UNIT–9: ADVENTURE AND OBSTACLE TRAINING

Content and specific topic	Comprehension	Analysis	Synthesis	Evaluation
Slithering	Understand about the concept of slithering	Analyse the process of slithering in detail.	Acquire the perfection to face difficult situations with ease.	Worksheets, comprehension questions, discussion and activities.
Obstacle training	Understand about obstacle training	Analyse the process of such training and precautions to be taken during the training.	Appreciate the role of this training in overall personality building of the cadet for life.	Worksheets, comprehension questions, discussion and activities.

Unit-9

Adventure and Obstacle Training

Adventure activities have been incorporated in NCC training with the aim of inculcating and strengthening leadership traits amongst the cadets. These activities in NCC can be broadly divided into following:

1. Land Based – Mountaineering, Rock Climbing, Trekking.
2. Water Based – Sailing Expedition, White Water Rafting, Scuba Diving, River Crossing.
3. Air Based - Parasailing

1. Slithering

The literal definition of the word slithering is to slide or glide, like a reptile. This can be better explained as descending from a height, most of the times a bridge, slowly at a controlled pace and touch the surface underneath. The thrill in this sport is to see the ground coming closer and closer as you descend down and feel the wind in your hair and with no support besides a rope, which one is tied with. **It is also known as fast roping.**

Slithering

Fast-roping, also known as **Fast Rope Insertion Extraction System** (**FRIES**) is a technique for descending a thick rope. It is useful for deploying troops from a helicopter in places where the helicopter itself cannot touch down. First developed by the British with UK rope manufacturer Marlow Ropes, its first combat use was during the Falkland War. The original rope was a thick nylon that could be used in a manner akin to a Firepole. The special ropes used today are braided (plaited), which results in pattern on the outer circumference that is not smooth and so is easier to grip. Originally, each person would hold the rope for the next person; however this has been phased out.

General Information

Slithering is quicker than abseiling (rappelling), although more dangerous, particularly if the person is carrying a heavy load, because the rope is not attached to them with a descended. The person holds onto the rope with his gloved hands and feet and slides down it. The British method advises not to use the feet as this can make the descent for following personnel more dangerous because boot polish or the leather of the boot can make the rope extremely slippery. Several people can slide down the same rope simultaneously, provided that there is a gap of approximately 3 meters (9.8 ft) between them, so that each one has time to get out of the way when they reach the ground.

River Crossing

The rope must be thick, typically 40 millimetres (1.6 in) diameter, to prevent it from being wildly jerked about from the rotor blast of the helicopter. It is essential to wear gloves, as sliding down a rope generates great heat from friction.

Fast roping onto a ship can take approximately 30 seconds, and is used when a rapid build-up of boarding forces is required.

What can go wrong? Two things:

a) People who are fast-roping are vulnerable to small arms fire, both as they exit the helicopter and as they descend the rope.

b) People who are new to fast-roping can misjudge their speed and land hard. This can also happen, if the backpack weighs a hundred pounds or the gloves are too thin.

1.1 Slithering Equipment

Equipment

a) **Rope**: The rope has to be thick for two reasons. Firstly if it is too thin, it is hard to grip and causes too much friction (even with gloves). Secondly, if it is too thin, all the wind from the props down wash will whip it around. Worst case scenario is that a thin rope somehow whips into the main rotor or the tail rotor. The rope should meet the following specifications:

(i) The rope should be made of polyester armide.

(ii) The diameter of the rope should be 12mm.

(iii) The rope should have a working load of minimum 700 Kgs.

(iv) The rope should have a tenacity of minimum 700 K.

Rock Climbing using rope

b) **Gloves**: Each member of the team must wear proper fast rope gloves when sliding down the rope. The gloves need some thought as well. Braking our descent with our hands means friction and therefore heat. Too much heat can be a real problem, so thick or padded gloves are preferred.

c) **Boots**: Cadets must also wear a reliable pair of boots to provide support both in the slide and the landing.

d) **Helmet and Knee Pads:** It is advisable that protection such as a helmet and knee pads be worn to protect the soldier in the event of a rough landing.

1.2 Uses and Techniques of Slithering

Uses: Slithering is most commonly used in three situations which make landing a helicopter a potential safety hazard, they are as in followings:-

Airwing Training

a) When ground is soft or uneven making for a dangerous landing situation.

b) Deployment into an urban setting with low building rooftops can be completed using a fast rope without having to find a large clearing to set down the helicopter.

c) A slithering deployment can be used when there is risk of fire from the opposition as fast roping shortens the time required to get the soldiers down and on to the ground, then the helicopter is moved out of danger.

Techniques: Proper technique for the sliders is essential in ensuring that an individual on the line does not deploy too fast, risking injury on landing or falling off the line altogether. Going too slowly can cause a logjam, forcing a longer deployment time. To fast, rope, the soldier grabs onto the rope with both hands then steps out of the helicopter. Using both feet, the soldier pinches the rope between their boots and then increases the pressure on the rope to regulate their speed.

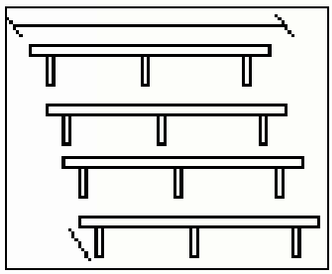
2. Obstacle Training Course

The training in negotiating the obstacles by NCC cadets is a very important aspect of NCC curriculum. The obstacle course training not only makes the cadets physically tough but develops a very high degree of confidence and inculcates the qualities of patience and courage to face challenges.

Obstacle Course

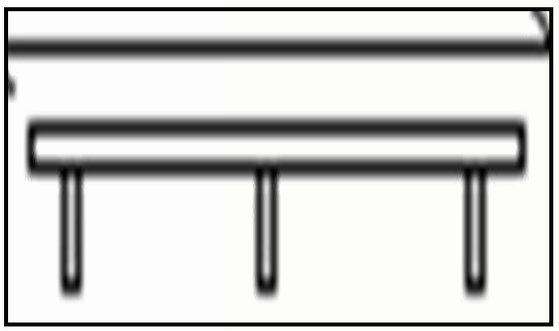
The Standard Obstacle Course that the NCC cadets are required to negotiate consists of ten obstacles. The obstacles, depending upon the structure are constructed of wood, bricks, concrete and mud. Each obstacle is placed at a distance of about 30 feet from each other. The details of each obstacle course are given in the succeeding paragraphs.

a) **Straight Balance:** It is a wooden plank of 3 inches thickness, 4 inches width and 12 ft in length, which is 1½ ft above ground level. A cadet crosses this obstacle running, keeping his arms open and balancing his body.



Straight Balance

b) **Clear Jump**: Its structure is just like a straight beam. This wooden beam is 2 ½ ft from the ground. Cadet has to jump over it without touching or using any part of the body.

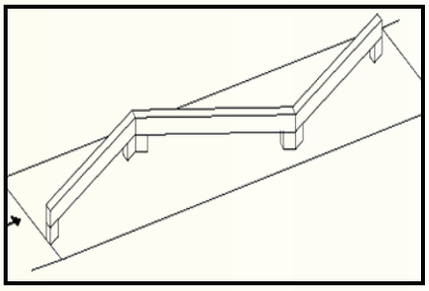


'Beams'

'Beam race'

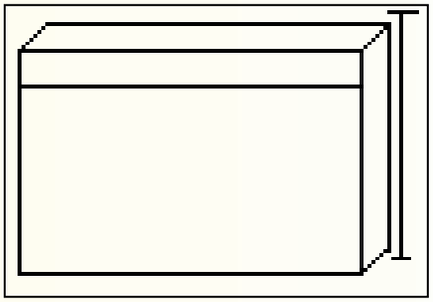
Clear Jump

c) **Zig-Zag Balance**: It is a Zig-Zag a structure of wooden beam 18 ft in length, with 3 inch width and 1 ½ ft above the ground and is constructed in a zig-zag manner. The Cadet has to cross the obstacle lengthwise with open hands and balancing the body similar to straight balance.



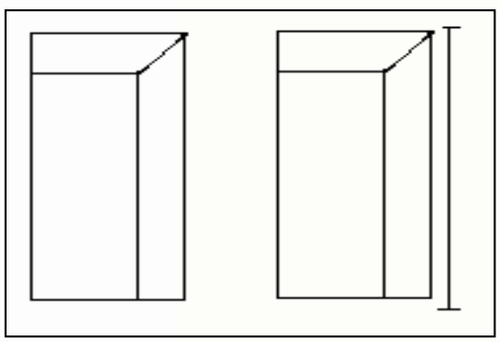
Zig Zag Balance

d) **High Wall**: It is a 6 feet high and 12 feet long brick wall with plaster on both sides. For crossing this obstacle, a cadet has to run, jump, kick the wall with one leg and take leap putting both hands on the wall and then push his body upwards and jump over the other side.



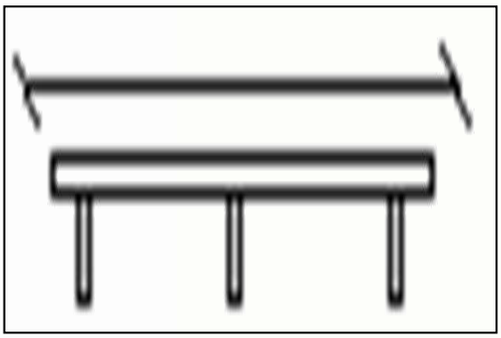
High Wall

e) **Double Ditch**: The obstacle is composed of two ditches each of approximately 6-8 ft in length, 4-5 ft wide and 3-4 ft deep separated by a small gap of approx 9-12 inch. The Cadet have to jump across the two ditches by jumping over the first ditch, placing one foot on the gap and jumping across the second ditch.



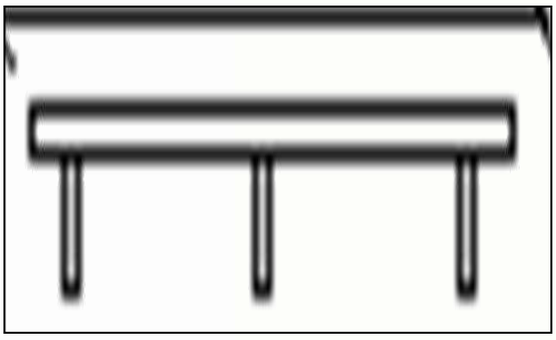
Double Ditch

f) **Right Hand Vault**: This wooden structure is 3 ½ ft above the ground and 1 ½ feet long. The Cadet is required to jump over using the right hand as support on the beam, throwing both legs up and jump across.



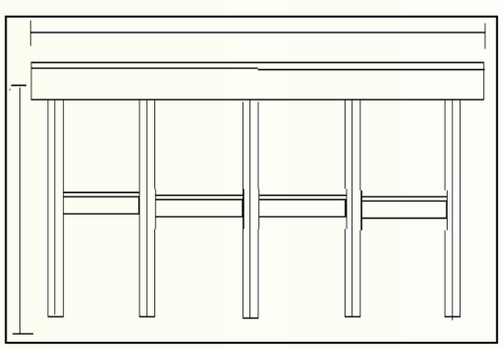
Right Hand Vault

g) **Left Hand Vault**: This wooden structure is 3 ½ ft above the ground just like Right Hand Vault. The Cadet is required to jump over using the left hand as support on the beam, throwing both legs up and jump across.



Left Hand Vault

h) **Gate Vault**: This is a wooden structure which has two beam at height of 3 ft and 5 ft respectively, both 18 ft long. One has to cross the gate by holding upper beam with both hands and by putting one's feet on 3 ft gate and jump across.



Gate Vault

i) **Ramp**: It is 15 feet long, 18 feet wide and 4 ½ feet high sloppy hillock. For crossing it a cadet has to run in and climb over the ramp and take long jump after reaching the top and landing on a pit on both the feet.

Ramp

Safety Measures: Following Safety Measures must be ensured during the conduct of Obstacle Course training to cadets

a) Suitable and physically fit cadets only to be selected.

b) Training to be given first in PT dress, later on with packs and weapon.

c) Emphasis to be given on closing of individual timings and later team timings.

d) Wet and slippery obstacles and area to be avoided.

e) Obstacles to be done under supervision of qualified instructors and only correct technique to be used.

f) Arrangement of first aid to be ensured.

Benefits: Benefits of Obstacles course are as under:-

a) Ensures physical fitness.

b) Ensures agility

c) Ensures mental robustness.

d) Coordination and balance of mind and body.

e) Improves risk taking ability.

f) Evaluating problem solving skills.

g) Enhance overall team spirit.

Demonstration

The demonstration will be given by a trained cadet under the supervision of PI Staff.

SUMMARY

Slithering is to slide or glide, like a reptile. This can be better explained as descending from a height, most of the times a bridge, slowly at a controlled pace and touch the surface underneath. The thrill in this sport is to see the ground coming closer and closer as you descend down and feel the wind in your hair and with no support besides a rope, which one is tied with.

Fast roping is an insertion technique used by Special Forces in the military to deploy into a location rapidly. Whether the helicopter carrying the soldiers cannot land because of the terrain or because of fire on the helicopter from enemy forces on the ground, dropping fast ropes allows the soldiers to disembark safely and the helicopter to leave the dangerous area. Although fast roping has many benefits, it is not without its risks to the soldiers deploying. While the helicopter is deploying the troops it is a sitting duck, a situation which led to the famous "Black Hawk Down" encounter in Somalia in which helicopters deploying US Special Forces troops were shot down. Additionally, if the helicopter is forced to perform evasive manoeuvres it can endanger soldiers on the rope or near the exit to the helicopter, as can a loss of grip as a soldier is sliding down the rope.

The training in NCC is comprehensive. The basic training of regular Defense services (Army, Navy and Air force) is imparted to the students. The cadets receive training throughout the NCC tenure.

Intensive training is given to cadets in the camps especially in Thal Saink Camp.

Obstacle course is one such training activate conducted for making the NCC cadets physically fit and mentally robust.

Obstacle training infuses Courage, patience and makes them physically fit.

OBSTACLE COURSE

(a) Straight Balance

(b) Clear Jump

(c) Zig-Zag Balance

(d) High Wall

(e) Double Ditch

(f) Right Hand Vault

(g) Left Hand Vault

(h) Gate Vault

(i) Ramp

Comprehension Questions

Q.1. Answer the following in about 15 words:

i. What is the definition of slithering?

ii. What is the full form of FRIES?

iii. Where was FRIES first developed and why?

iv. What should be gap between the people who are sliding down the same rope simultaneously and why?

v. When is fast roping done on a ship?

vi. Why is it essential to wear gloves in slithering?

vii. How many obstacles are there in the standard obstacle course?

viii. What is clear jump?

Q. 2. Answer the following in about 50 words:

i. What specification should the rope in slithering meet?

ii. What can go wrong during slithering?

iii. Write a short note on gloves used in slithering?

iv. Write about three types of vaults.

v. Write about any two obstacle course.

Q.3. Answer the following in about 75 words

i. In which situations slithering is most commonly used?

ii. Why a proper technique for sliders is essential? Explain.

iii. What are the benefits of obstacle courses.

iv. How do you differentiate between right hand vault and left hand vault.

Q.4. Answer the following in about 150 words

i. What safety measures must be ensured during the conduct of obstacle course training to cadets.

Q.5. Answer the following in about 250 words

i. Write in detail about different types of obstacle courses.

Let's Discuss:

Q.6. HOTS (Higher Order Thinking Skills)

i. An obstacle training prepares you to face challenges of life: How far do your agree in the statement. Support your answer with suitable example.

ii. What values did you pick up or reflect during the performance of various obstacle courses? Discuss any 4 values?

Activities:

1. Locate the names of the slithering equipment from the word puzzle

A	J	H	H	G	Z	F	V	G
O	B	I	T	L	A	H	L	K
R	O	C	R	O	P	E	U	N
D	O	S	K	V	B	L	F	E
T	E	F	L	E	N	M	P	E
B	O	O	T	S	S	E	K	P
T	S	K	N	T	O	T	R	A
A	R	P	O	T	P	S	S	D
I	J	K	M	L	N	T	R	S

2. A group of children from your school wish to join NCC. Tell them about the obstacle training course and which obstacles they will be taught to overcome.

3. NCC cadets are given intense training to overcome obstacles. As NCC cadets make models of any two obstacles that you have been taught. Use waste material to make the model.

UNIT–10: ENVIRONMENT AWARENESS AND CONSERVATION

Content and specific topic	Comprehension	Analysis	Synthesis	Evaluation
Natural resources-conservation and management	Understand about conservation and management of natural resources.	Analyse the need and importance to conserve the natural resources.	Appreciate the concept of sustainable development.	Worksheets, comprehension questions, discussion and activities.
Water conservation and rain water harvesting.	Understand the need for water conservation.	Examine the methods that can be used for conservation of water and rain water harvesting.	Infer the importance of rain water harvesting.	Worksheets, comprehension questions, discussion and activities.

Unit-10

Natural Resources Conservation and Management

'The conservation of natural resources is the fundamental problem. Unless we solve that problem, it will avail us little to solve all others'.

- Theodore Roosevelt

1. Natural Resources

Natural resources occur naturally within environment that exist relatively undisturbed by humanity, in a natural form. A natural resource is often characterized by amounts of biodiversity and geo diversity existent in various ecosystems.

Natural resources are derived from the environment. A **natural resource** is any useful product which is produced by nature and is essential for our survival. Natural resources can be defined as "materials or substances such as minerals, forests, water, and fertile land that occur in nature and can be used for economic gain". Natural resources can be classified in different ways as per their nature or availability or type. A few examples of natural resources are air, water, wood, oil, solar energy, wind energy, fossil fuels, minerals and coal. Refined oil is not a natural resource since humans create it.

Source: http://2.bp.blogspot.com/_bfUGD2eoAxc/S-PWYsa6hrI/AAAAAAAAB58/XIaHikl-qwo/s320/Natural-Resources-754285.JPG

1.1 Types of Natural Resources

Natural resources can be classified by various methods, which include source of origin, stage of development and by their renewability. These classifications are described below.

Natural resources are basically classified as either renewable or non-renewable:-

a) **Renewable Resources**: These are resources which can be replenished naturally. Some of

these resources, like sunlight, air, wind, water etc, are continuously available and their quantity is not noticeably affected by human consumption.

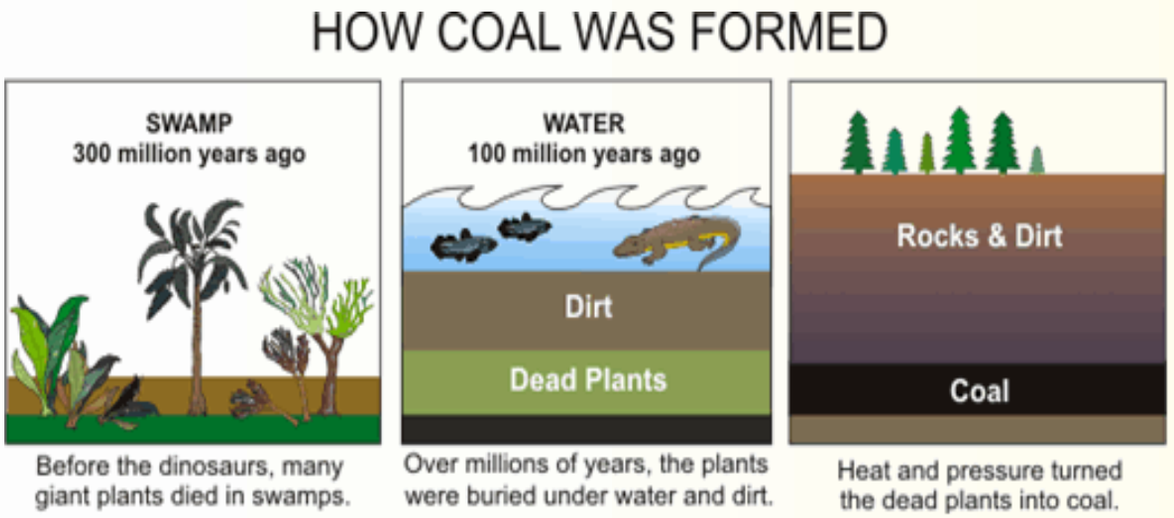
The Carson Fall in Mount Kinabalu,Malaysia is an example of undisturbed natural resource. Waterfalls provide spring water for humans, animals and plants for survival and also habitat for marine organisms. The water current can be used to turn turbines for hydroelectric generation.

Source: http://en.wikipedia.org/wiki/Natural_resource

b) **Non-Renewable Resources:** These are resources which are formed extremely slowly and those which do not naturally form in the environment. Minerals and Fossil Fuels are the most common resources included in this category.

Resources can be further classified on the basis of origin:-

a) **Biotic:** Biotic resources are obtained from the biosphere (living and organic material), such as forests and animals and the materials that can be obtained from them. Fossil fuels such as coal and petroleum are also included in this category because they are formed from decayed organic matter.



Source: http://www.portal.gsi.gov.in

b) **Abiotic**: Abiotic resources are those that come from non-living, non-organic material. Examples of abiotic resources include land, fresh water, air and heavy metals including ores such as gold, iron, copper, silver, etc.

Considering their stage of development, natural resources may be referred to in the following ways:

a) **Potential Resources:** Potential resources are those that exist in a region and may be used in the future. For example, petroleum may exist in many parts of India, having sedimentary rocks but until the time it is actually drilled out and put into use, it remains a potential resource.

b) **Actual Resources**: Actual resources are those that have been surveyed, their quantity and quality determined and are being used in present times. The development of an actual resource, such as wood processing depends upon the technology available and the cost involved.

c) **Reserve Resources**: The part of an actual resource which can be developed profitably in the future is called a reserve resource.

d) **Stock Resources**: Stock resources are those that have been surveyed but cannot be used by organisms due to lack of technology. For example, hydrogen.

2. Conservation and Management of Natural Resources

Need for Management and Conservation of Natural Resources

Most of natural resources on earth, especially the non-renewable resources, have a finite limit. Excessive use of these may deprive the future generations of their use. It is therefore extremely essential that, we not only conserve natural resources but also plan their proper management so that the longevity of these resources increases. Some of the major effects of unrestricted use of natural resources are:

a) **Ozone Depletion**: This is a process by which the total volume of ozone in the Earth's atmosphere decreases. The major reason for this ozone layer depletion is the production of man-made refrigerants (CFCs, Freon, Halons). Since the ozone layer prevents most harmful UVB wavelengths (280–315 nm) of ultraviolet light (UV light) from passing through the Earth's atmosphere, depletion of the ozone layer has serious damaging effects.

b) **Soil Erosion:** Erosion is the process by which soil and rocks are removed from the Earth's surface by natural processes such as, wind or water flow and then transported and deposited at other locations. While erosion is a natural process, human activities such as deforestation and expansion of built up areas have dramatically increased the rate of soil erosion. Excessive soil erosion causes problems such as desertification, decrease in agricultural productivity due to land degradation, sedimentation of waterways and ecological collapse due to loss of the nutrient rich upper soil layers.

c) **Acid Rain:** It is a rain or any other form of precipitation that is unusually acidic, meaning that, it possesses added levels of hydrogen. Acid rain is caused by emission of harmful

chemicals such as sulphur dioxide and nitrogen oxide, which react with water molecules in the atmosphere to produce acids. Chemicals in the acid rain cause paint to peel, corrosion of steel structures such as bridges and erosion of stone statues, besides causing total destruction to crop.

d) **Global Warming**: Global warming is a phenomenon associated with the increase of earth's temperature. One of the major causes of global warming has been excessive production of ***Greenhouse gases***. A greenhouse gas is a gas that absorbs and emits radiation within the thermal infrared range. The primary greenhouse gases in the Earth's atmosphere are water vapour, carbon dioxide, methane, nitrous oxide and ozone. Greenhouse gases have a great effect on the earth's temperature.

In just a few decades shrubs in the Arctic, tundra have turned into trees as a result of the warming Arctic climate, creating patches of forest which, if replicated across the tundra, would significantly accelerate global warming.

Source: http://www.sciencedaily.com/releases/2012/06/120606113146.htm

View of the northernmost foothills of the Polar Ural mountains on the Southern Yamal Peninsula in West Siberia, Russia. Here willow (Salix lanata) thickets and individuals have a greyish metallic canopy and stand out in the forefront and background, located mostly in concave areas. Alder (Alnus friticosa), green canopy, stands out clearly against both willow and the other tundra vegetation. An increase in shrub height in recent decades has been remarked upon by indigenous Nenets nomads both east and west of the Urals, who have had to modify their reindeer herding practices in response to the changes. (Credit: BC Forbe)

2.1 Methods of Management and Conservation of Natural Resources

Following methods contribute immensely towards efficient conservation of resources:-

a) **Recycling:** This is a method by which some of the resources can be conserved by recycling them or reusing them by adopting certain methods as under:-

(i) Recycling of paper will reduce the burden on trees.

(ii) Recycling of water including sewage will reduce the burden on sub soil /fresh water for irrigation.

(iii) Recycling of metal / plastic waste will conserve metal resources.

b) **Water Harvesting**: This method can be used for storing rainwater for use at a later date. In villages, storing of rain water in ponds will increase the level of sub soil water.

c) **A forestation:** Planting more trees and avoid cutting of trees. This will prevent soil erosion as also increase good gases in the environment.

d) **Proper Waste Management:** This will prevent pollution of soil and water sources like river, ponds and sea. This not only involves segregation of waste into biodegradable / non-biodegradable and its subsequent treatment, but also treatment of industrial / sewage effluents before discharge into the river / sea.

e) **Greater Use of Renewable Sources**: Using renewable sources of energy like solar and wind power will help in conserving electricity.

f) **Avoid Wastage:** Excessive use / uncontrolled use lead to wastage. Wastage can be prevented by proper education, monitoring and controlled usage.

g) **Increasing Energy Efficiency**: Use of energy efficient vehicles or equipment like CFLs will reduce consumption. Also use of alternate sources of energy like solar or wind energy will reduce consumption of electricity.

h) **Monitoring and Control:** There is a strong need to put into place strong and stringent control and monitoring organizations so that uncontrolled wastage can be prevented.

2.2 Role of NCC in Conservation of Natural Resources

Every cadet can fulfil his obligation towards environment individually or collectively by following:-

a) Avoiding cutting of trees and by planting more trees.

b) Not polluting water sources like river, ponds and sea.

c) Avoiding use of plastic.

d) Reducing noise pollution.

e) Recycling natural resources to ensure their efficient sustainable use.

f) Using renewable sources of energy like solar and wind power.

g) Saving energy in small and practical ways like switching off fans, lights and other electric gadgets when not needed.

3. Water Conservation and Rainwater Harvesting

Water is a very important and precious resource for survival of mankind. Water Conservation encompasses policies, strategies and activities to manage fresh water as a sustainable resource, to protect the water environment and to meet current and future human demands. Population growth, household size and affluence affect the quantity of water that is consumed. Factors such as climate change increases pressure on natural water resources, especially in manufacturing and agricultural irrigation. Water is fast becoming scarce due to increase in population, industries and agricultural activities and due to poor rainfall.

3.1 Need for Water Conservation

No other natural resource has had such an overwhelming response on the history of mankind as much as Water. As human population increases, the desire for a better standard of living will increase the demands on fresh water resources.

Much of the world's fresh water is consumed by the agricultural, industrial and domestic sectors. The failure in efficiently managing this resource to meet the increasing water demands of these sectors has resulted in a situation of crisis in many parts of the world. In many parts of India, freshwater crisis already exists.

With only 1% of water available for human consumption, we must treat our water supply with more respect. Water conservation should not be considered an option any longer but is an inescapable necessity. Current circumstances require our full attention, if we hope to thrive as a civilization. Much of the world is currently suffering due to lack of clean water. Therefore, it is extremely important to seek out, find and start using all the innovative water conservation solutions and methods that are available today.

3.2 Ways to Conserve Water Indoors: The best place to start Water Conservation is one's own house. Certain measures which can be adopted at home are:-

a) Ensure that there are no leaks in our house, in the pipelines, taps and toilets.

b) Use water efficient flushes and if possible, toilets with dual flushing systems.

c) Close taps while brushing our teeth, shaving or soaping our face.

d) Use water from washing of clothes for cleaning floors.

e) Use appropriate amount of detergent for washing clothes.

f) Close the shower tap whilst soaping our body.

g) When washing dishes by hand, we shouldn't let the water run while rinsing. Fill one sink with washing water and the other with rinsing water.

h) Monitor your water bill for unusually high use. Our bill and water meter are tools that can help us to discover leaks.

j) Water our lawn and garden in the morning or evening when temperatures are cooler to minimize evaporation.

Water Conservation Practices for Water Utilities: Common practices used by water supply utilities include metering, leak detection, repairing water lines, well capping, retrofitting programs, pricing, waste-water reuse and developing public education programs and drought management plans.

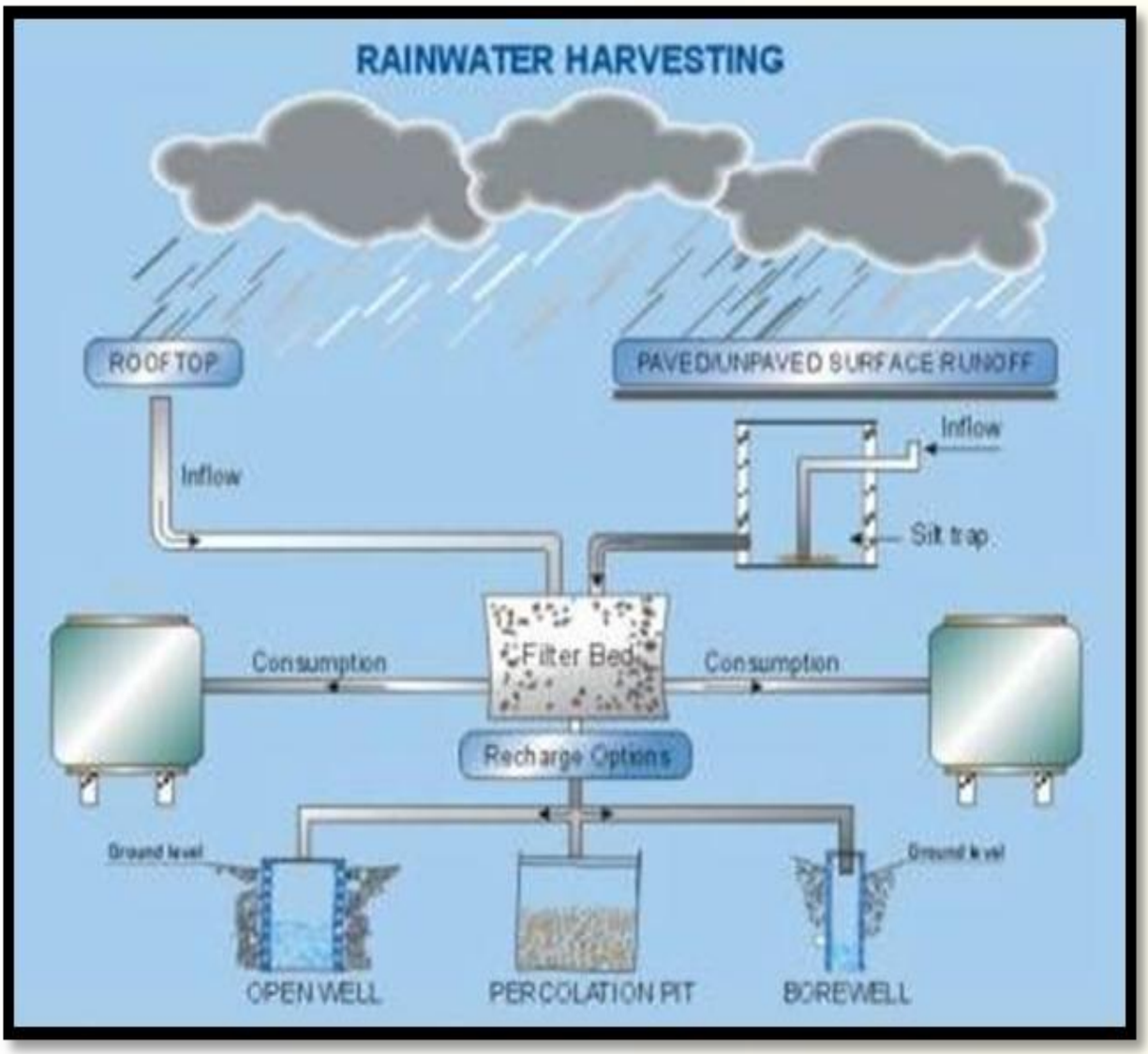
Agricultural Water Conservation Practices: Water saving irrigation practices fall into three categories, field practices, management strategies and system modifications. Practices such as drip irrigation can save large quantities of water. Careful and judicious use of water for irrigation can lead to irrigating much more land.

Industrial and Commercial Water Conservation Practices: Industries could save copious amount of water by installing water recycling systems. 'Cooling Water Recirculation' and 'Wash Water Recycling' are the most widely used water recycling practices.

Other Methods to initiate Water Conservation would include, public outreach programmes, nukkad and community dramas and water audits. Rainwater harvesting is one of the most successful techniques being used in India.

4. Rain Water Harvesting

Rainwater harvesting means capturing the runoff of the rainwater in our own house, village, town or city. It basically means accumulation and storage of rainwater for reuse, before it reaches the aquifer. Utilisation includes water for garden, livestock, irrigation, etc. In many places, the water collected is just redirected to a deep pit with percolation. The harvested water can be used for drinking water also, if the storage is a tank that can be accessed and cleaned when needed.



Source: http://www.ppcb.gov.in/rwhs.php

Need for Rainwater Harvesting: India is in a state of water crisis, both in rural and urban areas. Floods and droughts go hand in hand in this country, which causes water scarcity. Rainwater is a pure form of water if stored properly and it can greatly reduce the pressures on treated water supply. Rainwater harvesting is therefore extremely essential for the following reasons:-

a) It helps to recharge sub–soil and groundwater thus increasing the level of the water table.

b) It helps to create large quantity of pollution free potable water that can be stored in huge tanks or ponds for use later on. In cities, it reduces the dependence on treated water supply to a great extent.

c) It ensures ready supply of water on the land surface thereby reducing dependence on the groundwater.

4.1 Types of Rainwater Harvesting Systems

There are a number of ways to harvest rainwater, ranging from very simple to the complex industrial systems. Generally, rainwater is either harvested from the ground or from a roof. The rate at which water can be collected from either system is dependent on the plan area of the system, its efficiency and the intensity of rainfall.

a) **Ground Catchment Systems:** Channelize water from a prepared catchment area into a storage system. Generally, this method is only considered in areas, where rainwater is very scarce and other sources of water are not available. They are more suited to small communities than individual families. If properly designed, ground catchments can collect large quantities of rainwater. This method is ideally suited for villages in rural India.

Rain Water Recylcing

b) **Roof Catchment Systems**: Roof catchment systems channelize rainwater that falls onto a roof, into a storage tank via a system of pipes. The first flush of rainwater after a dry season, should be allowed to run to waste as, it will be contaminated with dust, bird droppings etc. Rain Water from the subsequent showers can be harvested. Roofs and pipes should have sufficient incline to avoid standing water. They must be strong enough and large enough to carry peak flows. Storage tanks should be covered to prevent mosquito breeding and to reduce evaporation losses, contamination and algae growth. Rainwater harvesting systems require regular maintenance and cleaning, to keep the system hygienic and in good working order. This method is most suited for towns and cities.

c) **Subsurface Dyke**: A Subsurface Dyke is built in an aquifer to obstruct the natural flow of groundwater, thereby raising the groundwater level and increasing the amount of water stored in the aquifer. Example, the Subsurface Dyke at Krishi Vigyan Kendra, Kannur under Kerala Agricultural University with the support of ICAR, has become an effective method for ground water conservation by means of rain water harvesting technologies. India. The dyke is now the largest rainwater harvesting system in that region.

Subsurface dyke

Subsurface dyke is a structure that is built in an aquifer with the intention of obstructing the natural flow of ground water, thereby raising the ground water level and increasing the amount of water stored in the aquifer. A trench was made across the valley portion of the undulating topography of the farm down to the bed rock. Three layers of plastic sheets were spread on the wall of the trench from ground level to the bed rock level. The plastic sheet on the wall measured 40m in length with a maximum depth of 8m. It obstructs the flow of sub surface water raising water table in the catchment area.

Source: http://en.wikipedia.org/wiki/Subsurface_dyke

Subsurface Dyke

Source: www.thehindu.com

Groundwater Recharge: Rainwater may also be used to recharge groundwater where the runoff on the ground is collected and allowed to be absorbed, adding to the groundwater. In India this includes Bawdis and Johads, or Ponds which collect the run-off from small streams in a wide area. In India, reservoirs called tank as were used to store water; typically they were shallow with mud walls. Ancient tank as still exist in some places.

Advantages in Urban Areas: Rainwater harvesting in urban areas can have manifold advantages. Some of the reasons why rainwater harvesting can be adopted in cities, is to provide supplemental water for the city's requirements, to increase soil moisture levels for urban greenery, to increase the ground water table through artificial recharge, to mitigate urban flooding and to improve the quality of groundwater. In urban areas of the developed world, at a household level harvested rainwater can be used for flushing toilets, washing laundry, showering or bathing. It may however require some treatment before it can be used for drinking.

SUMMARY

Natural resources are Mother Nature's gift to mankind. These need to be used with discretion. Large scale industrialization, urbanization and massive increase in population are leading to depletion of these meagre resources. Natural resources are to be conserved and managed judiciously.

Types of Natural Resources

- *Renewable Resources*
- *Non-Renewable Resources*

On the basis of origin

- *Biotic*
- *Abiotic*

Need for Management and Conservation of Natural Resources

- *Ozone Depletion*
- *Soil Erosion*
- *Acid Rain*
- *Global Warming*

Methods of Management and Conservation of Natural Resources

- *Recycling*
- *Water Harvesting*
- *Afforestation*
- *Proper Waste Management*
- *Greater Use of Renewable Sources*

- *Avoid Wastage*
- *Increasing Energy Efficiency*
- *Monitoring and Control*

Comprehension Questions

Q.1. Answer the following in about 15 words:

i. What is a natural resource?

ii. What do you understand by reserve resources?

iii. What do you understand by water conservation?

iv. What affects the quantity of water that is consumed?

Q. 2. Answer the following in about 50 words

i. What are renewable and non-renewable resources?

ii. Write a short note on ozone depletion?

iii. How can we conserve water indoors?

iv. Write a note on agricultural water conservation practices?

v. What do you understand by ground water recharge?

Q.3. Answer the following in about 75 words

i. Write short note on

a) Soil erosion

b) Biotic and abiotic

ii. What do you understand by global warming?

iii. What are the advantages of rain water harvesting in urban areas?

iv. Why is there a need for water conservation?

Q.4. Answer the following in about 150 words

i. How can every cadet fulfil his/her obligation towards environment individually or collectively?

ii. On the basis of their stage of development, in how many categories can we divide the natural resources?

iii. Why is there a need for rainwater harvesting?

Q.5. Answer the following in about 250 words

i. Explain the types of rainwater harvesting systems?

Let's Discuss:

Q.6. HOTS (Higher Order Thinking Skills)

i. "Natural resources are to be conserved and managed judiciously". How far do you agree with the statement.

ii. "Charity begins at home ". In the light of given statement give any five measures of Water Conservation at home.

iii. One morning when you woke up, you realised that there was no water supply; other families also faced the similar crisis, thanks to a neighbour having left a tap open and proceeding on a vacation.

a) How would you fix the problem?

b) Did this incident teach you a lesson? Mention at least two values that you learnt from this incident.

Group Activities:

1. Make a power point presentation (10-12 slides)/charts on types of renewable resources and their conservation

Or

Make a power point presentation (10-12 slides)/charts on conservation of Natural resources

2. "Human being are misusing Natural Resources". As Disha/Karam, cultural secretary of ABC school, design a poster on 'Save Natural Resources - Save Humanity'

3. "Water water everywhere, not a drop to drink". Though we are surrounded by 71% water on earth, we do not have enough to drink. Only 1% water remains portable. You are Madhu/Saurav, Cultural Secretary of XYZ School. Through a speech in the morning assembly, discuss the 'Need to conserve water and Rain water harvesting'.

4. Conduct an Intra class quiz competition on water conservation and rain water harvesting.

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