

ECO-CLUB MANUAL

(FOR ECO-CLUB INCHARGES)

2012



स्वाध्यायान्मा प्रमदः

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CHAPTER

1

ECO - CLUB

Introduction

A group of people who are interested in doing something for the environment can achieve much more than an individual can. Groups promote discussion, which can lead to innovative and exciting ideas. Working as a club is also much more fun and is a good way to make friends. All sorts of clubs can be formed, but an eco club will enable you to do something positive about the environment and there are interesting and exciting activities that can be generated around the topic “our environment”.

Historical background

Environment Education, Awareness & Training (EEAT) Scheme is a Central Scheme.

EEAT Scheme was launched during the 6th Five Year Plan in 1983-84 with specific objectives . Over a period of time, it undertook number of programmes with different names .

- (i) To promote environmental awareness among all sections of the society;
- (ii) To spread environment education, especially in the non-formal system among different sections of the society;
- (iii) To facilitate development of education/training materials and aids in the formal education sector;
- (iv) To promote environment education through existing educational/scientific/research institutions;
- (v) To ensure training and manpower development for environment education, awareness and training;
- (vi) To encourage non-governmental organizations, mass media and other concerned organizations for promoting awareness about environmental issues among the people at all levels;
- (vii) To use different media including films, audio, visual and print,, theatre, drama, advertisements, hoarding, posters, seminars, workshops, competitions, meetings etc. for spreading messages con-

cerning environment and awareness; and
(viii) To mobilize people's participation for preservation and conservation of environment.

How to achieve objectives

The objectives of this scheme are being realized through implementation of the following programmes launched over the years:

- (1) National Environment Awareness Campaign (NEAC).
- (2) National Green Corps (NGC) / ECO Club.
- (3) Global Learning & Observations to Benefit the Environment (GLOBE).
- (4) Seminars/Symposia/Workshops.
- (5) Other Awareness Programmes like Quiz/Essay/Debate/Poster/Slogan competitions/ Rally / Campaigns/ Mock Eco Assembly, training programmes etc.

Environmental Education, Awareness and Training plays a significant role in encouraging and enhancing people's participation in activities aimed at conservation, protection and management of the environment, essential for achieving sustainable development. The Ministry, therefore, accords priority for the promotion of non-formal environment education and creation of awareness among all sections of the society through diverse activities using traditional and modern media of communication. Some of the major activities undertaken in this regard are as follows:

National Environment Awareness Campaign (NEAC):

The NEAC was launched in mid 1986 with the objective of creating environmental awareness at the national level. It is a multi-media campaign which utilises conventional and non-conventional methods of communication for disseminating environmental messages to a wide range of target groups. Under this campaign, nominal financial assistance is provided to registered NGOs, schools, colleges, universities, research institutions, women and youth organisations, army units, State Government Departments etc. from all over the country for organising/ conducting awareness raising activities. These activities which include seminars, workshops, training programmes, camps, padyatras, rallies, public meetings, exhibitions, essay/debate/painting/poster competitions, folk dances and songs, street theatre, puppet shows, preparation and distribution of environmental education resource materials etc., are followed by action like plantation of trees, management of household waste, cleaning of water bodies etc. Diverse target groups encompassing students, youth, teachers, tribals, farmers, other rural population, professionals and the general public are covered under NEAC. The programme is being implemented through 28 designated Regional Resource Agencies (RRAs) for specific states/regions of the country. The list of these RRAs along with their addresses is given at the end. The applications for participation in this programme are invited every year through advertisement in major national and regional newspapers during the months of May/June. Any additional information can be obtained from the concerned regional resource agency.

Eco-clubs (National Green Corps) :

The main objectives of this programme are to educate children about their immediate environment and impart knowledge about the eco-systems, their inter-dependence and their need for survival, through visits and demonstrations and to mobilise youngsters by instilling in them the spirit of scientific inquiry into environmental problems and involving them in the efforts of environmental preservation.

Since the modification of the scheme in 1993, more than 10,000 Eco-clubs had been provided grants until 2000-2001 in various parts of the country. Considering that the total number of schools covered

were grossly inadequate compared to the total number of schools in the country and keeping in view the potential of this programme in sensitizing the school students. It was decided to intensify this programme to cover each and every district of the country.

A programme of raising National Green Corps through the Eco clubs was, therefore, launched during 2001-2002. Under this programme, Eco-clubs are being set up in 100 schools of each District of the country. 47,000 Eco-clubs have been set up so far in the country. This programme is being implemented in each State/UT through the Nodal agency appointed by the State/UT Govt.

Global Learning and Observations to Benefit the Environment (GLOBE)

The GLOBE is an International Science and Education Programme, which stress on hands-on participatory approach. India joined this programme during the August, 2000. This programme, which unites students, teachers and scientists all over the world, is aimed at school children.

The Supreme Court and Environment Education

In 1991, Shri M C Mehta filed an application in the public interest (Writ Petition (Civil) No. 860 of 1991), asking the Supreme Court to:

- Issue direction to cinema halls that they show slides with information on the environment;
- Issue direction for the spread of information relating to the environment on All India Radio; and
- Issue direction that the study of the environment becomes a compulsory subject in schools and colleges.

The consequent order of the Supreme Court dated 22 Nov. 1991 is available .

On 18th December 2003, the Hon'ble Supreme Court further ordered, “We also direct the NCERT....to prepare a module (model) syllabus”, and directed that

“We accept on principle that through the medium of education awareness of the environment and its problems related to pollution should be taught as a compulsory subject. The University Grants Commission will take appropriate steps immediately to give effect to what we have said, i.e. requiring the Universities to prescribe a course on environment. So far as education upto the college level is concerned, we would require every State Government and every Education Board connected with education upto the matriculation stage or even intermediate college to immediately take steps to enforce compulsory education on environment in a graded way.”

On 13th July 2004 the Supreme Court directed that “the syllabus prepared by the NCERT for Class I to XII shall be adopted by every state in their respective schools”. It further directed that “NCERT be appointed as a nodal agency to supervise the implementation of this Court's order”. Compliance to Supreme Court order is mandatory and desirable, and applies to all states and Union Territories (in fact, it is one of the few things that apply to all education in India).

NCERT developed the following syllabus for Environment Education for 1 to 12 standards, which was accepted by the Supreme Court (*but this syllabus has subsequently been reviewed and revised in the light of NCF 2005*)

NCERT clarified that in order to have compliance, a separate subject is not necessary. It can be done through infusion, in science, social studies, mathematics, language and other subjects, and/or through a separate subject. It does however have to be part of the compulsory curriculum.

The NCERT submitted an affidavit to the Supreme Court, which was accepted by the Supreme Court on 03-12-2010 and the matter of the writ petition is deemed to have been resolved.

The current method of implementation of EE in Schools as accepted by the petitioner Mr. MC Mehta, the NCERT and the Supreme Court, is as follows

Classes	Mode of Transaction
I and II	Through Activities
III to V	Environmental Studies (EVS)
VI to X	Infusion Model
XI to XII	Project based study

The NCERT is to bring out project books for standards V to XII.

Purpose to establish Eco-club

- Teach others about what we have learned
- Actively involve with nature physically and spiritually
- Provide a service to our community
- Protect and preserve wildlife
- Gain an understanding of our environment and our place in it
- Improve the natural environment
- Lessen our negative impact on the environment
- Develop and enhance our mental and physical skills

BASIC STRUCTURE OF ECO-CLUB IN SCHOOL

Initiation of an Eco club :

The idea of forming an Eco club may come from principal or school administration . Sometimes an enthusiastic teacher may take the lead or students themselves may ask to be allowed to take up these activities . In some cases , outside organizations like WWF or CEE may initiate the process of starting an Eco club in the school .

How to form an Eco club:

A club can be a school-related activity, in which case it would be useful to obtain the involvement of a teacher. It can also be run within your community, where you can use word of mouth or advertise in newspapers to recruit members. It is a good idea to have a constitution for your club. This will include:

- The name of the club
- The aims and objectives of the club
- Administration, for example, a chairperson, a treasurer and a secretary
- Membership
- Club meetings
- Contacts (organizations which can provide assistance, such as the WWF and Deptt. of Environment, NCT of Delhi & Ministry of Environment and Forests, Govt. of India)

Eco clubs in Delhi Institutions :

Eco Clubs play an important role in creating environmental awareness amongst the future generation. 2000 Eco-Clubs have been established in Government, Aided, Private, Public Schools and Colleges of NCT of Delhi. Department of Environment provides a token grant @Rs. 20000-/- to each Eco Club School/College for undertaking various eco-friendly activities.

The School/Colleges interested in Setting up of the “Eco-Club”

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The activities under the scheme include

1. Motivate the students to keep their surroundings green and clean by undertaking plantation of trees. (Forest Department provides free saplings from its 14 nurseries)
2. Promote ethos of conservation of water by minimizing the use of water.
3. Motivate students to imbibe habits and life style for minimum waste generation, source separation of waste and disposing the waste to the nearest storage point.
4. Educate students to create awareness amongst public and sanitary workers, so as to stop the indiscriminate burning of waste which causes respiratory diseases.
5. Sensitize the students to minimize the use of plastic bags, not to throw them in public places as they choke drains and sewers, cause water logging and provide breeding ground for mosquitoes.
6. Organize tree plantation programmes, awareness programmes such as Quiz, essay, painting competitions, rally, nukkad natak etc. regarding various environmental issues and educate children about re-use of waste material & preparation of products out of waste
7. Organize Nature Trail in Wild Life Sanctuaries/Parks/Forest areas to know about the Bio-diversity

In order to undertake the programme in a systematic way the Department has identified 93 schools and 2 colleges as Lead Schools and about 25-30 schools/colleges are attached to each lead school for proper coordination and implementation of various activities. Each lead eco-club school/college teacher has been trained as master trainer on environmental issues. Orientation programmes for Eco Club incharge teachers are also conducted with the help of Environment experts. The students are also exposed to field activities such as Nature Trails, Quiz and poster competitions etc. so as to create enthusiasm regarding issues pertaining to Plants/Forest/Wildlife/Bio-diversity and Nature.

Performance Measures

Growth in self knowledge and knowledge of the world around us .

Improved and healthier natural environment and increase in wildlife habitat .

Increase in species and biodiversity of wildlife .

Earn in ecology badges for activities performed .

Gain positive and peaceful feelings .

Campaigns in Eco-club schools

1. Tree Plantation drive
2. Anti –Fire Crackers
3. Say No to Plastic bags
4. Khelo Holi Naturally
5. Zero Garbage concept in schools

6. Water Conservation and Energy Conservation .
7. Rally / Human chain / Eco-care in schools and surrounding areas .
8. Message on Environment during Prayer / Morning Assembly .
9. Action oriented programmes like Paper recycling , Vermi-composting , Rain water harvesting , Mushroom cultivation , waste management etc.

Eco-club Dynamics :

1. Essay writing competition
2. Debate
3. Extempore
4. Poster making
5. Slogan making
6. Drawing and Painting
7. Quiz Competition
8. Rally
9. Expert Lecture
10. Eco Games
11. Cleanliness Drive
12. Field trips / Nature trails
13. Mock Eco Assembly
14. Any other

Tools / Materials needed

(Depending upon the project)

Seeds , seedlings , saplings , gardening gloves , various digging tools , rakes , pieces of wood , strong wood glue , hammer , nails , non-toxic paints , brushes etc.

Projects

1. Grow living gardens, flowers, vegetables and native plants .
2. Plant native trees on school ground .
3. Make birdhouses and nesting boxes and place on school grounds .
4. Build a nature trail with signposts and information .
5. School waste composting .
6. Waste material management
7. Build wildlife habitats and provide food , water and shelter for wildlife
8. Build a compost pile using grass clippings , fruit and vegetable scraps .
9. Environmental education : Provide learning resources for members .
10. Start recycling project by collecting cans , bottles , paper or cloth .
11. Remove alien invasive plant species in streams and catchment areas .
12. Litter clean ups of parks and other open spaces .
13. Undertaking environment management plan for your school or community centre .

Financial assistance for Action oriented programmes

1. **Rain water Harvesting** : 50% of the project cost Target - 2500 units .
2. **Waste Paper Recycling machine** : Rs. 1 Lac provided for each machine unit in 100 schools .

3. **Herbal Garden** : Rs. 2000/= each to each of the 60 schools .
4. **Solar Water Heating system** : Rs.. 60,000/= assistance for each of the 45 schools and colleges from Environment Deptt. to have Solar Water heating system with a life span of 30 years
5. **Vermi-composting** : Rs. 17000/= per school programme set up in 200 schools by M/s Society for Environment & Development and Control Association
6. **Mushroom cultivation** : Rs. 20,000/= per school programme set up in 40 schools using waste materials by M/s Delhi Tamil Education Secondary School .
7. **Solar Signage** : Proposed erection of Signage in 2000 Eco-club schools by M/s Prime Green Free of cost .
8. **Distribution of C Ds** : Getting ready for free distribution .

Composition of Eco-club

CHAIRMAN -	Principal / Vice Principal
ADVISOR TEACHER -	1 Senior Teacher preferably P G T
CO-ORDINATOR -	1 Teacher Incharge
MENTOR TEACHERS -	4 – 10 Teachers - 1 or 2 from each faculty of Science / Humanities / Language / Miscellaneous categories
PRESIDENT	1 Student – (Preferably of senior most class)
VICE PRESIDENT	1 Student – (Preferably of XI or IX class)
SECRETARY	1 Student
JOINT SECRETARY	1 Student
TREASURER	1 Teacher – (Assisted by a student)
MATERIAL MANAGER	1 Student
CLASS REPRESENTATIVES	1 or 2 Per Section
MEMBERS	All students and all teachers

Duties of Office bearers

- * **President** : He/she calls the meetings ; liaises with the teachers, school administration, etc., on behalf of the club ; takes a leadership role in organizing events and in planning , managing projects. **Vice President** will perform same duty in the absence of President .
- * **Secretary** : Keeps the minutes of the meetings ; sends copies of the minutes to concerned persons including Principal, parents, etc.; maintains the record of attendance of members ; prepares the report of activities at the end of every school term and one at the end of the year. **Joint Secretary** will perform same duty in the absence of Secretary .
- * **Treasurer** : He/she collects and manages all the money of the club ; keeps accounts of the funds received, spent, etc.
- * **Materials Manager** : Is in charge of the safe keeping of all the equipment, materials, books, videos, charts, etc., of the club .

These office bearers could be elected by the members. In order to give more children a chance to take responsibility, office bearers could hold office for a period of six months, or one school term .

- Executive body will meet once a month .
- Vice President will report to Mentor faculty .
- One Executive member of each group will write monthly report and give it to Vice President who will present it in Executive body meeting of the month .

Inventories of Eco-club :

- Minutes Register
- Cash book and Ledger
- Stock Register
- Certificates of Eco-club
- Prizes and Shields
- Banners and Play cards
- Dust bind or Twin bins
- Member badges
- Tools and materials

Eco-club Student Badge



Eco-club Monograms



CHAPTER

2

Biodiversity

Introduction

The variety of life present on Earth is commonly referred to as biodiversity. The number of species of plants, animals, and microorganisms, the enormous diversity of genes in these species, the different ecosystems on the planet, such as deserts, rainforests and coral reefs are all part of a biologically diverse Earth and represent its rich biodiversity. The earth supports an incredible array of biodiversity—from micro-organisms to the ocean's great blue whale—with plants and animals of all shapes and sizes in between. India is a biodiversity hot spot. The diversity of organisms could be seen as species diversity when we take into account the number of variety of individual species or taxonomic diversity i.e., number of variety of major groups of organisms. The richness of an area reflected in the terms of various life forms is good for the sustainable development. Monoculture, that is a single species dominated area have an adverse impact on the biodiversity of an area.

The main focus of the biodiversity education is to create knowledge, interest and necessary skills to solve various biodiversity problems.

Key words: biodiversity, ecosystem, hotspot, taxonomy, monoculture

About the topic

Why is Biodiversity important?

Biodiversity is essential to every aspect of the way that humans live around the world. Plants and animals provide people valuable services in the form of food and medicine, trees play an important role in absorbing green house gases, through photosynthesis trees absorb and store atmospheric carbon, helping to combat global warming and purifying the air we breathe. Forests also control soil erosion

and clean the air we breathe.

The various life forms present around us are serving various ecological roles and we all are interconnected via **food chain**, representing different trophic levels. A food chain is a sequence of who eats whom. The usual order of a food chain is sunlight, plants, herbivore, omnivore and/or carnivore. Food chains that are related in an ecosystem form a **food web**. Carnivores are an important part of biodiversity because they regulate herbivore populations so that they do not eat their favorite plant species to extinction.

Importance of plants cannot be ignored as they provide us food but animals also perform various significant jobs in our ecosystem for example; Amphibians play a pivotal role in ecosystem as secondary consumers in many food chains. Tadpoles have significant impact in nutritional cycling. They are herbivorous to omnivorous and are the prey items for both invertebrates and vertebrates. Adult amphibians are the best biological pest controllers. Invertebrates and vertebrates also predate them. Because of their importance in ecosystem, decline or extinction of their population has significant impact on other organisms along with them. Amphibians are particularly sensitive towards the changes in their immediate environment. Amphibians have been described as a marker species, as they provide an important signal to the health of biodiversity, when they are stressed and struggling. Their body along with the water can also soak up various chemical contaminants just like the way a sponge does and therefore amphibians are also called ecological sponges. The amphibians therefore can serve as bioindicators, providing valuable information about the aquatic ecosystem's health.

The tiny bee making that journey to a beautifully coloured flower and way back to the hive is not just collecting the nectar to make honey which we as human being cherish as part of our diet but also doing a valuable job to the plant species involved. The bee unknowingly carries the pollen sticking on the legs and the body and act as a pollinator.

Loss of biodiversity

We are losing this treasure called biodiversity because of many reasons, mostly due to the human-activities (anthropogenic activities). Sometimes it is because of the fascination for the items derived from the animal body/body parts or as a result of urbanization process. The human population is constantly growing but the space on mother earth is limited. Habitat loss due to deforestation as more of the trees are being cut under growing human population pressure is a major threat for biodiversity.

The Tibetan antelope, or chiru, produces a type of wool called *shahtoosh*. It is so fine that a shawl made from it can be pulled through an index-finger ring. Such a shawl may cost up to \$16,000, making it among the most expensive in the world. But what does this mean for the antelope that wears the wool?



Source: http://www.zzzlife.com/wp-content/uploads/2011/08/Tibetan_antelope3.jpg

One shahtoosh shawl meant at least the lives of five chirus. About 20,000 chirus from the Tibetan plateau are said to be poached each year. This occurs even though the animal is supposed to be protected under various endangered species acts. Moreover, in 1979 a ban was placed on trade in *shahtoosh* wool. Yet, since then, the number of chirus has continued to diminish.



The golden toad of Costa Rica was among the first casualties of amphibian declines. (Last seen in 1989).

Source: http://www.supergreenme.com/data/images/35/500x333_Golden-toad--Bufo_periglenes.jpg



Rana pipiens

Source: <http://www.denniskalma.com/rana%20pipiens.jpg>

Killing the animal directly is not the only way via which we are losing biodiversity. Atrazine, a widely used pesticide is making leopard frogs (*Rana pipiens*) hermaphrodite (bearing both male and female gonads in the same organism). Atrazine gets into aquatic water body, by means of agriculture runoff. It has the ability to disrupt sex hormones. This may be one of the causal agents for amphibian decline, world over.

The leopard frog is not the only victim, struggling hard to live on, even the large birds of prey, the vultures are experiencing the threat to life and their population has crashed down by 97%.

Vultures are called nature's sweepers as they provide a useful service by scavenging on carcasses, and thus, preventing the spread of any disease (due to rotting of carcass). The careless and casual



Oriental white-backed vulture (*Gyps bengalensis*)

Source: http://www.cosmosmagazine.com/files/imagecache/news/files/20080505_vulture.jpg

use of an anti-inflammatory drug, diclofenac used by cattle farmers as a popular cure to treat a variety of diseases is supposed to be the reason behind the severely declined population of vultures. The vultures feeding on carcasses of cows treated with the drug died of kidney failure.

Lion, Tiger, Indian one horned Rhinoceros, Elephant and Olive Ridley Turtle are also facing the threat to become extinct if steps are not taken to save them, as all these animals have already become endangered, that is facing a serious threat to become extinct very soon and the population size is small.

Threats

It has long been feared that human activity is causing massive extinctions. Despite increased efforts at conservation, it has not been enough and biodiversity losses continue. The costs associated with deteriorating or vanishing ecosystems will be high. Some of the threats are summarized below:

Deforestation: leading to habitat loss

Not only the forests are depleting year by year, but species that depend on the forests are also disappearing.

Pollution: in various forms like fertilizer, solid garbage, sewage disposal, pesticides and other man-made chemicals.

Oil spills have been a major and really threatening reason in the recent past for biodiversity loss.

Global warming, Ozone layer depletion, Acid Rain are some other factors responsible for biodiversity loss.

Man-Animal Conflict: A major problem associated with the conservation of wild animals especially the herbivores like elephants in India is that of crop depredation and man-slaughter. Animals such as elephants, gaur, sambar, wild boar and birds like peacock, cause extensive damage to the crops. This phenomenon has registered significant increase in recent years due to habitat fragmentation and degradation of natural forests and corridors.

Poaching: The abundance of wild animals and high demand for their products in the market pose threat to wild animals. Herbivores like gaur, sambar, chital etc are being poached for their meat. A lot of other not so spectacular species of animals ranging from reptiles to birds as well as plants and medicinal herbs are all part of the illegal wildlife trade.

Invasive species: An area/locality teeming with life forms comprises various organisms which stay comfortably with each other. The populations in a locality consists of plants, herbivores feeding on green plants and thus constantly keeping the green cover trimmed and carnivores eating and thus surviving on herbivores and keeping their population under constant check. Removal of a predator from the locality/ an ecosystem almost always imparts negative effects on the ecological balance. Similarly an **alien** or **invasive species** which has no known competitor or natural predator in the locality/area of invasion often displace and sometimes even force the native species (the old/earlier habitant species) to extinction. Examples of plant invasion in Kerala include Water hyacinth (*Eichornia crassipes*) and Lantana (*Lantana camara*). The weed water hyacinth, prevents sunlight and oxygen from reaching the water column and submerged plants. By crowding out native aquatic plants, it dramatically reduces biological diversity in aquatic ecosystems. Listed as one the 100 most dangerous invasive alien species of the world, this aquatic weed native to South America, was introduced to the country as an ornamental plant for cultivation in ponds because of its beautiful, large purple and violet flowers.

Conservation of ecosystems and the species within them would help to maintain the natural balances disrupted by recent human activity.

What you can do?

Save energy

Recycle and reuse

Use both sides of the paper , recycle your news papers and magazines

Be a smart shopper

Buy recycled paper products, like envelopes, chart papers

Use efficient transport

Less air pollution

Do not buy things made from animals avoid ivory products ,fur coats, toosh shawls, leather belts ,leather bags, leather wallets made up from endangered animals skin.

Suggestive activities:

In order to develop the biodiversity consciousness among students, the action oriented biodiversity education methods such as active classroom sessions (quiz, discussions, painting competitions, debates etc.), hands-on activities, experiential education, and field exposures that are vital to achieve sustainable biodiversity knowledge and motivate to protect and conserve local biodiversity should be employed.

Few suggestions are:

1. Organizing nature trails in wildlife sanctuaries, parks /forest to know biodiversity.
2. Collecting various types of bird features and making a scarp –book out of those, pasting the picture of the bird along with the feature.
3. Making a botanical garden in the school, putting signposts and providing some information about the tree/herb/shrub.
4. Making a herbarium
5. Making bird houses and placing at school grounds (students can be asked to make small bird houses out of old and discarded shoe boxes at home as well).
6. Planting saplings increasing the green cover of the school, student care-taker (adopt a tree)
7. Maintaining a small nursery at school, and providing free saplings to students to plant in the neighbourhood.

8. Depending upon the number of students ,name individual student or group of students after endangered species and collecting information about the same.
9. Collecting articles ,news items ,related to environmental issues affecting biodiversity, from magazines or newspapers for a week and pasting in a scrap book.
10. Organizing quizzes, painting competitions, essay competitions.
11. Making small index cards (with a picture and information about a plant/animal).
12. Puzzles (cross words, hidden names) match the tail with the animal, match the print (stripes, spots) with the animal), playing recorded sounds of various animals and students could be asked to recognize the animal.
13. Making paper bags out of waste /used paper.
14. Sorting out bio-degradable from non-biodegradable waste and use of separate bins .

Other Activities

Activity 1: The Value of Being Different

1. Go to your school ground , or a nearby park.
2. Look around at the trees. Are they different or are they the same?
3. Have students pair off or form small groups and find their own tree. Once they have found their tree, ask them to do the following:
 - a. Use your four senses to get to know your tree.
How does it look? Feel? Smell?
 - b. Find things that make your tree unique or different.
 - c. Match up with another group and explain to them why your tree is the same or different from theirs, and discuss these differences.

Activity 2: Mini-Forest in your school grounds

1. Divide the students into small groups and go to an area of your school ground, or park, where a variety of plants and insects may be found.
2. Have each group choose a small study area, and mark off the area (e.g. string, etc). Mark off an area of about 50cm.
3. Inspect the marked off area for different types of plants and insects. Use magnifying glasses to get a closer look.
4. What do you see? Are there any plants? Is anything moving?
What is dead? What is alive?
5. Have each group visit each other's areas and compare observations.
6. Sit in a circle and discuss the similarities and differences. Why is it important to have lots of different things in an ecosystem?

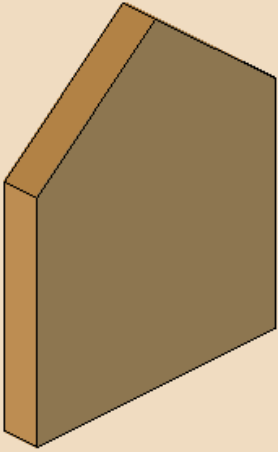
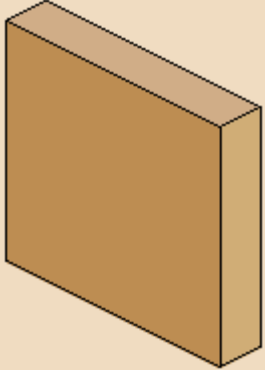

Activity 3: Making a Bird House



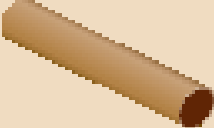


STEP 1.

Cut out the pieces. Use 3/4" thick wooden plank for the whole thing, and a 3/8" diameter dowel for the perch.

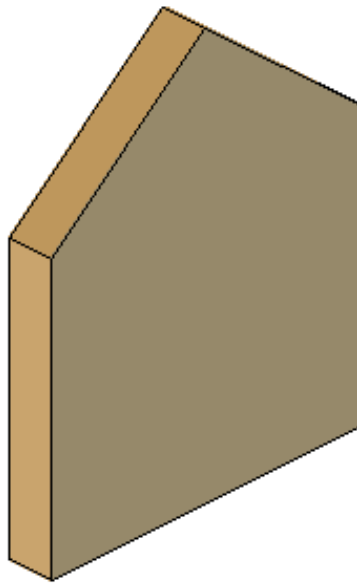
Here are the sizes of 3/4" thick wood to cut for the Bird's Bird House.

Quantity	Length	Width	Part	
(2)	8½"	5½"	Front & Back	
(2)	4½"	4"	Sides	
(1)	5½"	3¾"	Floor	

(1)	5¼"	6½"	Left Roof	
(1)	6"	6½"	Right Roof	
Here is the size of dowel to cut for the Bird's Bird House.				
Quantity	Length	Diameter	Part	
(1)	2"	3/8"	Perch	

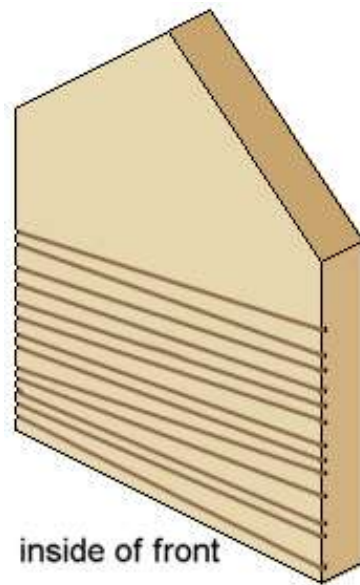
STEP 2.

Cut the 45° angles on the back and front.



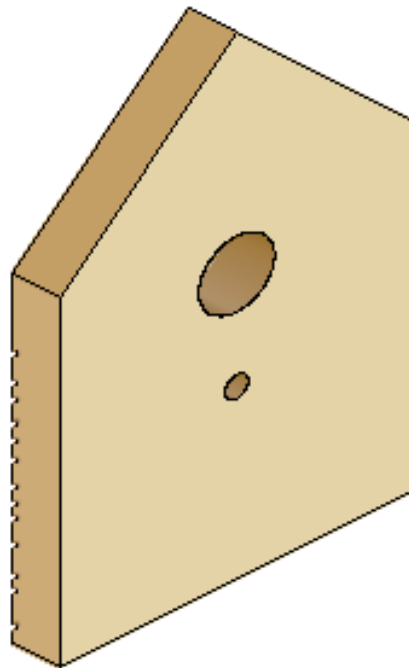
STEP 3.

Sometimes newly hatched baby birds have a tough time getting a grip on the smooth wood of the inside of ordinary bird houses, and the poor wee things can't get out. So, make little ridges with a saw across the inner surface of the front wall. Then the hatchlings will easily climb up to the door when they are ready.



STEP 4.

Drill the $1\frac{1}{4}$ " door hole. The center of the door is $4\frac{3}{4}$ " from the bottom. Drill a $\frac{3}{8}$ " hole $\frac{1}{2}$ " deep for the perch, on the outside of the front. The center of the perch is 3" from the bottom.



STEP 5.

Get a big wood screw about 3 or 4 inches long for mounting the Bird House to a fence post. Drill a $\frac{1}{8}$ " hole through the back piece of the Bird House $4\frac{3}{4}$ " up from the bottom edge. Get the screw started before assembling the Bird House. The mounting screw will line up with the door hole, so you will be able to tighten it up after assembly and painting.

STEP 6.

When nailing the Bird House together, there should be a 1/8” drainage gap at the front and back of the floor.

Use wood glue to set the perch in place.

STEP 7.

Paint the outside of the birdhouse but not the inside. Birds prefer natural wood for their interior decor.

STEP 8.

Find a good spot for Bird House outside, and tighten in the mounting screw. Put another one in at an angle from the bottom for stability, using a pilot hole there as well.

Materials required: notebook, pencils, magnifying glasses, strings, measuring tapes, screws, nails, hammer, saw, glue, and some wood.

Evaluation: On the basis of activities performed inside and outside the class-room, students can be assessed and evaluated for the understanding of the concept and value of biodiversity conservation.

Various parameters for evaluation : Tools like multiple choice questions, fill in the blanks, match the patterns, short answer type questions for example;

1. Define biodiversity
2. Identify threats to biodiversity
3. Provide examples of the importance of biodiversity.

Values developed

1. Understanding the relevance of biodiversity to real world issues.
2. Understanding the relationship between biodiversity, climate change, and human health and well-being.
3. Development of respect towards all life-forms (big/small).
4. Changes in lifestyle choices (avoiding products derived from endangered animal’s skin).
5. Sensible utilization of resources (especially non-renewable ones).
6. Understanding the Judicial and careful use of chemicals like pesticides, fertilizers and drugs

ENVIRONMENT EDUCATION FOR SUSTAINABLE DEVELOPMENT

During the recent decades the blind race for industrial growth has enhanced human activities. This has induced stresses on environment, necessitating the understanding of environment. It is more critical than ever before for the humankind as a whole to have a clear understanding of environmental concerns and to follow sustainable development practices. The degradation of our environment is linked to continuing problems of global warming, pollution, loss of forest, solid waste disposal, and issues related to economic productivity and national as well as ecological security. Environmental education focusing on real-world contexts and issues often begins close to home, encouraging learners to understand and forge connections with their immediate surroundings. The awareness, knowledge, and skills needed for these local connections and understandings provide a base for moving out into larger systems, broader issues, and a more sophisticated comprehension of causes, connections, and consequences.

Environmental education

Environmental education refers to organized efforts to teach about how natural environments function and, particularly, how human beings can manage their behavior and ecosystems in order to live sustainably. The term is often used to imply education within the school system, from primary to post-secondary. Environmental education is a learning process that increases people’s knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the

challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action (UNESCO, Tbilisi Declaration, 1978).

Sustainable Development

The common definition for sustainable development is: “ Development that meets the needs of the present without compromising the ability of future generation to meet their own needs” Sustainable development is economic development that exclusively relies upon and is firmly rooted in the integrity and sustainability of the natural environment. National resources management has emerged in line with the evolving concept of sustainable development over the past three decades. If nature’s resource base is irredeemably depleted or irreversibly degraded , the means of wealth creation for social welfare will be seriously jeopardized. Without environmental sustainability, it is impossible to achieve sustainable development.

Importance of Environmental education

The ultimate goal of environmental education is to develop an environmentally literate public. It needs to address the connection between our conception and practice of education and our relationship as human cultures to life-sustaining ecological systems. For each environmental issue there are many perspectives and much uncertainty. Environmental education cultivates the ability to recognize uncertainty, envision alternative scenarios, and adapt to changing conditions and information. This knowledge, skill, and mindset translate into a citizenry who is better equipped to address its common problems and take advantage of opportunities, whether environmental concerns are involved or not.

In order to achieve the goals of sustainable development, people need to become aware of the environmental issues and acquire background knowledge to enable them to make and influence decisions. Environmental education is thus concerned with attitude towards, and decisions about environment quality, with informed management of resources, and with the ethical considerations that relates to these. Recognizing the importance of environmental education at all levels, the Hon’ble Supreme Court of India ruled that a course on Environment be made mandatory at the undergraduate level to sensitize the youth to environmental issues and concerns. As per the Supreme Court direction, the University Grants Commission introduced six months of compulsory environmental course in all the universities and colleges during the academic year 2004-05.

The declaration of the decade for Education for Sustainable Development (ESD) beginning in 2005, by the United Nations has provided further impetus. The goal is to create a *sustainable world* through active participation of citizens. Thus, ESD is seen as a process that develops vision, builds capacity, and empowers to make changes in human societies. Education has a pivotal role to play in achieving a sustainable economy and society.

Benefits of Environment Education Programmes

The management of ecosystem involves inventorying and monitoring, and applying integrated technologies, methodologies, and interdisciplinary approaches for its conservation. Hence, now it is even more critical than ever before for the human beings to be environmentally literate. To realise this vision, both ecological and environmental education must become a fundamental part of the education system at all levels of education. Environmental education programme at schools would generate ecological and environmental quality data at regional levels, which helps the local administration in the management of natural resources. Involvement of schools (every year) helps in getting the data updated. The benefits are:

- At the students level – students and local public get sensitised about their local/neighbourhood environment, socio-economic backgrounds and ecological relevance.
- When carried out periodically, over a period of time a good repository of local environmental information is generated by the high school students for their neighbourhood, which is a *contribution* in itself.

Fate of the earth's remaining natural resources depends on the sustainable management and development actions by humans. India will certainly achieve the goals of sustainable development only if it succeeds in developing environmentally literate public with the knowledge of ecosystems and the environment. This requires sincere effort and involvement of all sections of the society - decision makers, educators, and general public at large. It is the right time for all of us to plan our natural resources through conservation approaches. Sustainable ecosystem management and development leading to conservation of natural resources is the key to our secured future.

Role of Eco-Club

Eco- Clubs can play a pivotal role in spreading awareness of Environmental Education for Sustainable Development among the students . A variety of activities and programmes can be employed to spread awareness among students, a few of them are:

- **Environmental Review and an Action Plan** to set achievable targets and deadlines for raising awareness, acquiring new perspectives, values, knowledge and skills; and formal and informal processes leading to changed behaviour in support of a sustainable environment.
- **Essay competition and quiz programmes.**
- **Drama, Nukkad Natak, Poetry Recital, Singing Programmes.**
- **Poster Making, Slogan Writing Competitions.**
- **Tree Plantation, Van Mahotsav Celebrations.**
- **Workshop/ training programmes** to train students and teachers in environmental monitoring (this would include hands-on training). Paper presentation by students in international and national symposium / seminars.
- **Development of environment education materials in self learning format**

Evaluation

To ensure that progress is made and that achievements are celebrated, monitoring and evaluation are necessary. Certain themes are studied in the classroom through Curriculum Work, and all students are involved in practical initiatives. Each school should develop its own Eco-code (like not using plastics in schools, using different dustbins for biodegradable and non biodegradable waste etc.), outlining the environmental values and objectives and what the students are striving toward. After a period of participation, an evaluation of the success of these initiatives and the methodology is undertaken, and each school should be assessed. Successful Eco-clubs (and schools) and students are awarded with the **Eco Award** during the Annual Functions.

Word find

There are twenty Biodiversity related terms hiding in this puzzle. See if you can find them. The names can be read upwards, downwards, backwards or diagonally.

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

CHAPTER

3

HEALTHY FOOD HABITS AND DEFICIENCY DISEASES

RICE- CARBOHYDRATES

BUTTER- FATS

RADDISH- FIBER

MUSHROOM- MINERALS

WATER

CARROT- VITAMINS

SALMON- PROTIENS

There are seven major classes of nutrients: vitamins, carbohydrates, fats, fibre, minerals, proteins and water.

FROM WHERE DO YOU THINK TIMMY HAS GOT THE ENERGY TO PLAY ALL DAY LONG?

Carbohydrates are necessary to your health, because every cell in your body uses them for energy. In fact, your brain can only use carbohydrates for energy. Unfortunately, over consumption of sugar and other highly refined carbohydrates has been associated with a higher incidence of diabetes and Cardiovascular Disease. Carbohydrates are high-fiber foods, which improve your digestion.

Some examples of healthy foods containing complex carbohydrates are Spinach, bread and Oats.

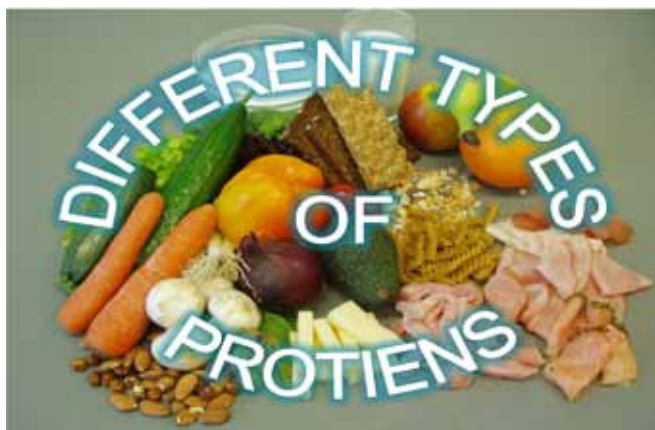
Simple carbohydrates are more refined, are usually found in foods with fewer nutrients, and tend to be less satisfying and more fattening.

Some examples of foods containing simple carbohydrates are:

Coke[®], Pepsi[®], Mountain Dew[®], etc.

PROTEINS

Proteins are needed for building the structure in the cells and in the formation of tissues and organs. They are needed for the growth of the body to repair damaged parts such as cuts on the skin and to replace tissues that are constantly being worn away such as the lining of the mouth.

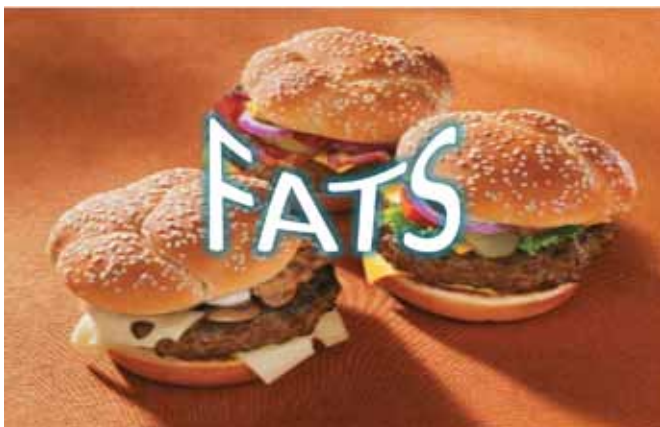


WHEY PROTEIN

Whey protein is a quickly digested protein. During the day there is a great need for amino acids to begin muscle repair and Whey protein is excellent for this. Whey is highly available, and boasts the highest value of any protein source.

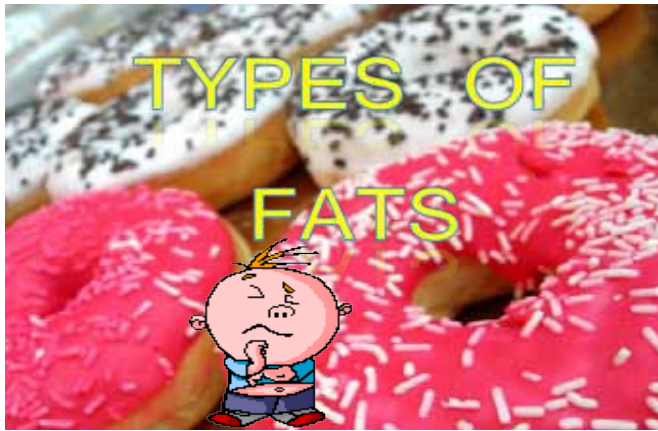
CASEIN PROTEIN

Casein protein is slower absorbing from the stomach and small intestine so the blood amino acid levels don't rise quite as rapidly as the Whey protein. Casein is extracted from the milk without the use of chemicals. Casein is the only protein you should be taking before going to sleep. The reason is because your body needs to be sustained for six to eight Hours during your sleep without food.



Fats are concentrated source of food energy. They are also the source of linoleum acid, an essential nutrient, and the fat-soluble vitamins A, D, E and K.





<u>Vitamins</u>	<u>Symptoms of deficiency</u>	<u>Sources</u>
vitamin A	Easy to infection; poor vision in twilight. Retarded growth.	Milk, butter, eggs, liver, margarine, tomatoes, carrots, fish liver oils.
vitamin B1 (Thiamine)	Loss of appetite; nerve disorders; fatigue; poor digestion. Retarded growth.	Meat, especially pork, wholemeal bread and cereals, milk, vegetables.
vitamin B2 (Riboflavin)	Sores at corners of the mouth; other skin and membrane disorders	Meat, milk, green vegetables, eggs, poultry.
vitamin C	Slow healing; tendency to bruise and bleed easily; sore gums. Scurvy.	Many raw fruits, especially the citrus group, and vegetables, tomatoes, melon.
vitamin D	Poor bone and tooth development; dental decay; Rickets.	Fish liver oils, liver, fortified milk and baby cereals, irradiated margarines, etc., sunshine.
vitamin E	Infertility.	Seed germs, green vegetables.
vitamin K	Faulty clotting of the blood. Bleeding.	Meat, poultry, fish, potatoes, peanuts; whole grain cereals.

- 1) The body needs to use these vitamins. Vitamins A, D, E, and K are fat-soluble vitamins which means that the fat in foods helps the intestines absorb these vitamins into the body.
- 2) **Brains development:** Fats provide the structural components not only of cell membranes in the brain, but also of myelin, the fatty insulating sheath that surrounds each nerve fiber, enabling it to carry messages faster.
- 3) **Healthier skin:** The layer of fat just beneath the skin acts as the body's own insulation to help regulate body temperature.
- 4) **Healthy cells:** Fats are a vital part of the membrane that surrounds each cell of the body. Without a healthy cell membrane, the rest of the cell couldn't function.
- 5) **Making hormones:** Fats are structural components of some of the most important substances in the body, including hormone-like substances that regulate many of the body's functions.
- 6) **Protective cushion for our organs:** Many of the vital organs, especially the kidneys, heart, and intestines are cushioned by fat that helps protect them from injury and hold them in place.
- 7) **Pleasure:** Besides being a nutritious energy source, fat adds to the appealing taste, texture and appearance of food. Fats carry flavour.



Dietary fibre

Fibre helps prevent constipation problems. Good sources of fibre are baked beans, kidney beans, high-fibre breakfast cereals, wholemeal bread, fruit and vegetables.



If we don't have sufficient water, we will become dehydrated.

Dehydration is the deficiency disease.

DEFICIENCY DISEASES

DEFICIENCY DISEASES

Any illness associated with an insufficient supply of one or more essential dietary constituents.

Single or multiple deficiencies

Excess of one nutrient may also lead to deficiency of other nutrient.

BALANCED DIET

Food Guide Pyramid

The Five Food Groups are the building blocks of the Food Guide Pyramid.

DEFICIENCY DISEASES

Obesity	Tetany
Night blindness	Osteoporosis
Beriberi	Goitre
Pellegra	Anaemia
Scurvy	Kwashiorkor
Rickets	Marasmus

OBESITY

Excessive accumulation of major nutrients in the form of fat.

Taking excess food .

Doing less exercise .

Cardiovascular disorders .

Breathlessness

NIGHT BLINDNESS

Deficiency of Vitamin- A (Retinol) in food
Rhodopsin formation requires retinol
Rod cells of retina do not perceive dim light
Can not see in dim light except bright light
Hyperkeratosis (darkness of skin)
Thickness and roughness of skin

XEROPHTHALMIA

Deficiency of Vitamin- A in the food
Eye lesions in the beginning
Dryness of conjunctiva
Cornea ulcerated then its deep destruction
Keratomalacia leads to permanent blindness
Carrot
Green leafy vegetables
Papaya
Onion

XEROPHTHALMIA



BERI-BERI

Deficiency of Vitamin B₁ (Thiamin)
Energy production , Nerve conduction
Leg cramps muscle weakness
heart failure high pulse rate
limb swelling memory loss
Legume yeast
seed coat of cereals

RIBOFLAVINOSIS

Deficiency of Vitamin B₂ (Riboflavin)



PELLEGRA

Deficiency of Vitamin B₃ (Niacin)
Pellegra means " rough skin "
Dementia = mental weakness
Dermatitis = skin sores and scars
Diarrhea = loose motion
Cereal grains
proteins (no corn)

PELLEGRA



SCURVY

Deficiency of Vitamin C (Ascorbic acid)
Bleeding gums (Gingivitis)
Skin break & Impaired wound healing
Anaemia and shortness of breadth / faint
Joint pain and irritability
Citrus fruits tomato
Amia Lemon

SCURVY



RICKETS

Deficiency of Vitamin D (Calciferol)
Rickets word from " twist " or " wrick " .
Vit. D interacts with Ca^{++} & P to form bone .
Poor calcification results deformed bones .
Delayed dentition , teeth decay , soft skull .
In adults - Osteomalacia
Milk , cheese , fish /meat , oils , sunshine
Only vitamin to be self prepared by body

RICKETS



OSTEOPOROSIS

Deficiency of Calcium (Ca^{++}) in the food
Decrease in mass of bone causing pores
Low osteoblast more osteoclast cells
 Ca^{++} , P and parathormone are responsible
Leg cramps muscle weakness
heart failure High pulse rate
Limb swelling

Persons with age 40+ are more prone
Females after menopause prone to fracture

Hump in the back of females
Repeated fractures in hip,wrist & vertebrae

Leg cramps muscle weakness
heart failure High pulse rate
Limb swelling

SIMPLE GOITRE

Deficiency of Iodine in the food
Less secretion of Thyroxin hormone .
Enlargement of Thyroid gland of neck .
Metabolic disorders in the body .

Source of Iodine is common salt (Iodized)
Sea food
Iodine tablets in water

GOITRE



Goitre

ANAEMIA

Deficiency of Iron (Fe^{++}) in the food
Deficiency of Vit. B_{12} & folic acid in food
Low RBC formation , No RBC maturation
Low haemoglobin amount in RBC
Low O_2 absorption ,less energy production

Chronic diarrhea malaria
Hookworm infection
Excessive menstruation thalasemia

KWASHIORKOR

Deficiency of Proteins and Carbohydrate .
It is a nutritional disorder of PEM .
It means "The disease of displaced child" .
Small children are mostly affected .
Stunted growth , weight loss , edema ,
swollen abdomen , diarrhea, skin peeling ,
white spots on skin , reddish hairs ,
muscle loss , anaemia , coma , death
Supplements of proteins and carbohydrate

KWASHIORKOR



MARASMUS

Deficiency of Protein and Carbohydrate .
Severe form of PEM disorder .
Small children of 1 to 5 years affected
Results acute infection , T B & HIV
Lethargy , slow growth , weight loss , thin
body, dark skin, muscle loss, coma , death
Rehydration , immunization for infection
carbohydrate & protein supplements

MARASMUS



The Importance of Physical Activities, Exercise, Yoga and Meditation

The regular **physical activity**, fitness and exercise, are critical for the health and well being of people of all ages. Researches show that everyone, young or old can benefit from regular exercise, either vigorous or moderate. Even very old adults can improve mobility and function through physical activity. It should be a priority for everyone. Millions of people suffer from chronic illnesses that can significantly improve through activity. Exercise reduces the risk of heart disease, diabetes, colon cancer, and high blood pressure. People who are active outlive those who are inactive.

Despite the well known benefits, most adults and children lead relatively sedentary lifestyles. They are not active enough. A sedentary lifestyle is defined as engaging in no leisure-time physical activity, like exercises, sports, physically active hobbies, in a two-week period. Typically a lot of older people lead sedentary lifestyles. More than one-third of young children of 9-12 standards do not exercise regularly. They tend to watch too much television.

The cost to the medical establishment is in crores for treatments of diseases, which could be minimized with exercise. Regular exercise should be of 30 minutes, 5 days a week, or 20 minutes of vigorous exercise 3 times a week. Physical activity maintains muscle strength, joint structure, joint functioning and bone health. Exercise has an effect on mental health as well, especially among young people. It increases the capacity for learning, increases self esteem and reduces anxiety and stress. Sports can introduce skills such as teamwork, self-discipline, sportsmanship, leadership and socialization. Lack of recreational activity may contribute to making young people susceptible to gangs, drugs or violence and other unethical activities.

The problem of obesity has become a nationwide epidemic. Regular activity, along with a nutritious diet, that incorporates quantity control is the key to maintaining a healthy weight. Public and private sectors need to band together to encourage more activity. Walking programs for schools, worksites and

the local community are some examples. The most important change has to come from the individual and families. Every person must realize the benefits of physical activity for the development of mind and body.

Regular physical activity is one of the most important things we can do for our health. It can help:

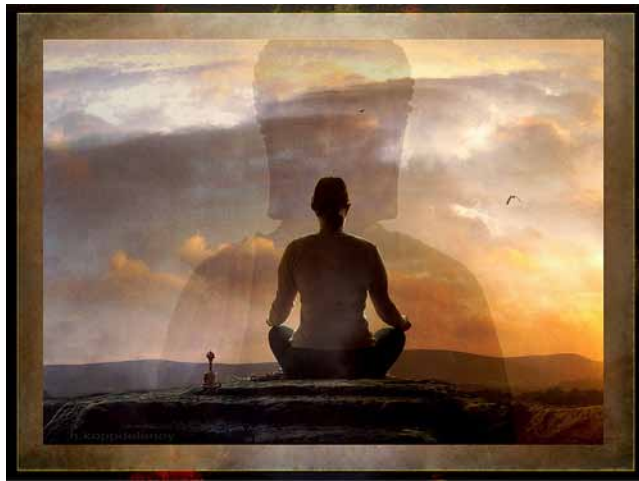
- Control our weight
- Reduce the risk of diabetes and metabolic diseases
- Minimize the risk of cardiovascular diseases
- Strengthen the bones and muscles
- Improve the mental health and mood
- Reduce the risk of some cancers
- Increase the chances of long life

Physical exercise is any bodily activity that enhances or maintains physical fitness and overall health and wellness. It is performed for various reasons including strengthening muscles and the cardiovascular system, inculcating athletic skills, weight loss or maintenance, building and maintaining healthy bone density as well as for the purpose of enjoyment. Frequent and regular physical exercise boosts the immune system, and helps prevent us from so many diseases. It also improves mental health, helps prevent depression and helps to promote or maintain positive self esteem. Obesity in children is a growing global concern and physical exercise may help decrease some of the effects of childhood and adult obesity. Studies have shown that exercising in middle age leads to better physical ability later in life.

Yoga is the ancient art, science and philosophy of maintaining a balance between the three most important elements of a human being, the mind, body and soul, by synchronizing them in a single chord. The word ‘Yoga’ means union with the Supreme power or God. God is the creator of all the living beings in this earth and it is Him whom we merge with at the end of our lives. This practice was started by the Vedic people thousands of years ago.

Yoga has various forms such as Raja yoga, Karma yoga, Bhakti yoga, Kriya yoga or Kundalini yoga which aim to connect the Atma or the human soul with the Paramatma or the Supreme soul. It helps to merge the individual identity with the universal identity by creating a union.

Meditation or ‘Dhyana’ was also a part of ancient yoga practice. Meditation is the way of connecting to the God by developing a deeper level of consciousness. By meditating, an individual can communicate with the Almighty on the intra-personal level. Apart from its spiritual significance, yoga and meditation are also widely practiced for a healthy life. The physical and mental benefits of yoga, make it a boon to the mankind. Yoga helps to prevent as well as cure a number of ailing diseases. It makes the muscles and the muscular joints flexible, improves the musculoskeletal disorders like arthritis, back and knee problems.



The regular practice of yoga promises a stress free life by improving the health condition. Practicing yoga provides strength to the spinal chord, improves digestion. Yoga is also the best solution to all heart related problems like improving the heart condition, maintaining proper blood circulation in the whole body as well as controlling the blood pressure level.

Yoga and meditation are also very much helpful in recovering the breathing disorder. Both help in boosting the immune system, decreasing cholesterol and increasing the stamina. Besides improving the health status, yoga also upholds the spiritual sense within a human being. It becomes much more easier to connect to the divine identity with a pure body and heart free from all illness. There are no greater happiness than to merge with that Omnipotent power. Some benefits of meditation are:

- It decreases respiratory rate.
- It lowers oxygen consumption.
- It increases blood flow and slows the heart rate.
- Increases exercise tolerance in heart patients.
- Leads to a deeper level of relaxation.
- Good for people with high blood pressure as it brings the B.P. to normal.
- Reduces anxiety attacks by lowering the levels of blood lactate.
- Decreases muscle tension (any pain due to tension) and headaches.
- Builds self-confidence.
- It increases serotonin production which influences mood and behaviour. Low levels of serotonin are associated with depression, obesity, insomnia and headaches.
- Helps in chronic diseases like allergies, arthritis etc.
- Reduces pre- menstrual syndrome.
- Helps in post-operative healing.
- Enhances the immune system. Research has revealed that meditation increases activity of ‘natural-killer cells’, which kill bacteria and cancer cells.
- Also reduces activity of viruses.
- Reduces emotional distress.

Word find

There are fifteen names of Indian rivers hiding in this puzzle. See if you can find them. The names can be read upwards, downwards, backwards or diagonally.

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

Word Scramble

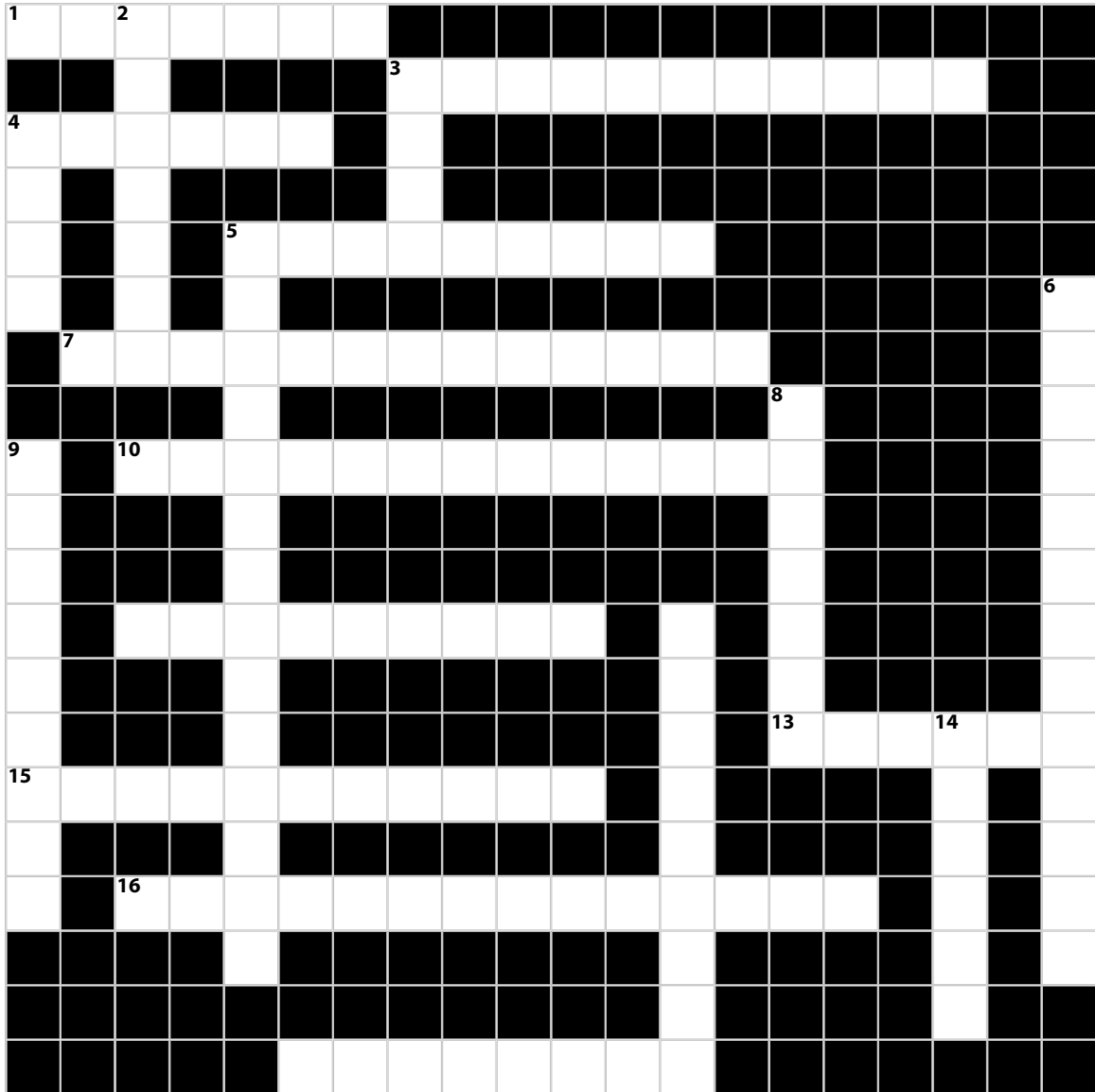
There are fifteen scrambled water related words. Unscramble them to get the correct words in space provided.

1. Gawees
2. teiscpide
3. PAIHUROETITCNO
4. TINOVEROSACN
5. FEEFUTNEL
6. EORCLHA
7. RAMILARA
8. ENOPAHEELS
9. REPHNODIOTOTMEAY
10. DOTYIPH

- 11. SARCO SIEN SO
 12. ISPEHATST
 13. YNCHAHIT
 14. BCIMIGTONAIFIAON
 15. OOMNSON

Environment related crossword

Crossword



CHAPTER

4

WATER : SANITATION AND HYGIENE WATER AND WATER RELATED RESOURCES

- Water is a natural resources.
- Water has unique physical and chemical characteristics.
- Water is essential for life to exist.
- Water connects all earth system.
- Water resources are managed.
- Water resources exist with social and cultural constructs.
- Water pollution:- definition , cause effect control.
- Water conservation/ management
 - ◆ Water conservation .
 - ◆ Rainwater harvesting.
 - ◆ Water shed management.
- The Water act
- Water-related diseases.
- Ground water management.
- Flood management.

INTRODUCTION

- Water is a natural resource that is necessary for the life on earth to exist.
- About 97% of the total water available on the earth is found in the oceans ,only 3% is freshwater.
- 2.9997% is available as ice caps and only 0.003% of the total volume of water is available to us as soil ,moisture , ground water , water vapour and water in lakes , streams , rivers and wet lands

- Water has unique physical and chemical characteristics .
- Water that is found in streams , rivers ,lakes , wet lands and artificial reservoir is called SURFACE WATER.
- Water that percolates into the ground and fills the pores in soil and rock is called GROUNDWATER.
- India is gifted by nature with large number of major and medium rivers constituting 24 river basins
- India receives annual precipitation of about 4000KM, including snowfall.
- India receives most of the rainfall during the months of June to September.
- The monsoon in India is usually stable but varies geographically. They may be heavier in some parts whereas scarcity in others.
- Due to lack of adequate storage facilities and water management system, there is water shortage even in areas with adequate rainfall.

WATER POLLUTION

When the composition or quality of water change due to direct or indirect effect of anthropogenic activities and the water becomes unfit for any purpose it is called WATER POLLUTION.

SOURCE OF WATER POLLUTION

- TWO TYPES :- a) point source b) non – point source
- A) point source :- when the source of pollution can be identified . eg:- municipal waste , industrial waste.
- a) Non- point source:- when the source of pollution cannot be identified .eg:- acid rain, agricultural run off.

CAUSES OF WATER POLLUTION

- Oxygen –depleting waste . these includes organic waste which is decomposed by bacteria . they use up the O₂ present in the water to degrade these wastes and in this process degrades water quality. The biological oxygen demands (BOD) is an indicator of level of pollution.
- Disease – causing agents . these includes bacteria, virus , protozoa and parasitic worms that enter water from the domestic sewage and untreated human and animal waste.
- Inorganic plant nutrients . these are excessive amount of water soluble nitrates and phosphate that cause excessive algal growth. As the organic matter decays , the oxygen level decrease which kills fish and other aquatic species.
- Contamination by pesticides . this leads to biomagnifications , birds of prey and other fish-eating birds are affected by such pollution.
- Water –soluble inorganic chemicals. It includes acid , salts and compounds of toxic metals like mercury and lead.
- Organic chemicals, which includes oil , gasoline, plastic , pesticide, cleaning solvents, detergent and other chemical.
- Sediment of suspended matter. These are insoluble particles of soil and other solids that become suspended in water .
- Water –soluble radioactive isotopes.
- Hot water released by power plants and industries .This water not only decrease the solubility of oxygen but also changes breeding cycles of various aquatic organisms.

- Oil washed into surface water .Accidental oil spills.

CONTROL

- Treatment plants should be set up to treat waste.
- Bioremediation using microbes and plants.
- Avoid throwing waste in water bodies.

ACTIVITIES

1. Quiz related to topic-Multiple choice question.
2. Crossword puzzle.
3. Slogan writing.
4. Poster making .
5. Construction of words from from WATER, POLLUTION, CONSERVATION

WATER- RELATED DISEASES

KEYWORDS:- Water supply , sanitation, blue revolution, sanitation with rapidly expanding populations, many places in the world are already facing a crisis over water, there should be a balance between demand and supply . conservation of water and better management is an urgent need . this is being termed as “BLUE REVOLUTION”.

The present water management strategies do not take care of:-

- a. Wastage of water
- b. Overuse
- c. Water pollution
- d. Erratic water supply
- e. Sanitation related issues
- f. Water related diseases

There are four major types of water-related diseases:-

1. Water borne diseases
caused by contamination of water by human and animal waste
contaminations include sewage chemical waste
diseases caused by these agents include cholera, typhoid Hepatitis, diarrhea, dysentery, neurological disorders , cancer .
Remedy:- * Improving Sanitation
Sufficient quantity of safe drinking water .
2. Water based disease
caused by aquatic organism that live a part of life in water and another part as human parasite.
e.g:- Round worm
s. Remedy:- Use of clean and safe drinking water
* Adequate sanitation services.
3. Water – related vector diseases
*Breeding of mosquitoes in stagnant water spread diseases like malaria, dengue, filariasis.
*Remedy:-
cleanliness of surrounding
Health education
4. Water – scarcity diseases

- *Occur in areas where water and sanitation is poor.
- *Remedy:- . Providing safe and clean drinking water.
- Improved sanitation facilities
- Good personal and food hygiene.

5. SUGGESTED ACTIVITIES

- *Quiz related to the topic.
- *Posters showing spread of watervector diseases
- *Posters – description of – diseases plus do and donts
- *Slogan – writing.

6. Reference

- *Erah bharucha. Text book of Environment studies .

7. Values developed

- *cleanliness of surrounding.
- *Importance of safe and clean drinking water;
- *Good personal and food hygiene
- *Importance of health education
- *sanitation practices.

ACTIVITIES QUIZ RELATED TO TOPIC

1. Which of the following is not a vector-borne disease?
 - a. Dengue
 - b. Cholera
 - c. Malaria
 - d. Filariasis

ANS : b. cholera
2. Water management and conservation of water is termed as
 - a. Green revolution
 - b. White revolution
 - c. Red revolution
 - d. Blue revolution

ANS : d. blue revolution
3. Arsenic poisoning is
 - a. Water-scarcity disease
 - b. Water-related vector disease
 - c. Water-borne disease
 - d. Water- based disease

ANS : c. water borne disease
4. Water related diseases are mainly caused due to
 - a. Erratic water supply
 - b. Poor hygiene related behavior pattern
 - c. Poor sanitation services
 - d. All of the above

Ans: all of the above

ACTIVITIES

Slogan writing

Save water, every drop count

POSTER MAKING

DENGUE

Vector :- Aedes aegypti

Symptoms :-

- high fever
- joint pain
- red rashes

Don'ts

- Accumulation of water
- Neglect the symptoms.

Do's

- Consult physician
- Avoid self medication
- Prevent accumulation of water in surrounding.
- Health education
- Use of anti larval spray

“Sanitation is more important than independence.” Mahatma Gandhi

The literal meaning of sanitation is providing the means of promoting health through prevention of human contact with the hazards of wastes. According to WHO, “Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and faeces.” Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. In other words ‘sanitation’ also refers to the maintenance of hygienic conditions, through services such as garbage collection and wastewater disposal.

If we look at our past, the earliest evidence of urban sanitation was seen in Harappa, Mohenjo-daro and the recently discovered Rakhigarhi of Indus Valley civilization. This urban plan included the world's first urban sanitation systems. Within the city, individual homes or groups of homes obtained water from wells. From a room that appears to have been set aside for bathing, waste water was directed to covered drains, which lined the major streets. So we see that the importance of sanitation was felt since then.

The term “sanitation” can be applied to a specific aspect, concept, location or strategy, such as:

- **Basic sanitation** - refers to the management of human faeces at the household level.
- **On-site sanitation** - the collection and treatment of waste is done where it is deposited. Examples are the use of pit latrines, septic tanks etc.
- **Food sanitation** - refers to the hygienic measures for ensuring food safety.
- **Environmental sanitation** - the control of environmental factors that form links in disease transmission. Subsets of this category are solid waste management, water and wastewater treatment, industrial waste treatment and noise and pollution control.
- **Ecological sanitation** - an approach that tries to emulate nature through the recycling of nutrients and water from human and animal wastes in a hygienically safe manner.

Objectives of Sanitation

1. To increase awareness of the importance of sanitation to one's daily lifestyle, health and dignity
2. To improve people's behavior through the correct use of sanitation facilities and good hygiene practices
3. To promote the continued identification, documentation and replication of sanitation best

practices.

4. To promote innovative approaches towards the acceleration of sanitation
5. To promote programmes to ensure sustainability of sanitation facilities, through their correct usage, operations and adequate maintenance.
6. To provide safe, private hygienic and convenient facilities for defecation.
7. To monitor infection threats and respond by offering useful advice to the public to help to prevent the spread of infection. eg. Workers of MCD visit all the residents of the area allotted to them to inspect for the growth of larvae of mosquitoes (Malaria) and eggs of *Aedes aegypti* (Dengue/ Yellow fever/Chickengunya) in the stagnant waters of pot/coolers etc. and also advice the people to pour few drops of oil on top of the stagnant water so that it does not become a breeding ground for the pathogens.
8. To maintain hygienic conditions through services such as garbage collection and waste water disposal.

HYGIENE

Hygiene refers to the set of practices perceived by a community to be associated with the preservation of health and healthy living. In modern medical sciences there is a set of standards of hygiene recommended for different situations but what is considered hygienic or not can vary between different cultures, and groups. Some regular hygienic practices may be considered good habits by a society while the neglect of hygiene can be considered disgusting, disrespectful or even threatening.

Hygiene is an old concept related to medicine, as well as to personal and professional care practices related to most aspects of living. In medicine and in home (domestic) and everyday life settings, hygiene practices are employed as a means to reduce the incidence and spreading of disease. In industries related to the manufacture of food, pharmaceutical, cosmetic and other products, good hygiene is a key part of quality assurance i.e. ensuring that the product complies with microbial specifications appropriate to its use. The term cleanliness (or cleaning) and hygiene are often used interchangeably, which is quite confusing. In general, hygiene mostly means practices that prevent spread of disease-causing organisms. Since cleaning processes (e.g., hand washing) remove infectious microbes as well as dirt and soil, they are often the means to achieve hygiene. Other uses of the term such as body hygiene, personal hygiene, sleep hygiene, mental hygiene, dental hygiene, and occupational hygiene, imply their usage in connection with public health. Hygiene is also the name of a branch of science that deals with the promotion and preservation of health, also called hygienics. Good hygiene is an important barrier to many infectious diseases including the faecal - oral diseases and it promotes better health and well- being.

Home and everyday life hygiene

Home hygiene includes the hygiene practices that prevent or minimize disease and the spreading of disease in home (domestic) and in everyday life settings such as social settings, public transport, the work place, public places etc.

Hygiene in home and everyday life settings plays a significant role in preventing spread of infectious diseases. It includes procedures used in different domestic situations such as hand hygiene, respiratory hygiene, food and water hygiene, general home hygiene(hygiene of environmental sites and surfaces), care of domestic animals, and home healthcare (the care of those who are at greater risk of infection).

The major sources of infection in the home are people (who are carriers or are infected), foods (particularly raw foods) and water, and domestic animals (pets). Additionally, sites that accumulate stagnant water—such as sinks, toilets, waste pipes, etc.—readily allow microbial growth, and can become reservoirs of infection. Safe disposal of human waste is a fundamental need; poor sanitation is a

primary cause of diarrheal disease in low income communities. Respiratory viruses and fungal spores are also spread via the air.

Hygienic cleaning can be done by

1. Mechanical removal (i.e. cleaning) using a soap or detergent. This process must be followed by thorough rinsing under running water to remove germs from the surface.
2. Using a process or product that inactivates the pathogens in situ. Germ kill is achieved using a “micro-biocidal” product i.e. a disinfectant such as use of antibacterial product or waterless hand sanitizer, or by application of heat.
3. In some cases e.g. laundering of clothing and household linens such as towels and bedlinen can be done by using Dettol or soaking in Savlon.

Food hygiene at home

Food hygiene is concerned with the hygiene practices that prevent food poisoning. The five key principles of food hygiene, according to WHO, are:

1. Prevent contaminating food with pathogens spreading from people, pets, and pests.
2. Separate raw and cooked foods to prevent contaminating the cooked foods.
3. Cook foods for the appropriate length of time and at the appropriate temperature to kill pathogens.
4. Store food at the proper temperature.
5. Use safe water and raw materials

Household water treatment and safe storage

Household water treatment and safe storage ensure drinking water is safe for consumption. Drinking water quality remains a significant problem, not only in developing countries but also in developed countries. Methods for treatment of drinking water, include:

1. Chemical disinfection using chlorine or iodine
2. Boiling
3. Filtration using ceramic filters. Solar disinfection - Solar disinfection is an effective method, especially when no chemical disinfectants are available. UV irradiation – as in case of Aqua guards 4. Combined flocculation/disinfection systems – available as sachets of powder that act by coagulating and flocculating sediments in water followed by release of chlorine.

Medical hygiene

Medical hygiene and medical care, that prevents or minimizes disease and the spreading of disease. Medical hygiene practices include:

Isolation or quarantine of infectious persons or materials to prevent spread of infection.

Medical hygiene pertains to the hygiene practices related to the administration of medicine,

Sterilization of instruments used in surgical procedures.

Use of protective clothing and barriers, such as masks, gowns, caps, eyewear and gloves.

1. Proper bandaging and dressing of injuries.
2. Safe disposal of medical waste. eg. use of incinerators.
3. Disinfection of reusables (i.e. linen, pads, uniforms)
4. Scrubbing up, hand-washing, especially in an operating room, but in more general health-care set-

tings as well, where diseases can be transmitted. Autoclaves can be other option.

In the food industry

Modern restaurant food preparation area.

Sanitation within the food industry means the adequate treatment of food-contact surfaces by a process which is effective in destroying vegetative cells of microorganisms and in substantially reducing numbers of other undesirable microorganisms, but without adversely affecting the quality of food or its safety for the consumers.

PROMOTING HYGIENE

Hygiene can be improved by the following practices:-

1. By providing proper water supply and sanitation services.
2. By disposing the waste water properly; If wastewater is not disposed of effectively it can serve as a breeding ground for mosquitoes. People may also slip. children may play in them and risk water-borne illness.
3. By proper handwashing: It is one of the most effective ways of preventing the spread of diarrhoeal diseases. Pathogens cannot be seen on hands, and water alone is not always sufficient to remove them. Soap and wood ash are both cleansing and disinfecting agents when used with water and can be used to kill pathogens on hands and utensils. The most important times that hands should be washed with soap and water are:
 - ◆ After defecating.
 - ◆ After cleaning a child who has defecated.
 - ◆ Before eating or handling food
 - ◆ To encourage hand washing to become part of the daily routine.
 - ◆ Suitable facilities must be located near to places such as latrines and kitchens, where they will be needed. If running water is available, the facilities should include a tap and a sink as well as soap.
4. By promoting good personal hygiene through hygiene education programmes which should teach them the importance of bathing. Regular bathing and laundering are important for cleanliness and good personal appearance. They also prevent hygiene-related diseases such as scabies, ringworm, trachoma, conjunctivitis and louse-borne typhus. Educational and promotional activities can encourage bathing and laundering, but increasing the number of washing facilities and locating them conveniently may be more effective. Bathing with soap is an important means of preventing the transmission of trachoma—an illness that can cause blindness and other eyesight problems. Children's faces in particular should be washed regularly and thoroughly. If a child has trachoma, a special towel or tissue should be used to wipe or dry the child's face; the towel should never be used for other children because of the risk of transmitting the disease. Ideally, programmes that promote bathing should be combined with a programme to reduce the numbers of flies, which spread trachoma and other diseases, and to improve sanitation.
5. By promoting laundering of clothes and bedding, laundry slabs or sinks can be constructed near water points. They should be large enough to wash bedding and other bulky items and be situated so that water drains away from the laundry area and away from the water source. Locating laundry places in natural water bodies, streams and irrigation canals is best avoided if possible, since this practice can contribute to the transmission of various diseases.
6. **Community Hygiene:** Some health measures can be undertaken only at the community level; these include water source protection, proper disposal of solid waste and excreta, wastewater

drainage, controlling animal rearing and market hygiene. Individual community members can play a very important role in community hygiene, and have a responsibility towards their neighbours and to the community to promote good health and a cleaner environment. For example, everyone in the village, they must keep their houses and compounds clean, because one dirty house can affect many conscientious neighbours and contribute to the spread of disease. Community leaders can promote cleanliness in the home by regularly visiting the houses and by using by-laws to encourage household maintenance. Some kind of reward can also be given to the cleanest house for encouragement.

7. **Markets:** Markets often represent a health hazard because foodstuffs may not be stored properly thereby causing rotting and because the markets may lack basic services, such as water supply, sanitation, solid waste disposal and drainage. Ideally, markets should have several taps to provide ready access to safe water for drinking and washing to traders and consumers.. Many vegetable and fruit sellers regularly sprinkle their produce with water, and it is important that they have access to clean water for this. The sanitation facilities should also be appropriate for the number of people who visit the market, i.e. separate facilities for men and women. Water and sanitation facilities for a market are often relatively easy to support by charging a small fee, or by using part of the market fee to pay for such services. If people are charged a fee to use the facilities, they can be kept clean.
8. **PERSONAL, DOMESTIC AND COMMUNITY HYGIENE :** Foodstuffs sold at the market should be inspected daily by health officials. This is particularly important in case of meat and fish, which should be inspected before sale to ensure that they have been prepared according to national regulations and that they are devoid of any contaminants. Markets usually generate a lot of solid waste and it is important that it is disposed of properly, to prevent vermin such as rats and insects from feeding and breeding among it. The layout of market stalls should thus allow easy access for vehicles that collect waste and clean the area. Solid waste should be collected and disposed of daily, and preferably more often. Strategically located waste bins (often concrete bunkers) can make this more effective. Market areas should also be properly drained to prevent flooding and insect breeding. Markets function most effectively when they have legal status, with market fees and supervision, preferably by health officials .Well run markets tend to have strong traders' associations and good links between market associations and local service providers. This helps them to have a strong voice in improving conditions, since they generate significant income for communities and provide essential food distribution services. Traders' associations can take up the task of setting up standards for the market, can successfully manage water and sanitation facilities, and can organize regular waste collection. If markets are held regularly, community members should seek advice and support from local health staff on issues such as setting up an association, establishing trading standards and penalties for contravention, and on lobbying for service provision. As markets grow, the management of services often gets easier because of more income.
9. **Animal rearing:** In many communities animal rearing is not only a means of generating food high in protein content and nutritional value, but also for generating additional income. Animals can also provide many other products, such as leather and fuel, that improve the quality of life. However, if it is not practiced safely, rearing can have negative effects on the health of the community. Animals should always be kept away from households, particularly cooking areas and drinking-water sources, because their excreta contain pathogens which can contaminate food and water. Preferably, animals should be kept in compounds at least 100 metres from water sources and 10 metres from houses. Animal waste should be disposed of properly, away from homes and water sources, or be used as a fertilizer. It is also best that animals are slaughtered away from households and water sources, since the wastes may introduce contamination. Slaughtering must be carried out

by qualified individuals who follow the country laws governing slaughter practices. Some disease vectors have animal hosts as primary and humans. Secondary e.g. Pigs, for example, can be reservoirs of Japanese encephalitis, dogs can be reservoirs of leishmaniasis, and some mosquitoes prefer to feed on cattle rather than humans. Placing animal shelters between mosquito breeding places and the village may therefore provide some protection against malaria transmission.

10. **Food hygiene:** Contaminated food represents one of the greatest health risks to a population and is a leading cause of disease outbreaks and transmission. Food that is kept too long can get fermented and contain toxic chemicals or pathogens, and foodstuffs that are eaten raw, such as fruits or vegetables, can become contaminated by dirty hands, unclean water or flies. Improperly prepared food can also cause chemical poisoning: cassava leaf that has not been properly pounded and cooked, for example, may contain dangerous levels of cyanide. To promote good health, therefore, food should be properly stored and prepared. **Food preparation in the home:** As most food is likely to be prepared in the home, it is important that families understand the principles of basic hygiene and know how to prepare food safely. Before preparing food, hands should be washed with soap or ash. Raw fruit and vegetables should not be eaten unless they are first peeled or washed with clean water. It is also important to cook food properly, particularly meat. Both cattle and pigs host tapeworms that can be transferred to human.

PROMOTING SANITATION

“A good sewer is a far nobler and far holier thing than the most admired Madonna ever painted.”

- John Ruskin

WASTE WATER MANAGEMENT

The standard sanitation technology in urban areas is the collection of wastewater in sewers, its treatment in wastewater treatment plants for reuse or disposal in rivers, lakes or the sea. Sewers are either combined with storm drains or separated from them as sanitary sewers. Combined sewers are usually found in the central, older parts or urban areas. Heavy rainfall and inadequate maintenance can lead to combined sewer overflows or sanitary sewer overflows, i.e. more or less diluted raw sewage being discharged into the environment. Industries often discharge wastewater into municipal sewers, which can complicate wastewater treatment unless industries pre-treat their discharges. The high investment cost of conventional wastewater collection systems are difficult to afford for many developing countries. Some countries have therefore promoted alternative wastewater collection systems such as condominal sewerage, which uses smaller diameter pipes at lower depth with different network layouts from conventional sewerage. In developed countries treatment of municipal wastewater is now widespread, but not yet universal. In developing countries most wastewater is still discharged untreated into the environment. For example, in Latin America only about 15% of collected sewerage is being treated

Reuse of wastewater

The reuse of untreated wastewater in irrigated agriculture is common in developing countries. The reuse of treated wastewater in landscaping, especially on golf courses, irrigated agriculture and for industrial use is becoming increasingly widespread. In many suburban and rural areas households are not connected to sewers. They discharge their wastewater into septic tanks or other types of on-site sanitation.

Ecological sanitation

Ecological sanitation is sometimes presented as a radical alternative to conventional sanitation systems.

Ecological sanitation is based on composting or vermicomposting toilets where an extra separation of urine and feces at the source for sanitization and recycling has been done. It thus eliminates the creation of black water and eliminates fecal pathogens. If ecological sanitation is practiced municipal wastewater consists only of grey water, which can be recycled for gardening. However, in most cases grey water continues to be discharged to sewers.

Sanitation and public health

The importance of the isolation of waste lies in an effort to prevent diseases which can be transmitted through human waste, which afflict both developed countries as well as developing countries to differing degrees. It is estimated that up to 5 million people die each year from preventable water-borne disease, as a result of inadequate sanitation and hygiene practices. The effects of sanitation have also had a large impact on society. Relevant disease include: Waterborne diseases, which can contaminate drinking water. Diseases transmitted by the fecal-oral route ;Hookworm, where eggs can survive in the soil.

Thus a large number of these diseases can be prevented by proper sanitation.

Global access to improved sanitation

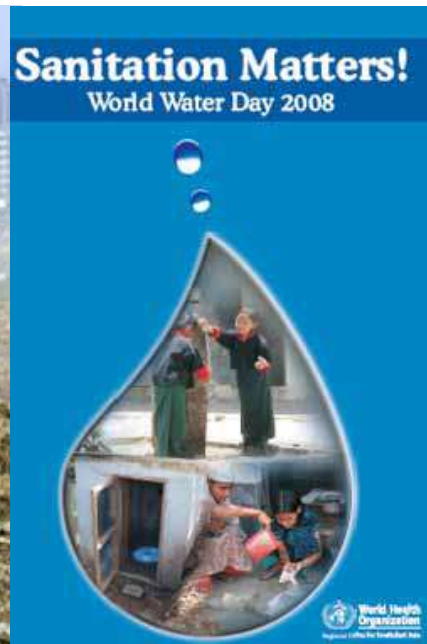
The Joint Monitoring Program for water and sanitation of WHO and UNICEF has defined improved sanitation as connection to a public sewer connection to a septic system pour-flush latrine, simple pit latrine. ventilated improved pit latrine. According to that definition, 62% of the world's population has access to improved sanitation in 2008, up by 8% since 1990. Only slightly more than half of them or 31% of the world population lived in houses connected to a sewer. Overall, 2.5 billion people lack access to improved sanitation and thus must resort to open defecation or other unsanitary forms of defecation, such as public latrines or open pit latrines. This includes 1.2 billion people who have access to no facilities at all.

In India, 200m women are obliged to wait throughout day for hours together to go to fields for defecation. Adolescent girls have nowhere private to deal with menstrual hygiene. Inadequate sanitation can result in morbidity and mortality, poor child development ,terrible indignity for huge number of people. At micro level at school on 'eco-club' platform the preventive measures can be taught and can be spread from classroom to home and then at community level some of these problems can be addressed.

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- 2) Teacher's handbook on Environmental Education, NCERT, 2011
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STAND UP FOR THOSE WHO CAN'T SIT DOWN

You may not think standing in line for the toilet for half an hour is the most glamorous way to spend your lunch break but imagine the **2.6 Billion** people who don't even have the luxury of a toilet to line up for.

Come help us make a public statement with the longest toilet line and raise awareness about the global sanitation crisis. Join us to celebrate World Water Day and motivate action now.

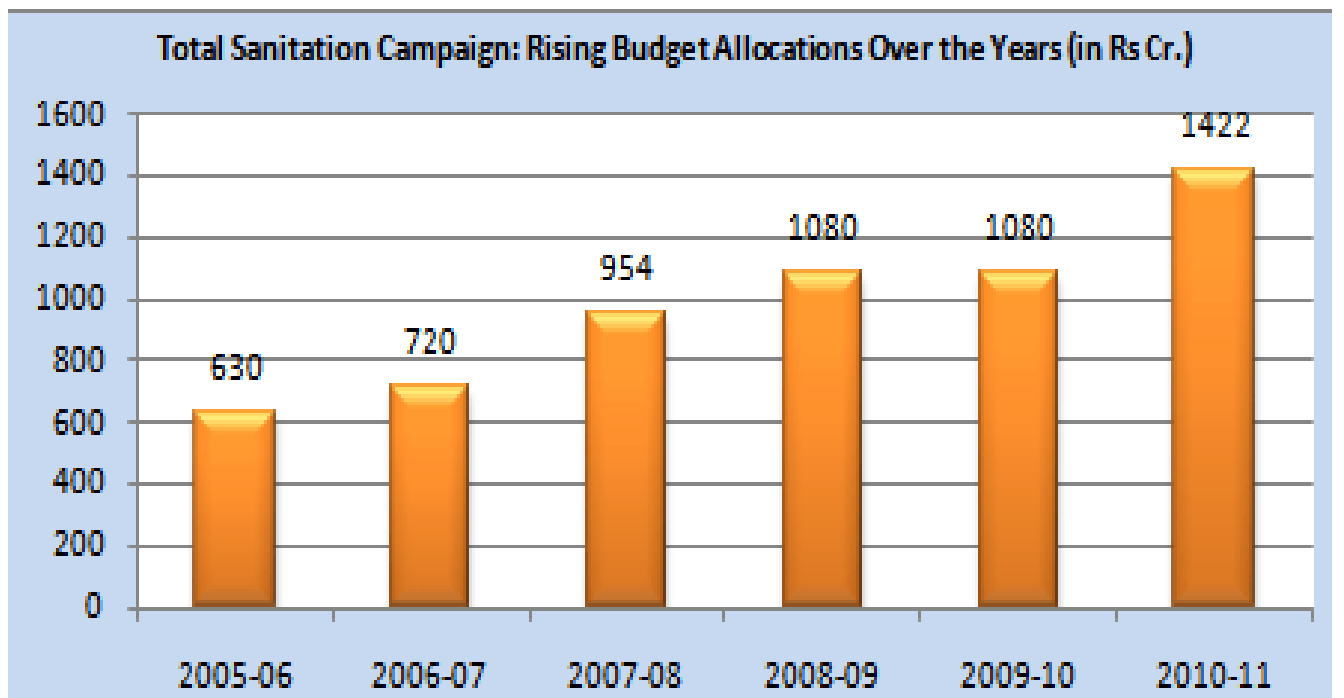
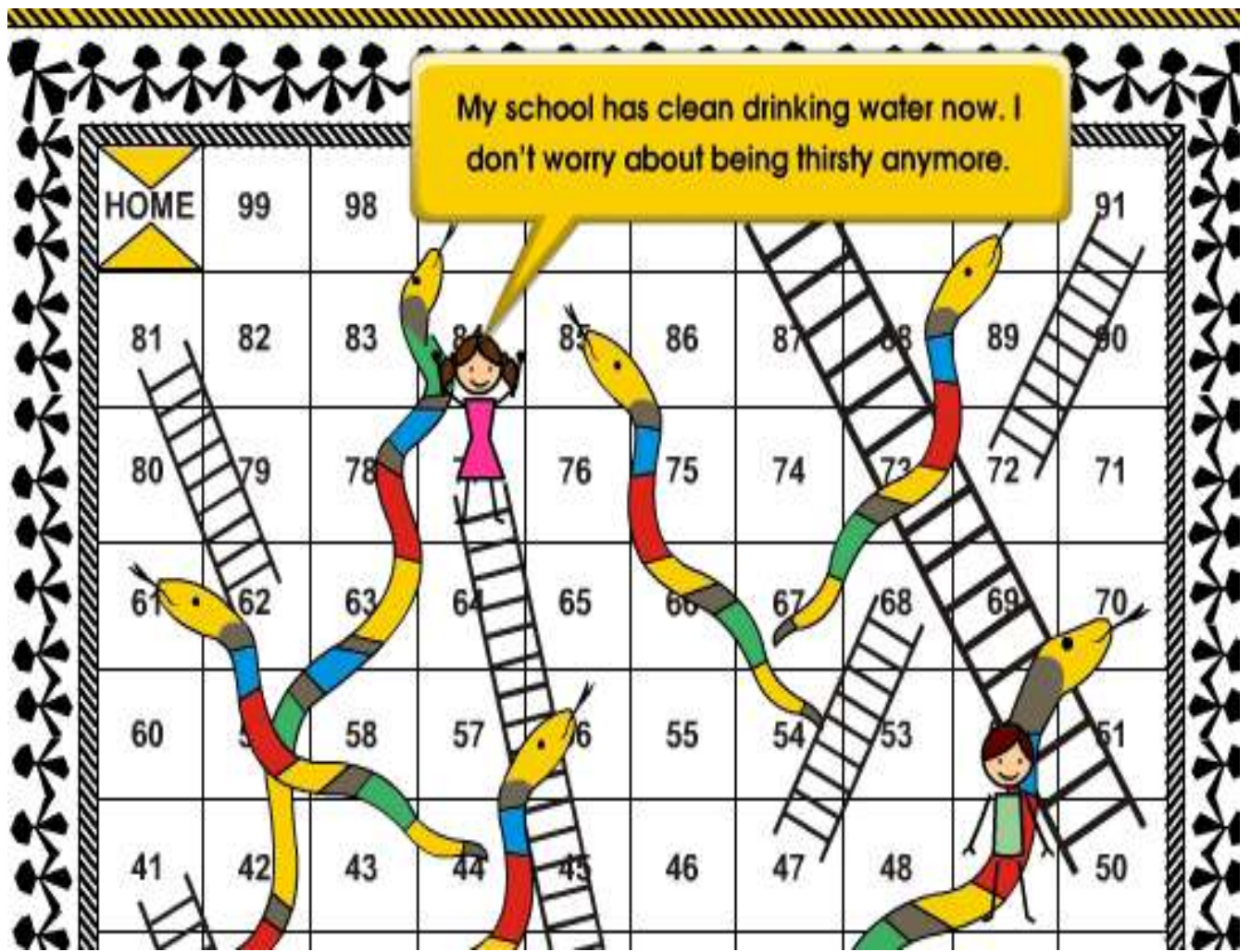
When: Thursday 20th March 2008.
12.00pm - 2.00pm

Where: NYC Central Park West, Merchants Gate,
(by Columbus Circle, south-west entrance)

Exhibit: "Sanitation is Dignity"

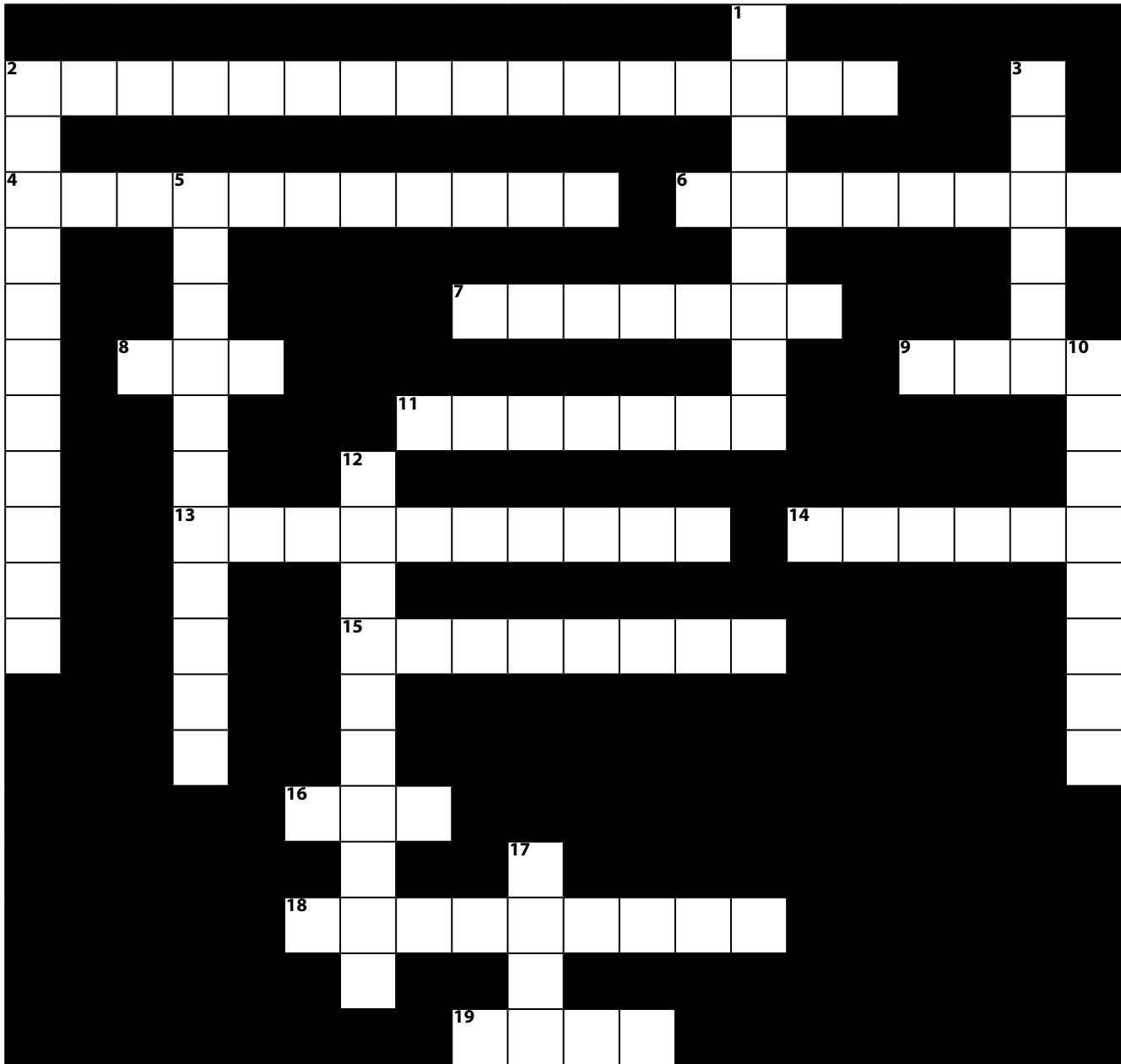
INTERNATIONAL YEAR OF
SANITATION

2008



Water related issues

Crossword



Word Scramble

There are twenty five scrambled water related words. Unscramble them to get the correct words in space provided.

1. ERHSBEOPI
2. LIFSOS
3. MYCOSEMTSE
4. TOLPILONU
5. WAELRNEEB
6. TOFERS
7. METALIC
8. TEFOREDASTNOI
9. GDTRHOU
10. RIEGRQUALTE
11. ROMETEPUL
12. EARCINGOCN
13. DRECYLOHTRIEC
14. TALVOPHICOTO
15. LIFEBOU
16. LIDINLWM
17. TREOMGALHE
18. CLEUNAR
19. NOISEOR
20. CLECEYR
21. LIDAT
22. DERUCSE
23. BLCUEOC
24. MIRONVEENT
25. BOVIERYISTID

CHAPTER

5

Best Out Of Waste

Eco cubs play an important role in creating environmental awareness amongst the future generation. Eco clubs in schools are the means by which students can be empowered to participate and take up meaningful environmental activities and projects.

Many programmes and projects are formed and combined together to make a frame work of Eco club. Preparation of Eco-friendly product out of waste material forms an important part of Eco club. As it enables us to make the useless things more useful.

PREPARATION OF ECO-FRIENDLY MATERIAL USING WASTE MATERIAL

Recycling and reusing the valuable waste material can result in development of fantastic and usable products. Rather than putting these waste materials into the landfills, various innovative and creative ideas can be put together to being something new and useful.

OBJECTIVES

Before, we start with any program, certain aims/ objective need to be formulated so as to conduct successful programmes. Some of such objectives are listed below.

- To develop the ability to think and organize the thinking to create something useful.
- To indulge the students into a extracurricular activity with exclusive tool i.e. waste material.
- To explore the environmental concepts and actions which are beyond the curriculum & syllabus.
- To make our vision and outlook broader about the nature & society.
- To control the harmful effects of waste on our environment.

HOW TO ACHIEVE THE OBJECTIVES

In order to achieve the objectives it is necessary to formulate certain programmes and follow-up has to be done efficiently.

- Create awareness among students to use the waste products in best possible manner.
- Various things can be put to different uses.
- More of awareness and efforts combined together to make variety of products.

Advantages /uses:-

- Helps in generating the awareness and building the attitude to take up activities in real world.
- Controlling the amount of waste sent into landfills.
- Enables the students to give this creativity & innovation a shape.
- Reduces the destruction of forest & other eco – system.
- Helping the society and nation in conserving our nature.
- Keeping our planet a much safer place for coming generation.
- Developing the sense of using ecosystem.

VARIOUS WASTE MATERIAL USED FOR MAKING USEFUL PRODUCTS

- Old Newspaper
- Notebooks and chart paper
- Cardboard and book cover
- Paper plates, spoons and disposable glass
- Pens and refills
- Old CDs and DVDs
- Toothpicks and matchsticks
- Dry stem of plants and trees
- Mango seeds
- Seeds of various fruits
- Old curtains & table covers
- Used foil paper
- Jute rope
- Plastic bottles
- Strings and sequences, etc.

Along with these a large number of products are also being used which are somehow felt to be useless.

LIST OF ITEMS THAT CAN BE MADE USING WASTE

A large number of products can be made using waste products. Some of such products and items are listed below.

1. Paper bags
2. Puppets
 - Envelope puppets
 - Finger puppets
 - Stick puppets
3. Puzzles and games
4. Mat from cloth
5. Mat from paper
6. Paper Mache

- Jewelry
 - Toys
 - Puppets
 - Wall decorations
 - Decorative items, etc.
7. Foil paper art
 8. Wall decoration using
 - Matchsticks
 - Toothpicks, string & sequences
 - Paper and charts, etc
 9. Jewelry using
 - Paper
 - Paper mache
 - Old beads and string, etc.
 10. Paper Glass toys
 11. Flower vase using
 - Jute rope
 - Old plastic Bottles etc.
 12. Magic board
 13. Kandeel using
 - Charts
 - Card Boards
 - Sequences & strings etc.
 14. Animals using
 - Mango seeds
 - Chikoo seeds
 - Walnut shells
 - Pistachio shells etc
 15. Face masks using –
 - Paper mache
 - Charts
 - Paper plates etc
 16. Wall Hanging using
 - newspaper
 - Jute Rope
 - card board
 17. Folders and files using
 - Old cloth
 - Card boards, etc.
 18. Pen stands using
 - CDs & DVDs
 19. Flowers using
 - Cloth
 - Sponge
 - Tissue paper
 - Toffee wrappers, etc.
 20. Stuff toys using

- Cloth
- Cotton
- Sponge, etc.

CLASSIFICATION OF PRODUCTS

CLASS	PRODUCTS MADE OUT OF WASTE
1 – 2	Wall decorations using sequence, strings, pens, wools, etc Paper mache toys, etc.
3 – 5	Paper mache toys Flower making Wall hangings Face masks Foil paper art, etc.
6 – 8	Mat using newspaper Mat using cloth Jewelry with paper mache Paper bags, etc.
9 – 10	Puzzles & Games Puppets Paper glass/cup toys Paper plate craft Files and folders Stuff toys, etc.
11 - 12	Paper coiling Jute work Plastic bottle craft Paper mache Wall decoration All of above From (1 to 10)

OUTCOME OF THE ACTIVITIES TAKEN UP

- Optimum use of waste material.
- Minimum harm in atmosphere.
- Reduction in cutting of trees for paper.
- Development of innovation & creativity.
- Development of aesthetic appreciation.
- Clean & beautified surroundings.
- Development of ability to create, develop and present in form of an object.
- Protection of nature and atmosphere.
- Lost cost material can be made use waste.

SOME OF THE IMAGE OF PRODUCTS MADE OUT OF WASTE



Envelope puppet (Material used: Chart paper, Colours, Fevicol, Book cover, etc.)



Paper bag (Material used: Old calendars, Newspaper, Rough cloth, Strings, Fevicol, etc.)



Wall decoration (Material used: Old bangles, Pens, Refills, Strings, Sand, Ribbon, etc.)



Wall decoration (Material used: Sequences, Shells, Strings, Mirrors, etc.)



Flower (Material used: Ice cream sticks, cotton, buttons, paper, paper plates, etc.)



Paper Cup Baby (Material used: Glass/cup, Ball, Colours, Paper, Buttons, etc.)



Stuff toys (Material used: Rough/old cloth, cotton, needle, string, etc.)



Foil paper craft (Material used: Foil paper, chart, paper, glue, etc.)



Craft using seeds (Material used: Mango seed, Bamboo sticks, Dried plants, etc.)



Flower (Material used: Spring, Wool, Bamboo, Stick, paper (green) etc.)



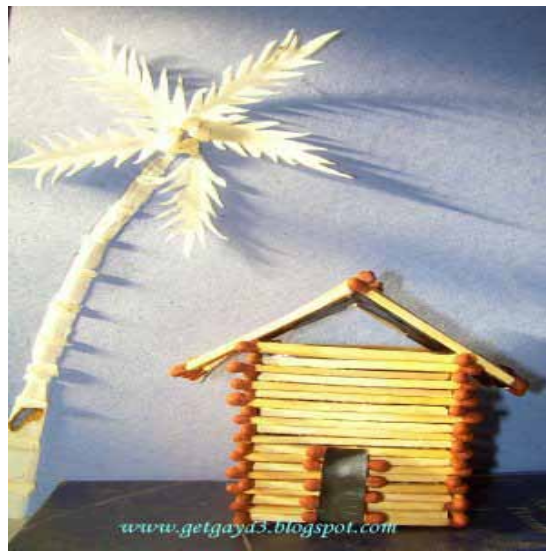
Dry stem plants (Material used: Dry stem, sponge, toffee wrappers, string, plastic bottle or glass bottle, etc.)



Wall hanging (Material used: Tooth picks, chart or board, sequences, wool or rope or string, etc.)



Rangoli (Material used: Chart paper, board, sequences, ribbons, match sticks, strings, etc.)



Wall decoration (Material used: Chart paper or board, thermocol plate/glass, match sticks, etc.)



Wall decoration (Material used: Board, match sticks, fevicol etc.)

Paper Mache Products



Toys (Material used: Paper mache, colours, etc.)



Bowl (Material used: Paper mache, colours, etc.)



Making paper mache toys



Wall decoration (Material used: Board, paper mache, etc.)



Turtle (Material used: Paper mache, colours, etc.)



Paper carnations (Material used: Tissue paper, sticks, fevicol, green paper or tape, strings etc.)



Bottle and rope art (Material used: Old plastic bottles, jute rope, fevicol, etc.)



Ball using circles (Material used: Chart paper, fevicol, etc.)



Wall hanging (Material used: Chart paper, fevicol, scissors, etc.)

CHAPTER

6

ENVIRONMENTAL ETHICS AND LEGAL ASPECTS

Environmental ethics believe in the ethical relationship between human beings and the natural environment. Just as human beings are a part of the society, living beings are also a part of it. When we talk about the philosophical principle that guides our life, we often ignore the fact that even plants and animals are a part of our lives. They are an integral part of the environment and hence have a right to be considered a part of the human life. Thus, it is clear that they should also be associated with our guiding principles as well as our moral and ethical values.

What is Environmental Ethics?

We are cutting down forests for making our homes. We are continuing with an excessive consumption of natural resources. Their excessive use is resulting in their depletion, risking the life of our future generations. Is this ethical? This is the issue that environmental ethics takes up.

Thus human beings are disturbing the balance in the nature. The harm we, as human beings, are causing to the nature, is coming back to us by resulting in a polluted environment. The depletion of natural resources is endangering our future generations. The imbalance in nature that we have caused is going to disrupt our life as well. But environmental ethics brings about the fact that all the life forms on Earth have a right to live. By destroying the nature, we are depriving these life forms of their right to live. We are going against the true ethical and moral values by disturbing the balance in nature. We are being unethical in treating the plant and animal life forms, which coexist in society.

- Is it important for us to preserve nature for the future generation? If so, are we even making an effort to do that?
- Is the human race alone important on this earth? If not, then aren't our actions proving otherwise?

- What would happen if animals, plants and other species are destroyed. Would we be affected?
- Are our future generations entitled to a clean and green environment? Do they even have a right?
- Is it right for us to be responsible for the extinction of certain species only for the sake of our consumption and greed?
- Is it our moral right to be clearing forests for the sake of human consumption?
- In spite of knowing that gasoline run vehicles lead to the destruction of natural resources, is it right for us to continue manufacturing and using them? Can we not use alternate natural resources?
- Are the guidelines which are drawn to protect the environment and nature any effective? What is causing their failure?
- What is environmental pollution and pollution of the air, soil and water doing to the world?
- If you ask yourself any of these above mentioned questions, you'll know what the solutions are. But is that enough?

Environmental ethics is definitely just not a fancy term which is added into the dictionary of environmental words but is going to get results. It is the generation of today who can make clean, non-polluted and healthy environment of tomorrow provided they are guided in the right direction. So, let us inculcate some ethical environmental values in them for a better tomorrow. Have we the right to take all the Earth's resources for our own use?

NO! Then why are we doing so? Let us first understand what can happen if our resources are not judiciously used?

1. Ecological balance will be disturbed.
2. Survival of the human race will be seriously affected.

What can we as responsible citizen's of India do in order to save the earth's resources?

The student's will give answer to this question

You could tell them short instances in story way form so that they realise the importance of our resources. For example: A girl is taking bath with the shower on. She is applying soap and singing in real masti. Her mother is repeatedly telling her from outside to close the shower otherwise the water will finish, but the girl is so busy entertaining herself with the latest melodies that she is not listening to her mother and suddenly water finishes. She shouts!!!! She has soap all over her body. She dose'nt know what to do. She now curses herself for not closing the shower when it was not required and realises the importance of water.

And do you know after this incidence the girl started preaching her mother how to save water. She told her mother that the washings of the pulses, rice and vegetables could be used for watering the plants. Similarly, the water of the washing machine could be used for cleaning the floor/ tiles.

Another story to inculcate in students that using electricity judiciously can not only bring down the electricity bill, but can also save you from frequent power cuts. When there is a power cut and the generator is on your elders tell you to sit in one room with minimum of the lights, fans and other gadgets to be used so that the generator lasts for long, as one does not know for how long the power cut is. Think, if you switch off the lights, fans and other gadgets when not in use then won't you be saving electricity? Like the generator, the electricity too will last for a longer duration and a time will come when you will not require a generator at all.

By these short stories you will at least make the students think how to save our natural resources particularly water and light which are the two major resources required in our daily life.

ADOPT A PLANT

ACTIVITY: In a small pot each student will be asked either to sow seeds of some simple vegetables like tomato, chillies or they can take a sapling of some ornamental plants, they can even take sapling of

tulsi plant or curry patta. Now they will be asked to look after their own plant till the time they pass out from the school. The plant can then be given them as their farewell gift.

Evaluation: Periodical evaluation for each student in the class can be done monthly by the class teacher. The most healthy plant can also be rewarded by a gift.

CLEAN YOUR ENVIRONMENT

ACTIVITY: Every classroom and the part of the corridor in front of their classroom has to be kept neat and clean. This will be the responsibility of all the student's of one class.

The principal or its representative can take a round at the end of the day and the student's of neat and clean classroom along with the neat corridor can be rewarded by some small gift-----may be toffees, pencil, eraser, etc. and the dirtiest classroom students can be fined (may be asked to bring one pencil, eraser, scale etc which can be given as reward to the one that has won the prize.

Evaluation: The student's can be evaluated on the basis of:

- Neat and clean classroom
- Neat and clean corridor
- Tables and chair properly arranged

Most of you have pets at home. Where do you take them for their nature's call. On the road? But when you are going to school early in the morning you must have seen the faeces of these pets on the road and you were just about to step on it or may be sometime in a hurry you must have stepped on it. What feeling do you get? You curse the society. Have you ever thought that you are also a party to it? Now what you can do? You could suggest your RWA (Resident's Welfare Association) to select a small park which is already there at the extreme end of the society. If the park is not there a small pit can be dug in one corner of the society and can be marked as pet's toilet. Pets should be taken there only for the nature's call. In some days you will realise that the pet will also go to that place only for easing out. You could ask your society sweeper to clean the place once in a day by accumulating all the faeces in one corner. Soon the faeces will decay and become manure which can be used in the society park.

We often crib about water logging especially during the rainy season and curse the government's inefficiency. But are we not responsible? Do we not throw our waste all around without realising that it can block the sewer lines. Are we not constructing houses by cutting down our natural greenery without giving a thought whether our land can withstand it or not. You all love to go to a park on a holiday. Think where will you go if most of the parks are cut for residential / commercial purposes.

SAVE PAPER, SAVE TREE AND SAVE THE ENVIRONMENT

We all use paper but most of the time we throw the waste paper in the dustbin. We tear off the envelopes of our electricity, water other bills and throw them in the dustbin. Don't you think we are doing wrong? Do you know where do we get our paper from? YES! You are right. Paper is made from the wood. So, we are cutting a large number of trees to make paper. You also know that trees are very important for a clean and healthy environment and thus it becomes necessary for you to use the paper judiciously. Recycling of the paper is the need of the hour.

ACTIVITY: Select five children in your neighbourhood studying in different classes from class 6th to 10th and ask them the following questions:

1. Do they use full page, half page, single side, both sides of their notebooks?
2. What do they do with the pages left in their notebooks after the session is over?
3. Do they use these empty pages for rough work?
4. What do they do with their old note books? Throw it in the dustbin, give it to the kabadiwallah or burn it?

Record your data in a tabular form. What conclusion do you draw from this?

If these children are not using the paper judiciously, explain them how they are disturbing the natural environment and that their own doing can harm their own future.

Do you know what all you can make with the waste paper?

1. Carry bags
2. Cards
3. Wall hangings and many more articles

ACTIVITY: Ask the students to make best out of waste paper and you could arrange for an exhibition and prizes can be given to the 1st -3rd best articles made out of waste paper.

EVALUATION: Student can be evaluated on neatness of the article, whether the article has actually been made from the waste paper and the innovative idea.

MAKE YOUR OWN COMPOST

- Collect the biodegradable waste in one corner of the school
- The students of each class will be asked to throw the biodegradable wastes in a dustbin kept outside their class.
- At the end of the day one student (every day the student will change and in this way there will be involvement of the whole class) will throw this waste in the large pit made in one corner of the school.
- In this way all the biodegradable waste of the school will be collected in this pit.
- You can select two small corners of your school. Fill one at a time. For two months use one pit and then throw your biodegradable waste in the other pit. Cover the first pit containing the biodegradable waste with soil and leave it for two months. Make sure you keep the soil moist.
- After some time you will see that all the biodegradable waste has been converted into manure.
- This manure can now be used in your school gardens.

You can make your own compost at home also in a pot. Put the used tea leaves, egg shell or any other biodegradable vegetable waste in this pot and cover it with atleast 15cm. of soil. Make sure you keep the soil moist.

And in this way you you have not only made your own compost, but also have saved the environment from pollution.

SANITATION AND HYGIENE

The need of the hour is to make the people aware they have a great role to play in keeping their surroundings neat and clean and that their participation is essential in the management of garbage in their neighbourhood. Why always curse the MCD? If we can keep our house spick and span then why not our surroundings?

ACTIVITY: Each student will be asked to do a survey of atleast 5 families in their neighbourhood and the following questions can be included in the survey sheet.

1. Is there any accumulation of garbage in and around your society/house?
2. Who all are responsible for dumping the garbage in the neighbourhood? The people of the society/ house or street sweepers or any other person. Who throws your garbage and where?
3. Is there a municipal corporation dustbin?

- If yes, then who comes to collect the garbage and how frequently? Twice a day, once a day or once in two days or only when repeatedly complaints are sent to the MCD.

The student will record the observations in a tabular form.

CONCLUSION: Who is responsible for dirtying the environment?

- The students will be asked to write ways of educating their neighbours on proper disposal of garbage.
- The children of their society can take out a rally with placards and shouting slogans educating the society on hygiene and sanitation. This is our place. We live here. Keep the place neat and clean.

EVALUATION:

- Did the students complete their survey on time?
- The different ways that they have suggested for educating their neighbours for disposal of garbage.
- Neatness and presentation of their survey data.
- Put three dustbins for disposing off your waste outside your classroom and also in your house. Paint one with red colour, 2nd with green colour and third with blue colour.
- In the red dustbin throw your non-biodegradable waste, in blue recycled waste like paper etc. and in the green dustbin put bio-degradable waste.
- The biodegradable waste can be put in a pit for making of the compost, recycled waste to be given for recycling (there are green peace people who collect this, including the newspaper from your doorstep), and only the non-biodegradable waste should be thrown in the municipal corporation dustbin.

ACTIVITY:

BIODEGRADABLE DUSTBIN (GREEN)	NON-BIODEGRADABLE DUSTBIN (BLUE)	RECYCLED DUSTBIN (BLUE)

- Record the waste of your house for a particular day in the above table.
- Record your observation for seven consecutive days.

What did your mother do with the respective waste?

Were you successful in segregating the household waste?

EVALUATION:

- Was the student able to segregate the waste correctly?
- Presentation of his/her work.
- Neatness
- Was the work done on time?

ACTIVITY: Role play: The student to be given some topics and asked to enact in the assembly. In this way the entire school will be educated on the environmental ethics. The topic can be chosen from any of the questions written in the beginning of this topic.

- Inter class/ inter school debate/extempore :
- Some of the topics for debate:
 - Should the paper be recycled?
 - Should we think of the present and use our natural resources?
 - Any other topic-----help in choosing the topic can be taken from the questions given in the first part of the topic.

CHAPTER

7

DISASTER MANAGEMENT

India has been traditionally vulnerable to natural disasters on account of its unique geo-climatic conditions. Floods, droughts, cyclones, earthquakes and landslides have been a recurrent phenomena. Apart from natural calamities, accidental disasters have been frequent for one or the other reasons. Terrorist attack with bomb explosion in different parts of country, stampede in schools, religious places and other crowded areas are hard evidence of the fact that our country needs a better disaster management approach. If we could remember a few of them are:



- **Dec. 4, 1981**— Forty-five people, most of them schoolchildren, were killed when panicked sightseers stampeded down the narrow staircase of the Qutb Minar, in New Delhi.
- **Sept. 10, 2009** five girls were killed and 27 other students injured, five of them critically, in a stampede triggered by rumours of a short circuit in the Government Senior Secondary School in Khajuri Khas at around 9 am following the rumours.

People's attitude in our country towards this issue is *'I was not involved in this disaster, I am safe, and thus I can worry when it will affect me'*. This callous attitude is not going to solve the problem. Disaster management occupies an important place in this country's policy framework as it is the poor and the under-privileged who are worst affected on account of calamities/disasters. Not just our city but the entire country lacks the proper disaster management skills or approach. When an earthquake comes,

people just rush out of their buildings without stopping to think that they might cause stampede which may take more lives than the actual disaster.

Objectives of the chapter

- To have a basic understanding of various concepts used in Disaster Management, like Disaster, Hazard, Vulnerability and Disaster Management Cycle.
- To explain various types of disasters.
- To have a better understanding of natural hazards, disasters and their management.

INTRODUCTION TO DISASTER MANAGEMENT

Over the past decade, the number of natural and manmade disasters has climbed inexorably. Drought and famine have proved to be the deadliest disasters globally, followed by flood, technological disaster, earthquake, windstorm, extreme temperature and others. In India, 59 per cent of the land mass is susceptible to seismic hazard; 5 per cent of the total geographical area is prone to floods; 8 per cent of the total landmass is prone to cyclones; 70 per cent of the total cultivable area is vulnerable to drought. Apart from this the hilly regions are vulnerable to avalanches/ landslides/hailstorms/cloudbursts. Apart from the natural hazards, we need to know about the other manmade hazards which are frequent and cause huge damage to life and property. It is therefore important that we are aware of how to cope with their effects. We have seen the huge loss to life, property and infrastructure a disaster can cause but let us understand what is a disaster, what are the factors that lead to it and its impact.

What is a Disaster ?

The term disaster owes its origin to the French word “**Desastre**” which is a combination of two words ‘**des**’ meaning bad and ‘**aster**’ meaning star. Thus the term refers to ‘**Bad or Evil star**’. A disaster can be defined as “*A serious disruption in the functioning of the community or a society causing wide spread material, economic, social or environmental losses which exceed the ability of the affected society to cope using its own resources*”. A disaster is a result from the combination of hazard, vulnerability and insufficient capacity or measures to reduce the potential chances of risk. A disaster happens when a hazard impacts on the vulnerable population and causes damage, casualties and disruption. Any hazard – flood, earthquake or cyclone which is a triggering event along with greater vulnerability (inadequate access to resources, sick and old people, lack of awareness etc) would lead to disaster causing greater loss to life and property. For example; an earthquake in an uninhabited desert cannot be considered a disaster, no matter how strong the intensities produced. It is disastrous only when it affects people, their properties and activities. Thus, disaster occurs only when hazards and vulnerability meet. But it is also to be noted that with greater capacity of individual/community and environment to face these disasters, the impact of a hazard reduces. Therefore, we need to understand the three major components namely **hazard, vulnerability and capacity** with suitable examples to have a basic understanding of disaster management.

What is a Hazard & How is it classified?

Hazard may be defined as “a dangerous condition or event, that threat or have the potential for causing injury to life or damage to property or the environment.” The word ‘hazard’ owes its origin to the word ‘**hasard**’ in old French and ‘**az-zahr**’ in Arabic meaning ‘chance’ or ‘luck’. Hazards can be grouped into two broad categories namely natural and manmade.

1. **Natural hazards** are hazards which are caused because of natural phenomena (hazards with meteorological, geological or even biological origin). Examples of natural hazards are cyclones, tsunamis, earthquake and volcanic eruption which are exclusively of natural origin. Landslides, floods, drought, fires are socio-natural hazards since their causes are both natural and man made. For example flooding may be caused because of heavy rains, landslide or blocking of drains with human waste.
2. **Manmade hazards** are hazards which are due to human negligence. Manmade hazards are associated with industries or energy generation facilities and include explosions, leakage of toxic waste, pollution, dam failure, wars or civil strife etc.

What is vulnerability ?

Vulnerability may be defined as “The extent to which a community, structure, services or geographic area is likely to be damaged or disrupted by the impact of particular hazard, on account of their nature, construction and proximity to hazardous terrains or a disaster prone area.” In simple terms is the potential for loss to an individual, community or place because of a disaster, which is affected by geographical as well as social conditions. People living in an area may be vulnerable to more than one disaster. For instance, a coastal area may face floods and cyclones frequently, while being located in an earthquake zone. Such an area is called a ‘multi-hazard’ zone. Our country is divided into various zones based upon the vulnerability of the area to various disasters. When these zones overlap, we have a multi-hazard zone.

What is Disaster Management Cycle?

Disaster Risk Management includes sum total of all activities, programmes and measures which can be taken up before, during and after a disaster with the purpose to avoid a disaster, reduce its impact or recover from its losses. The three key stages of activities that are taken up within disaster risk management are:

Before a disaster (pre-disaster):

Activities taken to reduce human and property losses caused by a potential hazard. For example carrying out awareness campaigns, strengthening the existing weak structures, preparation of the disaster management plans at household and community level etc. Such risk reduction measures taken under this stage are termed as mitigation and preparedness activities.

During a disaster (disaster occurrence):

Initiatives taken to ensure that the needs and provisions of victims are met and suffering is minimized. Activities taken under this stage are called emergency response activities.

After a disaster (post-disaster):

Initiatives taken in response to a disaster with a purpose to achieve early recovery and rehabilitation of affected communities, immediately after a disaster strikes. These are called as response and recovery activities. Disaster Risk Reduction can take place in the following ways:

1. Preparedness

This protective process embraces measures which enable governments, communities and individuals to respond rapidly to disaster situations to cope with them effectively. Preparedness includes the formulation of viable emergency plans, the development of warning systems, the maintenance of inventories and the training of personnel. It may also embrace search and rescue measures as

well as evacuation plans for areas that may be at risk from a recurring disaster.

Preparedness therefore encompasses those measures taken before a disaster event which are aimed at minimising loss of life, disruption of critical services, and damage when the disaster occurs.

2. Mitigation

Mitigation embraces measures taken to reduce both the effect of the hazard and the vulnerable conditions to it in order to reduce the scale of a future disaster. Therefore mitigation activities can be focused on the hazard itself or the elements exposed to the threat. Examples of mitigation measures which are hazard specific include water management in drought prone areas, relocating people away from the hazard prone areas and by strengthening structures to reduce damage when a hazard occurs. In addition to these physical measures, mitigation should also aim at reducing the economic and social vulnerabilities of potential disasters

Conclusion

‘Prevention is better than cure’, educating the people about small things like how to evacuate, where are the safety exits, where to assemble during disasters is certainly much better than having the paramedics search the disaster affected area for dead bodies. What needs to be understood here is that a little education and awareness goes as far as saving a life or two. There is already a legislation which takes care of institutionalization of disaster management (Disaster Management Act, 2005).

There are various ways to achieve a great improvement in the way we look at ‘disasters’, some of them are:

1. Making it compulsory for every institution or building to have an evacuation plan. Conducting mock drills at least once a month.
2. Disaster Management courses in schools should be more practical in nature and not theoretical. Making students ‘learn’ what to do during disasters for examination purposes is not going to help them when an actual disaster strikes.
3. Local authorities should mark disaster sensitive areas and alert the locals to take all the necessary steps to prevent getting affected.
4. Since technology and internet have become a great tool for self education these days, the websites for NDA need to be improved to make them more interactive and educative.
5. India as a nation needs to inculcate a culture where disaster management becomes a habit. Our approach regarding putting off such things for future or until they affect us directly can someday cost loss of many lives. Being prepared and cautious is any day better than being full of regret.

FIRST AID

INTRODUCTION

First aid is the immediate treatment given to the victim of an accident or sudden illness before medical help is obtained. First aid has been practiced ever since the beginning of humanity. Learning first aid is the responsibility of every citizen.

Mahatma Gandhi was a great supporter of the cause of First Aid, and led a band of dedicated volunteers in 1906 during the time of the Zulu Rebellion and earlier in 1899 during the Boer war.



OBJECTIVE

First aid is an important skill. It is important for every person to know the simple methods of first aid for some of the common ailments. By following some of the guidelines one can save life of many people by giving these initial remedies until the professional medical aid arrives.

In an emergency there's no time to read manuals or instructions. If one has memorised some of the immediate medical help, it will help in emergencies by reacting quickly and efficiently.

Learning objectives

After reading this module we will be able to:

1. Provide pre-medical help to the victims of an accident or sudden illness
 2. Make our own first aid box and maintain it
 3. Develop basic skills to provide immediate help in emergent medical situations
1. **BLEEDING:** While playing, you or your friend must have fallen down and got hurt and bleeding may have occurred from the injured area. You may have panicked because the bleeding was not stopping. The immediate medical help that you can give to stop bleeding is as follows:
 - ◆ Raise the injured part (this will reduce the flow of blood from the injured part). If required, lay the victim down and raise the injured part.
 - ◆ Stop the bleeding by applying pressure with a clean cloth (preferably an absorbent cloth). If the cloth is not there then the pressure can be applied with your fingers to stop the bleeding.
 - ◆ If the blood soaks through the cloth, then apply a second bandage. Do not remove the first cloth as it will disturb the clotting which has already taken place.
 - ◆ Once the bleeding has stopped, clean the wound gently with soap and water to remove the dirt and apply a mild antiseptic.



APPLY FIRM PRESSURE TO THE WOUND UNTIL THE BLEEDING STOPS

<http://www.wikihow.com/Stop-Bleeding>

2. **NOSE BLEEDING:** During the hot summer months, due to the intense heat sometimes you or your friend's nose may have suddenly started bleeding. The first and foremost thing for you is to remain calm. If it is your friend, ask her/ him to remain calm and then follow the self-care home treatment given below.

- ◆ Sit down and lean forward
- ◆ Using your thumb & index finger, squeeze soft part of nose
- ◆ This part is between end of nose and the bridge of nose
- ◆ Continue holding till bleeding stops. Do not stop in-between
- ◆ If bleeding continues, hold for another 10 minutes
- ◆ Divert the attention of the patient
- ◆ Avoid picking, blowing or rubbing nose for 2 days
- ◆ Place an ice pack on the bridge of nose

3. **CUTS AND GRAZES:** It is very common and each one of us must have got cuts at some stage in our life either while playing or while working in the kitchen or while sharpening a pencil with a knife or a blade. Here are some simple tips for you to follow under these circumstances.

- ◆ Clean the cut area using a cotton swab or gauze.
- ◆ Apply a mild antiseptic.
- ◆ Tetanus injection may be required if the cut is caused by a rusty or dirty object.
- ◆ For small cuts, cover it by band aid (surgical tape).



4. **BRUISES:** Bruises are caused when a fall or a blow causes bleeding in the tissues beneath the skin.

Caution: Don't fight with blows with your friends

- ◆ Place a plastic bag containing some ice on the bruise for 20-30minutes. You can put crystals of ice in a zigloc bag and seal it to make an ice pack. The cold reduces the flow of blood to the bruised area, thus limiting the bleeding into the skin. It also reduces the size of the bruise.



5. **BURNS:** Be careful while doing an experiment in the lab or while working in the kitchen on a gas stove/ gas burner. On Diwali festival be extra careful while burning crackers. Always have some elderly person with you while burning crackers on Diwali.
- ◆ In case of minor burns (first degree burns- damages only the outer layer of the skin), cool the burn by dipping the burnt area in cold water or holding it under cold water for 10-15 minutes.
 - ◆ Gently dry and cover the burnt area loosely with a clean, dry gauze to prevent infection.
 - ◆ In case of second degree burns, remove all clothing, jewellery etc. from the burnt area unless it is sticking to the skin. Pour cold water over the affected area for 10-15 minutes. Gently blot the area dry (do not rub as rubbing may break the blisters thus subjecting it to infection). Lightly cover the entire area with a clean dry dressing. Raise the burnt area (arm or leg) to reduce swelling and immediately consult a doctor.
 - ◆ In case of third degree burns, immediately rush the patient to a doctor. Do not wash with cold water or apply medication to the burn. Just place clean, dry cloths over the burnt area.
 - ◆ In case of burn with acid, use large quantity of water to wash off the acid and then wash with an alkali and treat as for ordinary burn.
 - ◆ In case of burn with strong alkali, wash with water and apply vinegar or boric acid solution. Apply a burn ointment.
 - ◆ If the patient has burn on the face, keep checking to make sure the patient is not suffering from breathing problem.
 - ◆ Never put butter or greasy ointment on a burn. They seal heat into the wound and may cause infection. Also never use ice directly on the burn. Putting ice directly on the burn can cause frost bite further damaging the skin.
6. **FOREIGN BODY IN THE EYE OR EAR:** It is quite common and everyone of us must have faced some dust particles getting into our eyes. What should we do then? Here are some easy home care remedies for you:
- ◆ Never rub the eye.
 - ◆ Wash the eye with clean water.
 - ◆ In case of chemicals that have splashed into the eye, quickly wash out the chemicals by holding the victims face under the running water for at least 10-15minutes. Care should be taken that the chemical is not washed over the uninjured eye (tilt the head with the injured side downward).
 - ◆ Cover the eye with a clean pad and consult a doctor.
7. **FRACTURES AND DISLOCATIONS:** If you feel there is a dislocation or fracture, then:
- ◆ Make the patient comfortable. Move the patient as little as possible (movement may displace the broken bones).
 - ◆ Give support to the injured part. For example: the fractured arm should be supported against the body with a sling or bandage.
 - ◆ For the dislocation, do not try to force back a dislocated joint by yourself. Apply a splint to the joint to keep it from moving. Try to keep the joint elevated to slow the blood flow to the area and immediately consult a doctor.
8. **INSECT BITES AND STINGS:** A honey bee or wasp enters your classroom and stings you, then don't panic, just follow these home care remedies.
- ◆ Insects, spiders and scorpions are capable of causing very painful reactions. They can be dangerous but are rarely fatal. Sometimes they may cause allergic reaction. Remove the sting by scraping it using tweezers or a straight edged object.

- ◆ Wash the area with soap and water.
- ◆ Apply cotton or gauze soaked in ammonia solution or washing soda.
- ◆ Apply ice to reduce pain and swelling.
- ◆ Take the patient to a doctor.

9. ANIMAL BITE (PETS /WILD ANIMALS):

- ◆ Wash the wound with soap and running water.
- ◆ Apply an antiseptic ointment and rush to a doctor for medical aid. Tetanus booster may be required.

CAUTION: Don't go too near a stray dog. Don't disturb a pet when the pet is having food.

10. SNAKE BITE: First identify whether the bite is of a poisonous snake or a non- poisonous snake. In case the bite is of a poisonous snake then give the following immediate medical help:

- ◆ Tie a piece of cloth above the wound to check the blood circulation and spread of venom into the body.
- ◆ Cut open the wound made by the snake's teeth with a sharp knife or razor blade.
- ◆ Suck the blood out with a tube or mouth and immobilize the affected area with splints.
- ◆ Immediately take the victim to a doctor for medical treatment (you should do this only with required precautions).

11. Food POISONING: Food poisoning can be caused if you eat open food from road side food stall or you eat cut fruits from the road side vendor or drink juice from an unhygienic juice stall.

- ◆ In case of food poisoning induce vomiting by giving a large quantity of a solution of common salt, or a solution of soda or by putting fingers in the throat. If the patient's head is kept in the downward direction, then it will help in vomiting.
- ◆ Take the victim to the nearest hospital.

12. ARTIFICIAL RESPIRATION:

- ◆ Artificial respiration is a life-saving method used to restore breathing to a person whose breathing has stopped.
- ◆ Tilt the head back and lift up the chin.
- ◆ Pinch the nostrils shut with two fingers to prevent leakage of air.
- ◆ Take a deep breath out and put your mouth over the victim's mouth and breathe slowly into the patient's mouth. Repeat this twice.
- ◆ Check if the chest rises as you breathe into the patient. If it does, then enough air is being blown in.
- ◆ If there is no response, hold the head back further and lift the chin and repeat the procedure until the person starts breathing.
- ◆ Take the person to the nearest doctor.



Take a deep breath and put your mouth over the victim's mouth and breathe out slowly into patient's mouth. Repeat this process.

13. HEART ATTACK:

- ◆ Immediately lay the person in a horizontal position and encourage the victim to relax. Prevent any unnecessary stress and avoid movement.
- ◆ Allow plenty of fresh air to come.
- ◆ Loosen the person's clothing.
- ◆ In case the person's physician has advised any medicine for heart attack, then immediately give the medicine and call for the doctor.
- ◆ Meanwhile follow the advice given by the doctor over the phone.

14. UNCONSCIOUSNESS: A person may become unconscious because of intense heat, epilepsy or if the person is empty stomach for a long time. Here are some immediate remedies that you can give to the patient:

- ◆ Prevent overcrowding around the victim to ensure fresh air.
- ◆ Lay down the victim with head lowered and legs elevated.
- ◆ Loosen any tight clothing.
- ◆ Apply cool, damp cloth to the face and neck and allow fresh air to come.
- ◆ Keep the patient lying down for at least ten minutes after recovery
- ◆ Do not give anything to drink unless fully revived.

15. ELECTRIC SHOCK:

- ◆ Electric shock can cause unconsciousness, or stop breathing. First aid cannot be given unless the victim is separated from the electric current.
- ◆ Immediately turn off the electricity.
- ◆ In case you are not able to turn off the electricity, stand on the dry insulating material such as rubber mat, or a thick pile of newspaper. With a wooden stick or a wooden chair, push the victim's body away from the electrical appliance. **Never touch the victim.**
- ◆ If the person becomes unconscious or stops breathing then follow the instructions given before.
- ◆ Call for a doctor/ rush the victim to a nearby hospital.

16. DROWNING:

- ◆ Make the victim lie down with head lower than the chest/rest of the body to reduce the risk of inhaling vomit.
- ◆ The person should be kept warm by rubbing on the palm.
- ◆ Turn the victim upside down and press his/ her back so that he vomits out water from the lungs.
- ◆ Give artificial respiration till the victim starts breathing on his or her own again or till medical advice arrives.
- ◆ If the victim starts coughing or spurting again from mouth and nose, then turn the victim on their side. This will remove the water from the lungs.
- ◆ Once the victim starts breathing naturally, keep him or her warm and call for the doctor/ take the victim to a nearby hospital.

CAUTION: Never enter a swimming pool alone. Always go with a trainer or with someone who knows swimming.

First aid box

The eco-club teacher should keep a first-aid box in her/ his cupboard. She should also train all the eco club members how to use the various first aids.

CONTENTS OF FIRST AID BOX

1.	SMALL COTTON ROLL	1
2.	GAUZE BANDAGES (different sizes)	3
3.	DISPOSABLE GAUZE BANDAGES (different sizes)	3
4.	CREPE BANDAGE	1
5.	SAVLON/DETTOL (small bottle)	1
6.	POVIDONE IODINE OINTMENT	1 TUBE
7.	BETADINE SOLUTION	1 BOTTLE
8.	THERMOMETER	1
9.	SMALL SCISSORS	1
10.	CROCIN/PARACITAMOL TABLETS/ DIEGIENE TABLETS/PUDHINHARA TABLETS	6
11.	SMALL STEEL BOWL	1
12.	ASPIRIN TABLETS	50
13.	JOHNSON'S BAND AID TAPE STRIPS OR MICROPORE TAPE	25
14.	HAND SANITIZER	1
15.	CALAMINE LOTION	1
16.	BURNOL/SILVER SULPHADIAZINE TUBE	1 tube
17.	TRIANGULAR BANDAGES	2
18.	STERILE GLOVES PAIR	1

ACTIVITY 1

Your friend was jumping the hurdles during the games period and suddenly misses her rhythm and falls down. She bruised her elbow and got a cut on her knee. What immediate medical care would you give to your friend?

ACTIVITY 2

Your mother was cutting vegetables and was distracted by a serial on the television and suddenly cut her finger. Blood started coming out. You were sitting next to her. What will you immediately do?

ACTIVITY 3

In the laboratory, while working with concentrated sulphuric acid it suddenly fell on your hands. What immediate medical care will you take?

ACTIVITY 4

You were making Maggie at home, your finger got burnt, what will you do?

ACTIVITY 5

Your friend had not eaten any breakfast. She was playing in the playground in the hot summer month and suddenly she fell unconscious. What immediate medical care will you give to your friend?

ACTIVITY 6

You see a person falling down on the road as his motorbike skids. You rush towards him and you think that the pain and agony of the person is because of a dislocated bone or maybe a fracture of his right leg bone. What medical care will you immediately give to the victim before taking him to a doctor.

REFERENCES

- Home Science Teaching-A New Perspective Teacher's Manual For Classes VI-X
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CHAPTER

8

GREEN SCHOOL CAMPUS

To achieve the objective of creating environmental awareness amongst the future generation, the Ministry of Environment and Education has been implementing several schemes and programmes. One of such measures is eco clubs. Eco-clubs are environment clubs which are formed in various educational institutes, started in 1998 with 100 schools in Delhi. Eco Clubs play an important role in creating environmental awareness amongst the future generation. 2000 Eco-Clubs have been established in Government, Aided, Private, Public Schools and Colleges of NCT of Delhi.

Now the Department of Environment provides a grant of Rs. 20, 000 to each eco-club on annual basis for undertaking various eco- friendly activities. The major activities carried out by these eco-clubs include tree plantations, clean drives, awareness programmes like quiz, essay-writing competitions, nature trails etc. The perceptions of the teachers reveal that the status of environmental education is not much encouraging. A lot has to be done with respect to curricula, development of teaching-learning material, modes of transaction, co-curricular activities, and providing reinforcement for attainment of the objectives of environmental education. . The Green Team is the heart of the Green Schools process, both organizing and directing activities at the school. Consisting of the stakeholders of the school environment - students, teachers, custodians, facilities managers, parents and school board members - the Green Team is democratic and can often be run by the students themselves. Whatever the type of school or age group, student involvement in the committee is essential. This group can be charged with coordinating many of the greening activities, making recommendations to relevant school decision-makers, and facilitating communication among -- and actions by -- the whole school community. Use our tips for starting your Green Team.

- 1) **Adopt an Environmental Vision Statement or Planet Pledge:** Each school produces its own vision statement, setting out what the students and/or school community are striving to achieve. The Environmental Vision Statement or Planet Pledge is displayed in various places within the

school and is recognized by the students and other school community members as a statement of beliefs and intents. This statement is often in the words of students, and can be an inspiring classroom, art, or school-wide assembly project. Such statements can also be accompanied by a resolution from the school board, Parent Teacher Association, the Green Team, or other school bodies (see the sample school board resolution and sample policies on our [Take Action](#) page). Use our [Four Pillars Graphic](#) to help you understand and define the key components of a Green School.

- 2) **Conduct a School Environmental Survey or Audit:** To identify priorities for action, begin with conducting a review of your school’s environmental impact. Students are involved in this work at every step, from assessing the level of waste from school lunch, to checking the building for inefficiencies such as leaky taps, or electrical equipment left on overnight. The school and the Green Team can work with local organizations, businesses, or other resource people or experts during the review. Take the [“How Green is Your School Quiz”](#) and see how you rate. Find other examples of environmental surveys and audit tools on our [Resources](#) page, under Curricula. We’ve also got lots of ideas and resources on our [Curriculum Ideas for Hands-On Audits](#) page. These audits can be fun and really help educate the school community about the health and environmental impacts of the school.
- 3) **Create A Green School Action Plan:** Use the results of your environmental survey or audit to identify priorities of the key areas where you want to make change and create an action plan. It is important to set realistic and achievable targets to improve environmental performance at the school so kids and adults can take pride in tangible accomplishments in the short term. And it is important to set long-term, inspiring and challenging targets to move beyond the status quo and foster greater environmental improvements. The action plan could involve and promote, for example, a school recycling program; eco-friendly, non-toxic cleaning materials; carpooling; energy conservation like turning off lights, computer monitors and printers; or a school garden. See the “sample school board resolution” and “Steps Forward” on our [Take Action](#) page for examples of policy resolutions, and specific action items under a range of environmental and health topics. [Download a sample worksheet](#) (Word doc) to help create a one-year work plan.
- 4) **Monitor and Evaluate Progress:** The Green Team, students, or other school community members can assist with monitoring and evaluating progress on the priorities in the action plan. This could involve conducting an annual environmental audit to monitor levels of waste, recycling, energy use, purchases of environmentally-preferable products, and financial savings and/or costs. [Use these ecological footprint tools](#) combined with [our resources on school audits](#). The information from the monitoring is needed to ensure that progress towards the goals and targets is made and that the action plan is modified, if necessary. It also ensures that environmental education is an ongoing process in the school, since students can be responsible for the annual audits. The basic data collected over time can show the waste, pollution, and energy avoided - big motivators for people to continue the efforts.
- 5) **Integrate Greening into the Curriculum:** Greening activities can be integrated into existing curricula in science, art, humanities, math, language arts, or electives. Using the school as a hands-on laboratory offers opportunities for real-world problem-solving. Students can undertake study of themes such as energy, water, forests, toxic pollution, and waste. The whole school should be involved in practical initiatives - for example, saving water, recycling materials and saving energy. Outdoor education and time spent in nature locally - whether the schoolyard, a park, or a field trip - is a critical component of a hands-on, place-based, experiential education. Where environmental education is not part of the regular curriculum, recommendations can be made by the Green Team as to how these themes can be incorporated. See our [Teach Stewardship](#) and [Resources](#) pages for a [Sustainable Curricula Directory](#), examples of environmental curricula, on-line quizzes, and other

teaching and learning resources, including reviews of books and other media with environmental themes. No need to reinvent the wheel - there are loads of existing curricula you can use!

- 6) **Inform, Involve, and Celebrate!** : Honour, celebrating, and communicating about achievements are critical components of a Green School! Greening programs can often unify the whole school and strengthen community relations. Your school might consider partnering with external organizations from the community to benefit from their experience and expertise. In some schools, environmental consultants have offered to take part in the environmental review process. Many local government agencies and utilities offer free advice on energy, recycling, and hazardous waste management. Schools should also consider the wider community when preparing action plans - for example, schools could offer to be the local recycling point or to be a drop-off for Community Supported Agriculture boxes. Some schools get involved with clean-up or habitat restoration at nearby parks or share their experiences in other ways. A communication and publicity program keeps the school and the community informed of progress through classroom displays, school assemblies, newsletters, or other press coverage. Communicating is key to spreading success and inspiring more actions. Annual Earth Day celebrations - organized around April 20 - can offer an opportunity to showcase actions taken by the school and bring together the school and wider community.

The number of studies has also been carried out to reflect upon the role of eco club students in creating environment awareness. Case study from the eco club of presentation convent school in Delhi (2006) showed the effective use of three R's- reduce, recycle. reuse , it is recycling waste paper generated in school started with small recycling paper machine in the school they have move on to recycling machine which can load 10 kg in one operation. Eco club students recycled paper once a week and generated around 100 chart papers from 10 kg of paper waste. So in order to familiarize students with linkage between education and environment; and how healthy living conditions in schools can be enhanced, a project on Green School Programme was initiated at DIET Daryaganj with collaboration from Centre for Science and Environment (CSE) is a public interest research and advocacy organization based in New Delhi. Through in this project pupil teachers were trained to use Green School Manuals prepared by CSE in assessing environment of their schools during School Experience Programme, which would lead to betterment in environmental conditions. The study reflected that status of eco club in schools was on the average. Majority of the sampled schools were involved in number of activities related to environment such as plantation, rain water harvesting but not all. As suggestion mentioned by the teachers training on eco clubs need to be increased and involvement of NGOs with school was also strengthened. Moreover encouragement among stakeholder need to be emphasized as the participation by schools in environmental programmes at different level was low. Over and all there seems to be lack of planning and organization. The structure of eco club in schools need to reorganize as respondents reported that eco club should not be responsibility of eco club in charge only but each and every personnel in school should be include in it. In future following more environment activities can be conducted to make school green

1. **Lighting:**

Switch to CFLs: Ask school to switch all light bulbs to CFLs. CFLs provide the same light as incandescent but use less energy and last longer. Switching to CFLs is one of the easiest ways to reduce your campus footprint and save money. Check out these CFL facts from Energy Star:

- ◆ Install **occupancy sensor lights** that turn on and off automatically based on room activity.
- ◆ Ask your school to order “Turn off Lights” **switch decals** as a friendly reminder to turn lights off on your way out.
- ◆ *Use compact fluorescent light bulbs* .This is a good bit of advice for those students, teachers and school staff members who are living or working in school campus. These bulbs might be

slightly more expensive than regular ones, but will decrease your energy intake, last longer and ultimately save you money. Lamp light is a lot more pleasant and environmentally efficient than overhead dorm lighting.

2. **Go tray less:** Join several schools in going tray less at dining halls in an effort to conserve water and reduce food waste. Need to get food to go? Ask if your school provides reusable to-go boxes, and if not, bring your own.
3. **Natural cleaning products:** Encourage your school to purchase and use environmentally-friendly cleaning products. These [Enzymatic Cleaners](#) from Green Irene are safe for both you and your students, and the environment. [Seventh Generation](#) products are also a great choice.
 - ◆ Ask residence halls to keep a **supply** of environmentally- friendly cleaning products at the front desk so students can sign them out as needed.
 - ◆ Keep environmentally-friendly detergent in campus laundry rooms. **Bonus Points:** Keep drying racks in laundry rooms to encourage air drying, or set up a residence hall air drying rack rental system.
 - ◆ Check out Ithaca College's [Green Cleaning Commitment](#).
4. **Recycle:** Your school can significantly reduce its footprint by supplying recycled products and offering recycling options.
 - ◆ Ask computer labs and administrative offices to use recycled paper.
 - a. Advertise Eco Font and **double sided printing** options on computer screen backgrounds! Teachers and students both usually don't mind if they read papers that are printed using both sides of the paper. This is a huge way to save on paper. Also, to save ink, use the low quality settings on items that don't need to look too nice or that are just text. Lastly, think about what you're printing out. If you can show someone the website on a screen, do it. You don't need to print it out.
 - ◆ Buy recycled napkins for dining halls and recycled toilet paper for campus facilities. We're not telling you to eat cleaner, but we're telling you to not overdo it in good restaurants. Generally, a lot of fast food and take out is eaten by students, which means a lot of napkins get grabbed on the way out. Limit the amount you grab!
 - ◆ Set up **recycling stations** at residence halls where residents can drop off light bulbs, batteries, paper, aluminum, cardboard, and glass to be recycled. Supply residents with in-room recycling bins to make it easier for them.
 - ◆ Hold an e-waste day where residents and even community members can drop off electronic wastes to be recycled.
5. **Walk, bike, and limit the use of your car:** Most campuses, especially those that are trying to become a more eco-friendly campus, have pretty good public transit. Walking or cycling will not only help make your campus and nearby region a green area, but will help you avoid the pollution. If you must drive, try to find others who need to as well, and [carpool](#) to save emissions. Starting a bike or car share program on campus is a great way to get students, faculty, and employees to use a clean, efficient mode of transportation.
6. **Install water-filtration fountains:** Decrease your school's footprint by installing more water fountains on campus to encourage less plastic water bottle use.
 - ◆ You can order customized reusable water bottles with your school logo through the campaign.
 - ◆ Carry a water bottle. Not only will this save the environment by decreasing the amount of plastic waste on your campus, but will also help keep you hydrated and your metabolism high. A water bottle can be refilled at any water fountain and can easily be drunk in class or while riding a bike, car, train or bus.

7. **Energy Efficiency:** Let your school know that it can save money while helping the environment by using more energy-efficient appliances.
 - ◆ Tackle Vampire Energy by providing **power strips** to residents and administrative offices.
 - ◆ Encourage your school to buy energy-efficient **appliances** for residence halls, dining halls, and campus offices. Hamilton College received Energy Star certification for two of its residence halls.
 - ◆ Installing energy-efficient **hand dryers** saves both energy and paper waste.
8. **Conserve Water:**
 - ◆ **Install dual-flush toilets:** Boston University installed dual-flush toilets on campus to help conserve water. Check out their dual-flush toilet information and facts on their sustainability website.
 - ◆ Ask Housing to provide dorm bathrooms with **shower timers**. Read how 16 students at Seattle University save over 1,000 gallons of water a week by using shower times here.
 - ◆ Install **low-flow shower heads** in showers to conserve water.
9. **Vacations and Break**
 - ◆ **Email students** a few days before break to remind them to turn lights off, unplug appliances, and to turn down thermostats before leaving for break.
 - ◆ Ask campus facilities and operations to decrease building energy use by going into “**break mode**”
 - ◆ Make a website or Face book group that students can ask for and offer **carpool** rides.
10. **Go Paperless:**
 - a. Save trees, energy, and money by going paperless!
 - b. Ask to submit assignments through e-mail and if they don’t mind posting assignments and readings online.
 - c. Encourage clubs and groups to advertise on white boards instead of posting flyers.
 - d. Use refillable binders instead of notebooks. This is a simple way to save waste. Whenever the session is done you can take out your notes, staple and save, then use the binder for the next session.
 - e. If you really want to take an extra step to make your campus greener, Increase use of laptop/desktop/tablet etc. to take and compile notes.
 - f. The amount of paper student goes through per year is insane; between class notes, scrap copies, term papers, student newspapers, graphs and pictures printed out plus countless other random items add up. We know that these things can’t be avoided, but the way you handle the use of all the paper can really help create a better green campus. Look for recycling bins by garbage bins, dorms, restaurants and classrooms.
11. **Buy recycled goods as much as possible.**
 - ◆ Paper, cleaning products and water are products that can be purchased as a recycled good. They’re slightly more expensive than the normal products, but it’s worth it to make a green campus.
 - ◆ Buy used clothing. Usually thought of as something to do to save money, it is also good for the environment! Recycling clothes minimizes the use of resources to make clothing and puts a dent in the problem of worldwide sweatshops

Its not only during the period of eco club or environment education when you devote significant classroom time to exploring issues of environmental awareness and stewardship. Whether you teach biology, history, or language arts, the Web is a rich and ever-growing resource, with curriculum ideas for integrating environmental issues into lesson plans. But where to begin? That will be your decision, but we’ll help you get started. We’ve compiled a cross section of seven activities and projects in detail and

with ideas for every grade level. Some can be completed within a few class periods and others require more time, but all are sure to get your students -- and you -- thinking about what can be done to preserve our school campus, colony, district, state, country and in turn increasingly fragile planet.

Vermicomposting

Welcome to this lesson on Vermicomposting or worm composting.

- We will cover the characteristic and differences in the garden variety worms and the Red Wigglers.
- Reproduction and life cycle.
- Small medium and large scale worm bin/digesters, other type of worm operations and equipment.
- Talk about the uses of castings. And lastly we will set up a small bin.
- Later we are going to introduce some worms into to curing pile at UNC.
The process of utilizing worms and microorganisms to consume/convert organic wastes into nutrient-rich humus like material is known as vermicomposting. Actually it is worm castings or worm poop!
- Utilizing earth worms and microorganisms to convert organic waste into a nutrient-rich humus like material known as vermicompost (worm castings)
- *Eisenia fetida*, commonly called 'Red Wiggler', 'Manure Worm' or 'Tiger Worm'.

Characteristics of garden worms

Knight crawler or dew worm (*Lumbricus terrestris*).

~ Not a composter.

~ Garden variety worm are soil- dwelling species that tunnel & borrow.

~ Do not consume large volumes of organic material.

~ Will not reproduce well while being confined.

~ Live several feet below surface.

~ Feed on the surface at night.

~ Require cool (45 F or 7.2 ° C) temperature.

COCOON



VERMICOMPOSTING HOME MADE



VERMI-REPRODUCTION

A worm is sexually mature when they develop that band about 1/4 - 1/3 the distance back from the head. This band is called the clitellum's and it contains the reproduction organs. Worms are asexual (do not need a partner)but as a rule they do use a partner. What happens is that the worms find each other, then crawl facing each other and line up the clitellum's side by side. They each excrete a mucus like substance that encompasses them both. They both will then exchange both egg and sperm into this material. After the exchange has taken place, the worms then separate and the mucus like material then starts to harden. The worms then crawl out of this material, which creates a cocoon. This cocoon is a fertilized egg sac. 3-6 weeks after being deposited in the bedding, 1 – 7 worms can hatch. Within 6 weeks of hatching those worms are capable of reproducing. Limiting factors on population growth are food source, temperature, pH, moisture and living area. Pretty much the same parameters as a adult.

Home made version – drill a few holes for air and drainage

Works, inexpensive – a better way would be to drill 2” holes and use 2” soffet vents.

CAN – O – WORMS



WORM FRIENDLY BIN



MIDSCALE VERMICOMPOSTING



MIDSCALE VERMICOMPOSTING



Windrow Beds Utilization of Worm Casting



Above ground bin that could be easily insulated and green house heater cables installed to maintain a comfortable environment for the worms. Manual and labour intensive to harvest.

Vermicycle, Tarboro, NC 15000 LBS/Day Hog Manure

Raw Material

- Pit with PVC sheet or brick and cement tank or wooden boxes to house earthworms.
- Coconut fiber, rice husk, sugar cane bagasse, saw dust, chopped rice/wheat straw, cow dung, green foliage, vegetable remnants, discarded parts of fruits, droppings of animals

Process

- Select a place away from direct heat, strong sunlight and incessant rains.
- Dig a pit measuring 2 feet x 2 feet x 2 feet. Line the pit with polythene (PVC) sheet to arrest the escape of the earthworms. (brick and cement tank or wooden boxes can also be used).
- The pit is systematically filled with four layers of waste. First layer i.e., bottom of the pit is filled up to 2 inches with coconut fiber/husk or sugarcane bagasse. Second layer is 2 inches thick, consisting of saw dust/chopped rice/wheat straw.
- Dampen the bed by sprinkling water. Third layer is the earthworm food, this includes an admixture of cow dung, green foliage, vegetable remnants, discarded parts of fruits, dropping of horses, pigs, sheep or biogas slurry, human excreta, paper or scrap of cardboards etc.
- This feed should be spread till a height of 6 to 8 inches.
- Release about 100 earthworms on the top of the waste bed without hurting them.
- These earthworms will start penetrating to the bottom.
- Once all these earthworms disappear, cover the surface with jute bags and keep them wet by sprinkling water in a judicious way.
- The jute may be turned upside down thrice in the first week, twice in the second week and only once in the third and following weeks, without causing any disruption to the top layer.
- Water and heat inside the tank assist the organic matter to decay and the earthworms to proliferate, both occurring simultaneously.
- By 4 to 5 weeks, the heat inside the pit will start reducing and will come down to 15-18° C).
- When it does not appear warm when felt by hands, that means that the manure is ready for use.
- From one tank, 50 Kg of manure is produced.
- Spread a plastic paper on the ground and empty the contents of the tank slowly in sunlight making

Castings Utilization

Used in potting soil blend (10% max.).

Used to inoculate soils with beneficial microbes.

Excellent source of beneficial bacteria, fungi, nematodes for compost tea brewing.

Sales potential - \$ 16 per pound (2 oz pouch) / \$ 320 – 800 Pound tote

Herbal garden



Aims of this activity:

- Sustainable management of Medicinal and Aromatic Plants (MAP) for plant based drug industries and Traditional Health Practitioners
- Conservation of biodiversity
- Promoting the MAP as a rural livelihood package
- Popularizing the traditional medicine as a creditable and safe health programme so as to integrate with primary healthcare

Objectives:

- Sensitize students about importance of medicinal plants
- Develop skills in students to maintain gardens
- Involve community in garden development
- Learning and sharing

History of medicinal plants/herbs in India

- Plant based medicine is ancient (Ayurveda, Unani, Siddha, Homeo).
- Self reliance medical care system
- Usage in modern & traditional system of medicine

Pre-requisites at school level for setting up a herbal garden

- Presence of compound wall
- Water facility throughout the year
- Ownership of land by school
- Land area in the school of the size 1/10 of hectare (1000 sq.mt) for developing herbal gardens

- Willingness of the school to develop a herbal garden

***Mentha piperata* (Peppermint)**

- Leaves are used.
- Peppermint oil is largely used as a flavouring agent for confectionery as well as toothpastes and mouthwashes.
- The historical use is for easing intestinal cramping, reducing gas production and generally soothing intestinal irritation.
- Has the ability to reduce pain and tension.



***Ocimum basilicum* (Marua Basil)**

- Grown for their ornamental foliage as well as their culinary usage.
- Helpful in boosting immune system of our body.



Bryophyllum calycinum

- Leaves
- Magic leaf prevents ulcer.
- Has the effect of dissolving kidney stones.
- Practice is to cleanse the leaves and eat them every morning for 40 days to dissolve stones.



***Catharanthus roseus* (Sadabahar)**

- Whole plant.
- Used to treat diabetes in Europe.
- Juice from leaves used to treat wasp stings.
- In Hawaii, the plant is boiled to make a poultice to stop bleeding.
- In China, used as astringent, diuretic & cough remedy.
- In S. America used as homemade remedy to ease lung congestion and inflammation of sore throats.



***Cymbopogon citratus* (Lemon Grass)**

- Leaves
- Used as insect repellent and carminative.
- Used against coughing, asthma, bladder disorders and headaches.
- Used in herbal teas and confectionery.
- Its oil is widely used as a fragrance in perfumes and cosmetics.



Costus Ingneus

- Leaves
- Its extracts have up to 300 times the sweetness of sugar.
- Its sweet taste has a slower onset and longer duration than that of sugar.
- Is being administered to diabetics to lower the blood glucose level.



***Adhatoda vasica* (Vasaka)**

- Leaves, Flowers and bark.
- Used in mucolytic and expectorant drugs.
- Leaf extract used for treatment of bronchitis and asthma.
- It relieves cough and breathlessness.
- Gives relief in pyorrhoea and in bleeding gums.



***Urginea indica* (Van Pyaj)**

- Root
- Used as a diuretic.
- Frequently employed in dropsy.
- Used against bronchitis .
- Used in combination with other stimulating expectorants.



***Ocimum americanum* (American tulsi)**

- Leaves
- Used as mosquito repellent.
- Leaves made into paste with condiments and eaten raw.
- Boosts immune system.



***Plantago psyllium* (Isabgol)**

- Used since prehistoric times as herbal remedies.
- The herb is astringent, anti-toxic, antimicrobial, anti-inflammatory, anti-histamine & diuretic.
- Externally, a poultice of leaves is useful for insect bites.
- *P. psyllium* seed useful for constipation, irritable bowel syndrome.
- Plantain seed husks expand and become mucilaginous when wet, which is used in laxative.



***Elettaria* (Cardamom)**

- Used to break up kidney stones and gall stones.
- Was used as antidote for both snake and scorpion venom.
- Also used as a spice and as an ingredient in traditional medicine in systems of the traditional Chinese medicine in China, in Ayurveda in India.
- Green cardamom is broadly used in South Asia to treat infections in teeth and gums, to prevent & treat throat troubles, congestion of the lungs , inflammation of eyelids & digestive disorders.



Trachyspermum copticum

- It is also traditionally known as a digestive aid, a relief for abdominal discomfort due to indigestion & also used as an antiseptic.
- In southern parts of India, dry ajwain seeds are powdered and soaked in milk, which is then filtered and fed to babies. Many assume it relieves colic in babies, and for children it also improves digestion and appetite.
- In the northern part of India, it is often consumed after a heavy meal.



Bixa orellana

- It has long been used by American Indians to make body paint, especially for the lips, which is the origin of the plant's nickname, **lipstick tree**.
- It has a distinct flavor of its own, it can be used to
- color & flavor rice instead of the expensive saffron.



Benefits of Herbal Garden

- **Students**
 - ◆ Awareness & low cost school first aid
 - ◆ Conservation practices
 - ◆ Waste management
- **Community**
 - ◆ Farmers awareness
 - ◆ Conservation of local species

WASTE MANAGEMENT



What is waste Management

- Waste management is the collection, transport, processing or disposal, managing and monitoring of waste materials.
- The term usually relates to materials produced by human activity, and is generally undertaken to reduce their effect on health, the environment or aesthetics.

Methods of disposal

- **Landfill:** Disposing of waste in a landfill involves burying the waste, and this remains a common practice in most countries.
- **Incineration:** Incineration is a disposal method in which solid organic wastes are subjected to combustion so as to convert them into residue and gaseous products.

REASONS FOR IMPROPER MANAGEMENT OF WASTE

- Lack of planning for waste management while planning townships
- Lack of proper institutional set up for waste management, planning and designing in urban local bodies
- Lack of technically trained manpower and funds.
- Lack of community involvement
- Lack of expertise and exposure to city waste management using modern techniques / best

- practices
- Lack of awareness creation mechanism
- Lack of Management Information Systems

RECOMMENDED APPROACHES TO WASTE MANAGEMENT

1. Possible Waste Management Options :
 - (a) Waste Minimisation
 - (b) Material Recycling
 - (c) Waste Processing (Resource Recovery)
 - (d) Waste Transformation
 - (e) Sanitary Landfilling – Limited land availability is a constraint in Metro cities.
2. Processing / Treatment should be :
 - (i) Technically sound
 - (ii) Financially viable
 - (iii) Eco-friendly / Environmental friendly
 - (iv) Easy to operate & maintain by local community
 - (v) Long term sustainability

RECOMMENDED APPROACHES TO WASTE PROCESSING & DISPOSAL

- I WEALTH FROM WASTE (PROCESSING OF ORGANIC WASTE)
 - (A) WASTE TO COMPOST
 - (i) AEROBIC / ANAEROBIC COMPOSTING
 - (ii) VERMI-COMPOSTING
 - (B) WASTE TO ENERGY
 - (i) REFUSE DERIVED FUEL (RDF) / PELLETIZATION
 - (ii) BIO-METHANATION
- II RECYCLING OF WASTE
- III SANITARY LANDFILLING
- IV TREATMENT OF BIO-MEDICAL WASTE SEPARATELY

REDUCE :

- Do not buy products with excessive amounts of packaging.
- Buy fresh foods rather than canned foods.
- Reduce energy and water use.
- Turn off taps, fans and lights when not in use.

REUSE :

- Reuse scrap paper
- Reuse old tin cans, e.g., for storage or decorative purposes.

RECYCLE :

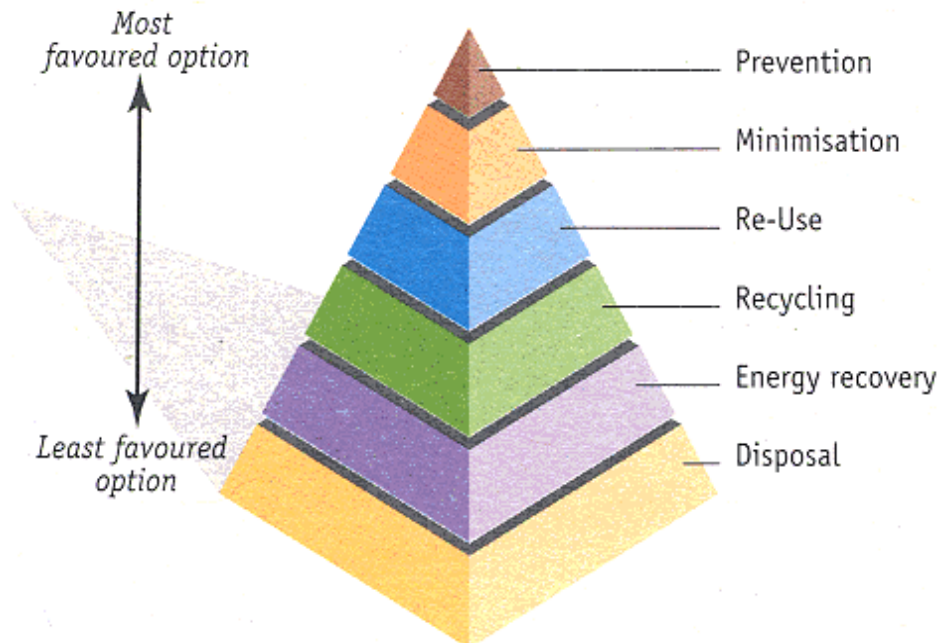
- Segregate garbage into biodegradable(Green bins), recyclable(Blue bins) and Non biodegradable/ Hazardous(Black bins).

DISPOSE :

- Dispose off the garbage properly using different types of bins provided.



WASTE MANAGEMENT HIERARCHY



MUSHROOM CULTIVATION

What is Mushroom :

- Mushrooms neither belong to the plants nor to animals.
- They belong to a separate group of organisms called fungi.
- They lack the usual green matter , grow on dead and decaying organic materials.
- The fruiting body umbrella like or various other shapes, size and colour.
- Mushrooms are known for their nutritive and medicinal value.

Mushrooms for health :

- Mushrooms, are called ‘white vegetables’ or ‘boneless vegetarian meat’
- Mushrooms are quite nutritious and possess many medicinal properties.
- High availability of lysine and tryptophan amino acids usually absent in cereals.

- Ideal food for patients suffering from hypertension, diabetes and obesity.
- Mushrooms a good source of protein 15 % to 30 % protein of their dry mass.
- Achieve great health benefits in regulation of blood cholesterol, immune system boost and anti-tumor, anti-cancer properties

Mushroom Production & Types :

- World 5,00,000 laks ton/ year
- India 40-42,000 ton/ year
- Types of Mushroom
- Button Mushroom (*Agaricus bisporus*)
- Dhingri / Oyster (*Pleurotus spp*)
- Paddy straw (*Volvariella volvacea*)
- Milky Mushroom (*Calocybe indica*)

Cultivation Season in North India :

- October to March ----- White Button
- May to Mid August-----Paddy straw
- Mid August to mid April---- Dhingri
- February to April ----- Milky Mushroom

Properties of Mushrooms :

- Rich proteins, less fat, less carbohydrate and salts.
- Rich in fiber and Have high Vitamin B12 and folic acid content uncommon in vegetables.
- High lysine and amino acids usually absent in cereals.
- Ideal food for patients suffering from hypertension, diabetes and obesity.

Substrates for *Pleurotus spp.* :

- *Agaricus* compost
- Rice straw
- Wheat straw
- Maize stalks & cobs
- Paper
- Hardwood logs, chips and sawdust
- Seed hulls
- Broadleaf “straw”
- Cotton wastes
- Coffee consumer-growing wastes

Cultivation Method :

- Cut the straw 3-5 cm
- Soak overnight in water
- Drain out Excess water next day
- Add @ 7gm bavastin/100Lit water+ 125ml formaldehyde before soaking in water
- Or Steam 2 Hrs (Eliminates sugars, removes the waxy layer, helps decomposition and growth ,free of competing organisms



Spawning & Filling

- Add 2-6% spawn in wet paddy straw
- Fill in perforated 40x30 cm black polythene up to 2/3 capacity
- Incubate in dark humid, well aerated room with 22-25°C , 80-85% RH for 10-15 days
- The area should be completely clean to avoid contamination.
- The substrate moisture should be around 75%).

Incubation :

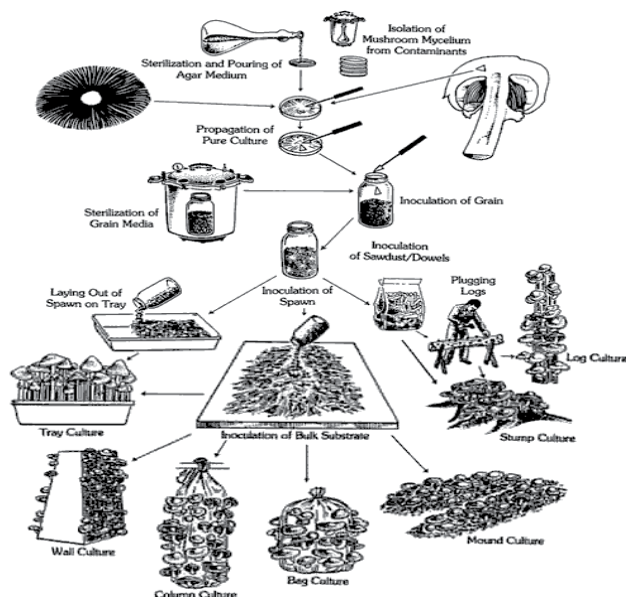
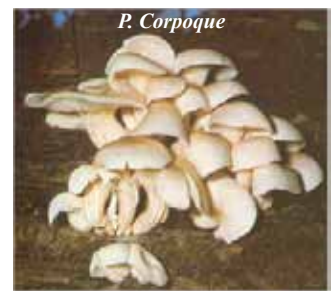
- During the first 24 hours, the mushrooms grow little while adapting to the medium.
- Increased growth starts about 48 hours after seeding, depending on ambient conditions.
- During this vegetative state of the mushroom, the temperature has to be between 22 and 26°C.
- Optimally, the incubation period should not exceed 17 to 22 days.

For Production :

- Cut open polythene & place one feet away on perforated racks fruiting structures appear in a few (five) days.
- When this happens, the humidity and temperature conditions will have to be 90 – 95 RH and 24 - 26°C, respectively.

Harvest :

- Cut the crop when fully developed, leaves twisting from the margin
- Cut larger ones first, leaving the smaller for later.
- The bodies are removed by cutting the base of the stalk with a clean, sharp blade.
- 4 - 6 days after harvesting, the next sprouts begin to appear. 15 kg substrate may produce 3 to 4 harvests; 80% production obtained during first two harvests. (1.5Kg Dry Straw = 6kg Wet straw) --- 1 Kg Yield Fresh



Rainwater Harvesting

What is Rainwater harvesting?

It is the process of collecting and storing water for future productive use.

Rainwater harvesting is the accumulating and storing, of rainwater for reuse, before it reaches the aquifer. It has been used to provide drinking water, water for livestock, water for irrigation, as well as other typical uses given to water.

What is rooftop rainwater harvesting?

Since it is quite easy to collect rainwater falling on roofs, rooftop rainwater harvesting is the process of collecting rainwater falling on rooftops in a tank or sump for future productive use.

Why rooftop rainwater harvesting in schools?

Many schools presently do not have a reliable source of water for drinking and other use.

The school rooftop rainwater harvesting system seeks to provide a source of water for all purpose such as toilet flushing, cooking, washing hands and feet before eating and after toilet use, hygiene and finally if the rainwater is treated well for drinking purpose.

This is especially important in areas where there is Fluoride, Nitrate, Iron or salt in the groundwater and therefore it is unfit for consumption. In these places the rainwater harvesting tank can provide mineral free water for consumption.

Rainwater collected from the roofs of houses, tents and local institutions can make an important contribution to the availability of drinking water. It can supplement the sub soil water level and increase urban greenery.

How much rainwater can be collected?

This depends on the rooftop area, the size of the tank and the rainfall at that place. For example in a place where it rains 500 mm and the roof area is 100 square meters, the rainwater falling on the roof is 50,000 liters. Some amount of it will be absorbed by the roof and some amount will be lost in the collection process. If we assume 80% can be collected then 40,000 liters of rainwater is available for collection.

Depending on the size of the rainwater tank and the distribution of rainfall even a 3000 liter tank may be sufficient to collect all this 40,000 liters of rainwater. We must however keep on using the rainwater in the tank and not wait for summer to use it.

By painting an information board , and keeping a small rain gauge in the school, a good school can involve students in monitoring rainfall, total rain in a year, water collected in the rainwater tank and teach them how to ensure good maintenance of the system.

SYSTEM COMPONENTS

What are the parts of the roof top rainwater harvesting system?

ROOF – The existing roof is made use of to collect rainwater. Since rainwater is pure as it falls from the sky it is necessary that the roof be kept clean for it to remain pure when it is collected. This means the roof will need to be swept and cleaned daily during the rainy season.

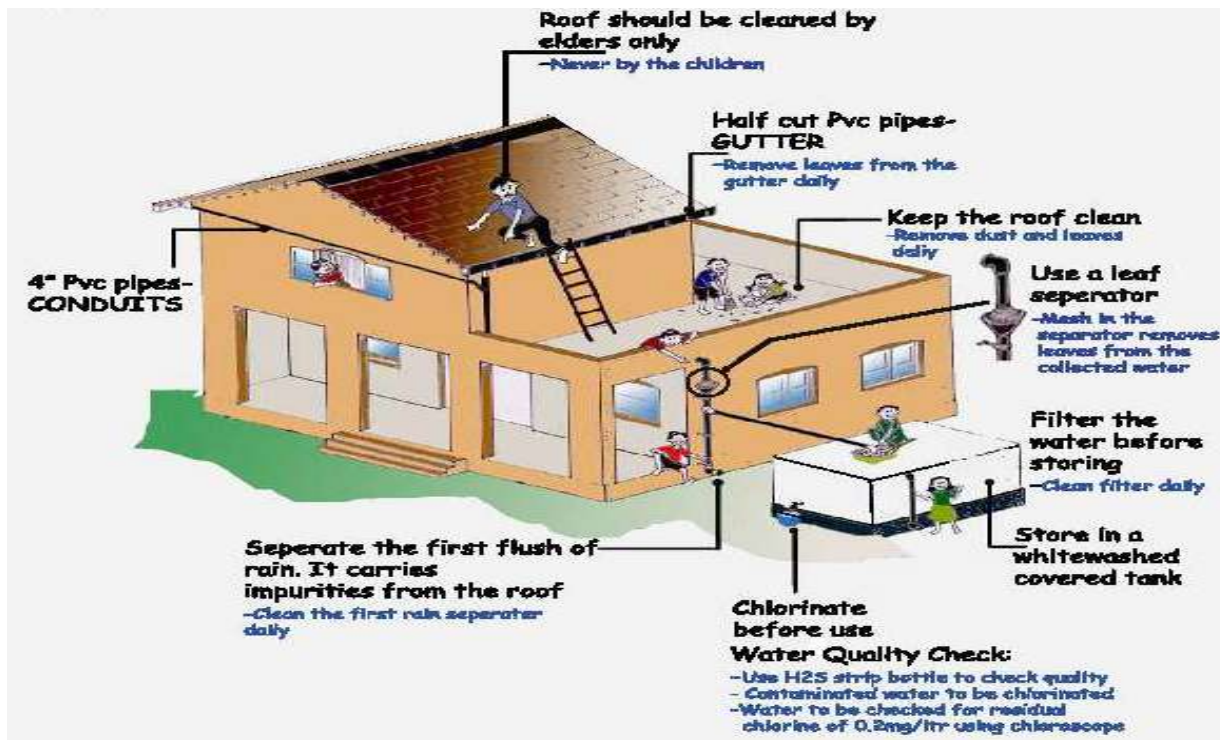
This should be carefully done by an adult (never by children unless it is accessible and safe) equipped with the necessary implements such as a ladder, broom and a brush if necessary.

Some schools will have shady trees to cover the roof. However leaves falling from the roof will cause



blockage in the gutters and pipes. The leaves can also colour the water and cause it to decompose and smell. Therefore, roofs should invariably be completely cleaned of all leaves, dust, bird droppings etc. using a broom. Water should only be used if necessary as most times a dry sweeping with a broom will be enough.

When cleaning the roof with water be careful to keep the first rain separator open so as not to allow the dirt to come into the filter and the tank.



PVC GUTTERS: The gutters of PVC collect the rainwater from the roof and transfer it to the filter. On sloping roofs, PVC gutters can pick up leaves, dust, small twigs and other organic matter. The gutters need to be cleaned regularly at least weekly once. During the rainy season the PVC gutters should be inspected and cleaned daily. The gutters are fixed to the roof or to the walls with clamps. The clamps hold the gutter or pipes to the wall or to the roof firmly and allow small slope in the system to enable water to flow in one direction.



A clean PVC gutter to catch every drop of rain

The clamps sometimes may come off due to various reasons. The clamps should be fixed immediately whenever it is seen to be loose or when it has come off.

At all times the PVC gutters or pipes should slope in the direction of the storage tank and not away from it. The PVC gutters should always have an end cap at the end where rainwater begins to flow in the direction of the tank.

DOWNPIPES: PVC down pipes brings the water from the rainwater gutters or pipes vertically down. They should invariably be clamped firmly to the wall and should never be loosely fixed. Always check that the down pipe is firmly fixed and if necessary replace or tighten the clamp whenever necessary.



End cap for the gutter

FIRST RAIN SEPARATOR: The first rain separator or a washout pipe as it is called, has a valve or an end cap to allow the first little amount of rainwater to be collected separately. This has most of the dust and dirt in it. The first rain separator also is used when the roof is being cleaned or when rainwater is NOT to be collected.



First rain separator with end cap on the wall

It is important to ensure that the first rain separator is always kept in the closed position and never left open. After every rain it should be opened carefully and the waste water allowed to flow out. The pipe should then be cleaned and the valve or the end cap closed.

Sometimes the first rain separator can get jammed due to the dirt or dust in it. In such a situation the valve or the end cap should be carefully replaced by a good plumber.

LEAF TRAP: Where the roof of a school has lots of leaves falling from a tree or trees a conical leaf trap can be placed in the vertical down pipe. This has a mesh on top. The mesh prevents small leaves, twigs and other material from entering the pipe and blocking it or choking the filter. The material collected on the leaf trap if any must be removed at regular intervals and daily during the rainy season.

FILTER: A gravel, sand and 'netlon' mesh filter is designed and placed on top of the storage tank. This filter is very important in keeping the rainwater in the storage tank clean. It removes silt, dust, leaves and other organic matter from entering the storage tank.



A good filter with mesh and gravel on top

The filter media should be cleaned daily after every rainfall event. Clogged filters prevent rainwater from easily entering the storage tank and the filter may overflow. The sand or gravel media should be taken out and washed before it is replaced in the filter.

STORAGE TANK: The rainwater **storage tank** collects all the filtered rainwater and keeps it for future use. The storage tank is made above the ground and on a platform. It can also be an underground sump in some cases.

The tank is invariably painted white on the outside. This is done to keep the water inside cool and prevent the growth of bacteria. Every year the tank must be white washed neatly.



Rainwater storage tank

The tank also will be sealed from the top either with concrete slabs or any local stone. It must be ensured that the top cover is permanent and always fully covered. This will prevent the growth of algae or bacteria in the tank. In no case should it be opened. If there are small cracks in the joints they should be sealed with cement mortar immediately. Mosquitoes and dust should never be allowed in to the stored rainwater tank.

The tank should also be completely water tight. If there is any leak in the tank or even dampness, the problem should be addressed immediately with the help of a trained engineer.

OVERFLOW PIPE: The storage tank will have an overflow pipe from the top of the tank. In case of heavy rain, the overflow pipe will allow the excess rain water to be safely disposed of without causing any flooding. The size of the overflow pipe should be the same as that of the inlet pipe. It will have a mesh at the bottom to prevent rats, squirrels and cockroach from coming in.



Overflow pipe with mesh

The mesh should be checked weekly and if torn or open should be repaired or replaced immediately. It should also be ensured that the overflow water is drained away effectively to a pit, plant or storm water drain and not allowed to cause flooding.

TAP: A tap is provided in every tank to draw the rainwater out. Sometimes a tank can have more than one tap. Invariably it is found that children play with the pipe outlet or the tap and it is damaged. Children should be taught not to stand on the pipe or to play with the tap. A broken tap will result in the entire system going to waste as all the collected rainwater will flow out.



A tap and a drain out pipe firmly anchored to tank

If there is no tap on the tank or if it is broken, no rainwater will be collected in the tank when it rains. Ownership of the system should be created and the taps taken care of and inspected daily.

If there is any leak in the tap, that too should be taken care of by replacing the washer or by getting a good plumber to repair it immediately.

Where the taps are located the area will be cemented to drain out any waste water from the site. This drain out water will be lead into a pit or a plant whichever is available.

WATER QUALITY CHECK: If the roof, the gutter, the first rain separator and the filter is kept clean, the collected rainwater will be crystal clear. This is an indication that good maintenance is being followed.

If the water is however dirty in colour or it smells bad, then it means that the system is not being kept clean.

Even if the water is clear and does not smell still it must be checked for micro-biological contamination. The checking should daily for the first one month and then weekly if the water is clear and not foul smelling. For this one must use a H₂S strip test bottle. Wash your hands thoroughly with soap. With clean hands the sealed bottle should be opened. From the tap in the rainwater storage tank fill the bottle to the mark provided.

Close the cap tightly. Bring the bottle back to a safe place in a room. Observe for 24 to 48 hours. If the water turns black in the bottle then it is micro-biologically contaminated and requires treatment before being used for drinking. If the water colour stays brown, then the water is fit for drinking.



H₂S strip test bottle: If the water turns black in the bottle then it is micro-biologically contaminated.

WATER QUALITY TREATMENT: Though rainwater as it falls from the clouds is very pure, it does pick up dirt, dust and bacteria once it falls on the roof. It is very necessary to therefore check the quality of the water before using it for consumption.

Once it is established that the rainwater is not micro-biologically contaminated it can then be consumed directly. However if the H₂S strip test suggests that water has bacteria in it, it must then be treated before it can be used for drinking.

The method suggested for treating for bacteria is chlorination. Liquid chlorine or chlorine tablets are available for treatment of water. Depending on the volume of the rainwater in the tank, chlorine needs to be added to disinfect the water. Chlorination should be carried out every time there is rain and a fresh infusion of water into the tank.

Using a chloroscope, residual chlorine of 0.20 mg/litre should be established before the water is used for drinking.

Another form of deactivating bacteria and making water fit for consumption is called SODIS – **Solar disinfection** of water. In this method, rainwater is kept in a PET bottle or a glass bottle in the sun for 6 hours. One side of the bottle is painted black.



Solar disinfection or SODIS using a bottle painted half black

The black surface is kept on the ground. With a combination of UV disinfection and infra red heat sterilization the water becomes fit for consumption. In cloudy weather the bottles need to be kept in the sun longer.



Rainwater Harvesting Project at RPVV, Surajmal Vihar, Delhi

BOTTLE PLANTS

Given the stale air circulating in most urban homes, indoor plants have difficulty flourishing unless they're plied with bushloads of TLC. A terrarium (which is a glass container used to grow and display plants) allows us to go slow on the intense personalized attention by creating a growth environment that requires very little care. Closed terrariums, happy in their humidity filled surroundings, actually thrive on neglect. They need nothing from the outside world except a little indirect sunlight. The plants transpire moisture through their leaves, which then condenses on the glass, and flows back to the soil. This 'rain effect' allows the terrarium to go for weeks without watering. Plants like money plant, spider plant, wandering jews, syngonium, cacti and succulents make for great terrarium residents. Exotic plants like ivy and nana can also go into these bottled gardens. But remember, the thumb rule for the selection of the plant is that it should be slow-growing.



Step – 1

First get together all the ingredients, so to speak. You will require an untinted glass bottle, bowl or aquarium tank as well as a glass, stopper or lid to seal the garden (avoid using corks as they absorb water, depriving the plants of moisture); gravel chips, soil, small stones, brick pieces, sand, charcoal and leaf mould or manure. Small rocks, stone figurines and shells do well as accessories.



Step – 2

Line the bottom of the container, that is about one inch or one-fifth of the container, with pea-sized gravel (the kind used in aquariums work well). This ensures that there is ample drainage for water. Place shells or coloured stones before introducing the gravel if you wish to beautify the piece.



Step - 3

Create a thin layer of charcoal (about one - fourth of an inch) above the gravel base. Charcoal purifies the air inside the container. The amount of charcoal you put in depends on the size of the glass container you are using. A small jar will require just two to three small pieces of charcoal whereas a large jar will require anything from five to six big pieces.



Step - 4

Sterilize the soil beforehand by drying it under the sun and weeding out unwanted roots. Mix some compost manure with the soil in equal proportions and fill about one-fifth of the container with this mix. If you want, you can even moisten the soil mix and then bake it for 20 minutes.



Step - 5

Select the plant which is to be grown. Ideally, it should be of non-flowering variety, adaptive to moist atmosphere and have a slow growth rate. Also remember to match the size of the fully grown plant to the size of the container.



Step - 6

Spray water sparingly so as to just wet the soil. Don't water too much. Cover the container with the lid and place it where it can get bright but indirect light. Don't put it under direct sunlight as this will increase the temperature inside the container. If the inside walls of the container (whatever the size) become foggy, remove the lid till the condensed water droplets evaporate. For the final touch, add coloured gravel, shells or marbles.



PAPER RECYCLING

Recycling paper is important for many reasons. Our energy supply and space are not unlimited, so recycling paper increases the sustainability of both these and many other important aspects of our environmental impact.

Resource Conservation

One of the primary reasons to recycle paper is to conserve resources. The primary product used to make paper is wood pulp. Recycling paper reduces the amount of wood pulp needed, and that in turn, reduces the number of trees that are cut down. Trees are a vital part of a balanced ecosystem. Although many paper manufacturers own land specifically for tree farming and replace cut trees with seedlings for future use, tree growth is very slow. Additionally, there is energy used and pollution created by cutting and transporting the trees to the mill.

Landfill Space

Although there is debate regarding whether or not we're running out of landfill space, there's little argument about the main component in our landfills: paper. Every tonne of paper takes more than 3.3 cubic yards of landfill space. According to the Environmental Protection Agency (EPA), forty percent of landfills' content is paper. And the proportion of paper in landfills has remained steady over the decades despite the rise of computers and the Internet. Although paper breaks down much easier than plastics and other forms of waste, it does not decompose very readily when compacting in a landfill.

Incineration Reduction

Besides saving landfill space, when people recycle paper, there's reduced need for trash incineration. Some municipalities burn trash rather than storing it in landfills. By diverting paper out of the trash stream, there is less to burn, so there's less need for incinerators and less ash output and air pollution.

Energy Conservation

Manufacturing paper from recycled paper fiber requires less energy than making paper from virgin wood pulp. In fact, making recycled paper is estimated to use 60 to 70 percent less energy, and the paper industry is the third largest user of energy in the U.S. In addition to saving energy, recycled paper manufacturing uses about 50 percent less water than its virgin counterpart and significantly reduces water pollution in the process as well.

It's Versatile

People should recycle paper because there's a wide range of products that can be created from recycled paper. Although paper fibers cannot be recycled indefinitely, like glass and aluminum, it is possible to recycle paper fibers about six or seven times. Each time paper is recycled, it becomes a lesser grade but is still a useful product. By the end of the fibers' usefulness, they can be made into pressboard, tissue or even insulation.

Reduces Global Warming

In today's world the importance of recycling is becoming greater of a concern both for the general public and also to the economy. Recycling has become a major issue as scientific research has been suggesting for years that the earth is being depleted too fast to sustain a healthy balance. The earth's natural resources are being consumed at a rate that reinforces the idea that we are living for today and

the future generations will be paying for the consequences. Recycling along with reducing consumption is our best means to counter the damage we have been doing to the earth for centuries. The importance of recycling is now held in such a high regard even famous people are taking up the plight. We have to educate the world on the effects of global warming, how we can reduce the causes of global warming. A major part reducing the warming is how we can recycle much of what we use instead of turning it into unusable waste. Recycling is incredibly important as a means to reduce poisonous emissions into the atmosphere and also to spare our natural resources.

The various steps in the process of Paper Recycling are:

STEP 1



Waste paper torn and soaked in water

- *Waste paper is torn into small pieces and kept in a large tub.*
- *They are soaked in water for two hours.*
- *Fenugreek seeds (Methi seeds) can be soaked along with the paper to increase the strength of recycled paper.*

STEP 2

This is an electrically powered mini-beater or a hydrapulper. Pulp is made ready in this hydrapulper for making paper

- The soaked paper is put into the hydrapulper along with soaked fenugreek seeds.
- Water is poured into the hydrapulper.
- The lid is closed.
- It is switched on and run for 20-30 minutes.
- This pulp is well beaten and smooth.
- We can add colours to this pulp and beat it for a few seconds.



STEP 3

This is a univat with a unique deckle and mould frame system.



Univat is filled with water and the deckle and mould frame system is slowly immersed in water.



The paper pulp is transferred to the deckle and mould frame, mixed thoroughly with water and lifted slowly. The quantity of pulp transferred depends on the thickness of the paper required.



STEP 4

A wooden board is placed on a table. A piece of thin cotton wet cloth is neatly spread on the board without any wrinkles.



The frame is carefully lifted and turned over the cloth. At least ten sheets can be stacked on top of each other separated by the thin cotton cloth.



Another wooden board is placed on this stack of sheets and pressed to squeeze out excess water.



STEP 5

This is a manual screw press. It is used to squeeze out water from the recycled paper sheets.



The stack of sheets along with the two wooden boards, one at the top and one at the bottom of the papers is placed in the screw press. It is rotated like a screw till most of the water is squeezed from the paper.



STEP 6

After squeezing out excess water by the screw press, the sheets of papers are separated and dried in the Sun.



The dry paper is peeled out from the cotton cloth the next day and straightened with a calendaring machine or a hot iron.



After this the paper is ready for use or sale.



WEALTH FROM WASTE

Saving paper is saving trees. It takes **17** fully grown trees to make **one tonne of paper**.

If each child saves **one sheet** of paper a day, then **40,000 trees** are saved per year by the students of **Delhi** alone.

Recycling paper is an endeavour not only towards saving precious paper but also towards **saving energy, water, chemicals** utilised in paper making and **reducing garbage**.

Recycling of paper creates widespread awareness in individuals of how they can **save our environment**. Each one of us can turn waste paper and cotton rags into useful and valuable products. At the same time it **eliminates pollution**.

It is the **best gift** we can give to **Mother Earth**.

PRODUCTS MADE FROM RECYCLED PAPER



Paper Bags



Pencil Stand and Gift Box



File Covers



Lamp Shade



Paper Flowers



Photo Frame



Slip Pad Box

ANNEXURES

DEPARTMENT OF ENVIRONMENT, GOVT. OF NCT OF DELHI,

6th, Level C-Wing, Delhi Secretariat, I.P.Estate, New Delhi-02

Tele Ph. no. 23392032

E-mail: ecoclub_delhigovt@yahoo.com.

F.9 (3)/Ec/Env/2012-13/

Dated:-29-8-12

Dear Principal,

It is suggested that you may take up the following actions to ensure proper utilization of grant.

1. Plantation/Greening Drive: Plantation in the campus and nearby areas. (Free saplings available in the 14 nurseries of the Forest Department) a r e
2. Conservation of water through Rainwater harvesting.
3. Action Oriented programme by different NGO's namely:
 - a) **Deeksha**- Herbal Garden, Mr. Tripat Parmar(011- 26912358, 46584340)
 - b) **Development Alternative** – For paper Recycling Machine, Samir Gera ()
 - c) **Nature Foundation** –For saving of sparrow houses, Mr. Rakesh Khatri(011- 32326909)
 - d) **Indian Pollution Control Association(IPCA)**- For Tendrella or Garbyhog project, Mr. Ashish Jain (011- 42207478)
 - e) **National Center of Fungal Taxonomy** – For Mushrooms Cultivation, Dr.P.N. Chowdhary (011- 25836498)
 - f) **Society for Environment & Development** –For Vermicomposting, Dr. Lalit Mohan (011- 22479505)
 - g) **Centre for Science and Environment**- For Green House programme, Ms.Sunita Narain(011- 29955124)
 - h) **Chintan**-For Waste Picker, Ms.Bharti Chaturvedi(011-46574171/2)
4. Promotion of the various campaigns of Department of Environment namely:-
 - a) Say No to Crackers.
 - b) Anti-Littering and Anti-Plastic Bags.
 - c) Clean Yamuna.
 - d) Khelo Holi Naturally.
 - e) Visit to Asola Wildlife Sanctuary (26042010)
 - f) Visit to Yamuna Biodiversity Park (27616569)
 - g) Visit to Nature Trail at CM house & Rashtrapati Bhawan.
 - h) Aravali Bio Diversity Park, Mr.Hasan (65422990)
 - i) Activity of Wildlife Society of the college.
 - j) Visit to Garhi Mandu Forest area
 - k) Visit to Bhatti mines
5. Taking up any other fun activity related to Environment.

Kindly acknowledge receipt of the same in the enclosed format. Also you are requested to send an utilization certificate (GFR-19A) along with the activities carried out by end of the current financial year i.e. March, 2012.

Yours Sincerely
(Dr. B. C. Sabata)
Sr. Scientific Officer (Env.)

Eco-Club Grant 2012-13

DEPARTMENT OF ENVIRONMENT , GOVT. OF NATIONAL CAPITAL TERRITORY OF DELHI
6Th Level, C – Wing, Delhi Secretariat , I P Estate, New Delhi 110002

Phone: 23392032 , Fax : 23392029

Email : ecoclub_delhigovt@yahoo.com Web:<http://www.environment.delhigovt.nic.in>

To

Dr. B.C. Sabata

Senior Scientific Officer

1	School I D provided by Education Dept. GNCT of Delhi	:	
2	Name of the School/College/Institution	:	
3	Address / Phone / Fax	:	
4	Name of the Principal/Director/V P/H M	:	
5	Email of the School/College/Institution		
6	Education District and Zone (Schools only)	:	
7	Member of Eco-Club since	:	
8	Whether Annual Report/Utilization Certificate submitted for 2011 – 12	:	
9	Name of the Eco-Club In-charge with Ph. (Mob. & Off) & email	:	
PARTICULARS OF BANK ACCOUNT FOR ECS			
1)	Name of the A /c holder	:	
2)	a) Bank Name & Address b) Account No./Acc.Type	:	
3)	RTGS / NIFT Code	:	
4)	9 digit code (MICR)	:	
5)	Copy of cancelled cheque may be attached	:	

PRE-RECEIPT

Received Rs. 20,000/- (Rupee Twenty Thousand only) as a token grant for Eco-Club during 2012-13 from the Department of Environment, Govt. of NCT of Delhi. Also, certify that the grant received during 2011-12 has been fully utilized.

Signature of the Principal / Head of the Institution with seal

Date:

FORMS
GFR 19-A
[See rule 212 (1)]

**Form of Utilization Certificate
(ECO-Club Grant of Rs. 20000/-)**

S.No.	Letter No. and date	Amount
1.	F.9(1)/Eco/Env/11-12/	20000/-
	Total	20000/-

Certified that out of Rs. 20000/- of grants-in-aid sanctioned during the year 11-12 in favour of _____ School under this Ministry/Department Letter No. given in the margin and Rs. _____ on account of unspent balance of the previous year, a sum of Rs. 20000/- has been utilized for the purpose of Eco-Club activities for which it was sanctioned and that the balance of Rs. _____ remaining unutilized at the end of the year has been surrendered to Government (vide No. _____ dated _____) will be adjusted towards the grants-in-aid payable during the next year _____

2. Certified that I have satisfied myself that the conditions on which the grants-in-aid was sanctioned have been duly fulfilled/are being fulfilled and that I have exercised the following checks to see that the money was actually utilized for the purpose for the purpose for which it was sanctioned.

Signature of the Principal

Date _____

Department of Environment, Government of NCT of Delhi
Level 6, C – Wing, Delhi Secretariat, I.P. Estate,
New Delhi – 110002
Tele: 23392032
Email: ecoclub_delhigovt@yahoo.com

F.9/Ec/Env/2012-13/2331

Dated: 25/6/12

To,
The Principal,

Dear Sir/Madam,

As you are aware, the Department of Environment, Govt. of NCT of Delhi has a plan scheme called Eco-Clubs in schools and colleges of Delhi to sensitize the students on environmental issues. Under the scheme, Department of Environment provides an annual grant of Rs.10, 000/-to each school & college for every year. It gives me immense pleasure to inform you that the Govt. of NCT of Delhi has increased the grant from Rs.10, 000/- to Rs.20, 000/- from this current financial year i.e., 2012-13.

Please find attached herewith the format, which may be dully filled and submitted within 31st July, 2012 so that the grant can be released as soon as possible. The undersigned may be contacted for further details.

Yours Sincerely,


(Dr. B.C. Sabata)
Sr. Sci. Officer

Encl-

1. Eco-club Format