5 Environmental Health

Atmosphere on all sides around us, in which are contained air and water, is called environment. Air and water, both these components are essential for human life. On the world, organisms like many animal, birds, insects, vegetation over and above man live in it. The particles, flowing or still water, form, mountains, rivers etc. are also a part of this environment. The industries factories, chemical substances, smoke, noise and advantage and disadvantage of these are also part of his environment.

Water :

We all know that water is obtained from clouds in the form of rain. Springs and rivers flowing down from mountains are also formed by rain water. Water formed by melting of ice on high show-covered mountains also flows in the same rivers. Over and above, the raing water is also storaged in places of water - like pond lake. Underground water is storaged in wells, step-wells. Large oceans surrounding the vast portion of the earth give an idea of quantity of water contained in the environment. Water on the surface forms clouds from water vapour through evaporation. It again comes down in the form of rain.

Pollution of Water :

Water is essential for human existence. It is essential for health to get pure water. Rain water is mostly on the top in purity. Some times when polluted gases from air mix with rain, rain water can be polluted. But we, man, polluted the water more. Industrial garbage enter into water and water becomes polluted. This polluted water passes in rivers, lakes etc. The lakes which are situated on the earth, people live in this area, villages, cities, corporations. Which are situated on these rivers, all are affected of many diseases.Thus water pollution is increased due to mixed excretion, industrial solid and liquid rubbish with water. These pollution should be stopped for the existence of all living creatures on the earth.

Factors Polluting Water :

The fear which was never befor of water being polluted due to industrial garbage has increased over the last 30 years. Poisonous chemicals, radioactive substances, offensive small spreading substances mix with water, so it becomes polluted and it is not potable water. But where there is non-availabity of potable water, people take such polluted water in order to sustain life any how. As a result, they gain many diseases and it may result in death also.

Due to excreta of men and other animals mixed with water the pollution spread out. Drinking such water, various bacteria and viruses enter the human body. Healthy man then becomes a victim of diseases like cholera, typhoid, jaundice and diarrhoe. If there is no suitable treatment of the dieses diseases, it may result in death also. It is seen, where there is non-availability of potable water in industrial area, cities, - corporation area there is high rate of polluted water diseases and death rate is also high.

Purification of Water :

We have seen that the polluted water causes many diseases. So polluted water should not be taken. This understanding is true but incomplete. Water which appears pure also can be polluted. The pollution of original source of water is responsible.

Impurities should not mix in water during transit from its original source. Hence it needs to be taken care of. It is very necessary that the original source - river, well, lake, pond and connecting water pipes, drain, pots, tanks etc. may be perfectly protected in order that pure water from the original source may reach the source of its use.

Methods of Maintaining Pure Water :

It is said 'Water is life'. To drink water is essention for all living creatures on earth including men to sustain their life. If there is a polluted drinking water, then they become victim to many diseases and their life ends early. Hence, the following details should be borne in mind in order that water may not get polluted and it becomes pure.

Individual Cleanliness :

Vessels which are used for drinking water at our home, i.e. pots, metal pots, hand lifter (doyo) for taking water, drinking glasses should be washed daily. If there vessels are not clean, impurities may mix with water. Impurities like dust particles, dirt or soil that can be filtered etc. should be removed. Water should he used after filteration, for filteration a piece of cloth or plastic net filter can be used.

When water comes in contact with hands or body, nail-dirt, hair and dirt, it gets polluted. So the care should be taken. After passing stool and urine hands should be washed with soap. The place for accumulation of water or water - closet should be kept clean. There should not be water on the place for accumulation of water, that place should be dried by wiping out water. Doing this, there will not be hazards of mosquito. As far as possible there will be a separate glass for each member of the family. Water should be drunk with up-lifled mouth, after drinking the water, glass should be cleaned. This is good for health. The good habit is to take water with doyo. A good habit should be developed from child-hood. There will be pipe under the pot or water-vessel, taking water from the pipe is healthy manner.

Application of Knowledge :

We, many a times, in spite of knowing, behave as ignorant. If water is kept uncovered, dirt, dust-particles, leaves etc. may fall in it and water becomes polluted. So water vessel should be covered. If there is a well, it should also be covered. So dust particles, rubbish may not fall in it and wate will be pure. Before using the well-water, water should be filtered by a piece of cloth. Due to the knowledge of purification of water and application of it, the diseases will be away and body will be healthy.

Health Education :

All persons in the family and especially children should be imparted such education so that they may be aware of purity of water. Elders should behave in such a way that good habits developed in children. Children follow elder's behaviour, so elder's behaviour for purification of water should be ideal for children. When children go to school, it is necessary to give them education of basic need. Teachers should provide pure water to the children. Children should be educated for pure water and put an ideal model for health education.

Methods of Purification of Water :

It is essential for the health that the potable water should be free from insect. There is water purification plant launched in big cities for purifying water. Purified water is supplied to the citizen. Filtration of water, decantation and application of insecticides like chlorine as well as mixing of alum are the main system for villages and small cities. Some time, pipes which supply water, are splitted or break, polluted water mix with pure water and it becomes impure. So it is necessary, the pipes should be in a good condition, old pipes should be replaced. The following methods are used with the purpose of using only pure water for drinking.

(1) Decantation : This method is very useful in rural and urban areas, to prepare purified water with out expenditure. Water should be kept still in the vessel for some time, so that impurities like soil, dust particles and dirt in the water settle down at the bottom, while light weight rubbish, such as leaves, grass etc. float over surface. Those can be removed by filteration using piece of cloth. This method is simple, it need not any expense. However, its use is also necessary before purifying water with substances like chlorine. Effectiveness of insecticide like chlorine reduces turbidity of water to a great extent.

(2) Filtration of Water : As heavy impurities settle down at the bottom, keeping water still for some time, light rubbish like grass, leaves etc. float on water. Such rubbish floating on the surface can be removed by filtration. Clean piece of cloth duly washed or plastic net should be used for this purpose.

(3) Water Purification by Mixing Alum : Alum has the characteristic of purification of water. Mistresses of house use Alum in rural and urban area. Municipalities in urban area also use Alum for purification of water.

(4) Filtration Bed of Earthen Substances : Water of well-stepwell is being purified by Filtration bed. But three earthen pots method is used for home. In this method, there are thee pots, in the most upper pot there is water, from this pot, water fall drop by drop in its below pot. This pot is filled by sand. Water passes through this sand and gets collected in bottom pot. There are pieces of stone in small and medium size water pass through them. Water is collected in a vessel, this is pure water.

(5) Disinfectants : Water which is not turbid (muddy) is made free of bacteria by adding disinfectants. Chlorine and likewise disinfectants (Potassium Permanganate, hypochlorate etc.) are used thus. Bleaching powder is used at village level for medium sized tanks. If bleaching powder is directly mixed with water, it contains lime. Hence if bleaching powder is mixed in bucket water and then allowed to decant, lime part settles down at the bottom. Water on upper part contains chlorine. This water on upper part is mixed with water in the reservior tank according to need.

Bleaching powder contains 30 to 40% active chlorine in ordinary circumstances. As time passes, quantity of chlorine goes on reducing. If the bleaching powder is good and fresh, 2.5 gm bleaching powder provides sufficient chlorine for 1000 litres of water. Measure of one empty matchbox is taken for this purpose in villages. It is approximately 2.5 gm bleaching powder. Chlorine tablets are available in the market for household use over and above chlorine gas and bleaching powder. Bottles of such tablets of 0.5 gm or 1 gm are available. How to use them is written on the bottle.

(6) Boiling : Boiling destroys various bacteria and viruses contained in water. Boiled water is allowed to cool and then kept in a clean reservior. Then it is the best. Many people use this water for religious and cultural reasons in our country. In case of epidemic and gastroenteritis spread, water should be boiler and then used.

(7) Purification of Water by Filter and Violet Rays : There are various methods of purification of water with scientific research. Now we get purified water, purified in the machine, water purified by R.O. System.

(8) Drinking Water from Sea-Sater :

Where there is non availabity of pure water, there they purify sea-water, convert it into drinking water. If man will not use pure water in modesty, then in future, where there is a scarcity of drinking water. They have to start industries for making sea-water drinkable water.

Garbage Hazards :

It is bad habit, throwing rubbish or making its heaps near one's neighbour's house or public road Industrial units product Rubbish, rubbish of synthetic garbage, pieces of cloth or plastic, papers, iron rubbish, rotted grain, chemicles of industries, chemicles are harmful to environment. They invite diseases. The carelessness toward cleanliness invite many diseases.

Disposal of Garbage :

There are rotted vegetables, leaving of food, solid garbage, dry garbage, green garbage etc. as well as rubbish accumulated on roads and streets. This garbage is collegcted in wheel-barrow, dustbins, in ox-cart by sweepers, and make it burnt or it is converted into manure. But if there is no proper arrangement for disposal of garbage, then the insects develope in it. Hot and humid weather makes this process quick.

Each house needs dustbin. Dustbin should be covered, otherwise insects enter in it and diseases will be spread out. Rubbish should be carried awage daily.

Methods of Disposal of Garbage :

(1) Collection of Garbage : Garbage and rubbish can be used to fill in low level land. In cities like. Mumbai, garbage is now used in filling sea and thereby new land is prepared. After making the land hard by collection of garbage. New land is prepared, it is used for human residence.

(2) Manure from Garbage : If organic elements in the rubbish are decomposed with help of bacteria and fungi, useless rubbish can be transformed into manure. First, solid rubbish like pieces of glass or metal need to be separated for such a plan. The place for making manure should be for away from human residence.

(3) Burning of Garbage : When garbage is harmful to human health, the rubbish is burnt. Excreta of patients in the hospital, clothes wet with blood, cotton, bandages etc. are collected and burnt.

A machinery completely closed is used for burning substances which are harmful to mankind, so that bacteria and viruses are completely destroyed. This is called incineration i.e. complete combustion. Every individual carrying such garbage which is harmful to health needs to put on hand gloves and mask and full clothes covering the body.

Vehicles carrying garbage and rubbish should be fully covered. That is decency and at the Some time it is essential to prevent spreading of rubbish and diseases through it.

Disposal of Excreta :

There is no latrine-bathroom to each family due to poverty and crowded residence. So they use to go to open in air for excreta. Excreta are responsible for spread and growth of many bacteria and insects in hot and humid weather. Worms in the excreta can enter into the body through skin of the bare footed person. Other types of worms enter into elimentary canal.

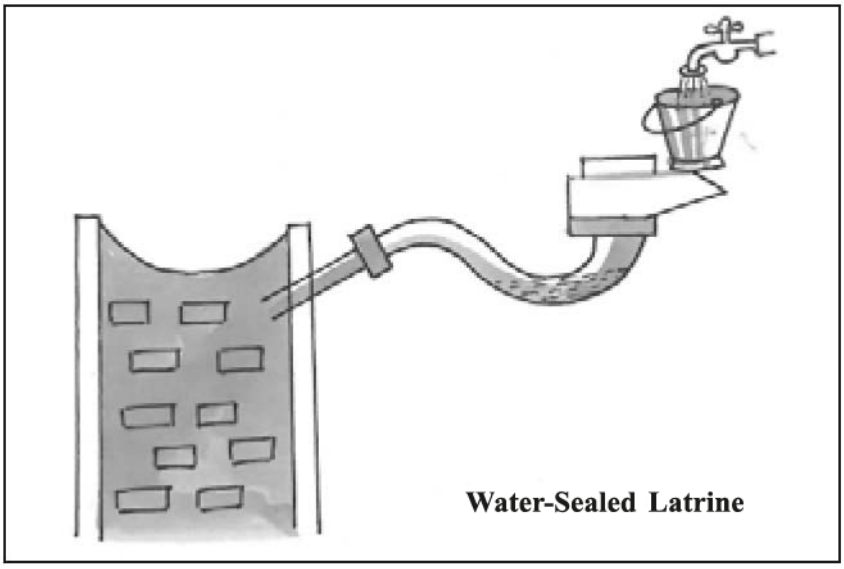
(1) Non-Hygienic Ways : To pass excreta on the bank of river or lake is dangerous for public health. If pits are dug for collecting excreta and Kacha latrines are made, it is necessary to make partition wall of cloth, jute, thin sheets of metal, or any other way for maintaining personal privacy. It should be looked after that the seat of such Kacha latrine may not collapse down. Growth of insects should be stopped by covering excreta in such pits with earth.

(2) Hygienic Way : The method of water - sealed latrine is considered the best for disposal of excreta in rural and urban population, where there is no drainage system.

Water - Sealed Latrines :

In this type latrine is connected with excreta-pit dug. The upper end of pipe going to excreta-pit connected with the water-sealed latrine is such an arrangement that excreta is pushed by pouring water towards excreta-pit and excreta does not return towards latrine. Due to this, flies, cockroaches and other insects cannot be carried to excreta and thereby cannot be grown.

Excreta is decomposed in excreta-pit and after the pit is full, pipe carrying excreta can be carried to another excreta pit by moving the pipe in another direction. The pipe containing decomposed excreta is open after some time and its manure can be made use of.



Water-Sealed Latrine

Government encourages for such latrines and subsidy is also given for such schemes. The Safai Vidyalay of Ahmedabad in Gujarat has presented various designs, and thereby provided many options also under this scheme.

Drainage System : The low-cost of water sealed latrine or 'Shosh-Khada' becomes useful in small colonies or villages for disposal of human excreta. Such individual arrangements are difficult to maintain in cities due to dense population. Its solution is drainage system. This aim at total disposal of rubbish by connecting systems of latrines and urinals, made for disposal of excreta of residential places.

Organic part contained in the excreta decomposes in presence of oxygen. Some bacteria play an important role in this manner. Moreover, some bacteria also decompose in situation where there is even no oxygen. Thus through decomposition of organic part in both ways, harmful elements are converted in to simple chemicals like water, ammonia and in some propotion gases like methane. Thus the main aim of drainage system is to convert harmful part of complex organic substances into chemicals which can be of simple use through decomposition by bacteria.

Individual houses or units of other places are connected with pipe line and these pipe lines can carry such excreta / rubbish of streets into big gutter-lines. Such pipe lines become very large along with increasing flow and some times the pipes are so large that even a man can move easily inside. At last, this rubbish is carried to very far off places from human colonies to the complex drainage system.

The whole garbage - rubbish is called sewage. It contains human excreta, water disposal and rubbish or water disposal from kitchen, bathrooms. On increasing industrialization, such industrial units carry and empty the rubbish including chemicals in this sewage. If this sewage mixes with earth or water in the some form, it can cause many diseases. Hence, the main function of drainage system is to give it proper treatment.

Treatment of Sewage :

Use of water in the whole of city comes to millions of litres many a time. Some times this water may fetch with it excreta or dead bodies of small animals or branches of trees from the lid having remained open in gutter lines. If the whole flow is first passed through iron net, rubbish of large size gets filtered through. It then becomes easy to lead the rest of the flow properly to decomposition.

This partly filtered flow is then passed through a long pipe of 10 to 20 mts such that the flow moves with an average speed of 30 cm per second. This helps heavy earth, stones or any such materials from the flow to settle down at the bottom. This solid heavy rubbish is frequently cleaned at the bottom with the help of machines.

Both the above processes, filtration and sedimentation respectively are simple physical processes. These processes make water free from heavy rubbish, which is worth filtering.

Special Treatment (Organic Waste) :

Now mainly inflow of water with organic waste is important. That is mainly responsible for spread of diseases. At the end of the primary treatment and in the beginning of special treatment, water flow is entered slowly is a large water reservior then water flows out of it at the other end. This work is done very slowly. All the solid rubbish settle down at the bottom as an important part of the process. Water used to flow at the speed of 30 cm per second in the sedimentation process. Here it flows at the speed of 30 or 50 cm per minute.

Treatment of organic Substances :

Stream flowing very slowly from the sedimentation is passed through porous pipe. The flow is continuous like a fountain on the large earth surface below this pipe. Water of this fountain falls on a large pit 1 to 2 mts deep and 2 to 30 mts broad and which is full of small bits of stones.

Bacteria, sources like fungi and viruses etc. are accumulated on the surface during slow sprinking of water and process of passing through stones. It helps in filtering and removing the harmful organic substances contained in this flow. Necessary oxygen also is available from air blowing in open for this work. Thus physical processes are tried in primary treatment and then organic process is used in this plant. This is a capable process. The flow passed through it is again carried to another lake of sedimentation where the water - settles down.

Nowadays other processes are made use of in place of this organic process of porous fountain and large pit of small stones. In this process, such a large land is not required. Time required is also short. Sludge as a residual solid rubbish at the end of the whole treatment is mixed with the steam from sedimentation tank, in this alternative arrangement. It is clear that this rubbish is full of various bacteria and hence it accelerates the rate of decomposition. This rubbish is stirred in a large tank, so that sufficient air mixes with it, Incoming water-flow, organic sledge being mixed and mixing of oxygen in air are the processes. In this refined method, if we compare, 10 hectare land is needed for sprinkling of water while only one hectare land is required in the process of decomposition by mixing sludge.

After decomposition by either of the two processes, the flow of water is passed through the second stage of water settlement. The flow detains here for two to three hours. It again separates the solid or floating rubbish. Here the rubbish of the second settlement tank is without odour, yet full of nitrogen phosphates and bacteria due to the process of organic decomposition. This can be used as the best manure. The same refuse is mixed with previous aeration tank utilizing oxygen - decomposition and further utilization.

Thus such residual solid waste is in tonnes. So its disposal is a problem in big cities. Disposal of Residual water after Removing solid waste (sledge) from Drain water flow.

There is a special system requiring precaution while disposing, waste-liquid in river or sea. There is possibility of harmful bacteria presented in waste liquid. Such liquid should be made bacteria free with the use of chlorine before it gets mixed with river water. This water can be alternatively used for irrigation. Sufficient land should be available for this. The type of produce should be keeping in view possible bacteria in water, so that its useful parts (fruits or leaves) may not come in direct contact with such waste water. Such basic, hygienic details should be taken into consideration.

Other Alternatives :

It is possible to pass the entire water-flow of drainage - scheme in sea, river or land without special treatment applied. Rubbish with bad odour mixed in sea may flow back to sea shore at the time of tide. River water becomes full of rubbish and flows downwards to bank - regions and spread bad odour and diseases. Its proper planning can reduce these disadvantages.

Disposal of Excreta and Condition of Nation :

Huge financial capital-fund is required for drainage system. If such a system is launched, its maintenance and repairs would require huge amount of money. It is necessary that gutter arrangement as an ideal should be launched everywhere. Even then, such a system is not prevalent in most of the country. Mostly, all of the villages are deprived of such facility in rural areas.

As per above condition, water - sealed latrines are the best solution. Over and above, good habits are also useful, i.e. after going to latrine and before taking food, hands should be washed with soap, and pure water. We will be safe from diseases due to such habits. For excreta, drainage system, water - sealed latrines and for solid waste compose pits are effective option and less expensive also.

Gobar Gas Plant :

Excreta of animals and other waste are used in Gobar Gas Plant. In this plant oxygen gas is absent and insects are present due to this and process of decomposition. Methane gas is produced, Methane will be 60% and inactive carbon dioxide will be 40%. There is Nitrogen sulphite also. In gobar gas, excreta of animals is the best raw matterial. In these excreta of man, pig, droppings of cock, hen are also added. For organic waste, stalks of Maize, leaves of plants, wild grass, rubbish of farm and moss are very useful for production of gobar gas. There is no decrease of quality of manure but it is increase. Thus both the aim, dung and manure are achieved.

There are different parts of gobar gas plants as under :

(1) Foundation

(2) Digester

(3) Gas collection tank, gas holder

(4) Place for Entering the raw material

(5) Passage ditch

(6) Exit valve for gobar gas, pipe line, water, trap, fittings.

Family Gobar Gas Plant :

It is necessary to build a plant of a capacity of 2-3 cubic meter for a family of 5-6 members under this family gobar gas plant. It need 2 to 3 cattles for one cubic meter gobar gas. The construction of family gobar gas plant is being done by Gujarat Agro industries corporation and Khadi Gram Udyog Bhawan.

The gobar gas plant for institution and community is bigger.

Institutional gobar gas plant is useful for residential school, residential institution, Trust etc. communal gobar gas plant is covered rural area or some urban area.

Village Panchayat or gobar gas co-operative society or concerned beneficiary are responsible for administration, maintenance and to take care of this plant.

Method :

First of all, dung is mixed with water. It is called slurry. This slurry is composed into digester. There is no oxygen in digester, so there is chemical catalysis in slurry and gas is produced. Gas is collected in gas holder. Slurry comes out from digester through pipe line and exit pit. Gobar gas is taken to kitchen, engine etc., from take through gas pipe line.

Useful Statistics :

When we pass dung and gobar from the gas plant, we receive gas for fuel and manure for land, on the other hand, if we do not pass dung from gas plant then we receive only one thing - dung, dung has flaming capacity 11 percent, gas has flaming capacity 60 percent.

A buffalo gives 15 kg dung daily. A cow gives 10 kg dung and a calf gives 5 kg dung. 0.037 cubic m (1.3 cubic foot) gas is produced from 1 kg dung. 0.028 cubic m (1 cubic foot) is produced from excreta of a man.

- 0;227 cubic m, 8 cubic foot gas is required for cooking per person / per day.
- 0.127 cubic m, 4.5 cubic foot gas is required for lightning / an hour / lamp c 100 candle power.

Working and Maintenance of Gobar Gas Plant :

When gobar gas plant is established and started to use, then, slurry should be filled up in digester. During filling, the following points should taken into notice.

Filling the dung in the initial stage :

(1) There will not be dust, a small piece of stone in dung which is used in the plant. There will be only grass to rubbish, stalks etc. things other the outer pipe will be blocked.

(2) Raw material should be filled up at a time, so that the gas which was produced from former slurry, will not be useless. The dung should be filled in at a certain level in the digester so that the gas which is produced will not mix in the atmosphere. It is desirable to pour a fresh dung in the digester so that fermentation process for producing gas will be speedy.

(3) 2-4 buckets of ferment slurry of old plant should be added in the plant so there will be speedy process of producing gas. In the beginning state, this starting doze is helpful to supply the insects and gas producing process will be speedy.

(4) When filling up the dung slurry work is finished, digester should be kept as it is for a week, During this period there will be fermentation in new slurry and gas will be produced in common rate. Once there is fermentation in digestery gobar gas will be produced regularly, at this stage use of gobar gas and daily activity of gobar gas plant is started.

Daily Activities of Gobar Gas Plant :

(1) Fresh and clean dung should be filled in the gobar gas plant.

(2) In the ratio of 1 : 1 mixer of dung and water should be filled in the gobar gas plant daily.

(3) Dung and water mixer should be added in the plant so that we can get the gas in certain rate.

(4) It is taken care during mixing dung and water, there will not be knot. When slurry becomes in a liquid form and then it will be filled in the plant.

Prepare slurry in mixer tank, let it be inactive for 10-15 minutes so the useless small substances will be in bottom part. Then slurry should be passed in disegestery and at last mixer tank will be cleaned so that dust and useless particles will be removed. When you put slurry first time, take care that the slurry should be put in similar rate to all sides.

EXERCISE

1. Answer the following questions in detail :

(1) How is water polluted ?

(2) State the method of water purification.

(3) State the methods of Disposal of Garbage.

(4) State the function of Gobar Gas Plant and give the information of its maintenance.

2. Write short note :

(1) Garbage Hazards

(2) Drainage System

(3) Treatment of Sewage

(4) Treatment of Organic Rubbish

(5) Daily Working of Gobar Gas Plant.

3. Write answers to the following questions by selecting correct option from the option given below :

(1) What is environment ?

(A) Useful cover to human world (B) Useless cover to human world

(C) Purification of water (D) Individual cleanliness

(2) When to clean the water vessels ?

(A) Each second day (B) Each third day

(C) Alternate day (D) Daily

(3) What type of water should be taken during vomitting - Diarrhoea diseases ?

(A) Cold water (B) Warm water

(C) Boiled (D) Recent filling

(4) Which components are included in Garbage ?

(A) Human excreta (B) Animal excreta

(C) Rubbish (D) Liquid garbage

(5) What is the best system for disposal of excreta, where there is no facility of drainage ?

(A) To pass excreta on the bank of river (B) To pass excreta on the bank of pond

(C) To pass excreta in open air (D) Water-sealed latrines

(6) Which gas is not there in Gobar Gas ?

(A) Oxygen (B) Methane

(C) Carbon dioxide (D) Nitrogen

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