Gopi Chandar,

Bol meri, machli kitna paani, kitna paani.

Gopi Chander, the ocean is green tell me my dear fish how much water is there, how much water is there. Apoorva and Marry were already playing when Mridula reached the terrace of the house. “Would the fishes really survive in the polluted water available for them” Mridula thought.

Abdul, Gurmeet and Rahul too had reached there by now. Today, Nandini had also come. She looked a bit tired but appeared to be well now. “Didi, Gurmeet told me that you shared very nice and useful, information with them yesterday. I missed out on it. Please let me know something about it.”

“Abdul could you please bring me a glass of water? Then we will talk about this” said Mridula. Abdul fetched the water within no time. “Have this Didi.”

“Look Nandini, this water which quenches our thirst, if it gets polluted then what will happen? It’ll become the source of many water borne diseases.” said Mridula.

“Water borne diseases? Which are those?” Marry and Apoorva left playing and joined the discussion out of curiosity.

“Cholera, Diarhorrea, jaundice, hepatitis and various types of skin diseases are caused by polluted water. Out of these Cholera is caused by bacteria, diarhorrea through protozoa and jaundice by hepatitis virus. Sometimes the bacterias and viruses are even hidden in water which appear to be fresh and clear.

Apoorva was not able to express her dilemma. Mridula noticed this and asked her. “What are you thinking Apoorva?”

Apoorva asked, “Didi, the water that we drink reaches us through closed pipes then how does it get polluted?”

Mridula said, “Wow, Apoorva you have really grown wiser. You have asked a very good question. But, I know that the answer lies with you. Ok. tell me, from where do the residents of Delhi get their supply of water?

Marry was quick to answer,” from the Delhi Jal Board.”

“And from where does Delhi Jal Board get its water?” It was Gurmeet’s chance to speak and without loosing a moment he said. “Jal Board supplies this water through the water treatment plants.”

“And these water treatment plants draw this water from the rivers.” Mridula said and finished with the question answer session. “We should know that Delhi has seven water treatment plants and these plants draw water from the river Ganges, Yamuna and Satluj. The water is then treated to make it fit for drinking and then supplied to our houses. These treatment plants are as follows:-

(a) Chandrawal water treatment plant. (two divisons are operational)

(b) Wazirabad.

(c) Haiderpur (two divisons operational —Yamuna& Satluj water is cleared)

(d) Bhagirathi.

(e) Soniya Vihar treatment plant. (Ganges water is treated here)

Apoorva said “Didi, in villages water is drawn through wells and handpumps.” You are right Apoorva in Delhi too, at some places , underground water is drawn through pumps, is treated with chlorine and then supplied.

“Didi then how does underground water get polluted?” Nandini spoke softly. Mridula held her affectionately on to her lap and said “first tell me, how does river water get polluted? Have you ever thought where does sewage water of your homes disappear?”

“In the drain” Abdul said.

“Ok, and where does this drain meet”? Now the children were silent.

Mridula said, “the sewers of our cities drain off into the rivers and not only this, the polluted water from the factories of the city as well as the harmful chemicals, find their way into our rivers, and as if this was not enough, about 1393 kgs of sewage passing through 19 big drains falls of into the Yamuna river.”

“Oh! Poor Yamuna river” said Apoorva.

“Yamuna is not poor or helpless, helpless are we who consume its water and pollute it too.” said Gurmeet. He further said, “Didi my teachers say, that the chemical fertilizers put in the agricultural fields too pollute the rivers.”

“Yes, absolutely right, these chemicals dissolve in rain water and then merge with the waters of river Yamuna. Besides this, the sewage from homes, markets and industrial wastes from factories is also disposed off in these rivers. The water of river Yamuna which is termed as the life line of Delhi got polluted to such an extent that it was found even unfit for treatment in treatment plants in November 2007.” The industrial wastes from the factories of the neighbouring states of Haryana caused the ammonia in the water to shoot up to dangerous levels. Such water even if treated in the plants and then supplied would have become a cause of major health problems for the residents of Delhi.”

“Oh, then what would have happened to the fishes?”—Marry was reminded of the game she played with her friends — “Bol meri machli…..!

Mridula said—“Yes, fishes and other acquatic animals become the first victims of water pollution.

Water is their home and we pollute their homes by releasing poisnous toxicants in it. Pollution reduces the level of oxygen in water. PH balance changes which turns the water saline.”

Mridula stopped for a while and then continued—“thousands of acqua plants and animals constitute the ecosystem in this water. These are vanishing how and this would adversely affect us as well as affect quality of life are live?” Gurmeet asked—“How would it affect us”? “We would be affected both directly as well as indirectly, many of the fisherman would loose their means of livelihood. Also frogs cannot live in polluted water because frogs do not eat insects, they thrive on the mosquitos taking birth in water. Frogs save us from the menace of these mosquitos by eating them.”

“Oh! that is why these mosquitos are multiplying with each season”— said Apoorva.

“But didi, how can the underground water get polluted?”asked Abdul. “Sometimes, the salt particles from the naturally occuring rocks makes the underground water salty and sometimes our irresponsible behaviour too results in pollution. For *eg.* sewer pits in unauthorised colonies are temporarily built. Through these, the polluted water seeps into the underground water and pollutes it. Besides this, the dirty water